электронное периодическое издание

ЭКОНОМИКА и социум

ISSN 2225-1545

№12(139)-2025



ЭЛЕКТРОННОЕ НАУЧНО-ПРАКТИЧЕСКОЕ
ПЕРИОДИЧЕСКОЕ ИЗДАНИЕ

«Экономика и социум»

iupr.ru

ISSN 2225-1545

УДК 004.02:004.5:004.9

Регистрационный номер
средства массовой коммуникации

ББК 73+65.9+60.5

Эл № ФС77 - 80454 от 01 марта 2021г.

Журнал включен в систему НЭБ (e-library) № 594-09/2013 от 26.09.2013

Тематика журнала: актуальные вопросы современной экономики и социологии - от теоретических и экспериментальных исследований до непосредственных результатов управленческой и производственной деятельности. Публикации в журнале учитываются как опубликованные работы при защите диссертаций на соискание ученых степеней России и зарубежья.

РАЗДЕЛЫ НОМЕРА:

- Основной раздел: социально-экономические аспекты развития современного государства;
- Современные технологии управления организацией;
- Актуальные вопросы политики и права;
- Современные науки и образование;
- Информационные и коммуникативные технологии;
- Здравоохранение в обществе.

Выпуск №12(139)-2 (декабрь, 2025). Сайт: http://www.iupr.ru

© Институт управления и социально-экономического развития, 2025

Редакционный совет:
Абдувалиев А.А., доктор философии по экономическим наукам (PhD),
Абдуллаев А.Г., доктор философии (PhD) по географическим наукам,
Абдуллаев С.И., кандидат географических наук, доцент,
Абдуллаева Х.Р., доктор сельскохозяйственных наук (DSc), профессор,
Абдулхаликова Н.Р., кандидат физико-математических наук, доцент,
Абдуллаев А.К., доктор педагогическим наук (DSc), доцент,
Абдуллаев У.М., доктор философии по техническим наукам (PhD),
Абдухамидов И.А., доктор философии (PhD) по историческим наукам,
Абдумаликов У.З., доктор философии в сельскохозяйственных науках (PhD),
Абдумуминова Б.О., доктор философии по географическим наукам (PhD),
Абдуназаров Х. М., кандидат географических наук, доцент,
Абдурахманов И.А., доктор сельскохозяйственных наук,
Абдурахимова А.Р., доктор философии по сельскохозяйственным наукам (PhD),
Абидов А.А., кандидат технических наук, доктор экономических наук, профессор,
Азизова Ф. С., доктор философии по педагогическим наукам (PhD), доцент,
Айнакулов М.А., кандидат экономических наук, профессор,
Аймуратов У.Д., кандидат сельскохозяйственных наук (PhD),
Алланов К.А., кандидат географических наук, доцент,
Аллаяров С.К., доктор философии по биологическим наукам (PhD),
Алимов Ш.К., доктор исторических наук,
Арзикулов З.О., кандидат физико-математических наук (PhD),
Арипов М.М., кандидат технических наук, доцент,
Арифходжаева И.Х., кандидат психологический наук,
Аскаров И.Б., доктор педагогических наук (DSc), профессор,
Ахмадалиева У.К., кандидат медицинских наук, доцент,
Ахмеджонов Д.Г., доктор технических наук, профессор,
Ахмедов А., кандидат физико-математических наук,
Ахмедов А.М., доктор философии по педагогическим наукам (PhD),
Ахмедов Ж.Д., кандидат технических наук, доцент,
Ахмедов А.У., доктор философии по техническим наукам (PhD),
Байзаков Ж.А., доктор философии по филологическим наукам,
Балтаева И. Т., доктор филологических наук, профессор,
Балташев Ж.М., доктор экономических наук (PhD),
Бахриддинов В.А., доктор философии по экономическим наукам (PhD), доцент,
Бегматов А. М., кандидат биологических наук, доцент,
Бобоназарова Г.Т., доктор философии по педагогическим наукам (PhD),
Бозарова Ф.Г., доктор философских наук, доцент,
Валиева М.Ю., доктор философии по медицинским наукам (PhD),
Вафоева Д.И., доктор философии по экономическим наукам (PhD),
Ганиева Г.И., доктор философии биологическим наукам (PhD),
Гапаров К.Г., доктор философии по техническим наукам,
Ганиев Ш.Р., доктор философии по географическим наукам (PhD),
Гафуров А.М., доктор философии по техническим наукам (PhD),
Гилижова А.М., доктор философии по педагогическим наукам (PhD), профессор,
Гопиров М.О., доктор философии по географическим наукам (PhD),
Гулимматов И.Б., доктор философии по географии (PhD),

Данабаев А.Б., кандидат сельскохозяйственных наук,
Дусмуратов М.Б., доктор философии по педагогическим наукам (PhD), доцент,
Екабсонс А.В., доктор философии по филологическим наукам (PhD), доцент,
Ергашев А.Х., доктор философии по филологическим наукам (PhD),
Жабборов Т.К., кандидат технических наук, доцент,
Жураев В.М., доктор философии по психологическим наукам (PhD), доцент,
Жураев С.А., доктор политических наук, профессор,
Жураев М.М., доктор философии по педагогическим наукам (PhD), доцент,
Зарайский А.А., доктор филологических наук, профессор,
Ибайдуллаев Т. Г., доктор философии (PhD), доцент,
Ибрагимов А.А., доктор философии (PhD) по техническим наукам,
Икрамова М.Х., доктор философии по педагогическим наукам (PhD)
Икромов М.-А. Х., доктор философии по педагогическим наукам,
Исакова Г.Н., доктор филологических наук (DSc), доцент,
Исмаилова Н.Я., доктор философии экономических наук (PhD), доцент,
Ишанкулов З.М., доктор философии по сельскохозяйственным наукам, доцент,
Кадирова Д.Н., кандидат биологических наук, доцент,
Калабаев С.Б., доктор философии по географическим наукам (PhD),
Қаландаров У. С., доктор философии (PhD) по географическим наукам,
Калимбетов Х.К., доктор экономических наук, доцент,
Камалов А.Ф. - Доктор философии по педагогическим наукам (PhD), доцент,
Камолов Б.Б., доктор философии по медицинским наукам (PhD), доцент,
Каниязова Ж.О., доктор филологических наук (DSc), доцент,
Касимов Н.К., кандидат филологических наук, профессор,
Киргизбаев Ф.Д., доктор философии (PhD) по сельскохозяйственным наукам,
Кобилов А.У., кандидат экономических наук, доцент,
Кобилова Ш.Х. доктор философии по педагогическим наукам (PhD),
Кодиров Б.Х., доктор философии по техническим наукам (PhD),
Кодиров Р.Н., доктор философии по сельскохозяйственным наукам (PhD), доцент,
Кораев С.Б., доктор педагогических наук (DSc), профессор,
Кочкаров Б.У., доктор философии по техническим наукам (PhD),
Косимов А.А., доктор философии (PhD) по сельскохозяйственным наукам, доцент,
Кудияров К.Р., доктор философии по экономическим наукам (PhD), доцент,
Кузибоев Ш.Ш., доктор философии (PhD) по техническим наукам,
Кукиев Б.Б., доктор философии по педагогическим наукам, доцент,
Кулматов К. А., доктор философии по техническим наукам (PhD),
Курбонов П.Р., кандидат географических наук, доцент,
Кутлимуратов Н. М., доктор философии по химическим наукам (PhD),
Латипов Н., доктор философии по географическим наукам (PhD),
Мадрахимов Д.У., кандидат технических наук (PhD),
Маллаев Р.К., доктор философии по педагогическим наукам (PhD), доцент,
Маматов Х.А., доктор философии по техническим наукам,
Мамашарипов А.А., доктор философии по техническим наукам,
Маматов Ш.К., кандидат физико-математика наук,
Маматов Х.А., доктор философии по техническим наукам,
Марасулова З.А., доктор философии по педагогическим наукам (PhD), доцент,
Марданова Г.Д., доктор философии по биологическим наукам (PhD),

Марозиков А.А., доктор философии по историческим наукам (PhD), доцент,
Махаммаджонов Т.А., доктор философии по педагогическим наукам (PhD),
Махмудов О.Х., доктор экономических наук, профессор,
Матчанов М.Ж., доктор географических наук, доцент,
Махсудов О.М., доктор философии по медицинским наукам (PhD),
Мамаражабов О.Э., Доктор философии по педагогическим наукам (PhD),
Машарипов Ф.Т., доктор педагогических наук (DSc), профессор,
Машрапов А. Т., доктор философии по сельскохозяйственным наукам (PhD),
Мирзаева С.А., кандидат сельскохозяйственных наук, доцент,
Мирзажанов М.А., кандидат технических наук, доцент,
Муминов У.М., доктор философии по техническим наукам, доцент,
Муминов О.А., доктор философии по техническим наукам (PhD),
Мусаев Б.Б., доктор педагогических наук (DSc), профессор,
Мухаммадиева О.М., кандидат философских наук, доцент,
Мухитдинова К.О., доктор философских наук по медицине (PhD),
Матякубов К.К., доктор философии по педагогическим наукам (PhD),
Наджмитдинов О.Б., доктор медицинских наук (DSc),
Назаров А.А., доктор технических наук, профессор,
Нигматов У.Ж., доктор философии по техническим наукам (PhD),
Норкузиева Д.Ш., доктор философии по психологическим наукам (PhD),
Нуридинов Т.К., доктор философии по историческим наукам (PhD), доцент,
Нуриев К.К., доктор технических наук, профессор,
Олимов Ж.Б., доктор философии по историческим наукам (PhD),
Олимова А.А., доктор философии по педагогическим наукам (PhD),
Омонов Ш.Б., кандидат технических наук,
Омонов М.И., доктор биологических наук, доцент, профессор,
Омонтурдиев А.М., доктор философии по географии (PhD),
Отажонов О.А., доктор философии по техническим наукам (PhD),
Охунжонов З.Н., доктор философии по техническим наукам (PhD),
Очилова Х.М. - доктор философии по педагогическим наукам. доцент,
Постюшков А.В., доктор экономических наук, профессор,
Пулатов А.А., доктор философии по сельскохозяйственным наукам (PhD),
Ражабова И.Т., доктор философии по филологическим наукам (PhD),
Расулова Г.А., доктор философии по педагогическим наукам (PhD), доцент,
Рафиков В.А., кандидат технических наук, доктор географических наук, профессор,
Рахимов С.М., доктор философии по педагогическим наукам (PhD),
Рахимов И.А., доктор философии (PhD) по политическим наукам,
Рахимов А.Д., доктор философии (PhD) по сельскохозяйственным наукам, доцент,
Рахматов О., доктор технических наук, профессор,
Рахматов Ф.О., доктор философии (PhD) по техническим наукам,
Рахмонов Х.Т., доктор философии по техническим наукам (PhD), доцент,
Рашидов Ж.Х., кандидат экономический наук, доцент,
Рустамова М.М., доктор философии по техническим наукам (PhD),
Сабитов А.У., кандидат технических наук,
Саидусманов Б.А., доктор философии по историческим наукам
Сайёра А.З., кандидат технических наук, доцент,

Салиева Д.А., кандидат психологических наук, профессор,
Салимжонов Ж.Х., доктор философии (PhD) по техническим наукам,
Саттаров А.У., кандидат географических наук, доцент,
Саттаров О.Х., доктор философии по медицинским наукам (PhD),
Сиддиков И.М., кандидат технических наук, доцент,
Смирнова Т.В., доктор социологических наук, профессор,
Собирова Л.Х., доктор философии по педагогическим наукам (PhD),
Суллиева С.Х., кандидат сельскохозяйственных наук, доцент,
Султанов Х.Э.. доктор философии по педагогическим наукам (PhD), профессор,
Султанова С.М., кандидат экономических наук, PhD, профессор,
Тангиров Х.Т., кандидат биологических наук, доцент,
Тангирова Н.Х., доктор философии по биологическим наукам (PhD),
Тешабаев Ш.А., доктор философии по сельскохозяйственным наукам (PhD), доцент,
Тилакова М.А., доктор философии по педагогическим наукам (PhD),
Тожибоев Ш.И., доктор философии по техническим наукам (PhD),
Тохиров И.Х., доктор философии по техническим наукам (PhD,
Туйчиев Ж. Ш., кандидат сельскохозяйственных наук, доцент,
Туланова Н.М., кандидат филологических наук,
Тураев К.Т., кандидат географических наук,
Тураева Н.О., доктор философии по экономическим наукам (PhD),
Тургунова Г.Б., доктор философии сельскохозяйственных наук,
Турдиалиева М.М., доктор философии (PhD) по техническим наукам,
Турдикулов Т.Т., кандидат сельскохозяйственных наук, доцент,
Турдикулов О.Т., кандидат исторических наук,
Турматов Д.Р., доктор философии (PhD) по педагогическим наукам, доцент,
Тягунова Л.А., кандидат философских наук, доцент,
Узакбаев К.К., доктор философии по географическим наукам (PhD),
Умаров Б. С., доктор философии по химическим наукам (PhD),
Умаров О.С., кандидат экономических наук, доцент,
Умарова Г.А., доктор педагогических наук, профессор,
Умидова Ф.И., доктор философии по экономическим наукам (PhD),
Уразматов Н.Н., доктор философии по сельскохозяйственным наукм (PhD),
Усманова Д.Д., доктор медицинский наук, доцент,
Усманова М.Н., кандидат экономических наук, профессор,
Файзиев Э.А., доктор философии по географическим наукам (PhD),
Фазилов Ф.М., доктор философии по юридическим наукам (PhD), доцент,
Федорова Ю.В., доктор экономических наук, профессор,
Фозилов А.С., доктор философии по географическим наукам (PhD),
Ҳакимов А.М., кандидат технических наук,
Хакимов А.Х., кандидат технических наук, доцент,
Хакимова Ё.Т., доктор философии по педагогическим наукам,
Хамдамова Х.Ш., доктор филологических наук(PhD),
Хаметов З.М., доктор технических наук (DSc), доцент,
Хамидов Д.А., доктор философии по медицинским наукам (PhD), доцент,
Хасанов Ж.Ю., доктор философии по географическим наукам (PhD),
Хидирова Б.И., доктор философии по экономическим наукам (PhD),

Хидоятова З.Ш., кандидат биологических наук,
Холдарова Д.Э.,д октор философии в области сельскохозяйственных наук. (PhD), доцент,
Холмурзаев А.А., кандидат технических наук, доцент,
Холмуродов А.Ш., доктор педагогических наук (DSc), доцент,
Хомидов И.И., кандидат химических наук, доцент,
Хурматов Й.Э., доктор философии по сельскохозяйственным наукам (PhD),
Хусанбоев А. М., кандидат технических наук, доцент,
Хусанов Ю.Ю., доктор технических наук, доцент,
Чориев С.Х., доктор философии по биологическим наукам (PhD),
Шарипов А.Э., доктор философии по биологическим наукам (PhD),
Шерматов М.Н.,доктор философии по педагогическим наукам (PhD),
Шерипбаев Н.С., доктор философии по сельскохозяйственным наукам (PhD),
Ширинов Ф.Ш., доктор философии в педагогических науках (PhD), доцент,
Эргашев И.О., доктор философии по техническим наукам (PhD),
Эрданов М.Н., кандидат географических наук,
Эрназаров А.Н., доктор философии по педагогическим наукам (PhD),
Эсанов А.А., кандидат технических наук (PhD),
Эсанов Н.А., доктор философии по географическим наукам (PhD),
Эсанова Ш.М., доктор философии по техническим наукам (PhD), доцент,
Эшонкулов Д.Т., кандидат экономических наук,
Юлдашев Х.Х., доктор философии по химическим наукам (PhD),
Юнусов З.М., доктор философии по военным наукам (PhD), доцент,
Юсупов А.Р., кандидат технических наук,
Якубова М.Ю., доктор философии по педагогическим наукам (PhD),
Ярашев К.С., доктор географических наук (DSc), доцент.

Отв. ред. А.А. Зарайский
Главный редактор: Тягунова Людмила Анатольевна, кандидат философских наук

Abdiholiqova G. A.
tayanch doktoranti
Qarshi davlat universiteti
Erdonov L. N.
geografiya kafedrasi o'qituvchisi
Qarshi davlat universiteti
O'zbekiston

QASHQADARYO VILOYATI SANOATINI INNOVATSION RIVOJLANTIRISHNING KOMPLEKS METODOLOGIYASI

Annotatsiya. *Maqolada Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning kompleks metodologik asoslari ilmiy jihatdan tadqiq etilgan. Tadqiqot jarayonida hududiy sanoat rivojlanishining iqtisodiy geografik xususiyatlari, ishlab chiqarish tarkibining transformatsiyasi hamda innovatsion omillarning sanoat samaradorligiga ta'siri tizimli yondashuv asosida tahlil qilingan. Matematik modellashtirish, prognozlash va statistik tahlil usullaridan foydalangan holda sanoat ishlab chiqarishining uzoq muddatli rivojlanish istiqbollari baholanib, investitsion faollik, klasterlashuv va innovatsion texnologiyalarni joriy etish bosqichlari asoslab berilgan.*

Kalit so'zlar: *Qashqadaryo viloyati, sanoat rivoji, innovatsion rivojlanish, kompleks metodologiya, hududiy iqtisodiyot, klasterlashuv, matematik modellashtirish, prognozlash, sanoat infratuzilmasi, barqaror rivojlanish.*

Abdiholiqova G. A.
PhD student
Karshi State University
Erdonov L. N.
lecturer
department of geography
Karshi State University
Uzbekistan

COMPLEX METHODOLOGY OF INNOVATIVE DEVELOPMENT OF INDUSTRY IN KASHKADARYA REGION

Abstract. *The article scientifically studies the complex methodological foundations of innovative development of industry in the Kashkadarya region. In the course of the research, the economic geographical features of regional industrial development, the transformation of the production structure, and the impact of innovative factors on industrial efficiency were analyzed based on a systematic approach. Using mathematical modeling, forecasting, and statistical analysis methods, the long-term development prospects of industrial production*

were assessed, and the stages of investment activity, clustering, and the introduction of innovative technologies were justified.

Keywords: *Kashkadarya region, industrial development, innovative development, complex methodology, regional economy, clustering, mathematical modeling, forecasting, industrial infrastructure, sustainable development.*

Kirish

Hozirgi globallashuv va raqobat kuchayib borayotgan sharoitda sanoat tarmoqlarining innovatsion rivojlanishi hududiy iqtisodiyot barqarorligini ta’minlashning asosiy omillaridan biri hisoblanadi. Jahon tajribasi shuni ko‘rsatadiki, sanoatni modernizatsiya qilish, yuqori texnologiyali ishlab chiqarishni kengaytirish va ilmiy-texnik yutuqlarni amaliyotga joriy etish hududlar iqtisodiy salohiyatining oshishiga, ishlab chiqarish samaradorligi va raqobatbardoshligining kuchayishiga xizmat qiladi. Shu jihatdan, sanoat rivojlanishini faqat alohida tarmoqlar kesimida emas, balki hududiy, tizimli va kompleks yondashuv asosida o‘rganish dolzarb ilmiy-amaliy masala sifatida namoyon bo‘lmoqda.

Qashqadaryo viloyati iqtisodiyotida sanoat yetakchi tarmoqlardan biri bo‘lib, uning innovatsion rivojlanishi hududning ijtimoiy-iqtisodiy taraqqiyotida muhim ahamiyat kasb etadi. Viloyatning tabiiy-resurs salohiyati, mehnat resurslari va ishlab chiqarish infratuzilmasi sanoatni innovatsion rivojlantirish uchun qulay sharoit yaratadi, biroq ushbu imkoniyatlardan samarali foydalanish ilmiy asoslangan kompleks metodologiyani talab etadi. Shu munosabat bilan, mazkur maqolada Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning kompleks metodologik yondashuvlarini ishlab chiqish, matematik modellashtirish va prognozlash usullari asosida rivojlanish istiqbollarini baholash hamda hududiy sanoat siyosatini takomillashtirishga qaratilgan ilmiy xulosalar bayon etiladi.

Asosiy qism

Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning metodologik asoslarini shakllantirishda, eng avvalo, hududning iqtisodiy geografik xususiyatlarini chuqur tahlil qilish muhim ahamiyat kasb etadi. Viloyatning tabiiy-resurs salohiyati, ishlab chiqarishning hududiy joylashuvi, mehnat resurslari tarkibi va transport-logistika infratuzilmasi sanoat tarmoqlarining shakllanishi va rivojlanishiga bevosita ta’sir ko‘rsatadi. Shu nuqtai nazardan, sanoatni innovatsion rivojlantirish jarayonida hududiy ixtisoslashuvni hisobga olgan holda ishlab chiqarish tarmoqlarini joylashtirish, resurslardan samarali foydalanish hamda iqtisodiy makonning ichki aloqadorligini kuchaytirish zarurati yuzaga keladi.

Sanoat ishlab chiqarish tarkibining transformatsiyasi Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning muhim yo‘nalishlaridan biri hisoblanadi. An’anaviy xomashyo yo‘naltirilgan tarmoqlardan yuqori qo‘shilgan qiymatga ega, qayta ishlash va texnologik jihatdan murakkab ishlab chiqarishlarga bosqichma-bosqich o‘tish sanoat samaradorligini oshirishga xizmat qiladi. Ushbu jarayonda sanoat klasterlarini shakllantirish, korxonalar o‘rtasida kooperatsiya va integratsiyani rivojlantirish, shuningdek, ilmiy-tadqiqot muassasalari bilan ishlab

chiqarish subyektlari o‘rtasidagi hamkorlikni kuchaytirish innovatsion muhitni shakllantirishning asosiy omillari sifatida namoyon bo‘ladi.

Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning kompleks metodologiyasida matematik modellashtirish va prognozlash usullaridan foydalanish muhim ilmiy-amaliy ahamiyatga ega. Ushbu usullar yordamida sanoat ishlab chiqarishining dinamikasi, rivojlanish bosqichlari va istiqbollari miqdoriy jihatdan baholanadi hamda turli ssenariylar asosida strategik qarorlar qabul qilish imkoniyati yaratiladi. Statistik tahlil, trend modellari va ko‘rsatkichlar o‘rtasidagi o‘zaro bog‘liqlikni aniqlash orqali hududiy sanoat siyosatini takomillashtirish, investitsion ustuvor yo‘nalishlarni belgilash va innovatsion rivojlanishni ta’minlashga qaratilgan ilmiy xulosalar ishlab chiqiladi.

Tadqiqot jarayonida Qashqadaryo viloyati sanoatini rivojlantirishga oid an’anaviy iqtisodiy va iqtisodiy geografik yondashuvlarning cheklangan jihatlari aniqlanib, ularni innovatsion rivojlanish paradigmasi bilan uyg‘unlashtirish zarurati ilmiy jihatdan asoslandi. Xususan, sanoatni faqat ishlab chiqarish hajmlari yoki tarmoq tarkibi asosida baholash hududiy rivojlanishning ichki mexanizmlarini to‘liq ochib bera olmasligi aniqlanib, kompleks yondashuv asosida takomillashtirilgan metodologiya ishlab chiqildi.

Metodologiyaning muhim yangiligi shundaki, unda matematik modellashtirish va prognozlash usullari iqtisodiy geografik tahlil bilan integratsiyalashgan. Sanoat mahsuloti ishlab chiqarish hajmlarining uzoq muddatli prognozlari hududiy innovatsion salohiyat, investitsion faollik va tarmoq ixtisoslashuvi bilan uzviy bog‘liq holda ishlab chiqildi. Bu yondashuv viloyat sanoatini rivojlantirish strategiyalarini ilmiy asosda rejalashtirish imkonini berdi.

Mazkur metodologiya hududiy sanoat rivojlanishini baholashda makro (viloyat), mezo (tuman va shaharlar) va mikro (alohida sanoat subyektlari) darajalarni o‘zaro bog‘liq holda tahlil qilish imkonini berdi. Bu yondashuv hududlararo sanoat rivojlanishidagi tafovutlarni aniqlash va ularni innovatsiyalar orqali yumshatish mexanizmlarini ishlab chiqishga xizmat qildi.

Mazkur kompleks metodologik model Qashqadaryo viloyati sanoatini innovatsion rivojlantirishni tizimli va ko‘p omilli yondashuv asosida tashkil etishga xizmat qiladi. Modelning tabiiy-resurs bloki hududning mineral xom ashyo, energetika va suv resurslari salohiyatini baholash orqali sanoat tarmoqlarining joylashuvi va ixtisoslashuvini belgilashda asosiy omil sifatida namoyon bo‘ladi, iqtisodiy-geografik blok esa transport va logistika imkoniyatlari, bozorlar yaqinligi hamda hududiy joylashuvni hisobga olib, sanoat ishlab chiqarishining hududiy samaradorligi va raqobatbardoshligini oshirishga yo‘naltiriladi. Ushbu bloklar o‘zaro uzviy bog‘langan holda sanoat rivojlanishining hududiy makonini shakllantirib, resurslardan samarali foydalanish va ishlab chiqarish xarajatlarini optimallashtirish imkonini yaratadi.

Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning kompleks metodologik modeli

Metodologik blok	Asosiy mazmuni	Baholash mezonlari	Hududiy rivojlanishga ta’siri
Tabiiy-resurs bloki	Mineral xom ashyo, energetika va suv resurslari salohiyati	Resurslar zaxirasi, foydalanish darajasi	Sanoat joylashuvi va tarmoq ixtisoslashuvini belgilaydi
Iqtisodiy geografik blok	Transport, logistika, hududiy joylashuv	Transport xarajatlari, bozor yaqinligi	Hududiy raqobatbardoshlikni oshiradi
Innovatsion blok	Texnologiyalar, ITTKI, innovatsiyalar joriy etilishi	Texnologik daraja, innovatsion faollik	Yuqori qo‘shilgan qiymatli sanoatni shakllantiradi
Hududiy-tarkibiy blok	Klasterlar va kichik sanoat zonalari	Kooperatsiya darajasi, ixtisoslashuv	Hududiy sanoat integratsiyasini kuchaytiradi
Ekologik blok	Atrof-muhitga ta’sir va barqarorlik	Ekologik sig‘im, resurs tejamkorlik	Barqaror sanoat rivojlanishini ta’minlaydi
Prognoz va modellashtirish bloki	Uzoq muddatli sanoat prognozlari	O‘sish sur’atlari, investitsiya hajmi	Strategik rejalashtirishni ilmiy asoslaydi

Modelning innovatsion, hududiy-tarkibiy va ekologik bloklari sanoatni sifat jihatdan yangi bosqichga olib chiqishga qaratilgan bo‘lib, texnologiyalarni joriy etish, klasterlar va kichik sanoat zonalarini rivojlantirish hamda ekologik barqarorlikni ta’minlash orqali yuqori qo‘shilgan qiymatga ega ishlab chiqarishlarni shakllantirishni nazarda tutadi. Prognoz va modellashtirish bloki esa sanoat rivojlanishining uzoq muddatli istiqbollarini ilmiy asosda baholash, o‘sish sur’atlari va investitsion yo‘nalishlarni aniqlash orqali strategik rejalashtirishni takomillashtiradi. Natijada mazkur kompleks metodologik model hududiy sanoat integratsiyasini kuchaytirish, barqaror iqtisodiy o‘sishni ta’minlash va Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning ilmiy asoslangan mexanizmini yaratishga xizmat qiladi.

Xulosa

Tadqiqot natijalari Qashqadaryo viloyati sanoatini innovatsion rivojlantirish jarayonini baholashda an’anaviy yondashuvlar bilan cheklanib qolish hududiy sanoat tizimining murakkab va ko‘p omilli xususiyatlarini to‘liq ochib bera olmasligini ko‘rsatdi. Shu bois, maqolada taklif etilgan kompleks metodologiya hududiy sanoat rivojlanishini tabiiy-resurs, iqtisodiy geografik, innovatsion, hududiy-tarkibiy, ekologik hamda prognoz va modellashtirish bloklari asosida tizimli ravishda tahlil qilish imkonini berib, sanoat rivojlanishining ichki mexanizmlari va hududiy nomutanosibliklarini aniqlashda yuqori ilmiy samaradorlikka ega ekanligi bilan ajralib turadi. Ushbu yondashuv sanoat

tarmoqlarining hududiy joylashuvi, ixtisoslashuvi va o‘zaro integratsiyasini ilmiy asosda baholashga xizmat qiladi.

Foydalanilgan adabiyotlar:

1. Abdullaev, Z. R. (2020). O‘zbekistonning sanoat rivojlanishi va hududiy taqsimoti. Toshkent: Fan va texnologiya nashriyoti.
2. Erdonov L.N., Mamatova S.A. O’zbekistonda muqobil energiya manbalaridan foydalanish istiqbollari // "Экономика и социум" №7(134)-2 2025 С. 99-102
3. I.S.Bekmurodova. Qashqadaryo mintaqasini innovatsion rivojlantirishning hozirgi holati tahlili. Science and education inagriculture agrar-iqtisodiy, ilmiy amaliy jurnal. №10, 2024 October. Andijon, 2024 yil.95–96 b. (08.00.00; OAK yangi tahrir).
4. Mirzajonov, Sh.R. "O‘zbekiston sanoati hududiy tashkiloti va rivojlanish strategiyasi." Iqtisodiyot va Innovatsion Texnologiyalar Jurnali, 2022.
5. Qosimov, A. (2021). Qashqadaryo viloyati sanoatining hududiy tahlili va iqtisodiy integratsiyasi. Toshkent: Geografiya institutining nashriyoti.
6. Fayzullayev M.A., Abdiholiqova G.A. Qashqadaryo viloyati sanoat tarmoqlari rivojlanishining istiqbolli yo’nalishlari // O‘zbekiston milliy universiteti xabarlari, 2025, [3/2/1] ISSN 2181-7324. B. 348-350.

Abdimurodova G. P.
master's student
faculty of economics
Termez State University

DIGITAL ECONOMY DEVELOPMENT IN UZBEKISTAN AND ITS PRIORITY DIRECTIONS

Abstract. *The rapid development of digital technologies has significantly transformed modern economic systems. In recent years, Uzbekistan has actively pursued digital transformation as a strategic priority for sustainable economic growth. This article analyzes the current state of digital economy development in Uzbekistan and identifies its key priority directions.*

Keywords: *digital economy, economic growth, development, digitalization.*

Introduction

The digital economy has become one of the most influential drivers of economic growth in the globalized world. Advances in information and communication technologies have reshaped production processes, service delivery, and public administration. Digitalization enhances productivity, reduces transaction costs, and increases transparency across economic sectors. In this context, Uzbekistan has identified digital development as a strategic objective of national economic policy. The adoption of digital technologies is viewed as a key instrument for modernizing the economy, improving governance efficiency, and integrating into the global digital market. The purpose of this article is to analyze the development of the digital economy in Uzbekistan and to identify its main priority directions. The object of the research is the digital transformation processes within the national economy, while the subject is the economic and institutional mechanisms supporting digital development.

Research Methodology

In recent years, Uzbekistan has implemented a number of reforms aimed at accelerating digital transformation. The adoption of the "Digital Uzbekistan – 2030" Strategy marked a new stage in the development of the national digital economy. This strategic document defines long-term goals related to digital infrastructure expansion, innovation promotion, and the integration of digital technologies into key economic sectors. Significant progress has been observed in the financial and banking sector through the introduction of digital payment systems, mobile banking services, and online financial platforms. Additionally, the expansion of e-commerce has contributed to increased business activity and consumer convenience. Digital transformation has also influenced industrial production and service sectors by improving operational efficiency and enabling data-driven decision-making. As a result, digital technologies have become an important factor in enhancing national economic competitiveness. The research is based on a systematic review of official policy documents, international reports,

and academic literature related to digital transformation. Comparative analysis is used to assess Uzbekistan's digital development in relation to global trends identified by international organizations such as the World Bank, OECD, and United Nations. In addition, descriptive analysis is applied to evaluate institutional reforms, digital infrastructure expansion, and policy initiatives implemented in recent years. The combination of these methods allows for a comprehensive understanding of digital economy development and the identification of priority directions relevant to Uzbekistan's economic context. Priority Directions of Digital Economy Development. The development of the digital economy in Uzbekistan is based on several priority directions. First, the development of digital infrastructure remains a fundamental priority. Second, the improvement of e-government services plays a crucial role in enhancing public administration efficiency. The digitalization of public services reduces administrative barriers, increases transparency, and improves citizen access to government institutions. Third, human capital development in the field of digital technologies is a key factor for sustainable digital growth. Training qualified specialists in information technology, data analysis, and cyber security is essential. In this regard, the establishment of IT schools, digital education programs, and technology parks has become increasingly important. Fourth, supporting digital entrepreneurship and startups is another strategic direction. Providing financial incentives, tax benefits, and institutional support encourages innovation and the development of digital business models, contributing to economic diversification.

Analysis and discussion of results

Disadvantages of the Digital Economy

Job Displacement: Automation and digital technologies can lead to job displacement, particularly in sectors that rely heavily on routine manual or cognitive tasks. As machines and algorithms become more capable, workers in these areas may find their skills obsolete, leading to unemployment and economic instability.

Income Inequality: The digital economy can exacerbate income inequality. High-skilled workers who can adapt to new technologies tend to benefit the most, while low-skilled workers may face reduced job opportunities and stagnant wages. This growing disparity can lead to social tensions and economic divides.

Data Privacy and Security: The increased reliance on digital technologies and data collection raises significant concerns about data privacy and security. Personal and sensitive information is often at risk of being hacked, misused, or sold without consent, leading to potential identity theft and loss of privacy.

Mental Health Issues: Increased use of digital technologies, particularly social media, has been linked to various mental health issues. Excessive screen time, online harassment, and the pressure to maintain a digital presence can contribute to stress, anxiety, and depression.

Loss of Traditional Businesses: The rise of e-commerce and digital services has led to the decline of traditional brick-andmortar businesses. Small businesses that cannot compete with online giants may struggle to survive, leading to job

losses and reduced economic diversity in local communities and others. These disadvantages highlight the complex and multifaceted challenges posed by the digital economy. Addressing these issues requires comprehensive policies, international cooperation, and a balanced approach to harnessing the benefits of digital technologies while mitigating their negative impacts.

The findings indicate that Uzbekistan has made significant progress in developing its digital economy over the past decade. One of the main achievements is the expansion of digital infrastructure, including improved internet connectivity and mobile communication networks. These improvements have facilitated greater access to digital services for both businesses and households. Another important result is the advancement of e-government services. The digitalization of public services has reduced administrative costs, increased transparency, and enhanced interaction between citizens and government institutions. Online platforms now play a key role in public service delivery. The study also finds that digital entrepreneurship has gained momentum due to supportive policies and institutional frameworks. The establishment of IT parks, startup incubators, and educational initiatives has contributed to the growth of innovation-driven businesses.

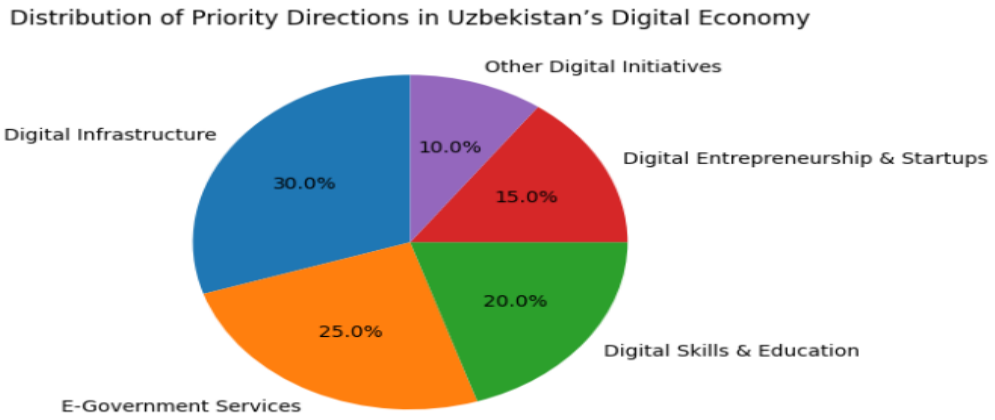


Figure 1. Distribution of Priority Directions in Uzbekistan's Digital Economy[1]

Moreover, investments in digital skills and education have strengthened the human capital base necessary for digital transformation. The results suggest that digital economy development in Uzbekistan aligns with global digital transformation trends. The prioritization of infrastructure development, governance digitalization, and human capital formation reflects internationally recognized best practices. From a policy perspective, continued investment in digital education and innovation ecosystems is essential.

[1] Source: Author's compilation based on national digital development priorities.

Conclusion

In conclusion, the development of the digital economy in Uzbekistan represents a crucial factor for long-term economic growth and modernization. The expansion of digital infrastructure, improvement of e-government services, development of digital skills, and support for digital entrepreneurship constitute the main priority directions of digital transformation. The successful implementation of these directions will enhance economic efficiency, improve public administration, and increase Uzbekistan's competitiveness in the global digital economy. Further research should focus on assessing the effectiveness of digital policies and exploring new opportunities for technological innovation.

References:

1. Decree of the President of the Republic of Uzbekistan. Digital Uzbekistan – 2030 Strategy.
2. Karimov, A. (2022). Digital economy and economic growth in Uzbekistan.
3. World Bank. Digital Economy for Development Report.

UDK: 796.332:616.7-056.262

Abdullayev D. D.
assistenti
fakultetlararo jismoniy tarbiya va sport kafedrasi
Zahiriddin Muhammad Bobur nomidagi Andijon davlat universiteti
O‘zbekiston

O‘ZBEKISTONDA VA DUNYO BO‘YICHA KO‘ZI OJIZLAR FUTBOLINING RIVOJLANISHI

Annotatsiya: *Mazkur ilmiy maqolada ko‘zi ojizlar futbolining paydo bo‘lishi, dunyo miqyosida rivojlanish bosqichlari, xalqaro musobaqalardagi o‘rni hamda mashhur sportchilarning faoliyati yoritilgan.*

KALIT SO‘ZLAR*: ko‘zi ojizlar futboli, paralimpiya sporti, IBSA, Paralimpiya o‘yinlari, adaptiv sport, nogironligi bo‘lgan shaxslar*

Abdullayev D. D.
assistant
interfaculty department of physical culture and sports
Andijan State University named after Zahiriddin Muhammad Babur
Uzbekistan

DEVELOPMENT OF FOOTBALL FOR THE BLIND IN UZBEKISTAN AND THE WORLD

Abstract: *This scientific article examines the origins of blind football, its developmental stages on a global scale, its role in international competitions, and the activities of renowned athletes.*

Keywords: *football for the blind, Paralympic sports, IBSA, Paralympic games, adaptive sports, people with disabilities*

Kirish

Bugungi kunda jismoniy imkoniyati cheklangan shaxslarning sport bilan shug‘ullanishi nafaqat sog‘lom turmush tarzini shakllantirish, balki ularning jamiyatga ijtimoiy moslashuvi va o‘ziga bo‘lgan ishonchini oshirishda muhim ahamiyat kasb etmoqda. Shu jihatdan, ko‘zi ojizlar sporti, xususan, ko‘zi ojizlar futboli (blind football) O‘zbekistonda tobora rivojlanib borayotgan yo‘nalishlardan biri hisoblanadi.. Ko‘zi ojizlar futboli adaptiv sport turlaridan biri sifatida sportchilarning jismoniy, ruhiy va ijtimoiy rivojlanishiga xizmat qiladi. Ko'zi ojizlar futbolining tarixi 2000-yillarning boshlarida boshlangan deb hisoblanadi. Bu sport turi ko'zi ojizlar uchun maxsus tashkil etilgan bo'lib, ularning sportga bo'lgan qiziqishini rivojlantirish maqsadida ishlab chiqilgan.

Mazkur sport turi XX asrning ikkinchi yarmida Janubiy Amerikada shakllangan. Braziliya va Argentina ushbu sport turining markaziga aylangan.

Ko'zi ojizlar futboli dastlabki musobaqalari 2000-yillarda tashkil etila boshlandi. Bu paytda sportga bo'lgan qiziqish ortdi va jamoalar o'rtasida o'yinlar o'tkazila boshlandi. Koʻzi ojizlar futboli 2004-yildan Paralimpiya oʻyinlari dasturiga kiritilgan. 2005-yilda birinchi marta xalqaro musobaqalar o'tkazildi.[3] Bu musobaqalar ko'zi ojizlar futbolini global miqyosda tanitishga yordam berdi.Ko'zi ojizlar futboli 2012-yilda Londonda bo'lib o'tgan Paralimpiya o'yinlarida o'z o'rnini topdi. Bu o'yinlar sportning yanada rivojlanishiga katta ta'sir ko'rsatdi.Hozirgi kunda ko'zi ojizlar futboli ko'plab mamlakatlarda rivojlanib, turli musobaqalarda ishtirok etadigan jamoalar soni ortmoqda. [4]Sportning bu turi ko'plab insonlar uchun ilhom manbai bo'lib xizmat qiladi. Bugungi kunda Yevropa, Osiyo va Janubiy Amerikada keng rivojlangan. Rikardinyo (Braziliya), Silvio Velo (Argentina), Antonio Martin (Ispaniya) va Zhu Zhenyu (Xitoy) ushbu sport turining afsonaviy namoyondalaridir.[1.2]

Koʻzi ojizlar futboli xalqaro miqyosda FIFA va IBSA (International Blind Sports Federation) qoidalari asosida oʻtkaziladi. Ushbu sport turi asosan B1 toifasidagi (toʻliq yoki deyarli koʻrmaydigan) sportchilar uchun moʻljallangan. Oʻyin maxsus tovush chiqaruvchi toʻp yordamida oʻtkaziladi, maydon atrofi esa xavfsizlik devorlari bilan oʻraladi. Darvozabonlar koʻra oladigan boʻlishi mumkin, ammo ular jarima maydoni doirasidan tashqariga chiqish huquqiga ega emas.

Oʻzbekistonda koʻzi ojizlar futbolining rivojlanishi mustaqillik yillarida boshlangan boʻlib, dastlab u nogironligi boʻlgan shaxslar sportini qoʻllab-quvvatlashga qaratilgan davlat siyosati doirasida shakllandi. Oʻzbekiston Nogironlar sporti federatsiyasi va keyinchalik Oʻzbekiston Paralimpiya qoʻmitasi tomonidan ushbu sport turiga alohida e’tibor qaratila boshlandi. Natijada, hududiy sport maktablari va ixtisoslashtirilgan sport toʻgaraklari tashkil etildi. [5]

Soʻnggi yillarda Oʻzbekistonda paralimpiya sportini rivojlantirish boʻyicha qator qaror va dasturlar qabul qilindi. Ushbu hujjatlar doirasida koʻzi ojiz sportchilar uchun sport inshootlarini moslashtirish, malakali murabbiylar tayyorlash va zarur sport jihozlari bilan ta’minlash ishlari amalga oshirildi. Shuningdek, koʻzi ojizlar futboli boʻyicha respublika miqyosida musobaqalar oʻtkazilib, iqtidorli sportchilar saralab olinmoqda.

Oʻzbekiston koʻzi ojizlar futbol jamoasi soʻnggi yillarda xalqaro musobaqalarda ishtirok etib, muayyan natijalarga erishmoqda. Bu yutuqlar nafaqat sportchilarning mahorati, balki mamlakatda paralimpiya sportiga yaratilayotgan sharoitlarning samarasi ekanligini koʻrsatadi. Xalqaro tajribaning oʻrganilishi va chet ellik mutaxassislar bilan hamkorlik qilinishi ushbu sport turining yanada rivojlanishiga xizmat qilmoqda.

Shunga qaramay, koʻzi ojizlar futbolini rivojlantirish jarayonida ayrim muammolar ham mavjud. Jumladan, barcha hududlarda yetarli infratuzilmaning yoʻqligi, maxsus jihozlarning cheklanganligi va tajribali murabbiylar yetishmasligi shular jumlasidandir. Kelgusida ushbu muammolarni bartaraf etish, ommaviy axborot vositalarida koʻzi ojizlar sportini keng targʻib qilish hamda yoshlar orasida qiziqishni oshirish muhim vazifa hisoblanadi.

XULOSA QILIB AYTGANDA, O‘ZBEKISTONDA KO‘ZI OJIZLAR FUTBOLI IZCHIL RIVOJLANIB BORAYOTGAN SPORT TURLARIDAN BIRI BO‘LIB, U NOGIRONLIGI BO‘LGAN SHAXSLARNING JAMIYATDAGI O‘RNINI MUSTAHKAMLASHDA MUHIM ROL O‘YNAYDI. DAVLAT TOMONIDAN KO‘RSATILAYOTGAN E’TIBOR VA QO‘LLAB-QUVVATLASH NATIJASIDA USHBU SPORT TURI KELAJAKDA YANADA YUKSAK NATIJALARGA ERISHISHI SHUBHASIZDIR.

FOYDALANILGAN ADABIYOTLAR

1. IBSA manual in partnership with UEFA – https://www.ibsasport.org/sports/files/ 1136-General-IBSA-Blind-Football-coaching-manual---a-guide-for-beginners.pdf
2. British Blind Sport – https://britishblindsport.org.uk/wp-content/uploads/2018/10/VIFriendlyFootball.pdf
3. Mayr Football for Blind – https://www.teiresias.muni.cz/download/futsal/Mayr_Football-for-the-Blind.pdf
4. Football Federation Australia – Coaching Resources – https:// www.playfootball.com.au/coach/resources
5. Gafurov Sh.Kh. Methodology for teaching paraathletics long jump to students with disabilities. Current issues and solutions in the development of Paralympic sports. Republican Scientific and Practical Conference. Tashkent. 2024. - pp. 33-41.

Abdunazarov X. M., geografiya fanlari nomzodi
dotsenti
geografiya kafedrasi
Termiz davlat universiteti
Xolboyeva M.
geografiya ta'lim yo'nalishi talaba
Alimova J.
geografiya ta'lim yo'nalishi talaba
Termiz davlat universiteti
Termiz, O'zbekiston

SURXONDARYO VILOYATIDA TUPROQ QOPLAMINI MUHOFAZA QILISH

Annotatsiya: *Ushbu maqolada Surxondaryo viloyatining sug'orma dehqonchilik rayonlarida tuproqning suv va shamol ta'sirida eroziyaga uchrashi, tuproq sho'rlanishini vujudga keltiruvchi omillar va unga qarshi kurash yo'llari yo'llari yoritilgan.*

Kalit so'zlar: *Sug'orma dehqonchilik, suv va shamol eroziyasi, tuproq sho'rlanishi, tuproq unumdorligi, agroekologik muammolar.*

Abdunazarov Kh. M., candidate of geographical sciences
associate professor
department of geography
Termez State University
Kholboyeva M.
student
geography education program
Alimova J.
student
geography education program
Termez State University
Termez, Uzbekistan

SOIL COVER PROTECTION IN SURKHANDARYA REGION

Annotation: *This article discusses the factors that cause soil erosion under the influence of water and wind, soil salinization, and ways to combat it in the irrigated farming areas of Surkhandarya region.*

Key words: *Irrigated agriculture, water and wind erosion, soil salinity, soil fertility, agroecological problems.*

Tuproq eroziyasi –tuproqning eng unumdor yuqori qatlamlari va tuproq osti jinslarining atmosfera yog'inlari, sug'orish suvlari, shamol va boshqalar omillar

ta’sirida yemirilish jarayonidir. Tuproqlarini muhofaza qilish, ulardan samarali foydalanish bugungi kunning dolzarb muammolaridan biri hisoblanadi.

Tuproq eroziyasi asosan relyefi notekis – past-baland, eroziya bazisi (ma’lum bir joyning metr hisobida dengiz sathidan balandligi bilan suv kelib quyiladigan joyning dengiz sathidan balandligi o‘rtasidagi farq) katta bo‘lgan yerlarda boshlanadi.

Tuproq eroziyasi hosil bo‘lish omillariga ko‘ra suv, shamol, o‘pirish, yemirish, yaylov, mexanik tuproq eroziya turlariga bo‘linadi. Suv eroziyasining boshlanishi va kuchayishi relyefning tuzilishi bilan bog’liq bo‘lib, odatda, yer yuzasining nishabligi 1-1,5^0 oshganda eroziya yuz bera boshlaydi.

Suv eroziyasi yemirilish jarayonida tuproq zarrachalarining bo‘laklarga bo‘linish va qayta joylashish usuliga ko‘ra, yuvilish, jilg’a va jarlanish eroziyasiga bo‘linadi.

Yuvilish eroziyasi tuproqqa singib ulgurmagan suvning oqimi ta’sirida vujudga kelib, tuproq qatlamini nisbatan bir tekisda yuvib ketishi bilan tavsiflanadi.

Jilg’a eroziyasi jilg’a suvining oqimi ta’sirida uncha chuqur bo‘lmagan o‘ydim-chuqurliklar hosil bo‘lishi bilan yuz beradi va buni odatdagi yerga ishlov berish bilan bartaraf etish mumkin.

Jarlanish eroziyasi suv eroziyasining bir turi bo‘lib, suv oqimining tor o‘zanda to‘planib oqishi, tuproqning vertikal yemirilishi va yuvilishi natijasida vujudga keladi. Suv ta’sirida yerning yuzasida yoriqlar paydo bo‘ladi, vaqt o‘tishi bilan ular kengayib jarliklarni hosil qiladi.

Surxondaryo viloyatida tuproqning ustki unumdor qatlamining uchirib ketilishida shamolning roli katta. Shamol eroziyasiga, hududning relyefdan qat’iy nazar, asosan bir yo‘nalishda esadigan kuchli shamol, tuproqning yengil mexanik tarkibi va sho‘rlanganligi, sug’oriladigan yer maydonlarining tabiiy sharoitiga nomuvofiq yoki ixota daraxtzorlarining yo‘qligi sabab bo‘ladi.

Surxondaryo viloyatida sug’orma dehqonchilik qiladigan hududlarda suv eroziyasi namlik bilan yetarli ta’minlangan, yog’in miqdori 350-400 mm dan yuqori va yarim ta’minlangan yog’in miqdori 200-300 mm ni tashkil qiladigan lalmikor yerlarda hamda tipik to‘q tusli sur tuproqlarda, qisman tog’ oldi va tog’ etagi qiyaliklarida uchraydi.

1-jadval

Surxondaryo viloyati sug'oriladigan ekin maydonlarida tuproqning sho'rlanish darajasi, gektar hisobida (2022yil 1-oktyabr holati)

Tumanlar nomi	Umumiy sug'oriladigan maydon	Sho'rlangan maydonlar	Shundan, tuproqning sho'rlanish darajasi		
			Kuchsiz sho'rlangan	O'rtacha sho'rlangan	Kuchli sho'rlangan
Angor	19520	6569	6009	529	32
Bandixon	17267	8169	5891	2207	70
Boysun	4508	-	-	-	-
Denov	30500	-	-	-	-
Jarqo'rg'on	27626	1511	1457	54	-
Qiziriq	29586	23631	14181	9250	200
Qumqo'rg'on	28444	406	281	125	-
Muzrabot	38802	24186	12671	11342	173
Oltinsoy	19710	-	-	-	-
Sariosiyo	14352	-	-	-	-
Termiz	17883	7665	6988	615	62
Uzun	14687	-	-	-	-
Sherabod	41060	20642	15633	4379	630
Sho'rchi	20895	-	-	-	-
Viloyat bo'yicha jami:	**324860**	**92780**	**63111**	**28501**	**1167**

Jadval Surxondaryo viloyati tabiatni muhofaza qilish boshqarmasi ma'lumotlari asosida tuzilgan.

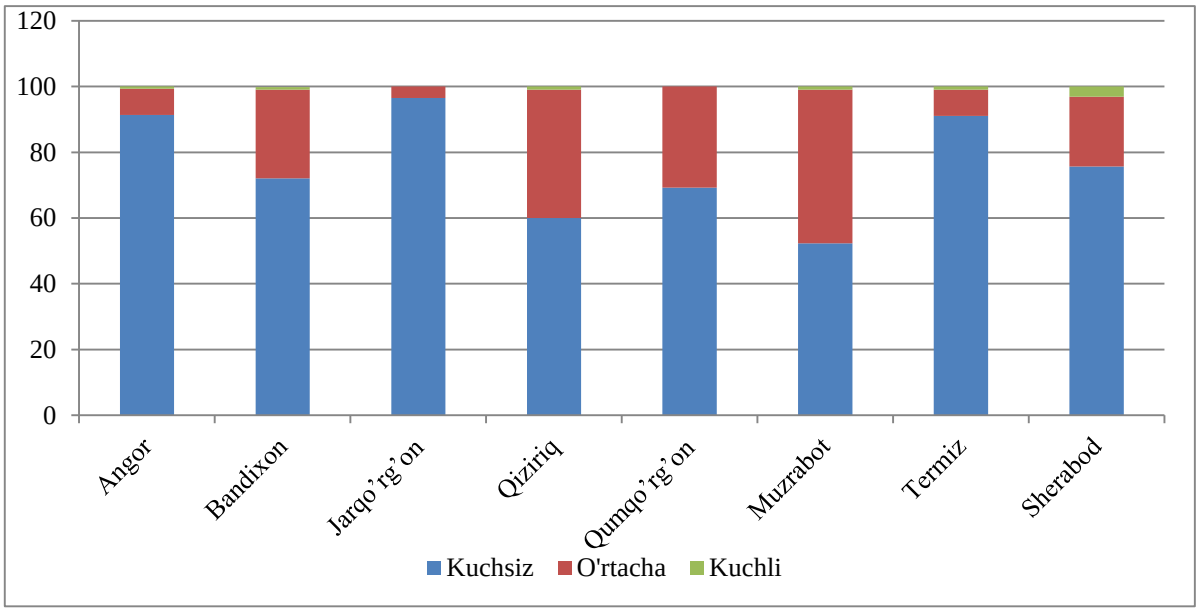
Surxondaryo viloyatining sug'orib dehqonchilik qilinadigan hududlari tuproq hosildorligining pasayishiga ta'sir etuvchi omillardan yana biri tuproqning sho'rlanishi hisoblanadi. Viloyatda yer va suv resurslaridan nooqilona foydalanishi sababli qishloq xo'jaligi bilan bog'liq agroekologik (yerlarning meliorativ holatining yomonlashuvi hisobiga tuproqning sho'rlanishi) muammolar vujudga keldi. Vujudga kelgan bunday agroekologik muammolarni viloyatning tekislik hududlarida joylashgan tumanlarida kuzatishimiz mumkin.

Surxondaryo viloyatida sho'rlangan tuproqlar 92780 gektarni tashkil etib, jami sug'oriladian maydonlaning 28,5 foizini tashkil etadi.

Jami sho'rlangan tuproqlarning 68 foizi kuchsiz sho'rlangan tuproqlar, 30,7 foizi o'rtacha sho'rlangan,1,3 foizi kuchli sho'rlangan tuproqlar toifasiga kiradi.

Viloyatning tekislik tumanlari bo'lgan Muzrabot, Qiziriq, Sherobod, Bandixon tumanlarida tuproqning sho'rlanish darajasi ancha yuqori bo'lib dehqonchilik ekinlaridan olinadigan hosildorlik ancha kamayib ketgan. Mazkur

tumanlarda yopiq kollektor-drenajlarni tozalash, zovurlarni qazish kabi kompleks meliorativ tadbirlarni amalga oshirishni taqoza etadi.



1-rasm Surxondaryo viloyatining ayrim tumanlarida tuproq sho‘rlanish darajasi (%da)

Tumanlar darajasida tuproqning sho‘rlanish darajasi tahlili shundan dalolat beradiki, viloyatning Qiziriq tumanida jami sug’oriladigan maydonlarning 79,8 foizi sho‘rlangan yerlarni tashkil etadi. Tumandagi jami sho‘rlangan tuproqlarning 60 foizi kuchsiz sho‘rlangan, 39 foizi o‘rtacha sho‘rlangan, 1foizi kuchli sho‘rlangan tuproqlarni tashkil etadi. Bunday agroekologik muammolarni viloyatning Muzrabot va Sherobod tumanlarida ham kuzatishimiz mumkin. Muzrabot tumanida jami so‘g’oriladigan yerlarning 62,3 foizi sho‘rlangan tuproqlarni tashkil etadi. Shundan sho‘rlangan tuproqlarning 52,3 foizi kuchsiz sho‘rlangan, 46,8 foizi o‘rtacha sho‘rlangan, 0,9 foizi kuchli sho‘rlangan tuproqlardir.Bu ko‘rsatkich Sherobod tumanida shunga mos holda 50,2;, 75,7;,

21,2; , 3,0 foizlarni tashkil etgan (1-jadval), (1-rasm). Viloyat tuproq qoplami eroziyasiga sabab bo‘luvchi yana bir omil inson hisoblanadi. Inson faoliyati bilan bog’liq bo‘lgan tuproq eroziyasining turlari ko‘p, jumladan sanoatda foydali qazilmalarni qazib olish, (ayniqsa ochiq usulda qazib olish), uy-joy, ishlab chiqarish binolari va yo‘l qurilishi, gaz va neft quvurlarini o‘tkazish va boshqalar.

Sanoat chiqindilari hamda maishiy chiqindilar ham ma’lum darajada tuproqning ifloslanishiga sabab bo‘lmoqda. Bunday holatdan qutulish uchun chiqindilarni qayta ishlashni tashkil qilish maqsadga muvofiq bo‘ladi.

Xulosa qilib aytganda, so‘nggi besh yilda respublikamizda paxta ekiladian maydonlarning qisqartirilishi, kam hosil beradigan paxta va g’alla ekinlarning o‘rniga poliz va sabzavot ekinlari maydonining kengaytirilishi, sohaga ilg’or

innovatsion texnologiyalarning joriy qilinishi, kompleks agrotexnikaviy va meliorativ tadbirlarni amalga oshirishga alohida e’tibor qaratilmoqda.

Foydalanilgan adabiyotlar:

1. Бабушкин Л.Н., Когай Н.А., Зокиров Ш.С. Агроклиматические условия сельского хозяйства Узбекистана. -Т.: “Меҳнат”, 1975.
2. Баратов П. Ўзбекистон табиий географияси. –Т:, “Ўқитувчи”, 1996.
3. Ғуломов П.Н. Ўзбекистонда табиатдан фойдаланишнинг географик асослари. Тошкент. 1990.
4. Ҳасанов И., Ғуломов П.Н. Ўзбекистон табиий географияси (1-қисм). Ўқув қўлланма.-Т.: Ўқитувчи, 2007.
5. Ҳасанов И., Ғуломов П.Н., Қаюмов А. Ўзбекистон табиий географияси (2-қисм). Ўқув қўлланма.-Т.: Университет, 2010.

Abdunazarov X. M., geografiya fanlari nomzodi
dotsenti
geografiya kafedrasi
Termiz davlat universiteti
Xolboyeva M.
geografiya ta'lim yo'nalishi talabala
Alimova J.
geografiya ta'lim yo'nalishi talabala
Termiz davlat universiteti
Termiz, O'zbekiston

SURXONDARYO VILOYATIDA TRANSPORT TARMOQLARINING SHAKLLANISHI VA RIVOJLANISHI

Annotasiya: *Ushbu maqolada Surxondaryo viloyatida temir yo'l transportining shakllanishi va rivojlanishi, hamda hududiy joylashishi shuningdek ushbu transport tarmog'ning mustaqillik yillarida rivojlanishi kabi masalalari yoritilgan.*

Kalit so'zlar: *tarixiy-siyosiy omil, yagona transport tizimi, temir yo'l liniyalari, temir yo'l zichligi, yo'lovchi va yuk tashush aylanmasi.*

Abdunazarov Kh. M., candidate of geographical sciences
associate professor
department of geography
Termez State University
Kholboyeva M.
student, geography education program
Alimova J.
student, geography education program
Termez State University
Termez, Uzbekistan

FORMATION AND DEVELOPMENT OF TRANSPORT NETWORKS IN SURKHANDARYA REGION

Annotation: *This article covers the formation and development of railway transport in the Surkhandarya region, its territorial location, and the development of this transport network during the years of independence.*

Key words: *historical and political factor, unified transport system, railway lines, railway density, passenger and freight traffic.*

Mamlakatimizning janubiy mintaqasi Surxondaryo viloyatida temir yo'l transportining rivojlanishi tarixiy-siyosiy omillar asosida vujudga kelgan. Mintaqada dastlabki temir yo'llarning qo'rilishi Chor Rossiyasining

mustamlakachilik siyosati negizida amalga oshirilgan.Tarixiy manbalarga ko‘ra Chor Rossiya hukumatining o’lkada o‘z manfatlarini mustahkamlash borasida Krasnovodsk- Chorjo‘y -Buxoro yo‘nalishidagi temiryo ‘lni janubga tomon Qarshi –Termiz yo‘nalishida davom ettirish orqali o‘lkaning tabiiy xom ashyo boyliklaridan foydalanish hamda siyosiy-harbiy mavqeini mustahkamlashga qaratilgan.

1914 yil boshida muhandislar Surxon vohasi hududida temir yo‘l qurish bo‘yicha tegishli tayyorgarlikni boshlab yubordilar. Buxoro –Termiz temir yo‘l qurilishida nafaqat Rossiya, balki chet davlatlar, xususan Italiya va Avstriyadan kelgan mutaxassislar ham ishtirok etishdi. Qurilishning aksariyat ishchilari mahalliy aholi vakillaridan iborat edi.1915yil iyun oyida birinchi tonnel bitkazildi. 1916 yil 16-iyunga kelib, 573 verst bo‘lgan Kogon-Samsonovo-Termiz temir yo ‘l tushirish va ortish ishlarni yo‘lga qo‘yish, yuklarni xavfsizligini ta ‘minlash yo’nalishi ishga tushirildi.

Temir yo‘l ish hajmini kengaytirish hamda yuklarni maqsadida 1916 yil Termiz temir yo‘l bekati qurildi [2].

1917 yilda Rossiyada amalga oshirilgan Oktyabr to‘ntarishi natijasida CHor Rossiyasi tuzumining ag‘darilishi, hokimiyat tepasiga kelgan sho ‘ro hukumati 1918 yilda O‘rta Osiyo-Toshkent temir yo‘lini, 1919 yilda Kelif-Termiz temir yo‘li hamda Amudaryo daryo floti ustidan o‘z nazoratini o’rnatadi. O‘lkada temir yo‘llarning qurilishi sobiq Sho‘ro tuzumi davrida ham davom ettirildi.

1925 yilda viloyatning ma‘muriy markazi Termiz shahridan Termiz-Jarqo‘rg‘on –Surxon yo‘nalishida temir yo‘l liniyasi qurib ishga tushiriladi. Ushbu yilda Termiz stantsiyasidan Amudaryo daryo portiga temir yo‘li quriladi. 1929-1932-yillarda uzunligi 248 km bo‘lgan Termiz –Dushanbe temir yo‘li qurilib, O’zbekiston temir yo‘liga birlashtiriladi. SHuningdek, 1930-yillarda o‘lkada Termiz-Kelif, Sho‘rchi-Denov, Termiz- Regar yo‘nalishidagi temir yo‘llar qayta ta‘ mirlandi.

Ikkinchi jahon urushidan keyin temir yo‘l transporti o‘lka iqtisodiyotini tiklash, xalq xo‘jaligi yuklarini tashishga xizmat qildi.

O‘tgan asrning 50-60 yillarda yangi yerlarning qishloq xo‘jaligi maqsadlarida o‘zlashtirilishi, yangi konlarning ishga tushirilishi negizida qishloq xo‘jaligi mahsulotlari va sanoat mahsulotlari ishlab chiqarishning o‘sishi hisobiga temir yo‘l transportida xalq –xo‘jaligi yuklarini tashish hajmi ancha oshirildi.

1974-yilda qo‘shni Tojikiston Respublikasining janubiy viloyatlari bilan iqtisodiy aloqalarni yaxshilash maqsadida uzunligi 54 km bo‘lgan Amu-Zang temir yo‘li va Termiz –Yovon temir yo‘li tarmog‘i qurib bitkaziladi.

1982-yilda Amudaryo daryosi orqali Afg‘onistonga o‘tadigan Termiz – Xayraton temir yo‘l va avtomobiль yo‘li ko‘prigi qurib ishga tushirildi. Bu esa

[2] Хидиров Х. Ўзбекистонда транспорт соҳаси:Натижалар ва муаммолар.”Тафаккур авлоди” Тошкент. 2021й-182 б-22-23б

qo‘shni Afg’oniston davlati bilan iqtisodiy-savdo aloqalarni yaxshilashga imkoniyat yaratdi.

Mustaqillik yillarida respublikamiz viloyat markazlari va yirik shaharlarida yo‘lovchilar va yuk tashishga xizmat qiladigan zamonaviy vokzallar qurib ishga tushirildi. Surxondaryo viloyatining ma‘muriy markazi Termiz shahrida 2002 yilda shaharning 2500-yillik yubileyi arafasida barcha qulayliklarga ega bo‘lgan zamonaviy vokzal qurib ishga tushirildi.

Ayniqsa arzon qulay dengiz yo‘llariga chiqish maqsadida qo‘shni Afg’oniston davlati bilan temiryo‘l qurilishini amalga oshirish ishlari olib borildi. Natijada 2010 yilning noyabr oyida ”Afg’onistonda Xayraton-Mozori-Sharif” temir yo‘l magistralini qurish ishlari nihoyasiga yetkazildi. Ushbu loyiha doirasida yangi temir yo‘l liniyasi qurilib, Xayraton temir yo‘l bekati, Noibobod bekatida raz‘ezdlar va yangi temir yo‘l yuk hovlisi qurib ishga tushirildi. Temiryo‘lning umumiy uzunligi 106 km ni, shundan asosiy yo‘llar 75 km ni tashkil qiladi.

Mustaqillik yillarida respublikamizning turli mintaqalarida joylashgan temiryo‘l liniyalarini zamonaviy asosda qayta modernizatsiya qilish ishlari davom ettirildi. O’zbekiston Respublikasi Osiyo taraqqiyot banki bilan 1998 yildan “O’zbekiston temir yo‘llari” orqali hamkorlik qilib kelmoqda. Mazkur hamkorlik natijasida “Pop-Namangan-Andijon” temiryo‘l uchastkasini elektrlashtirish” loyihasi amalga oshirilmoqda. Shuningdek, Xitoy Eksimbanki bilan respublikamiz 2010 yildan buyon “Elektorovozlarni xarid qilish” loyihasi doirasida hamkorlik qilib kelmoqda. Hozirgi kunga kelib Xitoy Eksimbanki bilan hamkorlikda “Toshkent shahrida yer usti xalqa metropolitenini qurish” va “Sharg‘un ko‘mir “aktsionerlik jamiyatini modernizatsiya qilish “ loyihalari amalga oshirilmoqda. Bundan tashqari mamlakatimiz temiryo‘l transportini jadal sur‘atda rivojlantirish maqsadida Xalqaro tiklanish va taraqqiyot banki (Jahon banki) bilan hamkorlikda loyihalarni amalga oshirmoqda.Ushbu hamkorlik bo‘yicha “Elektrlashtirilgan Angren-Pop temir yo‘lining qurilishi hamda Pop –Quqon-Andijon temir yo‘l uchastkasini elektrlashtirish” loyihasi amalga oshirilmoqda.

Respublikamizda temir yo‘llarni modernizatsiya qilish ishlari davom ettirilib, 2015-2021 yillarda sohani rivojlantirishla keng ko‘lamli ishlar olib borildi. Ko‘pgina shaharlarni bog‘lovchi temir yo‘llar elektrlashtirilib, yo‘lovchi poezdlar harakatini tashkil etish ishlari olib borildi. Jumladan: 2015yilda Samarqand – Qarshi, 2016 yilda Samarqand-Buxoro yo‘lini elektrlashtirish hamda yuqori tezlikda harakatlanuvchi yo‘lovchi poezdlar harakatini tashkil etish loyihasi yakunlandi va foydalanishga topshirildi.

2017yilda 325 kmli Qarshi –Termiz yo‘li elektrlashtirilib, foydalanishga topshirildi.

2018-yilda 357,3 kmli Buxoro Miskin hamda 33,8 kmli Urganch-Xiva yangi temir yo‘llari qurilib foydalanishga topshirildi. SHuningdek, Qarshi-Kitob yo’nalishidagi 124 km temir yo‘llar elektrlashtirildi. Qandim gazni qayta ishlash (GQZ) va Sherobod sement zavodlariga shahobcha temir yo‘llar qurildi.

2019-2020 yillarda Toshkent shaxrida aylanma yo‘l usti metropoliten liniyasining 1 bosqich va Yunusobod metropoliten yer osti liniyasi qurilish ishlari

olib borildi hamda Toshkent metallurgiya zavodi hududiga shoxobcha yo‘li qurilish ishlari boshlandi.

2019 - 2020 yillar davomida Pop-Namangan-Andijan temir yo‘l qismini elektrlashtirish va Andijon-Savay-Xonobod temir yo‘l qismini modernizatsiya qilish ishlari bajarildi. 2020 yilda Toshkent shaxrida Sirg’ali aylanma yul usti metropoliten liniyasi qurilish ishlari boshlanib, 2021 yilda nihoyasiga yetkazildi.

Bugungi kunga kelib “O’zbekiston temir yo‘llar” aktsionerlik jamiyati tizimidagi magistral yo‘llar zamonaviy aloqa vositalari bilan ta‘minlangan.

Xulosa qilib aytganda O‘zbekiston Respublikasida so‘nggi yillarda amalga oshirilayotgan islohotlar negizida temir yo‘l transportida ham chuqur tarkibiy o’zgarishlar yuz bermoqda, xususan mamlakatimiz hududida halqaro temir yo‘l yo‘laklarni shakllantirish va rivojlantirish hamda milliy transport kommunikatsiyalariga xalqaro transport oqimlarini jalb qilish, mamlakat ichidagi transport qatnovini yaxshilash uchun qulay shart-sharoitlarni yaratishga alohida e‘tibor qaratilmoqda.

Foydalanilgan adabiyotlar:

1. Солиев А.ва бошқ.минтақавий иқтисодиёт.–Т., 2003.
2. Солиев А .Ўзбекистон географияси.Т:.Университет, 2014, 404 b.
3. Солиев А.,Назаров М.,Қурбонов Ш. Ўзбекистон ҳудудлари ижтимоий – иқтисодий ривожланиши . –Т.: “Мумтоз сўз”, 2010.
4. Солиев А.Ҳудудий мажмуаларнинг назарий асослари. (Ўқув қўлланма) Т.,2007, 90 б.
5. O’zbekiston hududlarining yillik statistika to’plami.O’zbekiston Respublikasi davlat statistika qo’mitasi.T:.,2019,11-14b.

Abduqodirov N. F.
assistant
Samarkand State Medical University
Bozorboyeva I. N.
student
Samarkand State Medical University
Djurayeva F. A.
student
Samarkand State Medical University
Yusupbaeva M. R.
student
Samarkand State Medical University
Ashirbekova R. K.
student
Samarkand State Medical University

HEALTH INFORMATION SYSTEMS FOR HOSPITAL MANAGEMENT OPTIMIZATION

Abstract: *Health Information Systems (HIS) have become a cornerstone in modern hospital management, enabling the integration, analysis, and utilization of clinical, administrative, and operational data. This article explores the role of HIS in optimizing hospital management by improving workflow efficiency, resource allocation, patient safety, and decision-making processes. The discussion highlights key functionalities, benefits, and challenges associated with HIS implementation. Strategies for effective adoption, including interoperability, staff training, and data security, are also examined. The paper emphasizes how HIS can transform hospital operations, enhance patient-centered care, and support evidence-based management decisions.*

Keywords: *Health information systems, hospital management, clinical workflow, data analytics, patient safety, healthcare IT, resource optimization*

Introduction

The increasing complexity of hospital operations and rising healthcare demands have created a need for advanced tools to optimize management and improve the quality of care. Health Information Systems (HIS) integrate administrative, financial, and clinical information, providing healthcare managers and clinicians with real-time access to actionable data. HIS facilitate the coordination of care, reduce operational inefficiencies, enhance decision-making, and promote patient safety.

Modern hospitals face challenges such as high patient volumes, limited resources, fragmented information, and stringent regulatory requirements. HIS address these challenges by streamlining clinical workflows, automating administrative processes, and enabling data-driven management strategies. They

support hospital operations through functionalities such as patient registration, electronic medical records, scheduling, billing, laboratory and imaging integration, supply chain management, and reporting. The integration of analytics and reporting tools within HIS allows administrators to monitor performance metrics, identify bottlenecks, and optimize resource allocation.

Despite their potential benefits, successful HIS implementation requires careful planning, staff training, and consideration of technical, organizational, and regulatory factors. Interoperability between different HIS modules, data security, and user adoption remain significant challenges. When effectively deployed, HIS contribute to operational excellence, cost efficiency, and improved patient-centered care.

Discussion

Health Information Systems optimize hospital management through several key mechanisms:

Workflow Efficiency: HIS streamline routine administrative and clinical processes, reducing paperwork and manual data entry. Electronic patient records allow clinicians to access medical histories, laboratory results, and imaging data instantly, minimizing delays in diagnosis and treatment. Scheduling modules help manage staff and patient appointments efficiently, reducing waiting times and enhancing overall operational productivity.

Resource Allocation and Financial Management: HIS enable hospital administrators to monitor the utilization of resources such as beds, equipment, and personnel. Real-time tracking of inventory and supplies ensures timely replenishment and reduces wastage. Integration with billing and insurance systems automates financial processes, improves revenue cycle management, and supports cost-effective hospital operations.

Clinical Decision Support and Patient Safety: HIS often include Clinical Decision Support Systems (CDSS) that provide alerts, reminders, and evidence-based recommendations. These features help reduce medication errors, ensure adherence to clinical guidelines, and enhance patient safety. Data analytics can identify high-risk patients and prioritize interventions, contributing to proactive care and improved outcomes.

Data Analytics and Performance Monitoring: HIS collect large volumes of operational and clinical data that can be analyzed to identify patterns, trends, and inefficiencies. Hospitals can utilize predictive analytics to forecast patient admissions, optimize staffing, and allocate resources strategically. Performance dashboards provide administrators with actionable insights, enabling continuous quality improvement.

Interoperability and Integration: HIS integrate various hospital departments, including laboratories, pharmacies, radiology, and outpatient clinics, ensuring seamless data exchange. Interoperable systems enhance communication, reduce duplication of tests, and support coordinated care. Integration with external health information systems and national databases further expands the utility of HIS in hospital management.

Challenges: Despite the advantages, HIS implementation faces obstacles such as resistance to change among staff, high initial costs, system compatibility issues, and cybersecurity risks. Adequate training programs, change management strategies, and compliance with privacy regulations (e.g., HIPAA, GDPR) are critical for successful deployment. Hospitals must also plan for scalability and system maintenance to sustain long-term benefits.

Conclusion

Health Information Systems play a critical role in optimizing hospital management by integrating clinical, administrative, and operational data into a cohesive platform. They improve workflow efficiency, enable effective resource allocation, enhance patient safety, and support data-driven decision-making. By providing real-time insights, predictive analytics, and clinical decision support, HIS empower hospital administrators and clinicians to manage operations effectively and deliver high-quality, patient-centered care.

The successful adoption of HIS requires addressing challenges related to interoperability, cybersecurity, staff training, and system integration. Strategic planning, ongoing education, and stakeholder engagement are essential for maximizing the benefits of HIS. As healthcare institutions increasingly embrace digital technologies, HIS will remain a cornerstone for operational excellence, clinical efficiency, and sustainable hospital management. The continued evolution of HIS, coupled with innovative analytics and integration solutions, promises to transform hospital operations and improve healthcare delivery on a global scale.

References:

1. Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems. *Risk Management and Healthcare Policy*, 4, 47–55. https://doi.org/10.2147/RMHP.S12985
2. Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. *Health Affairs*, 30(3), 464–471. https://doi.org/10.1377/hlthaff.2011.0178
3. Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., Ferris, T., … & Blumenthal, D. (2009). Use of electronic health records in U.S. hospitals. *New England Journal of Medicine*, 360(16), 1628–1638. https://doi.org/10.1056/NEJMsa0900592
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.

7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Abduqodirov N. F.
assistant
Samarkand State Medical University
Sobirova M. A.
student
Samarkand State Medical University
Qilichboyeva M. U.
student
Samarkand State Medical University
Kalandarova M. T.
student
Samarkand State Medical University
Xudoynazarova X. Z.
student
Samarkand State Medical University

ARTIFICIAL INTELLIGENCE APPLICATIONS IN MEDICAL DIAGNOSTICS

Abstract: *Artificial Intelligence (AI) has rapidly emerged as a transformative technology in medical diagnostics, enabling faster, more accurate, and data-driven clinical decision-making. By utilizing machine learning algorithms, deep neural networks, and pattern recognition techniques, AI systems can analyze complex medical data such as imaging results, laboratory tests, and electronic health records. This article examines the main applications of artificial intelligence in medical diagnostics, highlights its advantages in improving diagnostic accuracy and efficiency, and discusses existing limitations and ethical concerns. The study emphasizes the importance of integrating AI technologies responsibly to support healthcare professionals rather than replace them.*

Keywords: *Artificial intelligence, medical diagnostics, machine learning, deep learning, clinical decision support*

Introduction

Medical diagnostics plays a fundamental role in healthcare systems, as accurate and timely diagnosis is essential for effective treatment, disease prevention, and patient safety. Traditionally, diagnostic decisions have relied heavily on the clinical experience of physicians and the interpretation of medical data obtained from imaging, laboratory tests, and patient histories. However, the rapid growth of medical information and the increasing complexity of diagnostic procedures have created significant challenges for healthcare professionals. Physicians are often required to analyze large volumes of heterogeneous data within limited timeframes, which increases the risk of diagnostic errors and delays.

In recent years, artificial intelligence has emerged as a promising solution to address these challenges. Advances in machine learning, deep learning, and data analytics have enabled AI systems to process and interpret complex medical datasets with high speed and accuracy. Unlike conventional software systems, AI-based diagnostic tools are capable of learning from historical data, identifying hidden patterns, and continuously improving their performance. As a result, artificial intelligence is increasingly being integrated into various diagnostic domains, including radiology, pathology, cardiology, oncology, and neurology.

The application of artificial intelligence in medical imaging represents one of the most developed areas of AI-driven diagnostics. Deep neural networks have demonstrated remarkable performance in detecting tumors, fractures, cardiovascular abnormalities, and neurological disorders from medical images. In addition to imaging, AI technologies are being utilized in laboratory diagnostics, where they assist in analyzing biochemical indicators, genetic data, and disease biomarkers. These capabilities support early disease detection and personalized treatment planning, which are critical components of modern medicine.

Despite the significant advantages of artificial intelligence in diagnostics, its implementation raises important technical, ethical, and organizational issues. Concerns related to data quality, algorithm transparency, patient privacy, and clinical responsibility remain central to ongoing discussions. Therefore, understanding both the opportunities and limitations of AI in medical diagnostics is essential for its safe and effective adoption. This article aims to explore the key applications of artificial intelligence in medical diagnostics, evaluate its impact on diagnostic accuracy and efficiency, and identify the challenges that must be addressed for its sustainable integration into healthcare systems.

Discussion

The integration of artificial intelligence into medical diagnostics has significantly reshaped traditional diagnostic approaches by introducing data-driven and automated analytical capabilities. One of the most notable advantages of AI-based diagnostic systems is their ability to process large and complex datasets that exceed human cognitive limitations. In clinical practice, physicians often face time constraints and information overload, whereas AI algorithms can simultaneously analyze medical images, laboratory results, and patient histories, thereby supporting more comprehensive diagnostic assessments.

In medical imaging, deep learning models have demonstrated high accuracy in detecting pathological changes across various modalities, including X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound. These systems are particularly effective in identifying early-stage abnormalities that may be overlooked during routine examinations. For example, AI-assisted radiology tools have shown promising results in the detection of lung nodules, breast cancer, and neurological disorders. By reducing inter-observer variability and improving consistency, artificial intelligence contributes to more reliable diagnostic outcomes.

Beyond imaging, artificial intelligence plays an increasingly important role in laboratory and molecular diagnostics. Machine learning algorithms are used to analyze biochemical parameters, genomic data, and biomarker profiles to identify disease patterns and predict disease progression. Such approaches are especially valuable in oncology and genetic medicine, where early detection and personalized treatment strategies are critical. AI-driven diagnostic models can assist clinicians in stratifying patients based on risk levels and selecting optimal therapeutic pathways.

Despite these advancements, the implementation of artificial intelligence in medical diagnostics is accompanied by several challenges. Data quality and representativeness remain critical issues, as biased or incomplete datasets can lead to inaccurate predictions and reinforce health disparities. Additionally, the lack of transparency in complex AI models, often referred to as the “black box” problem, raises concerns regarding clinical trust and accountability. Physicians must be able to understand and interpret AI-generated recommendations to ensure safe and ethical decision-making.

Furthermore, ethical and legal considerations play a crucial role in the adoption of AI-based diagnostic systems. Issues related to patient data privacy, informed consent, and responsibility for diagnostic errors require clear regulatory frameworks. The successful integration of artificial intelligence into healthcare systems also depends on adequate training of medical personnel and the development of interdisciplinary collaboration between clinicians, data scientists, and engineers. Addressing these challenges is essential to maximize the benefits of AI while minimizing potential risks in medical diagnostics.

Conclusion

Artificial intelligence has demonstrated significant potential in enhancing the accuracy, speed, and reliability of medical diagnostics. When properly integrated, AI technologies can support healthcare professionals, reduce diagnostic errors, and improve patient outcomes. However, AI should be viewed as a complementary tool rather than a replacement for medical expertise. Future research should focus on improving algorithm transparency, data security, and ethical standards to ensure sustainable and trustworthy use of artificial intelligence in medical diagnostics.

References:

1. Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. Nature Medicine, 25(1), 44–56.
2. Esteva, A., Kuprel, B., Novoa, R. A., et al. (2017). Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115–118.
3. Litjens, G., Kooi, T., Bejnordi, B. E., et al. (2017). A survey on deep learning in medical image analysis. *Medical Image Analysis*, 42, 60–88.
4. Ne’matov, N., & Ne’matova, N. (2022). OLIY TA’LIM TIZIMI TALABALARIGA O’ZBEK TILINI O’QITISHDA AXBOROT

TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

УДК: 614.876-092;616-71

Akhmadova M. A.
assistant professor
department of medical radiology and nuclear medicine
Abu Ali ibn Sino Bukhara State Medical Institute
https://orcid.org/0009-0004-36117-4472

THE USE OF PET TO EVALUATE THE EFFECTIVENESS OF DRUG THERAPY FOR DISSEMINATED THE TUMOR BREAST CANCER

Resume. *The current literature and the National Comprehensive Cancer Network (NCCN) guidelines state that 18F-FDG PET/CT is not routine for early diagnosis of breast cancer, and rather PET/CT scanning should be performed for patients with stage III disease or when conventional staging studies yield non-diagnostic or suspicious results because this modality has been shown to upstage patients compared to conventional imaging and thus has an impact on disease management and prognosis. Although 18F-FDG PET/CT mammography was able to detect axillary lymph node metastases with a high sensitivity, this method cannot soon be expected to replace the combination of clinical examination, ultrasound, and sentinel lymph node biopsy for axillary assessment. Drug therapy remains the main method of complex treatment at these stages. Positron emission tomography (PET) with fluorodeoxyglucose has now been used to assess the effect of the treatment. This method makes it possible to assess changes in the tumor at the cellular level long before morphological manifestations. Thus, a decrease in the accumulation of fluorodeoxyglucose in the tumor by more than 45% of the initial one predicts a complete pathomorphological response to drug therapy with great accuracy.*

Key words: *positron emission tomography (PET), fluorodeoxyglucoses, breast cancer, radiopharmaceutical*

Introduction

Effective management of breast cancer requires accurate diagnosis and determination of the extent of the disease to select the most effective treatment approach [3]. Breast cancer is very heterogenous and is characterized by different pathological features, with distinct responses to treatment and differences in long-term patient survival [4]. Approximately 70% of BC express the estrogen receptor (ER), and the majority of ER+ cancers also express the progesterone receptor (PR). Breast cancer occupies the first place both in the structure of morbidity and mortality in Russian and European women. Despite the successes achieved in the diagnosis and treatment of this suffering, the diagnosis of a locally spread or disseminated process is observed in almost every third patient. Drug therapy remains the main method of complex treatment at these stages. Positron emission tomography (PET) with fluorodeoxyglucose has now been used to assess the

effect of the treatment. This method makes it possible to assess changes in the tumor at the cellular level long before morphological manifestations. Thus, a decrease in the accumulation of fluorodeoxyglucose in the tumor by more than 45% of the initial one predicts a complete pathomorphological response to drug therapy with great accuracy. Results showed that 32.1% of the diagnosed lesions did not change their SUV values, 39.3% were treated, 27.4% were new lesions do not present in the original PET-CT scan, and 1.2% for lesions that increased the value of the SUV. Moreover, the results also showed that left breast cancer was more responsive to treatment than right breast cancer, while chemotherapy was more effective than radiation therapy. In summary, the efficacy of chemotherapy and/or radiotherapy for both right and left breast cancer patients was evaluated using PET-CT technology. The effectiveness of drug therapy in patients with disseminated breast cancer using PET/CT is evaluated. It was found that the diagnostic value (SUVmax) for breast cancer metastases ranges from 1.5 to 3, and for the primary tumor – more than 2. As an illustration, the authors cite two clinical examples.

The incidence of breast cancer in 2024 in the Bukhara region was 382 per 100,000 population. In 24.5% of cases, the disease was diagnosed in stages III and IV. In 2024, 74.6% of patients, 29.6%, received combined or complex treatment of breast cancer using various drug therapy regimens. At the same time, mortality in the first year after diagnosis was 5.8% [1,3]. Timely and accurate assessment of the effectiveness of drug therapy at various stages of treatment of disseminated breast cancer remains an urgent problem in oncology. Among the many diagnostic methods used in monitoring drug treatment of breast cancer, positron emission tomography combined with computed tomography (PET/CT) with radiopharmaceutical 18F-fluoro-2-deoxy-D-glucose (FDG) has now begun to be used [2,4].

This is a molecular imaging method that allows noninvasively monitoring the response of tumor cells to treatment at the cellular level long before structural changes in the tumor are detected by routine diagnostic methods such as mammography, ultrasound, CT and MRI [6,9]. At the same time, the level of FDG hyperfixation in the tumor focus can be considered a predictor of a complete pathomorphological response to treatment. Thus, according to a number of authors, a decrease in the accumulation of FDG by breast cancer cells during neoadjuvant drug therapy by more than 45% (SUV $\geq$ 45%), compared with baseline values, predicts with high accuracy a complete pathomorphological response and high effectiveness of systemic drug therapy for all molecular biological subtypes of breast cancer with The sensitivity of the method is 81.5%, the specificity is 77.8%. The degree of accumulation of FDG by breast cancer cells has a significant direct correlation with the large size of the primary neoplasm, high mitotic activity, and the absence of hormonal receptors in the tumor., It has a high Ki67 and is an early sensitive biological marker of the aggressiveness of the malignant process.In neoadjuvant chemotherapy for locally advanced breast cancer, clinical response criteria often do not allow evaluating the

effectiveness of the treatment before surgery due to the difficulty in differentiating residual fibrous changes and active tumor tissue [8,11]. An important clinical problem of the HER2-positive subtype of invasive breast cancer remains the early identification of "responding" and "non-responding" patients after first-line chemotherapy with trastuzumab/cytostatic. In patients with metastatic breast cancer, therapeutic monitoring is difficult due to the inaccessibility of determining histopathological results. At the same time, PET/CT allows us to judge whether the patient is responding to the therapy or not, as well as predict the therapeutic result with high accuracy. In case of secondary damage to the bones of the PET skeleton/CT with FDG is the most accurate and optimal imaging method for assessing a tumor's response to treatment and may become the standard in evaluating the effectiveness of drug therapy in bone metastases. About 15% of patients have a basal-like (triple negative) subtype of breast cancer. This aggressive form of the disease is characterized by the highest glycolytic activity, an unfavorable clinical prognosis, and high sensitivity to chemotherapy. A decrease in the accumulation of fluorodeoxyglucose by breast cancer cells after the second course of chemotherapy by more than 50% of the initial one is a sensitive marker of the complete pathomorphological response of this subtype of breast cancer to treatment. Thus, the 3-year event-free survival rate was 76.5% in the group with a complete pathological response (SUV $\geq$ 42%) versus 45.1% in the group of patients who did not respond to treatment (SUV <42%). The luminal subtype of breast cancer is characterized by low glycolytic activity and has the lowest basic SUV. In this regard, PET/CT with FDG has limited use for evaluating the effectiveness of hormone therapy for this subtype of breast cancer. However, according to B.B. Koolen et al., in some patients, SUV was a predictor of a complete pathomorphological response to treatment and had a prognostic value. This was mainly related to the luminal B subtype of breast cancer with a high Ki67 proliferative activity index. To evaluate the effectiveness of drug therapy for disseminated breast cancer in patients undergoing treatment at the Tambov Regional Oncological Clinical Dispensary, we used PET/CT with fluorodeoxyglucose [15,19]. The scan was performed strictly on an empty stomach (a 6-hour fast is required). In order to reduce the background activity of fluorodeoxyglucose, we used a water load. FDG was administered intravenously slowly, in a small amount of saline solution, at a rate of 3.4 MBq/kg. At the same time, the diagnostic dose of FDG ranged from 200 to 400 MBq. The radiation load on the whole body when the diagnostic dose was administered was 5-6 mSv. Scanning was started 60-90 minutes after administration of FDG. The duration of the study ranged from 14 to 16 minutes. The interpretation of the data during the "whole body" study was performed according to visual and quantitative criteria. Visual analysis of the images was performed in three projections using a gray scale. The intensity of FDG accumulation in the foci was also determined. Breast cancer is characterized by high glycolytic activity, which causes an intensive accumulation of FDG in the tumor tissue. The values of the standardized capture level were used as a quantitative criterion. This is a dimensionless quantity

representing the ratio of the specific radioactivity in the measured area (kBq/cm3) to the amount of radioactivity introduced per body weight (MBq/kg). The value of the SUV is automatically calculated by the PET/CT scanner software package already in the process of image reconstruction, taking into account the physical half-life of the FDG. After analyzing the data obtained and comparing them with the results of other authors, we found that the diagnostic value of SUV for breast cancer metastases ranges from 1.5 to 3.0. For breast cancer, this indicator is more than 2.0. The indicator of SUV> 3.0 in the primary tumor before treatment indicates an unfavorable prognosis for survival. The permissible error of the SUV oscillation during treatment does not exceed 25% of the initial value. In complex differential diagnostic cases, we performed a "delayed" scan 2-3 hours after a single injection of FDG. The absence of a significant decrease or increase in SUV values in the lesion indicated its malignant nature. Breast cancer response to treatment was assessed by PET response criteria of PERCIST solid tumors[19] . A complete metabolic response was recorded in the absence of foci of increased FDG accumulation. A partial metabolic response is a decrease in SUVmax of > 30%. Progression is an increase in SUVmax > 30%, the appearance of new foci of FDG accumulation. Stabilization of the tumor process is none of the above criteria. Malignant tumors on PET/CT looked like areas of pathological hyperfixation of fluorodeoxyglucose of varying intensity, with clear or indistinct contours, rounded or irregular shapes. Below we present several clinical examples of the use of PET/CT diagnostics in order to monitor the effectiveness of drug treatment of breast cancer.

Conclusion

With the growing interest in personalized medicine, including molecular targeted therapy, immunotherapy, and theranostics, the role of molecular imaging in breast cancer has evolved. PET/CT imaging has an emerging role in the identification of specific potential targets in the tumor-microenvironment and selecting patients who might benefit from novel molecular-targeted therapies, thus maximizing the therapeutic effect and minimizing toxicity. In this review, we will discuss the role of PET/CT imaging in the diagnosis, staging, prognostication, recurrence assessment, radiotherapy planning, restaging, and treatment response of patients with BC and in selecting patients eligible for novel targeted therapies. Applications of PET/CT in setting outside of the guidelines, such as in the setting of early stage breast cancer, are illustrated. Examples of 16-α[18F]-fluoro-17β-estradiol (FES) PET and 18F-fluorothymidine (FLT) PET scans are depicted with discussion of potential and future clinical applications.PET/Today, CT with FDG plays an important role in analyzing the results of drug treatment of breast cancer, especially in complex clinical situations. PET/CT with fluorodeoxyglucose is a promising biological marker for early evaluation of the effectiveness of drug therapy for disseminated breast cancer. It allows you to evaluate the effect of therapy in a timely manner, if necessary, to change, supplement or terminate it in time in case of progression. This will allow the doctor to carry out personalized treatment. Compared to other medical imaging methods PET/Full-body CT is

particularly effective in evaluating the results of drug therapy for bone metastases. It can become a standard for evaluating the effectiveness of therapy.

Literature

1. Каприн А.Д., Старинский В.В., Петрова Г.В. Состояние онкологической помощи населению России в 2016 году. М.: МНИОИ им. П.А. Герцена – филиал ФГБУ «НМИРЦ» Минздрава России, 2017. 236 с.
2. Groheux D., Espi´e M., Giacchetti S. et al. Performance of FDG PET/CT in the clinical management of breast cancer // Radiology. 2013. V. 266. P. 388-405.
3. Wahl R.L., Zasadny K., Helvie M. et al. Metabolic monitoring of breast cancer chemohormonotherapy using positron emission tomography: Initial evaluation // J. Clin. Oncol. 1993. V. 11. P. 2101-2111.
4. Boellaard R. Need for standardization of 18FFDG PET/CT for treatment response assessments // J. Nucl. Med. 2011. V. 52 (2). P. 93-100.
5. Cheng X., Li Y., Liu B. et al. 18F-FDG PET/CT and PET for evaluation of pathological response to neoadjuvant chemotherapy in breast cancer: A meta-analysis // Acta Radiol. 2012. V. 53. P. 615-627.
6. Wang Y., Zhang C., Liu J. et al. Is 18F-FDG PET accurate to predict neoadjuvant therapy response in breast cancer? A meta-analysis // Breast Cancer Res. Treat. 2012. V. 131. P. 357-369.
7. Mghanga F.P., Lan X., Bakari K.H. et al. Fluorine-18 fluorodeoxyglucose positron emission tomography computed tomography in monitoring the response of breast cancer to neoadjuvant chemotherapy: A meta-analysis // Clin. Breast Cancer. 2013. V. 13. P. 271- 279.
8. Schwarz-Dose J., Untch M., Tiling R. et al. Monitoring primary systemic therapy of large and locally advanced breast cancer by using sequential positron emission tomography imaging with [18F] fluorodeoxyglucose // J. Clin. Oncol. 2009. V. 27. P. 535-541.
9. Berriolo-Riedinger A., Touzery C., Riedinger J.M. et al. [18F] FDGPET predicts complete pathological response of breast cancer to neoadjuvant chemotherapy // Eur. J. Nucl. Med. Mol. Imaging. 2007. V. 34. P. 1915-1924.
10. Garc´ia Garc´ia-Esquinas M., Garc´ia-S´aenz J.A., Arrazola Garc´ia J. et al. 18F-FDG PET-CT imaging in the neoadjuvant setting for stages II-III breast cancer: Association of loco-regional SUVmax with classical prognostic factors // Q. J. Nucl. Med. Mol. Imaging. 2014. V. 58. P. 66-73.

Akhmedova Kh. T.
senior lecturer
department of interfaculty foreign languages
Termez State University

DEVELOPING LANGUAGE SKILLS THROUGH PROBLEM-BASED LEARNING TECHNOLOGIES

Abstract. *The development of language skills in modern education requires innovative pedagogical approaches that promote active learning, critical thinking, and meaningful communication. Problem-Based Learning (PBL) has emerged as an effective learner-centered methodology that integrates real-life problems into the educational process, encouraging students to use language as a tool for inquiry, collaboration, and solution-building. This article explores the theoretical foundations of problem-based learning technologies and analyzes their role in developing key language skills, including speaking, listening, reading, and writing.*

Keywords: *problem-based learning, language skills, communicative competence, learner-centered education, educational technologies.*

Introduction

In the context of globalization and digital transformation, language education is increasingly expected to go beyond memorization of grammatical rules and vocabulary. Modern learners must develop functional language skills that enable them to communicate effectively in academic, professional, and social environments. Traditional teacher-centered approaches often fail to provide sufficient opportunities for meaningful language use, resulting in passive learning and limited communicative competence.

Problem-Based Learning (PBL) offers an alternative pedagogical model that aligns with contemporary educational goals. Originally developed in medical education, PBL has been widely adopted across disciplines, including language teaching. By engaging learners in solving authentic and complex problems, PBL transforms language from an object of study into a medium of communication and cognitive activity. This article examines how problem-based learning technologies contribute to the systematic development of language skills.

Problem-Based Learning is grounded in constructivist learning theory, which emphasizes knowledge construction through active engagement and social interaction. According to this approach, learning occurs most effectively when students are confronted with meaningful problems that require inquiry, discussion, and reflection.

Key principles of PBL include:

- learner-centered instruction;
- learning through real-world or simulated problems;
- collaborative work in small groups;

- the teacher's role as facilitator rather than information provider;
- integration of knowledge and skills across disciplines.

In language education, these principles support the development of communicative competence by encouraging learners to negotiate meaning, express ideas, and interpret information in authentic contexts.

PBL naturally promotes oral communication, as learners must discuss problems, share perspectives, and present solutions. Group discussions, debates, and oral reports require students to use language spontaneously and purposefully. Listening skills are simultaneously developed through peer interaction, as learners must comprehend different viewpoints and respond appropriately [2, 84].

Problem-based tasks require learners to work with a variety of texts, including academic articles, case studies, instructional materials, and data sources, in order to understand a given problem and develop appropriate solutions. In this process, reading is not an isolated activity but a purposeful and goal-oriented skill closely connected to problem solving. Learners read texts with a clear objective: to identify key information, recognize relationships between ideas, and evaluate the relevance of the content to the problem at hand.

Such tasks promote the development of advanced reading strategies. Skimming enables learners to grasp the general meaning and structure of a text, while scanning helps them locate specific facts, figures, or arguments efficiently. At the same time, critical reading skills are strengthened as learners assess the credibility of sources, interpret implicit meanings, and compare different perspectives. As a result, problem-based reading activities foster deeper text comprehension and encourage learners to use reading as an active cognitive tool rather than a passive process.

Writing in PBL contexts is goal-oriented and contextualized. Learners may be required to produce reports, proposals, reflections, or summaries. Such tasks develop not only grammatical accuracy but also coherence, argumentation, and genre awareness.

The integration of PBL technologies in language education offers several advantages:

- ✓ increased learner motivation through meaningful tasks;
- ✓ development of critical and analytical thinking skills;
- ✓ improvement of collaborative and social communication abilities;
- ✓ enhancement of learner autonomy and responsibility for learning;
- ✓ contextualized and functional use of language.

Furthermore, digital PBL technologies, such as online collaborative platforms, virtual simulations, and multimedia resources, expand opportunities for interaction and access to authentic materials.

Despite its benefits, implementing PBL in language classrooms presents certain challenges. These include increased preparation time for teachers, the need for well-designed problem scenarios, and difficulties in assessing individual language performance in group work. Additionally, learners with lower language proficiency may initially experience anxiety or cognitive overload.

To address these challenges, teachers should provide scaffolding, clear task instructions, and appropriate language support. Assessment strategies should combine formative and summative methods, focusing on both process and outcomes.

Conclusion

Problem-Based Learning technologies represent a powerful approach to developing language skills in modern educational contexts. By placing learners in active problem-solving situations, PBL fosters meaningful language use, communicative competence, and higher-order thinking skills. The integration of PBL into language education not only enhances linguistic development but also prepares learners for real-world communication and lifelong learning. Future research may focus on empirical studies examining the long-term impact of PBL on language proficiency across different educational levels.

References

1. Akhmedova, K. T. (2024). LINGUODIDACTIC ASPECTS OF TEACHING THE ENGLISH LANGUAGE TO A UZBEK-SPEAKING AUDIENCE. Academic research in educational sciences, 5(12), 217-220.
2. Akhmedova, K. T., & Fatullaev, S. F. (2024). CASE STUDIES AND BEST PRACTICES IN DEVELOPING COMMUNICATIVE COMPETENCE IN ECONOMICS STUDENTS. Экономика и социум, (12-2 (127)), 83-85.
3. Fakhriddinovna, K. B. (2019). THE USE OF INTERACTIVE METHODS FOR TEACHING ENGLISH LANGUAGE THE AGES OF 5-6. European Journal of Research and Reflection in Educational Sciences, 7.
4. Karshieva, B. F. (2024). TEACHING ENGLISH TO TECHNICAL STUDENTS THROUGH THE PRINCIPLES OF INTEGRATION BASED ON INTERDISCIPLINARY RELATIONS. Экономика и социум, (7 (122)), 108-111.
5. Nation, I. S. P. (2001). Learning Vocabulary in Another Language. Cambridge University Press.
6. Schmitt, N. (2010). Researching Vocabulary: A Vocabulary Research Manual. Palgrave Macmillan.
7. Wilkins, D. A. (1972). Linguistics in Language Teaching. Edward Arnold.

Alijonova M. R., p.f.f.d, (PhD)
O‘zbek tili, pedagogika va jismoniy madaniyat kafedrasi mudiri
Andijon qishloq xo‘jaligi va agrotexnologiyalar institute

INTEGRATIV YONDASHUV ASOSIDA BO‘LAJAK AGRONOMLARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISH METODIKASINING NAZARIY ASOSLARI

Annotatsiya: *Ushbu maqolada agronomning kasbiy kompetensiyasining eng muhim tarkibiy qismlaridan biri — kasbiy bilim va amaliy ko‘nikmalarni rivojlantirish jarayonida masofaviy ta’lim, onlayn kurslar hamda innovatsion pedagogik metodlardan foydalanish orqali agronomlar uchun yangi o‘qitish usullarini ishlab chiqish masalalari yoritilgan.*

Kalit so‘zlar*: kasbiy bilim, kompetensiya, pedagogik metodlar, zamonaviy texnika va o‘z-o‘zini anglash, ijtimoiy muhit*

Alijonova M. R., doctor of philosophy (phd) in pedagogical sciences
head of the department of uzbek language,
pedagogy and physical education
Andijan Institute of Agriculture and Agrotechnologies

THEORETICAL FOUNDATIONS OF THE METHODOLOGY FOR DEVELOPING PROFESSIONAL COMPETENCE OF FUTURE AGRONOMISTS BASED ON AN INTEGRATIVE APPROACH

Annotation: *The article discusses the development of new methods for training agronomists, including distance learning, online courses, and innovative pedagogical technologies, aimed at forming professional knowledge and practical skills, which are among the key components of an agronomist’s professional competence.*

Keywords: *professional knowledge, competence, pedagogical methods, modern technologies and self-awareness, social environment.*

Jahon miqyosida mamlakatlar ijtimoiy-iqtisodiy va siyosiy-madaniy rivojlanishining jadallashuvi, fuqarolik jamiyatini barpo etish uchun ijtimoiy faol fuqarolar hamda raqobatbardosh, yuqori saviyali mutaxassislarni tayyorlash zarurati dolzarb ahamiyatga ega. Ayniqsa, raqamli qishloq xo‘jaligini tashkil etish va undan foydalanishda bo‘lajak mutaxassislarning zamonaviy texnika va texnologiyalardan foydalanish ko‘nikmasini rivojlantirish, aqlli qishloq xo‘jaligi texnologiyalaridan foydalanish ahamiyat kasb etadi.

Jaxonda ta’lim tizimidagi o‘zgarishlar, shu jumladan distansion ta’lim va onlayn kurslar va innovatsion pedagogik metodlar agronomlar uchun yangicha o’qish usullarini ishlab chiqishni va kasbiy kompetentliklarni rivojlantirishni talab

qilmoqda. integrativ yondashuv nazariy va amaliy bilimlarni muvaffaqiyatli birlashtirishga yordam beradi.

Respublikamizda qishloq xo‘jaligi ta’limi va ilm-fanini yanada rivojlantirishning ustuvor yo‘nalishlari etib sohada innovatsion resurslar va tejamkor texnologiyalarni qo‘llash, raqamlashtirilgan agrotexnologiyalarni joriy qilish bo‘yicha zamonaviy bilimlarga ega bo‘lgan kadrlar tayyorlashga alohida e’tibor qaratilmoqda. “Qishloq va suv xo‘jaligi tarmoqlarini oliy ma’lumotli yuqori malakali kadrlar bilan ta’minlashni yanada takomillashtirish chora-tadbirlari to‘g‘risidagi” O‘zbekiston Respublikasi Vazirlar Mahkamasining qarorida qishloq va suv xo‘jaligi sohasidagi oliy ta’lim muassasalari pedagog-kadrlarini ilmiy tadqiqotlarning ustuvor yo‘nalishlarini tanlash va shakllantirishga jalb etish, innovatsion loyihalarida ishtirok etishlari muhim vazifa sifatida belgilangan. Agronomlarning innovatsion usullari, o‘zgaruvchan klimat sharoiti va resurslardan samarali foydalanish talablarining oshishi agronomlarning yangi bilim va ko‘nikmalarga ega bo‘lishini taqozo etadi. Bu, o‘zaro integratsiyalashgan ilmiy va amaliy yondashuvlar asosida mutaxassislarning tayyorgarligini yaxshilashga ko‘maklashadi.

Agronomning kompetensiyasining eng zarur komponentlaridan biri – kasbiy bilim va amaliy ko‘nikmadir. Agrar fanlar asoslarini bilish va bu bo‘yicha chuqur bilim, iqlim va tuproq sharoitlarini tahlil qilish qobiliyati va ularga mos texnologiyalarni tanlash lozim. Kompetensiyaning kasbiy, maxsus, ijtimoiy, umummadaniy, shaxsiy va individual turlari mavjud bo‘lib ular bir-biri bilan uzviy aloqadorlikdadir. Kompetensiyaning ko‘p qirrali va xilma-xilligi ekanligi shaxsining kasbiy faoliyatida yaqqol namoyon bo‘ladi. O‘quv-biluv qobiliyati, ijtimoiy faollik, axborot mo‘lligi, kommunikativlik yoki nizoga moyillik kabi jihatlar agranom kompetensiyasining muhim mezonlaridir. Kompetensiya (lot.Competo erishyapman, munosibman, loyiqman) u yoki bu sohadagi bilimlar, tajriba degan ma’nolarni anglatadi. Kompetensiya (lot Competere layoqatli, munosib bo‘lmoq) shaxsning biror bir sohadan xabardorlik, shu sohani bilish darajasi.

Kompetentlik ma’lum holat xususida to‘g‘ri mulohaza yuritishga imkon beradigan bilimga ega bo‘lish, dalil isbotli fikr, kishining muayyan sohada saviyasini ifoda etadigan atama. Kompetentlik shaxs xususiyatlari va holatining murakkab majmui bo‘lib, ma’lum sohadagi bilim, ko‘nikma va tajribani mujassamlashtirishdir. Kompetentlik insonga muayyan masalalarda fikr bildirishi, ma’lum qarorlarni ishlab chiqishda ishtirok etish yoki mustaqil ravishda qaror qabul qilish imkonini beradi.

Oliy ma’lumotli mutaxassis shaxsiga va ularning faoliyatiga qo‘yilayotgan zamonaviy talablar asosida ta’limni modernizatsiya qilish, yangilash hamda ta’lim mazmunini izchil rivojlantirib borish bilan bir qatorda, bo‘lajak mutaxassislarga belgilangan malakaviy talablarni ham shaxs va jamiyat extiyojlariga muvofiq izchil takomillashtirib borish zarurati mavjud.

Shaxsning shakllanishini shaxsning o`zaro mos tarzda bajarilgan ijodiy faoliyat va ijodiy mahsulotlarni yaratish borasidagi rivojlanishi sifatida belgilash

mumkin. Ushbu jarayonning sur‟ati va qamrovi biologik va ijtimoiy omillar, shaxsning faolligi va kreativ sifatlari, shuningdek, mavjud shart-sharoit, hayotiy muhim va kasbiy shartlangan hodisalarga bog`liq. Zamonaviy sharoitda hodimning kreativlik sifatlariga ega bo`lishi taqozo etadi.

So`nggi yillarda etakchi xorijiy mamlakatlarning ta’lim tizimida o`quvchi va Bo`lajak hodimlarda kreativlik sifatlarini shakllantirish masalasiga alohida, jiddiy e’tibor qaratilmoqda.

Foydalanilgan adabiyotlar

1. Abdukodirov A., Pardayev A. Pedagogik texnologiyalarga oid atamalarning izoxli lug‘ati. - Toshkent: Fan va texnologiyalar, 2012. - 44 b.
2. Ahmedova N. “Integrativ yondashuv asosida bo‘lajak o‘qituvchilarning kasbiy tayyorgarligini takomillashtirish” Pedagogika fanlari bo‘yicha falsafa doktori ilmiy darajasii olish uchun yozilgan dissertatsiya avtoreferati. Toshkent 2020 yil. 54 bet.
3. Muslimov N.A. Kasb ta’limi o‘qituvchisini kasbiy shakllantirishning nazariy metodik asoslari. Diss. ... ped. fan. dokt. – T.: 2007. – 315 b]
4. Urazova M. Bo‘lajak kasbiy ta’lim pedagogini loyihalash faoliyatiga tayyorlash texnologiyasini takomillashtirish. 13.00.05 – Kasbiy ta’lim nazariyasi va metodikasi (pedagogika fanlari) ixtisosligi bo‘yicha yozilgan doktorlik dissertatsiyasi avtoreferati. Toshkent-2015. 80 b.
5. Xodjaboev A.R. Учебно-методический комплекс подготовки учителей трудового обучения. Метод. реком. – Т.: УзНИИПИ, 2009. - 93 с.
6. Djuraev R.X., Tolipov O‘.Q., Safarova R.G‘., To‘raqulov X.O., Inoyatova M.E., Divanova M.S. Pedagogik atamalar lug‘ati / R.X.Djuraev tahriri ostida. – T.: “Fan”, 2008. –58-b.

UO‘K: 579.861.2:616-002.5

Anarbayev A. A.
talaba
Aliyev M. J.
talaba
Murodjonov A. E.
talaba
Ilmiy rahbar: Abdullayev U. M.
katta o‘qituvchi
Toshkent davlat tibbiyot universiteti
Toshkent, O‘zbekiston

STAPHYLOCOCCUS EPIDERMIDISNING PATOGEN POTENSIALI: BIOFILM BIOGENEZINING GENETIK MEXANIZMLARI VA NOSOKOMIAL INFEKSIYALARDAGI ROLI

Annotatsiya. *Ushbu maqola Staphylococcus epidermidisning opportunistik patogen sifatidagi ahamiyatini ilmiy jihatdan tahlil qilishga bag‘ishlangan. S. epidermidis inson terisi va shilimshiq pardalarida keng tarqalgan kommensal mikroorganizmdir, ammo immuniteti susaygan bemorlar yoki tibbiy implantlarga ega shaxslarda u infeksiya chaqiruvchi vositaga aylanadi. Maqolada bakteriyaning biofilm hosil qilish qobiliyati va nosokomial infeksiyalardagi roli asosiy mavzu sifatida ko‘rib chiqilgan. Ushbu ishlanmalar S. epidermidis bilan bog‘liq nosokomial infeksiyalarning oldini olish, diagnostika va davolash strategiyalarini takomillashtirishga yordam beradi.*

Kalit so‘zlar: *Staphylococcus epidermidis, biofilm, virulentlik, antibiotik rezistentlik, nosokomial infeksiyalar, patogenez, diagnostika.*

Anarbayev A. A.
student
Aliyev M. J.
student
Murodjonov A. E.
student
Scientific supervisor: Abdullayev U. M.
senior lecturer
Tashkent State Medical University
Tashkent, Uzbekistan

STAPHYLOCOCCUS EPIDERMIDIS PATHOGENIC POTENTIAL: GENETIC MECHANISMS OF BIOFILM BIOGENESIS AND ITS ROLE IN NOSOCOMIAL INFECTIONS

Annotation. *This article examines the opportunistic pathogenicity of Staphylococcus epidermidis, a common commensal of human skin and mucous*

membranes, which can cause infections in immunocompromised patients or those with medical implants. Its main virulence factor is biofilm formation, which protects the bacteria from antibiotics and immune system attacks. The study focuses on biofilm formation mechanisms, virulence factors, antibiotic resistance, and the challenges in diagnosing and treating nosocomial infections. The findings have clinical and epidemiological significance and contribute to the development of preventive and therapeutic strategies against S. epidermidis.

Keywords: *Staphylococcus epidermidis, biofilm, virulence, antibiotic resistance, nosocomial infections, pathogenesis, diagnostics.*

Kirish

Staphylococcus epidermidis inson terisi va shilimshiq pardalarining keng tarqalgan kommensal bakteriyasi bo‘lib, sog‘lom shaxslarda odatda patogen emas [2,8]. Biroq, immuniteti pasaygan bemorlar yoki tibbiy implantlar mavjud bo‘lgan shaxslarda u opportunistik patogen sifatida namoyon bo‘ladi [7,10]. Ushbu bakteriyaning asosiy virulentlik omili – biofilm hosil qilish qobiliyati bo‘lib, u infeksiyalarning surunkali kechishiga, antibiotiklar va immun tizim hujumlariga chidamliligiga olib keladi [1,5]. S. epidermidis nosokomial infeksiyalarning yetakchi sababi bo‘lib, u intravaskulyar kateterlar, protez bo‘g‘imlar va prostetik yurak qurilmalariga bog‘liq infektsiyalarni, shuningdek neonatal sepsisini keltirib chiqaradi.

Biofilm hosil qilish mexanizmi bakteriyaning fenotipik va genotipik xususiyatlariga, yuzaki adgezinlar va ekstratsellyular polimerlar orqali kolonizatsiya qilishiga bog‘liq. Shu sababli S. epidermidisning opportunistik patogen sifatidagi roli va nosokomial infeksiyalardagi ahamiyati ilmiy va klinik jihatdan dolzarb masala hisoblanadi [2,7].

Tadqiqot maqsadi

Ushbu tadqiqotning maqsadi Staphylococcus epidermidisning opportunistik patogen sifatidagi ahamiyatini aniqlash, uning biofilm hosil qilish mexanizmlari, virulentlik faktorlar va antibiotiklarga rezistentlik mexanizmlarini tahlil qilishdan iborat. Shuningdek, S. epidermidis bilan bog‘liq nosokomial infeksiyalarning klinik ko‘rinishlari, diagnostik yondashuvlari va davolash strategiyalaridagi amaliy muammolarni baholash hamda biofilmga qarshi zamonaviy profilaktik va terapevtik choralarni ko‘rsatish tadqiqotning asosiy vazifalaridan hisoblanadi [3,9,10].

Materiallar va metodlar

Tadqiqotda S. epidermidisga oid nashr qilingan ilmiy maqolalar, klinik kuzatuvlar va epidemiologik hisobotlar (1990–2025) tahlil qilindi [1,2,4,8]. Kasalxonalardan olingan izolatlar, biofilm hosil qilish va antibiotik sezuvchanligi bo‘yicha mavjud laboratoriya ma’lumotlari ishlatildi. Adabiyotlar PubMed, Scopus va Web of Science bazalaridan tanlandi, muhim klinik va molekulyar ma’lumotlar sistematik tarzda yig‘ildi va tahlil qilindi. Klinik ma’lumotlar S. epidermidis bilan bog‘liq qon oqimi infeksiyalari, protez bo‘g‘im infeksiyalari va neonatal sepsisni qamrab oldi, biofilm va antibiotik rezistentligi darajasi o‘rganildi

[3,4]. Molekulyar tahlilda biofilm hosil qilish mexanizmlari (ica lokusi, PIA, eDNA, Aap/Bhp oqsillari) va virulentlik faktorlar (MSCRAMM proteinlari, toksinlar, fermentlar) tadqiq qilindi. Klinik, laboratoriya va molekulyar ma'lumotlar birlashtirilib, S. epidermidisning patogenlik salohiyati, nosokomial infeksiyalardagi roli va biofilmga qarshi profilaktika hamda davolash strategiyalari bo‘yicha xulosalar chiqarildi [1,7,8].

Natijalar va muhokama

Tadqiqot natijalari S. epidermidisning opportunistik patogen sifatidagi ahamiyati va nosokomial infeksiyalardagi rolini tasdiqladi [2,8]. Bakteriya odatda inson terisi va shilimshiq pardalarining kommensal mikroflorasi sifatida mavjud bo‘lsa-da, immuniteti zaif yoki tibbiy implantga ega bemorlarda infeksiyalarni chaqiradi. Epidemiologik ma'lumotlar S. epidermidisni kasalxona sharoitida eng keng tarqalgan patogenlardan biri ekanligini ko‘rsatadi; u intravaskulyar kateterlar, protez bo‘g‘imlar va boshqa tibbiy implantlar bilan bog‘liq qon oqimi infeksiyalari, prostetik klapan endokarditi va neonatal sepsisda yetakchi rol o‘ynaydi [3,6]. ICU bo‘limlarida qon oqimi infeksiyalarining taxminan 22%, protez bo‘g‘im infeksiyalarining 30–43%, neonatal sepsisning katta qismi S. epidermidis bilan bog‘liq [3,4].

S. epidermidisning asosiy virulentlik omili biofilm hosil qilish qobiliyatidir. Tadqiqotlarda bakteriyaning biofilm hosil qilish mexanizmlari chuqur o‘rganilgan: birlamchi adgeziya AtlE autolizini va MSCRAMM oqsillari (Fbe, SdrF, Embp) orqali yuzaki va host proteinlariga bog‘lanish bilan boshlanadi, ikkilamchi adgeziya esa polisaxarid intersellyular adgezin (PIA), eDNA va Aap/Bhp oqsillari orqali ko‘p qatlamli klasterlar hosil qilish bilan davom etadi [1,5,6]. Biofilm bakteriyani fagotsitozdan, antibiotik penetratsiyasidan va immun tizim hujumlaridan himoya qiladi, shuningdek, metabolizmni pasaytirib, infeksiyalarni subakut yoki surunkali kechishiga sabab bo‘ladi.

Molekulyar tahlillar S. epidermidisning rezistentlik mexanizmlarini ham ko‘rsatdi. Tadqiqotlarda klinik izolatlarning ~80% metitsillin-rezistent (MRSE) ekanligi aniqlandi [2,9]. Rezistentlik mecA geni va SCCmec elementlari orqali shakllanadi, shuningdek, MGE orqali boshqa antibiotiklar (makrolidlar, aminoglikozidlar, tetratsiklinlar)ga qarshi genlar ham tarqaladi. Biofilm bilan birga bu rezistentlik S. epidermidis infeksiyalarini davolashni murakkablashtiradi, ko‘pincha implantni olib tashlash va ko‘p bosqichli antibiotik terapiyani talab qiladi.

Klinik kuzatuvlar shuni ko‘rsatadiki, S. epidermidis infeksiyalari ko‘pincha subakut yoki subklinik tarzda kechadi. Simptomlar noaniq bo‘lib, mahalliy og‘riq, yallig‘lanish, implant ishlamay qolishi va vaqti-vaqti bilan isitma bilan namoyon bo‘ladi. Neonatal sepsisda apnoe, bradikardiya, letargiya va termoregulyatsiya buzilishi kuzatiladi [3]. Tadqiqotlar biofilm ichidagi bakteriyalar metabolizmni pasaytirgani va immun tizimni cheklaganini, shuning uchun standart davolash usullarining samaradorligi pastligini tasdiqladi.

S. epidermidisning boshqa mikroorganizmlar bilan o‘zaro raqobati ham muhim ahamiyatga ega. U S. aureusni lantibiotiklar (epidermin, epilancin K7) va

feromonlar orqali inhibe qiladi, bu esa teri va implant yuzalarida dominant kolonizatsiyani ta’minlaydi. Shu bilan birga, fermentlar (proteazlar, lipazlar) va kam miqdordagi toksinlar (PSMlar, δ-toksin) bakteriyaning host immun tizimidan muvaffaqiyatli qochishini va biofilm ichida xavfsiz qolishini ta’minlaydi [1,5].

Davolash va profilaktika strategiyalari bo‘yicha tadqiqot natijalari shuni ko‘rsatadiki, empirik davolashda vankomitsin va rifampitsin qo‘llanadi, ammo biofilmga qarshi yangi terapiya yo‘nalishlari (anti-PIA antikorlar, interferon-γ, yuzaki adgezinlarga qarshi antikorlar) samaradorlikni oshiradi [1,7,9]. Profilaktik choralar sifatida kateter va implantlar kiritishda gigiyena, antibiotik qoplamali materiallar va biofilmni inhibe qiluvchi vositalar muhim hisoblanadi.

Shu tarzda, tadqiqot S. epidermidisning nosokomial infeksiyalardagi yetakchi rolini, biofilm va rezistentlik mexanizmlarini, klinik va molekulyar xususiyatlarini birlashtirgan holda tahlil qildi. Natijalar kasalxona infeksiyalarini oldini olish, biofilmga qarshi yangi davolash strategiyalarini ishlab chiqish va S. epidermidisning patogenlik salohiyatini yaxshiroq tushunishga asos yaratadi [2,7].

Xulosa

Staphylococcus epidermidis inson terisi va shilimshiq pardalarining keng tarqalgan kommensal bakteriyasi bo‘lishiga qaramay, tibbiy implantlar mavjudligi, immunitet tanqisligi yoki epiteliy to‘sig‘ining buzilishi sharoitida opportunistik patogen sifatida namoyon bo‘ladi. Tadqiqot natijalari S. epidermidisning nosokomial infeksiyalardagi yetakchi rolini tasdiqladi: u intravaskulyar kateterlar orqali qon oqimi infeksiyalari, protez bo‘g‘im infeksiyalari, prostetik klapan endokarditi va neonatal sepsisning katta qismini keltirib chiqaradi. Bakteriyaning asosiy virulentlik omili biofilm hosil qilish qobiliyati bo‘lib, bu mexanizm antibiotiklar va host immun tizim hujumlaridan himoya qiladi, infeksiyalarni subakut yoki surunkali kechishiga sabab bo‘ladi.

Molekulyar darajada S. epidermidisning rezistentlik mexanizmlari, xususan mecA geni va SCCmec elementlari orqali metitsillin-rezistent shtammlar paydo bo‘lishi, shuningdek, MGE orqali boshqa antibiotiklarga qarshi genlar tarqalishi, infeksiyalarni davolashni murakkablashtiradi. Biofilm ichida bakteriyalar metabolizmni pasaytirib, fagotsitoz va antibiotik penetratsiyasini cheklaydi, bu esa davolash muvaffaqiyatsizligiga olib keladi va ko‘pincha implantni olib tashlashni talab qiladi.

Tadqiqot shuningdek, S. epidermidisning S. aureus kabi boshqa mikroorganizmlar bilan raqobatlashishini, lantibiotiklar va feromonlar orqali dominant kolonizatsiyani ta’minlashini va biofilm bilan birga minimal toksin arsenaliga ega ekanini ko‘rsatdi. Ushbu xususiyatlar bakteriyaning opportunistik patogen sifatida klinik ahamiyatini oshiradi.

Klinik va profilaktik jihatdan natijalar S. epidermidis infeksiyalarini oldini olishda gigiyena, sterilizatsiya, antibiotik qoplamali implantlar va biofilmni inhibe qiluvchi strategiyalarning muhimligini tasdiqlaydi. Shu bilan birga, yangi terapiya yo‘nalishlari – anti-PIA antikorlar, yuzaki adgezinlarga qarshi antikorlar va immunomodulyatorlar (interferon-γ) – infeksiyalarni samarali nazorat qilish va davolash imkoniyatlarini kengaytiradi.

Kelajakdagi tadqiqotlar S. epidermidisning genomik xilma-xilligi, klonal liniyalar (A/C va B), intracellulyar persistensiya va biofilmni hosil qilish mexanizmlarini chuqur o‘rganishga qaratilishi lozim. Bu yondashuv kasalxona infeksiyalarini oldini olish, S. epidermidisning patogenlik potentsialini aniqlash va zamonaviy davolash strategiyalarini takomillashtirishga xizmat qiladi. Shunday qilib, S. epidermidisning kommensaldan opportunistik patogenga evolyutsiyasi va antibiotik rezistentligi klinik amaliyotda dolzarb ahamiyat kasb etadi.

Foydalanilgan adabiyotlar:

1. Arciola, C.R., Campoccia, D., & Montanaro, L. (2012). Implant infections: adhesion, biofilm formation and immune evasion. Nature Reviews Microbiology, 10, 39–53.
2. Becker, K., Heilmann, C., & Peters, G. (2014). Coagulase-negative staphylococci. Clinical Microbiology Reviews, 27(4), 870–926.
3. Centers for Disease Control and Prevention (CDC). (1998). National Nosocomial Infections Surveillance System Report.
4. Christensen, G.D., et al. (1985). Nosocomial septicemia due to multiply antibiotic-resistant Staphylococcus epidermidis. Annals of Internal Medicine, 102(1), 1–8.
5. Heilmann, C., Thumm, G., Chhatwal, G.S., et al. (1997). Structure and function of microbial surface components recognizing adhesive matrix molecules of Staphylococcus epidermidis. Molecular Microbiology, 24(4), 797–808.
6. Heilmann, C., et al. (1996). Evidence for a common adherence mechanism of Staphylococcus epidermidis in device-related infections. Journal of Infectious Diseases, 174(4), 808–813.
7. Mack, D., et al. (1994). Biofilm formation in Staphylococcus epidermidis and its role in prosthetic device infections. Infection and Immunity, 62(1), 277–283.
8. Otto, M. (2009). Staphylococcus epidermidis—the ‘accidental’ pathogen. Nature Reviews Microbiology, 7(8), 555–567.
9. Clinical and Laboratory Standards Institute (CLSI). (2020). Performance Standards for Antimicrobial Susceptibility Testing, 30th Edition.
10. Vuong, C., & Otto, M. (2002). Staphylococcus epidermidis infections. Microbes and Infection, 4(4), 481–489.
11. Машарипов В. У., Мирвалиева Н. Р., Абдуллаев У. М. Местный иммунитет и специфическая сенсибилизация к антигенам бактерий у больных тонзиллитом //Science and Education. – 2023. – Т. 4. – №. 2. – С. 392-400.
12. UM, Bohodirov MD Abdullayev. THE ROLE OF BACTERIA IN ACUTE AND CHRONIC RHINOSINOCYTETIOLOGY AND CHRONIC RHINOSINOCYTETIOLOGY AND THEIR SENSITIVITY TO MODERN ANTIBIOTICS. Diss. 2022.

Aripov M. M., candidate of technical sciences
professor
department of digital technology and artificial intelligence
Kokand State University
Ferghana

METHODS OF TEACHING ROBOTICS IN SECONDARY SCHOOLS FROM THE TINKERCAD PLATFORM

Annotation. *The integration of robotics into secondary school curricula is becoming increasingly important to prepare students for the technological future. This paper presents a comprehensive methodology for teaching robotics in secondary schools using the Tinkercad platform, a user-friendly web-based tool that allows you to design, code and simulate electrical circuits in a virtual environment. The study examines how Tinkercad can enhance student engagement, creativity, and problem-solving skills through hands-on experience in designing and programming robotic systems. A mixed method was used to evaluate the effectiveness of the Tinkercad-based methodology. Quantitative data was collected through a preliminary and follow-up assessment of 200 students from 10 secondary schools, and qualitative data was collected through interviews with teachers and student focus groups. The results show that students have a significant understanding of the basic concepts of robotics, such as sensor integration, microcontroller programming, and system automation.*

Keywords: *Robotics education, Tinkercad, high school curriculum, STEM integration, educational technologies, microcontroller programming, project-based learning, simulation platforms, Arduino, digital literacy.*

Introduction

In the 21st century, the rapid development of technology has led to profound changes in almost all areas of human activity, including education, and the most dynamic innovation is robotics, which has emerged not only as a field. At the same time, robotics is a powerful pedagogical tool. The introduction of robotics into secondary schools is becoming increasingly necessary in order to equip students with the skills needed in a technology-driven world. As digital literacy becomes a core component of modern education, educational institutions are looking for effective and affordable tools to integrate robotics into the learning process. One of these tools is Tinkercad, a free web platform developed by Autodesk that allows students to design circuits, write code, and simulate real-world robotic systems in a virtual environment.

The global transition to STEM education (science, technology, engineering, and mathematics) highlights the need to teach robotics as an interdisciplinary subject that promotes creativity, problem solving, and critical thinking. Robotics education promotes students' understanding of abstract scientific and mathematical principles by offering them practical applications. It transforms passive learners

into active creators, encouraging hands-on research and iterative learning. However, the introduction of robotics in secondary schools is fraught with certain difficulties. Schools may not have enough financial resources to purchase equipment, and teachers may not have the technical knowledge necessary to teach complex robotic systems. This is where platforms like Tinkercad are invaluable, offering a simulated environment where both students and teachers can experiment, learn, and innovate without needing expensive physical components.

The educational potential of Tinkercad lies in its simplicity and accessibility. With just a computer and an internet connection, students can explore various aspects of electronics, programming, and robotics. Tinkercad supports the simulation of Arduino microcontrollers, allowing students to create interactive systems using block or text programming. With this platform, students can learn how to use sensors, actuators, and control systems, thereby gaining fundamental knowledge about embedded systems - knowledge that is essential in modern engineering and technology careers.

The purpose of this paper is to propose a structured methodology for teaching robotics in secondary schools using the Tinkercad platform. It aims to demonstrate how this platform can be effectively integrated into the school curriculum to increase student engagement and academic achievement in STEM-related subjects. The methodology is based on constructivist learning theories, emphasizing student-centered approaches and project-based learning models. Using Tinkercad, educators can create an interactive and collaborative learning environment that promotes 21st century skills development.

In addition, the article examines the broader implications of using virtual platforms in robotics education. While physical robotics kits such as LEGO and Arduino have traditionally been used in classrooms, their use often comes with significant costs. In contrast, Tinkercad is a free and scalable solution suitable for both urban and rural schools, especially in developing countries. The methodology presented in this paper includes a step-by-step scheme for integrating Tinkercad into lesson plans that meet national and international educational standards. It also contains practical strategies for teacher training, assessment development, and curriculum development.

In addition to its pedagogical value, this research contributes to the ongoing discourse on digital transformation in education. As distance learning and blended teaching models become more widespread, virtual platforms such as Tinkercad represent a paradigm shift in the teaching of technical disciplines.

Literature review. In recent decades, the emergence of robotics as a pedagogical tool has sparked growing interest in its application in formal education systems, especially in secondary schools. The literature on robotics shows that it has evolved from a specialized technical subject into an interdisciplinary teaching method aimed at developing 21st century skills. Scientists such as Papert (1980) laid the foundations of constructivist learning theories, which later served as the philosophical foundation for educational robotics. Papert emphasized the importance of learning through action, which is a

central element of the educational environment based on robotics. Tinkercad, as a modern virtual tool, builds on these pedagogical traditions by providing accessible interactive platforms for modeling and coding robotics.

Robotics in high school. Alimisis (2013) research highlights the role of robotics in developing critical thinking, creativity, and collaborative problem solving among high school students. Robotics is no longer seen only as a path to an engineering career, but also as a means to strengthen key competencies in various disciplines. According to Eguchi (2014), teaching robotics allows students to learn by doing what is consistent with experimental learning theories and promotes student independence.

The rise of virtual platforms in STEM education. Due to the growing demand for distance learning tools, some scientists note the advantages of virtual platforms such as Tinkercad in overcoming logistical and financial barriers in STEM education. A study by Said et al. (2020) showed that students who use Tinkercad to model electronic circuits demonstrate a better conceptual understanding compared to those who use only textbooks or static visual materials. In addition, Gamaj and Ayres (2019) found that Tinkercad reduces cognitive costs.

The workload associated with traditional laboratory installations allows students to focus on problem solving rather than on the complexities of installation.

Tinkercad as an educational tool. Tinkercad has been praised for its simplicity and accessibility. Fidan and Tuncel (2019), this platform allows students to study circuit engineering, programming, and electronics in a safe and interactive environment. Its compatibility with Arduino simulators makes it an ideal tool for teaching robotics concepts such as sensor integration and automatic control. Students gain valuable coding experience by visualizing the practical impact of their code on virtual hardware.

Integrating robotics into STEM curricula. Many scientists advocate for the inclusion of robotics in national STEM curricula. Behrs and Portsmore (2005) argue that robotics can combine the often disparate teaching of science, mathematics, and technology. In this context, Tinkercad serves as a bridge between theoretical concepts and real-world applications. Weng et al. (2016) believe that project-based learning using robotics contributes to a deeper study of mathematical reasoning and computational logic.

Teacher readiness and professional development. The successful implementation of robotics in schools depends on teacher training. According to the findings of Barak and Assal (2018), many educators feel insufficiently prepared to teach robotics due to a lack of technical knowledge. This highlights the need for affordable tools like Tinkercad that require minimal setup and training. A study by Ahmed and Yusoff (2021) confirms that short-term training using Tinkercad significantly increases teachers' confidence in conducting robotics lessons.

Assessment strategies in robotics education. Effective assessment remains a challenging task in robotics education. Traditional testing methods often do not reflect the creative processes and collaborative efforts of students. According to Erwin et al. (2017), performance-based assessments, portfolios, and rubrics that evaluate problem solving and design thinking are more suitable for teaching robotics. The modular structure of Tinkercad projects allows teachers to develop assignments that comply with modern assessment methods.

Digital equality and accessibility. The issues of digital inequality are widely discussed in the context of robotics education. The UNESCO Report (2021) highlights that virtual tools such as Tinkercad can democratize access to STEM education in under-resourced regions. Unlike expensive robotics kits, Tinkercad is free and requires no physical components, making it affordable for schools on a tight budget.

Motivation and engagement. Student motivation is a recurring theme in the robotics literature. A study conducted by Petra and Price (2004) showed that students experience a greater sense of belonging and purpose when working on robotics projects. Tinkercad enhances this engagement by allowing students to immediately test and visualize their code, which creates a feedback loop that supports iterative learning.

Methodology. This section describes the design of the study, the selection of participants, the learning framework, tools and evaluation strategies used to study the effectiveness of using the Tinkercad platform in teaching robotics in secondary schools. The methodology has been developed in such a way as to ensure reproducibility, validity and reliability in accordance with the best practices in the field of educational research.

Research design. For a comprehensive study of both quantitative results (such as academic performance and conceptual understanding) and qualitative results (such as student engagement and teacher perception) A mixed-method approach was used. This approach allows for triangulation, increasing the reliability of conclusions by combining statistical data with descriptive evidence.

The study was conducted according to a research sequential scheme, starting with a qualitative needs analysis to identify existing gaps in robotics training, followed by an experimental intervention using Tinkercad and culminating with an analysis of the results after the intervention.

Participants and selection. 10 secondary schools participated in the study. 220 students between the ages of 13 and 16 participated in the study. The schools were selected using a stratified random sample to ensure demographic diversity. The teachers involved in the study had an education in ICT, physics, or mathematics and had received prior training in using Tinkercad to teach robotics.

The stage of preparation for implementation. Before starting work in the classroom, a workshop was held for teachers on using Tinkercad, circuit modeling, Arduino programming, and project-based learning. Each teacher participating in the seminar received a guide with a description of the learning scheme and lesson plans.

In addition, students and teachers were offered a basic survey to assess previous experience in robotics, attitudes towards STEM and the level of digital literacy.

Instructional framework. The curriculum is based on project-based learning and constructivist pedagogy, when students actively construct knowledge by participating in practical, research activities. The course was divided into three main modules, lasting 12 weeks.:

Module 1: Fundamentals of Robotics and Electronics. Getting to know circuits, resistors, LEDs, and breadboards using the Tinkercad "Circuits" interface. Students simulate simple lighting systems and measure current/voltage

Module 2: Arduino and sensor integration. Programming Arduino using block and text code, using virtual sensors (for example, temperature, motion) and actuators (motors, buzzers).

Module 3: Final project. Students develop and model a robotic system (for example, a smart traffic light, a car that avoids obstacles).

Feedback from colleagues and presentations. Each week included a theoretical component, practical and laboratory simulations, reflective discussion, and weekly assessments.

Results and discussion. This section presents the empirical results of the study and discusses their implications in the light of the objectives set. To assess the impact of the Tinkercad platform on learning outcomes, student engagement, and the overall perception of robotics education in secondary schools, data obtained during preliminary and subsequent testing, surveys, and interviews with teachers were analyzed.

Improved conceptual understanding. The results before and after the test showed a statistically significant improvement in students' understanding of robotics and electronics concepts. The average score before passing the test was 42.5%, and after passing the test - 78.6%.

Increased student engagement. The student's thought diaries indicate a high level of engagement in the program. More than 89% of students said that Tinkercad made learning more "fun" and "easy" to understand.

Self-confidence and digital literacy. According to the results of surveys conducted after the intervention, 75% of students felt more confident when using digital learning tools. In addition, the digital literacy assessment showed that students' ability to navigate online platforms, troubleshoot code, and document their progress using digital tools improved by an average of 26%.

These results reflect the observations of Gamaj and Ayres (2019) that virtual instruments reduce cognitive load and promote confidence, especially in novice learners.

Teachers' views. Semi-structured interviews with 15 teachers revealed general enthusiasm for using Tinkercad in the classroom. Among the general advantages, the following were mentioned:

- simplified preparation and conduct of lessons;
- Real-time monitoring of student progress;

- flexibility in face-to-face and online learning formats.

However, some teachers noted that at first they were doubtful because they did not know the simulation tools. After the two-week training program, this concern has decreased, which suggests that professional development is a crucial factor contributing to successful integration.

Problems encountered. Despite the overall success of the program, several problems were noted. Limited Internet access, especially in rural schools, connection problems sometimes prevented classes from taking place. Workarounds included preloading simulations and scheduling lab sessions during low-workload hours.

Limitations of modeling. Some students noted that Tinkercad cannot fully reproduce the tactile sensations of working with real components. Although the platform is very effective for conceptual learning, its limitations in providing physical interaction have been recognized by both students and teachers.

Final projects. At the end of the course, students had to develop a working prototype robot using Tinkercad. The projects included:

- smart home systems;
- automated lighting for greenhouses;
- vehicles avoiding obstacles;
- environmental monitoring sensors (e.g. temperature, light).

Projects were evaluated based on creativity, functionality, problem solving, and documentation. 92% of the students successfully completed functional modeling, with more than 80% exceeding the expectations of the rubric.

This work demonstrated not only the acquisition of technical skills, but also the development of 21st century competencies such as teamwork, communication, and digital project management.

Implications for practice. The results show that Tinkercad can serve as an effective and scalable solution for integrating robotics education into secondary school curricula. Its accessibility and compatibility with project-based learning makes it a strong candidate for widespread adoption, especially in resource-constrained environments.

The high results and student engagement observed in this study suggest that virtual robotic platforms do not just replace physical sets, but can act as powerful educational tools, especially with thoughtful integration with pedagogy.

Conclusion

The integration of the Tinkercad platform into robotics education in secondary schools has shown promising results in terms of student learning, engagement, and digital competence. Through a blended research method involving more than 200 students in various educational contexts, the study provided compelling evidence that virtual platforms can significantly enhance STEM education if applied within a well-thought-out pedagogical framework.

Used literature

1. Alimisis, D. (2013). Educational robotics: Open questions and new challenges. Themes in Science and Technology Education, 6(1), 63–71.

2. Arduino. (2022). Arduino Education. Retrieved from https://www.arduino.cc/en/Main/Education
3. Bers, M. U. (2020). Coding as a playground: Programming and computational thinking in the early childhood classroom (2nd ed.). Routledge.
4. Blikstein, P. (2018). Pre-college engineering education: Theory, policy, and practice. Technology and Engineering Teacher, 78(3), 18–21.
5. Brown, N. C. C., Sentance, S., Crick, T., & Humphreys, S. (2014). Restart: The resurgence of computer science in UK schools. ACM Transactions on Computing Education (TOCE), 14(2), 1–22.
6. Clough, G., Jones, A. C., McAndrew, P., & Scanlon, E. (2008). Informal learning with PDAs and smartphones. Journal of Computer Assisted Learning, 24(5), 359–371.
7. Eguchi, A. (2014). Robotics as a learning tool for educational transformation. In Proceedings of the 4th International Workshop Teaching Robotics, Teaching with Robotics & 5th International Conference Robotics in Education (RiE 2014) (pp. 27–34).
8. Hamner, E., & Cross, J. (2013). Arts & bots: Techniques for distributing a STEAM robotics program. Proceedings of the 43rd ACM Technical Symposium on Computer Science Education, 591–596.
9. Tinkercad. (2022). Tinkercad Circuits. Retrieved from https://www.tinkercad.com (https://www.tinkercad.com/)

Axmedov Y. M.
sport faolyati va chaqiriqqacha harbiy ta'lim kafedrasi o'qituvchisi
Ro'ziboyev R. B.
Sport faolyati va chaqiriqqacha harbiy ta'lim kafedrasi
chaqiriqqacha harbiy ta'lim yo'nalishi talabasi
Norboyev I. X.
Sport faolyati va chaqiriqqacha harbiy ta'lim kafedrasi
chaqiriqqacha harbiy ta'lim yo'nalishi talabasi
Ibrohimov Sh. H.
Sport faolyati va chaqiriqqacha harbiy ta'lim kafedrasi
chaqiriqqacha harbiy ta'lim yo'nalishi talabasi
Termiz davlat pedagogika instituti

HARBIY-AMALIY SPORT TURLARINING RIVOJLANISHI YOSHLARDA VATANPARVARLIK HISSINI RIVOJLANTIRISHNING ASOSIY OMILI

Annotatsiya: *Maqolada harbiy-amaliy sport turlarining yoshlar orasida vatanparvarlik, jasorat va fidoyilik kabi ijobiy fazilatlarni shakllantirishdagi roli o'rganilgan. Harbiy-amaliy sportning jismoniy va ma'naviy tarbiya elementlarini birlashtiruvchi xususiyati, yoshlarni jamoaviy ishga o'rgatishi va qiyinchiliklarga dosh berish ko'nikmalarini rivojlantirishi batafsil tahlil qilingan. Shuningdek, maqolada bu sport turlarini maktab va oliy ta'lim muassasalarida kengaytirish orqali yoshlarning vatanparvarlik hissini mustahkamlash va ularni sog'lom turmush tarziga rag'batlantirish imkoniyatlari ko'rsatib o'tilgan. Tadqiqot natijalari harbiy-amaliy sportning nafaqat jismoniy, balki ma'naviy tarbiya vositasi sifatida muhimligini tasdiqlaydi.*

Kalit so'zlar: *Harbiy-amaliy sport, yoshlarda tarbiya, vatanparvarlik, jismoniy rivojlanish, ma'naviy rivojlanish , jasorat va fidoyilik, sport va ma'naviyat*

Ahmedov Y. M.
lecturer
department of sports activities and pre-conscription military training
Roziboyev R. B.
department of sports activities and pre-conscription military training,
pre-conscription military training program, student
Norboyev I. Kh.
department of sports activities and pre-conscription military training,
pre-conscription military training program, student
Ibrohimov Sh. H.
department of sports activities and pre-conscription military training,
pre-conscription military training program, student
Termiz State Pedagogical Institute

DEVELOPMENT OF MILITARY-APPLIED SPORTS AS A KEY FACTOR IN FOSTERING PATRIOTISM AMONG YOUTH

Abstract: *This article explores the role of military-applied sports in developing patriotism, courage, and selflessness among youth. The unique feature of military-applied sports, combining physical and moral education elements, the ability to teach young people teamwork, and develop resilience and perseverance skills, is analyzed in detail. Moreover, the article highlights the potential of expanding these sports in schools and higher education institutions to strengthen patriotism and encourage a healthy lifestyle among young people. The research results confirm the importance of military-applied sports not only as a means of physical education but also as a tool for moral and ethical development.*

Keywords: *military-applied sports, youth education, patriotism, physical development, moral development, courage and selflessness, sport and morality*

Harbiy-amaliy sport turlari –xarbiy xizmatchilar va maxsus xizmat olib boruvchi shaxslar tomonidan bajarilishi bilan bog‘lik maxsus xarakatlar, ularning xizmat vazifasining asosi bo‘lgan sport turlaridir.

Harbiy-amaliy sport turlari qoidalari O‘zbekiston Respublikasining “Jismoniy tarbiya va sport to‘g‘risida”gi Qonuniga muvofiq belgilanadi.

Harbiy-amaliy sport turlarining xar biri uchun aloxida qoidalar jismoniy tarbiya va sport soxasidagi maxsus vakolatli davlat organi bilan kelishgan xolda O‘zbekiston Respublikasi Mudofaa vazirligi tomonidan tasdiqlanadi.

Harbiy-amaliy sport turlarini ro`yxatdan o‘tkazish va uning maqomini belgilashda sport turlarini va sport turining tarmoqlarini e’tirof etish, ularni sport turlari reyestriga kiritish xamda ushbu reyestrni yuritish tartibi to‘g‘risidagi nizomga muvofiq amalga oshiriladi.

Harbiy-amaliy sport turlari qoidalari milliy armiya xizmat faoliyatida qo‘llanilib kelinayotgan sport turlariga nisbatan ishtirokchilar xamda xakamlar tomonidan musobaqa jarayonlaridan kelib chiqqan xolda belgilanadi.

Armiya tizimida harbiy-amaliy sport turlari harbiy xizmatchilarda jangovar va o‘z ixtisosligiga oid boshqa vazifalarni hal etish uchun zarur bo‘ladigan jismoniy sifatlarini talab darajasida saqlab, yanada rivojlantirish va yuksak ma’naviy-ruhiy sifatlarini tarbiyalashdan iboratdir.

Fuqorolik jamiyati tizmida harbiy-amaliy sport turlari yosh avlodlarda (harbiy sohaga oid o‘quv muassasalarida o‘qiyotgan yosh avlodlar) harbiy sohaga oid boshlang‘ich bilim, ko‘nikma va malakalarini haqiqiy harbiy xizmatga yo‘nalishga har tomonlama tayyorlab borish, ularda ona Vatanga sadoqat hamda yuksak ma’naviy-ruhiy sifatlarini tarbiyalab borishdan iboratdir.

Harbiy-amaliy sport turlari musobaqalari va mazkur sport turlari bilan shug‘ullanishning asosiy vazifalari shug‘ullanuvchilarning:

- chidamlilik, kuchlilik, tezlik va chaqqonlik kabi jismoniy sifatlarini rivojlantirib, talab darajasida saqlab borish;
- yurish qiyin kechadigan hududlarda piyoda harakatlanish, tabiiy va sun’iy to‘siqlarni yengib o‘tish ko‘nikmalari, qo‘l jangi amallarini dadil bajarish va harbiy-amaliy suzish ko‘nikmalarini shakllantirish;
- jismonan kamol topishini yaxshilash, sog‘ligini mustahkamlash, atrof-muhit va harbiy-professional faoliyatning salbiy ta’sirlariga nisbatan organizmining chidamlilik sifatlarini oshirish kiradi.

Harbiy-amaliy sport turlari shug‘ullanish va musobaqalarida ishtirok etish jarayonida harbiy xizmatchilarning va yosh o‘sib kelayotgan avlodlarning nazariy bilimlari va tashkiliy-uslubiy ko‘nikmalari shakllantiriladi.

Harbiy-amaliy sport turlari jamiyatda jamoalarning hamda harbiy bo‘linmalar shaxsiy tarkiblarining maxsus-harbiy tayyorgarlik darajasi yanada oshishi, ma’naviy-ruhiy sifatlari puxta tarbiyalanishi, ularning jangovar hamjihatligi takomillashishiga omil bo‘ladi.

Harbiy-amaliy sport turlari musobaqalari va shug‘ullanish dasturlariga kiritiladigan sport turlari hamda mashqlari:

- harbiy ko‘pkurash sport majmuyi – 100 metr masofaga yugurish, to‘siqlarni yengib o‘tish, turnikda tortilish, yosh gurxiga qarab 1000, 2000 va 3000 metr masofalarga yugurish;
- ofitserlar uchkurashi – 100 metr masofaga erkin suzish, Makarov to‘pponchasidan otish, yosh gurxiga qarab 1000, 2000 va 3000 metr masofalarga yugurish;
- harbiy uchkurash – 100 metr masofaga yugurish, garanatani aniqlikga uloqtirish, 3000 metr masofaga anjom-aslaha (qurol) bilan yugurish;
- besh kurash – 100 metr masofaga yugurish, to‘siqlarni yengib o‘tish, turnikda tortilish, yosh gurxiga qarab 1000, 2000 va 3000 metr masofalarga yugurish, Kalashnikov avtomatidan otishlar;
- sport mo‘ljali – haritadan yugurib xarakatlanish yo‘nalishini o‘rganis;
- 8 km masofaga ega bo‘lgan 8 ta nazorat nuqtalaridan yugurib o‘tish;
- o‘q-otish sporti – Makarov to‘pponchasidan hamda Kalashnikov avtomatidan otishlar;

- unversal jang – unversal jang to‘siqlarni yengib o‘tish, pnevmatik quroldan otish, nishonlarga pichoq uloqtirish va qo‘l jangi;
- qo‘l jangi;
- pichoq jangi;
- boks;
- tosh ko‘tarish sporti – 24 kilogrammi toshlarni siltab va dast ko‘tarish;
- sport va serxarakat o‘yinlar – futbol, voleybol, basketbol, regbi, kichik futbol, plyaj voleyboli, stol tennisi, badminton va boshqalar.

Harbiy-amaliy sport turlari bo‘yicha Respublika musobaqalarini o‘tkazishda Vazirlar Maxkamasining 2014 yil 29 iyuldagi 205-sonli qarori bilan tasdiqlangan “Ommaviy tadbirlarni o‘tkazish qoidalari” ga muvofiq, Mudofaa vazirligi miqiyosida esa Mudofaa Vazirligining jismoniy tayyorgarlik yo‘nalishidagi tegishli normativ-xuquqiy xujjatlari asosida amalga oshiriladi.

Harbiy-amaliy sport turlari bo‘yicha o‘quv-mashq mashg‘ulotlari yig‘ini hamda sport musobaqalari O‘zbekiston Respublikasi Mudofaa vazirligining jismoniy tayorgarlik va sport bo‘limi tomonidan tasdiqlangan o‘quv va sport musobaqalari dasturlariga muvofiq o‘tkaziladi.

Harbiy-amaliy sport turlari bo‘yicha musobakalariga xakamlik jismoniy tarbiya va sport soxasidagi maxsus vakolatga ega sport xakami toifalari mavjud bo‘lgan shaxslar hamda O‘zbekiston Respublikasi Mudofaa vazirligi jismoniy tayyorgarlik va sport mutaxassislari tomonidan amalga orshiriladi.

Harbiy-amaliy olimpiya sport turlari bo‘yicha umumarmiya o‘yinlari

Harbiy-amaliy Olimpiya sport turlari bo‘yicha Umumarmiya o‘yinlari (matn davomida HAOSTBUO‘ deb yuritiladi) O‘zbekiston Respublikasi sport tizmida belgilangan “Umid nixollari”, “Barkamol avlod”, “Universiada” kabi O‘zbekiston Respublikasi Qurorlli Kuchlari (matn davomida O‘R QK deb yuritiladi) miqiyosida harbiy xizmatchilar orasida bo‘lib o‘tadigan harbiy-amaliy sport turlari musobaqalaridir.

Harbiy-amaliy Olimpiya sport turlari bo‘yicha Umumarmiya o‘yinlarini o‘tkazishdan ko‘zlagan maqsad:

- harbiy xizmatchilarning chidamlilik, kuchlilik, tezlik va chaqqonlik kabi jismoniy sifatlarini rivojlantirib, talab darajasida saqlab borish;
- harbiy xizmatchilarning jismonan kamol topishini yaxshilash, sog‘ligini mustahkamlash, atrof-muhit va harbiy-professional faoliyatning salbiy ta’sirlariga nisbatan organizmining chidamlilik sifatlarini oshirish;
- harbiy bo‘linmalarning shaxsiy tarkiblarini maxsus-harbiy tayyorgarlik darajasi yanada oshishi, ma’naviy-ruhiy sifatlari puxta tarbiyalanishi, ularning jangovar hamjihatligi takomillashtirish;
- yuqori natijalarga erishadigan harbiy sportchilarni O‘zbekiston terma jamoalari tarkibida halqaro sport maydonlarida ishtiok ettirish uchun yetkazib berish.

O‘zbekiston Respublikasi Qurorlli Kuchlari miqiyosida (Mudofaa vazrligi raxbarligida) 2004 yildan boshlab to 2012 yilga qadar har ikki yilda ya’ni 2004

yilda I-chi, 2006 yilda II-chi, 2008 yilda III-chi, 2010 yilda IV-chi, 2012 yilda V-chi Umumarmiya o‘yinlari bo‘lib o‘tdi. 2016 yildan boshlab har uch yilda ya’ni 2016 yil VI-chi, 2019 yilda VII-chi Umumarmiya o‘yinlari bo‘lib o‘tdi. Navbatdagi VIII-chi Umumarmiya o‘yinlari 2022 yilda bo‘lib o‘tgan.

Adabiyotlar ro‘yxati:

1. Nurmuhamedov, B. (2014). Yoshlarni harbiy vatanparvarlik ruhida tarbiyalashda ta'limning roli. Tashkent: O‘zbekiston ta'limi va madaniyati.
2. Ergashev, A. (2017). Vatanparvarlik va yoshlar tarbiyasi. Tashkent: Akademnashr.
3. Sayfiddinov, T. (2016). Harbiy xizmatga tayyorlash: tarbiya va amaliyot. Toshkent: Fan va texnologiya.
4. Mirzaev, M. (2015). Oila va jamiyatda yoshlarni tarbiyalash. Tashkent: O‘zbekiston ijtimoiy fanlari.
5. Xudoyberganov, Sh. (2012). Sport va yoshlar tarbiyasida yangi yo‘nalishlar. Tashkent: Yangi avlod
6. Rizaev, F. (2018). Zamonaviy ta'lim texnologiyalarining yoshlar tarbiyasidagi o‘rni. Tashkent: Iqtisodiyot va ta'lim.
7. Turaeva, N. (2019). Yoshlarni harbiy vatanparvarlik ruhida tarbiyalash: nazariya va amaliyot. Tashkent: O‘zbekiston pedagogika va tarbiya instituti.
8. Shodmonov, S. (2020). Yoshlarni vatanparvarlik ruhida tarbiyalashda yangi metodikalar. Tashkent: O‘zbekiston yoshlar ittifoqi nashriyoti

UDK: 553.411(575.1)

Axmedov X. R., PhD
dotsenti
Qashi davlat texnika universiteti
Panjiyev H. A.
katta o‘qituvchi
Qashi davlat texnika universiteti
Abdusalomova M. M.
magistranti
Qarshi davlat texnika universiteti

ZARAFSHON-OLOY ZONASINING TEKTONIK RIVOJLANISH TARIXI

Annotatsiya. *Maqolada Zarafshon-Oloy zonasining tektonik rivojlanishi, stratigrafik kesimi va strukturaviy yaruslarining rivojlanish bosqichlari haqida ma’lumotlar keltirilgan. Shuningdek, zonaning chegaralari, tog‘ jinslarining yotish qiyaliklari kabi ma’lumotlar yoritilgan.*

Zarafshon-Oloy zonasida kaledon va gersin burmalanishlarga mansub strukturalar va uzilmalar haqida bayon qilingan.

Tayanch iboralar: *gersin, kaledon burmachanligi, strukturali yarus, strukturali-formatsion, ordovik, silur, devon.*

Axmedov X. R., PhD
associate professor
Kashi State Technical University
Panjiyev H. A.
senior teacher
Kashi State Technical University
Abdusalomova M. M.
master's student
Karshi State Technical University

HISTORY OF TECTONIC DEVELOPMENT OF THE ZARAFSHAN-ALAI ZONE

Abstract. *The article provides information on the tectonic development, stratigraphic section, and stages of development of the structural tiers of the Zarafshan-Alay zone. Information is also provided on the boundaries of the zone, the slopes of the rocks.*

Structures and faults of the Caledonian and Hercynian folds in the Zarafshan-Alay zone are described.

Key phrases: *Hercynian, Caledonian folding, structural stage, structural-formational, Ordovician, Silurian, Devonian.*

Kirish

Zarafshon-Oloy strukturali-formatsion zona, janubdan Zarafshon-Turkiston tizmasiga tutash bo‘lib, sharqda Zarafshon tizmasining janubiy adirlari va o‘q qismini va Hisor tizmasining shimoliy adirlarini qamrab olgan. G‘arbda davom etishi bo‘yicha Karatyubin, Zirabulak va Kuljuktau tog‘lari joylashgan. Zarafshon-Oloy zonasi shimolda Zarafshon-Turkiston zonasiga mansub Zarafshon va janubda Janubiy-Hisor zonasiga mansub Hisor chuqur uzilmalari bo‘yicha chegaralanadi.

O‘rganilish tarixi

Zonaning stratigrafik kesimi ordovikdan boshlab tanaffussiz rivojlanganligi bilan tavsiflanadi. Zarafshon tizmasida va Hisorning shimoliy adirlari bo‘yicha kesimi asosida ordovik va quyi silur (1700 m gacha) terrigen-karbonat va vulqonli hosilalar rivojlangan, vulqonli jinslarni – yuqori ordovik va o‘rta venlokga mansub o‘rta va nordan tarkibli effuzivlar va tuflar (500 m gacha). Bular o‘zida vulqon markazidan otilib chiqqan tog‘ jinslari mahsulotlarini o‘zida namoyonlaydi. Llandoveriy va venlok yotqiziqlari kesimi bir necha marta fatsial o‘zgaradi. Shimoldan janubda yo‘nalishi tomoniga terrigen-karbonat va vulqon jinslar karbonatlar bilan almashinishi sodir bo‘lgan. Bu bilan bog‘liq qalinligi ham 450 metrdan 1200 metrgacha o‘zgaradi. Yuqorida katta qalinlikdagi (3000 m gacha) yuqori silur va devon dolomit va ohaktoshlari muvofiq yotadi. Ordovik, silur va devon yotqiziqlari quyi strukturaviy yarusni hosil qiladi va eng yosh cho‘kindilardan regional nomuvofiqlik bilan ajralib turadi. So‘nggisi (toshko‘mir yotqiziqlari) turne terrigen jinslari (1600 m) va yuqori vize, namyura, Boshqir yarusi va quyimoskovski pod’yaruslarining karbonat cho‘kindilaridan iborat bo‘lib, qalinligi 700 metrgacha va o‘rta strukturali yarusni tashkil qiladi. Yuqori strukturali yarus kechkimoskva – kechki toshko‘mir yoshidagi ohaktoshli gorizontlari bilan molassali ko‘rinishdagi konglomerat-qumtosh qavati quyi va o‘rta strukturaviy yarusning turli gorizontlari ustida transgressiv yotadi va qalinligi 1200 metrga yetadi.

Muhokoma

Zirabuloq tog‘laridan g‘arbda quyi strukturaviy yarus kesimi zonaning sharqiy qismi kesimida muqobillashgan bo‘lib, karbonat fatsiyasi llandover bilan boshlanadi. Silur yuqorisi va devon quyisida qalinligi 700 metrgacha bo‘lgan terrigen jinslari (alevrolitlar, qumtoshlar va slanslar) qayd qilingan. Vulqonli jinslar yuqori ordovikda uchragan va linzali ko‘rinishdagi effuziv tarkibli uyumlarni hosil qilgan. Ordovik, silur, quyi va o‘rta devon yotqiziqlarining umumiy qalinligi 3600 m atrofida. O‘rta strukturaviy yarusni yuqori devon va quyi karbon (Tim svitasi) yoshidagi jinslar tashkil qiladi va qalinligi 800 metrgacha bo‘lgan ohaktosh, kvarsli porfir va tuf oraliq qatlamchali terrigen jinslaridan iborat. Bu yerda yuqori strukturaviy yaruslar yetarli darajada rivojlanmagan (Barovski va b.).

Kuldjuktau tog‘ida ordovik va llandover terrigen-karbonat kesimi venlok va yuqori silurning karbonatlari, yuqori silur – quyi devon karbonat-terrigen yotqiziqlari va quyi devon – eyfelski yarusining karbonat hosilalari bilan

almashadi. Quyi strukturaviying umumiy qalinligi 3600 m tashkil qiladi. Ichki tuzilishida ordovik va quyi silur, quyi va yuqori silur oraliqlarida lokal nomuvofiqliklar uchraydi. O‘rta strukturaviy yarus yuqori devon va quyi toshko‘mir terrigen hosilalaridan iborat. Yuqori strukturaviy yarus aniqlanmagan.

Zarafshon-Oloy zonasi uchun quyi strukturaviy yarus to‘liq rivojlanganligi tavsifli, shuningdek, quyi devon oldi (sharqda turney oldi) kechki boshqir oldi (sharqda kechki moskov oldi), ehtimol perm oldi burmachan fazalari bilan tavsiflanadi. Intruziv hosilalar yuqori paleozoy o‘rta va nordon jinslari bilan tavsiflanadi.

Zarafshon-Oloy zonasida kaledon burmachan harakatlar kuchsiz to‘lqin tebranishi bilan namoyonlangan bo‘lib, quyi va yuqori silurda bir xil yoshdagi terrigen fatsiyalari karbonat fatsiyalari bilan almashadi va ordovik bilan silur oralig‘ida va silur ichida lokal nomuvofiqliklarda hosil bo‘lgan.

Gersin harakatlar devon va karbon davomiyligida bir necha marta namoyonlangan bo‘lib, uzilmalar bilan jadal buzilgan murakkab burmachan strukturalarni vujudga keltirgan, bu strukturalarni rasshifrovka qilish qiyinlashgan. Burmachanlikning kechki devon oldi – turney fazasi namoyonlangandan keyin burmachanliklarni vujudga kelishida jadal yuvilish sodir bo‘lgan bo‘lib, ba’zi joylarida (Zarafshon tizmasida) yuqori venlok hosilalariga ham ta’sir qilgan. Ehtimol bu faza Zarafshon-Oloy zonasining asosiy strukturaviy elementlarining joylashishiga ta’sir qilgan. Turne oxirida yuqori devon – turne terrigen qavatini hosil bo‘lishiga olib olib kelgan to‘lqin tebranish harakatlari hududning umumiy ko‘tarilishi bilan yakunlangan bo‘lib, alohida egikliklarni shakllantirgan va keyinchalik yuqori vize, namyur, boshqir yarusi va quyi moskov podyaruslari karbonat qavatlarini to‘planishi sodir bo‘lgan (P.D.Vinogradov, 1959 y). Yuqori vize pod’yarusi turne cho‘kindilari ustida nomuvofiqlik bilan yotadi. O‘rta moskov asrida burmachanlik fazasining sezilarsiz jadalligi (intensivligi) bo‘yicha to‘lqinli harakatlar kuchaygan natijada ko‘tarilma va cho‘kindilarni ajratib turuvchi kechki moskov – kechki toshko‘mir yoshidagi molassoidli qavat botiqligida jadal yuvilish sodir bo‘lgan. Kechki karbon yakuniga zonaning bosh strukturaviy elementlarini shakllanishini nihoyasiga yetkazgan eng jadal burmachan faza namoyonlangan. Burmachanlik turli tavsifdagi uzilmalarni zich to‘rini namoyonlanishiga olib kelgan depressiya yotqiziqlarida antiklinora zonasining surilishini asoslagan. Bu bosqich yakunida intruziv hosil bo‘lishi boshlangan va chekka zonalar bo‘yicha o‘rta va nordon jinslar massivlari hosil bo‘lgan. Bu jinslarni joylashishi zonani chegaralab turgan chuqur uzilmalar joylashuviga bog‘liq .

Zarafshon-Oloy zonasining burmachan strukturalari uzilmali buzilishlarning jadal rivojlanishi natijasida rasshifrovkalashni qiyinlashtirgan. Zonaning shimolida uning sharqiy qismiga Markaziy Karatyubin antiklinali joylashgan bo‘lib, ehtimol Kuldjuktau antiklinali uning g‘arbiy davomi hisoblanadi. Strukturaning markazida ordovik-quyi silur yotqiziqlari yer yuzasiga chiqib qolgan, qanotlarida – eng yosh silur, devon va toshko‘mir yotqiziqlari chiqib qolgan. Markaziy Karatyubin antiklinali adabiyotlarda Zarafshon antiklinoriyasi (Martishev, 1956 y va b.) nomi

bilan ma’lum, o‘zida murakkab yelpig‘ichsimon burmani namoyonlab, qanoti silur, devon va quyi karbon turne yarusi turli yoshdagi cho‘kindilaridan iborat tangachasimon monoklinallar seriyasidan tashkil topgan. Burmachanning shimoliy qanoti va o‘q qismida granitoidlarning eng yirik massivi mansub. Shimoliy-Hisor antiklinali ham analogik tuzilishga ega bo‘lib, Markaziy Karatyubin burmasidan mezozoy va kaynozoy cho‘kindilari hosil qilgan Farob-Magian egikligi bilan ajralib turadi. Bayon qilinadigan strukturalarning murakkabligidan qat’iy nazar, bularda jinslarni yotishi qiya– $10° - 20°$ burchak, kam holatlarda $35°$ burchak ostida yotadti. Markaziy Karatyubin, Shimoliy Hisor va Kuldjuktau antiklinallarining umumiy tuzilishi ko‘p sonli uzilmali buzilishlar rivojlanishi bilan tavsiflanib, asosan burmalar hosil bo‘lishi bilan bog‘liq. Bu yerda buzilishlarning eng kami to‘rtta seriyasi ajratiladi. Subkenglik makondagi surilma eng qadimgi hisoblanib, surilish nishabi janubiy rumbda $20° - 30°$ burchak ostida yotadi. Bu surilmalarni keskin $(80° - 90°)$ tashlama uzilmalar shimoliy-sharq va kenglik makonga yaqin kesib o‘tadi, o‘z navbatida buzilmalar qiya $(10° - 20°)$ surilmalar bilan shimoliy-sharqda tekislanib ketgan. Eng kechki keskin buzilmalar vertikal uzilmalardan iborat bo‘lib, ko‘p hollarda minerallashgan. Shimoliy-Hisor antiklinalari uchun ko‘rsatilgan uzilmali buzilishlar amplituda bo‘yicha (bir va birinchi o‘n metrlarda) quyida to‘shalgan jinslar bilan turney hosilalari kontaktida buzilmalar qatlamlanib kelishi bilan tavsiflanadi.

Ilmiy va amaliy ahamiyati

Yuqorida bayon qilingan antiklinallarda janubdan Janubiy-Karatyubin sinklinali ba’zida uzilmalar o‘tgan bukilma bilan tutashadi. Zarafshon-Oloy zonasining sharqiy zonasi Shur-Marguzor sinklinali sifatida ma’lum. Kuldjuktay tog‘ida bu Yangikazgan sinklinali sifatida ma’lum. Zonaning sharqiy qismida burma yadrosida yuqori moskov – yuqori toshko‘mir yotqiziqlari chiqib qolgan, burma qanotlarida devon va turney hosilalari ustida yuvilgan holda yotadi. Marguzor ko‘lining sharqida burma sharniri ko‘tarilib boradi va burma yadrosi devon va turney cho‘kindilaridan tarkib topgan. Sharnirning ko‘tarilishi burma yadrosini devon va quyi karbon jinslari tashkil qilgan Kuldjuktau tog‘ida ham analogik kuzatiladi. Burma nisbatan kengligi kichik bo‘lib (5-8 km) bir necha o‘n kilometrgacha cho‘zilgan.

Xulosa

Yuqorida bayon qilingan Kinigir antiklinali Zarafshon-Oloy zonasining eng janubiy tuzilmasi hisoblanib, sharqda shuningdek, Markaziy Karatyubin va shimoliy Hisorda murakkab tuzilishga ega: tangachasimon qadimgi va yosh hosilalar (ordovikdan yuqori karbongacha) almashinib kelgan alohida yirik monoklinallardan iborat tangasimonlar kengligi 100 metrdan 2 kilometrgacha o‘zgaradi, uzunligi 5 km gacha yetadi. Kuldjuktau tog‘ida Kingir antiklinal yadrosida silur karbonat hosilalaridan tashkil topgan, qanotlari esa devon va toshko‘mir karbonatlaridan iborat. Bularda nordon va o‘rta tarkibli mayda

intruzivlar mansub. Antiklinalning janubiy qanoti shu uchastkaning blokli tasnifini ta’minlaydigan ko‘p sonli parallel uzilmalar bilan murakkablashgan.

Yuqorida bayon qilingan yirik tuzilmalardan tashqari Zarafshon-Oloy zonasining g‘arbiy qismida Daryosoy, Karashokin va Sartarash antiklinallari, Kitirmay, Daryosoy, Aldiyar va Zindan sinklinallari ajratiladi, bu tuzilmalar asosan mezozoy va kaynozoy cho‘kindi qoplamalari ostida ajratilgan.

Foydalanilgan adabiyotlar

1. Сидоренко А.В. Геология СССР. Том XXIII. Узбекская ССР. Геологическое описание. Книга 2. М., «Недра», 1972, 476 с с3 прил. (М-во геологии УзССР).
2. Axmedov X.R., Abdusalomova M.M. Qizilturuk ma’dan maydonining geologik tarixi va foydalali qazilmalari/ «Zamonaviy jamiyatning barqaror rivojlanishi uchun fan va texnologiyalar» mavzusidagi Xalqaro ilmiy-amaliy konferensiyasi materiallari to‘plami, Buxoro davlat texnika universiteti, 2025 yil 25-26 aprel
3. Жураев М. Н., Халматов У.А., Нажмиддинов *Б.У.* К специфике магматизма центральной части чакылкалянского мегаблока и ее влиянию на формирование апогранитоидного вольфрамового оруденения) //14-я международная научно-практическая конференция "Новые идеи в науках о Земле" Россия, г.Москва, ул. Миклухо-Маклая д.23 02-05 апреля 2019 г 261-265 с.
4. Безуглов Э.Д. Отчет Варганзинской партии о резульрарах геолого-съемочных работ м-ба 1:25000, проведенных в 1970-71 г.г. Фонды ГП «Кашкадарьинской ГРЭ»
5. Коробейников Г.Н. Отчет о результатах опытно-методических работ по повышению эффективности геохимических методов поисков и оценки проявлений цветных и благоролных металлов в пределах Южного Узбекистана за 1976-79 гг. Фонды ГП «Кашкадарьинской ГРЭ»
6. Раскин В.Е. Отчет о результатах детальных поисковых работ на золото и другие полезные ископаемые на наиболее перспективных участках гор Чакыл-Калян (Кызылтурукское рудное поле) и поиского-оценочных работы на рудопроявлении Кызылтурук за 1976-79 гг. Фонды ГП «Кашкадарьинской ГРЭ»
7. Panjiyev H.A., Musallamov Z.X. Geological and mineralogical substantiation of the Khodjadik area. Educational Research in Universal Sciences (ERUS)**.** volume 4 | special issue 12 | 2025 38-43 b.
8. Axmedov X.R., Panjiyev H.A. Musallamov Z.X. Xodjadik maydonini stratigrafiyasi va foydali qazilmalari. Development of science Volume/ 4 OKTYABR/10.
9. Sultonov Sh.A., Navotova D.I. O‘zbekistonda rangli metallarning geografik tarqalishi va foydalanish xususiyatlari. Экономика и социум. -№2(117)-1 2024, 682-690 betlar, 2024-yil. http://www.iupr.ru , ISSN 2225-1545

Axrorova M. Sh., PhD
dotsent
bolalar stomatologiya kafedrasi
SamDTU
Temirova M. O.
klinik ordinatori
bolalar stomatologiya kafedrasi
SamDTU

TISH PROTEZLARI. AKRIL YOKI NEYLON PROTEZLAR AFZALLIKLARI

Annotatsiya: *Mazkur ilmiy maqolada stomatologik amaliyotda keng qo‘llaniladigan akril va neylon tish protezlarining klinik va biokimyoviy xususiyatlari solishtirildi. Tadqiqotda ushbu protez turlarining og‘iz bo‘shlig‘iga moslashuv jarayoni, bemorlar qulayligi, so‘lak tarkibidagi o‘zgarishlar hamda biologik mosligi baholandi. Olingan natijalar neylon protezlarning yuqori elastikligi va biokompatibiliteti tufayli moslashuv jarayoni tezroq kechishini ko‘rsatdi, biroq akril protezlar iqtisodiy jihatdan qulay va keng qo‘llaniladigan variant sifatida o‘z ahamiyatini saqlab qolmoqda.*

Kalit so‘zlar: *Tish protezlari, akril protezlar, neylon protezlar, solishtirma tahlil, biokompatibilitet, moslashuv jarayoni, stomatologiya.*

Akhrorova M. Sh., PhD
associate professor
department of pediatric dentistry
SamDTU
Temirova M. O.
clinical resident
department of pediatric dentistry
SamDTU

DENTAL PROSTHESES. ADVANTAGES OF ACRYLIC AND NYLON PROSTHESES

Abstract: *This scientific article presents a comparative analysis of the clinical and biochemical characteristics of acrylic and nylon dental prostheses widely used in dental practice. The study evaluated the adaptation process of these prostheses in the oral cavity, patient comfort, changes in saliva composition, and biological compatibility of the materials. The obtained results demonstrated that nylon prostheses provide faster adaptation due to their high elasticity and biocompatibility, while acrylic prostheses remain relevant as a cost-effective and widely used option.*

Keywords: *Dental prostheses, acrylic prostheses, nylon prostheses, comparative analysis, biocompatibility, adaptation process, dentistry.*

Kirish

Tish yo‘qotilishi chaynash funksiyasi, nutq va estetik ko‘rinishga salbiy ta’sir ko‘rsatadi. Ushbu muammoni bartaraf etishda tish protezlari muhim ahamiyatga ega. Hozirgi kunda stomatologik amaliyotda akril va neylon asosidagi protezlar keng qo‘llanilmoqda.

Akril protezlar uzoq yillardan buyon qo‘llanib kelinayotgan an’anaviy material bo‘lsa, neylon protezlar zamonaviy va moslashuvchan material sifatida e’tirof etilmoqda. Ushbu ikki protez turining afzalliklari va kamchiliklarini ilmiy asosda solishtirish klinik qaror qabul qilishda muhim hisoblanadi.

So‘nggi yillarda stomatologiyada tish protezlaridan foydalanish sezilarli darajada ortib bormoqda. Tish yo‘qotilishi nafaqat estetik, balki chaynash funksiyasi, nutq va umumiy hayot sifatiga salbiy ta’sir ko‘rsatadi. Shu sababli protezlash muolajalari keng qo‘llanilmoqda.

Biroq protez materiallarining og‘iz bo‘shlig‘i to‘qimalari bilan o‘zaro ta’siri murakkab biologik va biokimyoviy jarayonlarni yuzaga keltiradi. Akril, metallokeramika va neylon kabi materiallar tarkibi, fizik-kimyoviy xususiyatlari hamda biokompatibilitet darajasi bilan farqlanadi. Ushbu materiallarning so‘lak tarkibiga, yallig‘lanish jarayonlariga va oksidativ stressga ta’sirini o‘rganish klinik jihatdan muhim hisoblanadi.

Akril va neylon protezlar orasidagi eng yaxshi tanlov bemorning individual ehtiyojlari va afzalliklariga bog'liq. Akril protezlar arzonroq, ammo kamroq bardoshli va sinishga moyil. Neylon protezlar qimmatroq, ammo bardoshliroq, egiluvchanroq va qulayroq.

Tadqiqot metodologiyasi

Tadqiqotda turli turdagi tish protezlariga ega bo‘lgan bemorlar kuzatuvga olindi. Bemorlar uch guruhga ajratildi:

1-guruh — akril protezlar,

2-guruh — metallokeramika protezlar,

3-guruh — neylon protezlar.

Barcha guruhlarda protez qo‘yilishidan oldin va moslashuv davrida (7–14 kun) so‘lak namunalarida quyidagi biokimyoviy ko‘rsatkichlar aniqlandi: pH darajasi, umumiy oqsil miqdori, amilaza faolligi, immunoglobulin A (IgA), antioksidant fermentlar faolligi. Olingan natijalar statistik usullar yordamida tahlil qilindi.

Akril protez:

-Ishlab chiqarish va ta'mirlash uchun arzon.

-Materialning og'irligi va nomukammal mosligi tufayli noqulaylik tug'dirishi mumkin.

Tez rang o'zgarishiga moyil.

Allergik reaksiyalarga olib kelishi mumkin.

Neylon protez:

Yengil va kiyish uchun qulay.

Yumshoq va egiluvchan material, bu milklarga payvandlash jarayonini osonlashtiradi.

U yuqori kuch va moslashuvchanlikka ega, bu sizga yangi protezga o'tish bilan bog'liq ko'plab muammolardan qochish imkonini beradi.

Og'izning old qismidagi bir yoki bir nechta tishlarni almashtirish uchun ideal.

Shunday qilib, akril va neylon protezlar orasidan tanlov qilishda sizning individual stomatologik ehtiyojlaringizni, narxingizni va potentsial allergik reaktsiyalaringizni hisobga olish muhimdir. Tish shifokori bilan maslahatlashish har bir alohida holat uchun eng yaxshi protez variantini aniqlashga yordam beradi.

Protez tanlash qiyin bo'lishi mumkin, chunki protezlar turli xil materiallardan tayyorlanishi mumkin, bu ularning narxiga ta'sir qiladi. Protezlar uchun mavjud bo'lgan ba'zi materiallar:

Neylon protezlar;

Akril protezlar;

Metall-keramik protezlar.

Neylon protezlar akril protezlarga qaraganda yengilroq va egiluvchanroq, shuning uchun ular ba'zi bemorlar uchun qulayroq bo'lishi mumkin. Ular, shuningdek, odatda, akril protezlarga qaraganda kamroq seziladi. Biroq, neylon protezlar qimmatroq bo'lishi mumkin. Akril protezlar uzoqroq xizmat qilishi va tayanch tishlarda yengilroq bo'lishi mumkin.

Metall-keramik protezlar yakuniy ko'rinish uchun keramika bilan qoplangan metall asosga ega. Ular akril protezlarga qaraganda bardoshliroq, ammo odatda qimmatroq.

Keramik protezlar ajoyib va juda tabiiy ko'rinadi. Biroq, ularning bir kamchiligi bor: keramika osonlikcha shikastlanadigan mo'rt materialdir.

Natijalar

Tadqiqot natijalari shuni ko‘rsatdiki, akril protezlar qo‘llanilgan bemorlarda moslashuvning dastlabki bosqichlarida so‘lak pH ko‘rsatkichining pasayishi va yallig‘lanish biomarkerlari oshishi kuzatildi. Metallokeramika protezlar esa nisbatan barqaror biokimyoviy muhitni saqlab qoldi, biroq ayrim hollarda metall ionlarining ajralishi kuzatildi. Neylon protezlar eng yuqori biokompatibilitetga ega bo‘lib, so‘lak ko‘rsatkichlarida minimal o‘zgarishlar qayd etildi.

Oksidativ stress ko‘rsatkichlari akril protezlarda yuqoriroq bo‘lib, bu materiallarning og‘iz bo‘shlig‘i to‘qimalariga moslashuvi sekinroq ekanligini ko‘rsatdi.

Akril va neylon protezlar orasidan tanlov qilishda bemorning individual ehtiyojlari va xususiyatlarini hisobga olish muhimdir. Akril protezlar arzonroq variant va ularga g'amxo'rlik qilish osonroq, ammo ular kamroq bardoshli va ishqalanish tufayli milklarning tirnash xususiyati keltirib chiqarishi mumkin. Boshqa tomondan, neylon protezlar egiluvchanroq va kiyish uchun qulayroq, og'iz shakliga osonroq moslashadi va gipoallergen hisoblanadi.

Men milk sezgirligini boshdan kechiradigan yoki og'ir va noqulay akril protezlarga ko'nikishni istamaydigan bemorlarga neylon protezlarni tavsiya qilaman. Biroq, neylon protezlar uzoq vaqt foydalanish bilan kamroq bardoshli va deformatsiyaga moyil bo'lishi mumkinligini yodda tutish muhimdir.

Har bir bemor uchun protez tanlash to'g'risidagi qaror individual ravishda, ularning fiziologik xususiyatlari, afzalliklari va moliyaviy imkoniyatlarini hisobga olgan holda qabul qilinishi kerak. Men har doim bemorlar bilan maslahatlashish va ularga eng mos protez variantini tanlashda yordam berishga tayyorman.

Akril va neylon protezlar orasidan tanlov qilish: Akril protezlarning afzalligi shundaki, ular a'lo darajada jilolanadi. Ularning yuzasi mukammal silliq, ya'ni ular og'iz shilliq qavatini bezovta qilmaydi va kamroq mikroblar va oziq-ovqat zarralarini ushlab turadi. Aksincha, neylon protezlarning yuzasi qo'pol bo'ladi va asta-sekin qorayadi, yaltiroqligini yo'qotadi.

Akril protez arzonroq, neylon protezga qaraganda taxminan 1,5-2 baravar arzon.

Neylon protezni o'rnatishning nuanslari

Agar sizda ketma-ket uchta yoki undan ortiq tish yoki tish yoyining oxiridagi tishlar bo'lmasa yoki og'ir suyak atrofiyasi bo'lsa, neylon protez tavsiya etilmaydi. Biroq, akril protezda bunday cheklovlar yo'q.

Protez turini tanlash bemorning individual ehtiyojlariga bog'liq. Agar bemor metall va akrilga allergiyaga ega bo'lsa, faqat neylon mavjud bo'ladi. Boshqa hollarda, tanlov mavjud.

Keng tarqalgan noto'g'ri tushunchalardan biri shundaki, akril protezlar neylon protezlarga qaraganda bardoshliroq va kuchliroqdir. Aslida, neylon protezlar juda bardoshli va egiluvchan bo'lib, ularni kiyishni qulay qiladi va tish shikastlanishining oldini oladi.

Akril protezlar neylon protezlarga qaraganda qimmatroq degan afsona ham bor. Aslida, narx ko'plab omillarga, jumladan, ishlab chiqarish jarayonining murakkabligiga va protezning xususiyatlariga bog'liq. Ba'zi hollarda, neylon protezlar hatto akril protezlarga qaraganda arzonroq bo'lishi mumkin.

Ba'zi odamlar neylon protezlarni akril protezlarga qaraganda kiyishni noqulayroq deb bilishadi. Biroq, neylon protezlar yengilroq va egiluvchanroq bo'lib, ularni yanada qulayroq qiladi. Bundan tashqari, ular milklarni tirnash xususiyati qilmaydi va maxsus parvarishni talab qilmaydi.

Shuni yodda tutish kerakki, akril va neylon protezlar orasidagi tanlov har bir bemorning individual ehtiyojlari va xususiyatlariga bog'liq. Qaror qabul qilishdan oldin, sizning aniq holatingiz uchun eng mos variantni aniqlashga yordam beradigan tish shifokori bilan maslahatlashish muhimdir.

Neylon yoki akril protezlar: qaysi birini tanlash kerak?

Ikkala turdagi protezlarning ham afzalliklari va kamchiliklari bor, shuningdek, narxi jihatidan farq qiladi.

Masalan, akril protezlar bardoshli akril plastmassadan tayyorlangan, bir necha soat ichida yaratilishi va o'sha kuni o'rnatilishi mumkin. Ushbu dizayn neylon protezlarga qaraganda unchalik og'ir emas, ozgina parvarish talab qiladi va

eng muhimi, arzonroq. Akril protezlarni ko'pincha sifat va arzonlikning uyg'unligini izlayotgan keksa odamlar afzal ko'rishadi.

Akrilning kamchiliklari orasida organizmga salbiy ta'sir ko'rsatishi mumkin bo'lgan metakrilatning ajralib chiqishi, shuningdek, foydalanish paytida qo'shni tishlarning aşınması kiradi, bu esa karies rivojlanishiga olib kelishi mumkin.

Neylon protezlar qimmatroq, ammo estetik jihatdan yoqimli variantlardir. Ular og'izda deyarli ko'rinmaydigan yumshoq neylon asosga ega elastik tuzilishga ega. Bu protezlar yaxshi qabul qilinadi va allergik reaktsiyalarga olib kelmaydi.

Biroq, neylon protezlarning ham kamchiliklari bor: material juda mo'rt va yumshoq bo'lib, u har doim ham chaynash bosimiga bardosh bera olmaydi. Vaqt o'tishi bilan protez "osilib" qolishi mumkin, bu esa milklarning shikastlanishiga olib kelishi mumkin. Shuning uchun, bunday protezlardan foydalanganda og'iz bo'shlig'i salomatligini diqqat bilan kuzatib borish va muntazam ravishda tish shifokoriga murojaat qilish muhimdir.

Stomatologlar hozirda akril, qisqich (metall arkali), neylon va poliuretan qisman protezlar kabi turli xil protezlarni taklif qilishadi. Biroq, qisqich yechimlari estetik jozibasi, ishonchliligi va arzonligi tufayli eng mashhur hisoblanadi.

Akril protezlar, ayniqsa, arzonligi va ko'plab afzalliklari tufayli mashhur. Ushbu material nihoyatda mustahkam va yengil, ajoyib issiqlik izolyatsiyasini ta'minlaydi, bardoshli, tozalash oson va tabiiy tishlarning rangi va yuzasiga aniq mos kelganda bosimning bir tekis taqsimlanishini ta'minlaydi. Ushbu protezlarni ishlab chiqarish jarayoni oddiy va tez bo'lib, ularga kam parvarish talab etiladi. Biroq, to'liq protezlar krem yoki yopishtiruvchi kabi maxsus fiksatorlardan foydalanishni talab qilishi mumkin.

Ba'zida akril protezlar elastikligini yo'qotishi va kiyish noqulay bo'lib qolishi mumkin;

Ular shuningdek, yoqimsiz hidga ega bo'lishi mumkin;

Eskirish va yirtish sinish va yorilishga olib kelishi mumkin, bu esa muntazam ravishda qayta qoplamani talab qiladi.

Atrofiya jarayonining doimiy rivojlanishi qo'llab-quvvatlovchi tishlarning haddan tashqari zo'riqishiga olib keladi, bu ularning holatiga salbiy ta'sir qiladi.

Agar rejalashtirilgan qayta astarlash amalga oshirilmasa, protez yorilib, tayanch tishlarning yo'qolishiga olib kelishi mumkin.

Komponentlarda metil efirining mavjudligi organizmga salbiy ta'sir ko'rsatishi mumkin.

Neylon protezlarning afzalliklari

Neylon protezlarni ishlab chiqarish texnologiyasi monomerdan foydalanmaydi, bu esa allergiya muammosini bartaraf etadi.

Neylonning elastikligi materialni mustahkam qiladi va metall qisqichlarga ehtiyojni yo'q qiladi.

Neylon protezlardagi ko'rinmas qisqichlar ishonchli ushlab turishni ta'minlaydi.

Neylon zaharli moddalarni o'z ichiga olmaydi va organizmga to'liq mos keladi.

Materialning shaffofligi protezlarga tabiiy ko'rinish beradi.

Tez moslashuv tufayli neylon protezlar og'izda deyarli sezilmaydi.

Protezga g'amxo'rlik qilish uchun tebranishli maxsus idishlar-vannalardan foydalanish tavsiya etiladi;

Siz protezingizni maxsus mahsulotlar va sovunli tabiiy tukli tish cho'tkasi bilan tozalashingiz kerak, lekin protez yuzasiga zarar etkazishi mumkin bo'lgan abraziv elementlarni o'z ichiga olgan tish pastalaridan foydalanmasligingiz kerak;

Tishlaringizni kamida uch oyda bir marta tish shifokori tomonidan professional tozalashingiz kerak;

Agar milk atrofiyasi 20% dan oshsa yoki periodontal kasallik, periodontit yoki milk shilliq qavatining yuqori harakatchanligi bo'lsa yoki tish tojlari past bo'lsa, protezlardan foydalanmaslik kerak;

Neylon protezlar yumshoq ramka tufayli milklarga yaxshiroq mos keladi, ammo ular akril protezlarga qaraganda tezroq shaklini yo'qotadi;

Neylon protezlar gigienikroq, chunki ular hidlarni yutmaydi va toksik emas;

Neylon protezlar materiallar va ishlab chiqarish narxi tufayli akril protezlarga qaraganda qimmatroq.

Neylon egiluvchan va yumshoq material bo'lib, uni egiluvchan neylon qisqichlar uchun ideal qiladi. Neylondan tayyorlangan protezlar akril protezlarga qaraganda yuqori darajada estetik ko'rinishga ega, yengilroq va yupqaroq. Bemorlar ularga tezroq moslashadi. Biroq, bu materialning egiluvchanligi va elastikligi bilan bog'liq ba'zi kamchiliklari ham mavjud.

Protez asosining to'qimalariga stress qo'llanilganda, neylon plastinka materiali o'zining barcha kamchiliklarini, masalan, yukni tishlash joyiga jamlash, ovqatlanish paytida og'riq paydo bo'lishini ochib beradi. Bu stress shilliq qavatga ham ta'sir qiladi, bu esa jag' suyagining tez atrofiyasiga olib keladi. Har yili jag' suyagi balandligi 1 mm ga kamayadi va to'qimalar 2 mm yoki undan ko'proq cho'kib ketganda, protez kiyish noqulay bo'lib qoladi, tishlardan sirg'alib ketadi, og'riq va noqulaylik tug'diradi va normal ovqatlanishga xalaqit beradi.

Shunday qilib, akril protezlar neylon protezlarga qaraganda qulayroq va amaliyroq degan xulosaga kelish mumkin.

Bir qarashda, aksariyat ko'rsatkichlar akril protezlarni afzal ko'radi. Ular ko'p jihatdan ustundir. Biroq, neylon protezlarni kiyish qulayroq. Biroq, ularning maqsadi - ovqatni chaynash - hisobga olinsa, og'riq neylon protezlarning afzalliklarini kamaytiradi.

Biroq, bu siz neylon protezlardan butunlay voz kechishingiz kerak degani emas. Vaqtinchalik neylon protezlar ko'pincha bitta yoki ikkita yo'qolgan tishni tiklash uchun ishlatiladi.

Moslashuvchan neylon protezlar

Olinadigan protezni tanlashda tish shifokoringiz moslashuvchan neylon protezlar kabi bir nechta material variantlarini taklif qilishi mumkin.

Neylon bardoshli va elastik material bo'lib, uzoq xizmat qilish muddatiga ega egiluvchan neylon protezlarni yaratish imkonini beradi.

Bu olinadigan protezlarni oddiy sovun va cho'tka bilan tozalash oson. Biroq, ularning ishlash muddatini uzaytirish uchun maxsus vannalar va pastalardan foydalanish tavsiya etiladi.

Neylon olinadigan konstruksiyalarning asosiy afzalliklaridan biri shundaki, ular har qanday turdagi toj uchun mos keladi, bu esa ushbu texnologiyani turli moliyaviy imkoniyatlarga ega bemorlar uchun qulay qiladi.

Neylon konstruksiyalarning biriktirilishi ishonchli va qo'shni tishlarni maydalashni yoki boshqa og'riqli muolajalarni talab qilmaydi.

Olib tashlanadigan akril protezlar

Olib tashlanadigan akril protezlar eng mashhur va keng qo'llaniladi.

Ular tishlarning qisman yoki to'liq yo'qolishi holatlarida qo'llanilishi mumkin.

Bundan tashqari, ularni tishlar orasida ancha katta masofa bo'lgan hollarda o'rnatish tavsiya etiladi.

Ba'zi mutaxassislar bolalarga doimiy tishlar paydo bo'lishidan oldin ham akril protezlarni o'rnatishni tavsiya qiladilar, bu esa kelajakda tishlarning noto'g'ri tishlanishining oldini olishga yordam beradi.

Biroq, akril tuzilmalar juda mo'rt va faqat 8 yilgacha xizmat qilishi mumkin.

Tish protezlariga ko'nikish uchun biroz vaqt kerak bo'ladi, bu usulning kamchiliklaridan biridir.

Akril protezlarning arzonligiga qaramay, ular barcha bemorlar uchun davo emas. Bioinertligi tufayli tibbiyotda keng qo'llaniladigan silikon protezlarda bunday holat kuzatilmaydi. Ularning moslashuvchanligi va elastikligi ularni ishlatishni qulay qiladi va estetikasi yuqori. Biroq, silikonning ham kamchiliklari bor: uning haddan tashqari yumshoqligi va elastikligi chaynash kuchlariga bardosh bermasligi mumkin va protezlar ortoped tomonidan muntazam ravishda sozlashni talab qiladi.

Shifokorlar va bemorlarning fikriga ko'ra, neylon protezlarning afzalliklari qanday?

Neylon protezlar mustahkamligi va chidamliligi tufayli tobora ommalashib bormoqda. Ular, shuningdek, yengil, bemorlarda tirnash xususiyati yoki yuqori sezuvchanlik keltirib chiqarmaydi va boshqa protez turlariga qaraganda tabiiyroq rangga ega. Bu esa katta qulaylik va estetik jozibadorlikni ta'minlaydi.

Neylon qattiq akril va yumshoq silikon o'rtasidagi ideal murosa bo'lib, ajoyib estetika va tez moslashishni ta'minlaydi. Gipoallergen xususiyatlari tufayli ushbu material deyarli qoldiq monomerni o'z ichiga olmaydi va allergik reaktsiyalarga olib kelmaydi, bu akrilga nisbatan sezilarli afzallikdir. Silikondan farqli o'laroq, neylon o'z shaklini yaxshiroq saqlaydi va chaynash bosimiga bardosh beradi.

Biroq, neylonning bir qator kamchiliklari bor, jumladan, nisbatan qisqa xizmat muddati va protez yuzasida tirnalishlarga qarshilik ko'rsatmaslik.

Mutaxassislarning ta'kidlashicha, hech qanday olinadigan protez turi yo'qolgan tishlar sohasida suyak yo'qotilishining oldini ololmaydi, chunki protezlar faqat vaqtinchalik chora hisoblanadi. Shuning uchun, agar implantatsiyaga nisbatan davolanish uchun vaqt talab qiladigan nisbiy kontrendikatsiyalar mavjud bo'lsa, bu variant jozibador bo'lishi mumkin.

Neylon boshqa materiallar bilan taqqoslanmaydigan ko'plab afzalliklari va minimal kamchiliklari tufayli olinadigan protezlar uchun afzal material hisoblanadi. Bu xususiyatlar neylon protezlarni eng keng tarqalgan materialga aylantirdi va deyarli barcha stomatologlar o'z bemorlariga olinadigan protezlar uchun material sifatida neylonni tavsiya qiladilar.

Xulosa

Tadqiqot natijalari shuni ko‘rsatadiki, neylon tish protezlari yuqori biokompatibiliteti va qulayligi bilan ajralib turadi. Akril protezlar esa iqtisodiy jihatdan qulay va keng tarqalgan variant bo‘lib qolmoqda. Bemorning individual holatini hisobga olgan holda protez turini tanlash stomatologik davolash samaradorligini oshiradi. O‘tkazilgan tadqiqot natijalariga ko‘ra, turli protez materiallari og‘iz bo‘shlig‘ining biokimyoviy muhitiga turlicha ta’sir ko‘rsatadi. Neylon protezlar eng yuqori biologik moslikka ega bo‘lsa, metallokeramika barqaror natijalar beradi. Akril protezlar esa ehtiyotkorlik bilan va individual yondashuv asosida qo‘llanilishi lozim. Olingan ma’lumotlar klinik amaliyotda bemorning holatini hisobga olgan holda optimal protez materialini tanlashda muhim ahamiyatga ega.

Foydalanilgan adabiyotlar ro‘yxati

1. Anusavice K.J. Phillips’ Science of Dental Materials. Elsevier, 2019.
2. Craig R.G., Powers J.M. Restorative Dental Materials. Mosby, 2018.
3. Sakaguchi R.L., Ferracane J.L. Dental Biomaterials. Elsevier, 2021.
4. Dorozhkin S.V. Biocompatibility of dental materials. Journal of Materials Science, 2020.
5. Kambarova D.K. Tish protez materiallarining biologik mosligi. Stomatologiya jurnali, 2022.
6. Абдувакилов Ж.У., ЯкубоваС.Р., Балтабаев У.А. Тиш протезларига мослашиш жараёнларида биокимёвий курсаткичларнинг ахамияти //Доктор ахборотномаси. – 2021. -№4. -С.139-144.
7. Gavkhar Nuriddinovna Indiaminova, Tulkin Elnazarovich Zoirov. (2021). Improvement of Methods of Providing Dental Care for Children with Mental Delayed Development. The American Journalof Medical Sciences and Pharmaceutical Research, 3(01), 111-116.
8. G. N. Indiaminova, “Duration of orthodontic treatment in patients with dental jaw anomalies with removal and withoutremoval of separate teeth” журнал биомедицины и практики №si-2 (2020).
9. «Клиническая оценка состояния протезных конструкций у больных с частичной адентией» Якубова С.Р., Абдувакилов Ж.У. «Актуальные проблемы детской стоматологии» 2021 Стр-285-290.

10. Шаныгина Д.В. Неинвазивные методы исследования в клинике ортопедической стоматологии / Д.В. Шаныгина, Г.В. Большаков, А.А. Подколзин // Институт стоматологии. - 2002. - № 3. - С. 46-47.
11. Craig R.G. Dental materials / R.G. Craig, J.M. Powers, J.C. Wataha.- London: Mosby, 2000. - 327p.
12. DrapalS. Биологическая совместимость дентальных металлов / S. DrapalIIНовое в стоматологии. - 2001. - №2. - С.39-48.

Axrorov M. N.
assistent
Samarqand davlat tibbiyot universiteti
Samarqand, O‘zbekiston

TIBBIYOTDA GELIY-NEON LAZER NURLARIDAN FOYDALANISH

Annotatsiya. *Tibbiyotda geliy-neon lazerlari ko'pincha terapevtik, diagnostika va jarrohlik maqsadlarida qo'llaniladi. Ularning kuchi hatto issiqlik effekti ham sezilmasligi va teri to'qimalariga zarar yetkazmasligi, balki ajoyib ta'sir ko'rsatishi, to'qimalarga sezilarli chuqurlikka kirishi uchun tanlanadi. Faqat past intensivlikdagi lazerlar bu xususiyatga ega. Optimal lazer qurilmasi tanaga optimal chastota diapazonini "tanlash" imkonini beradi; ya'ni elektromagnit tebranishlar "suzuvchi" tarzda taqsimlanganda, tana kerakli diapazonni "tanlaydi".*

Kalit so'zlar: *texnologiya, fizik, induktsiyalangan, majburiy, geliy-neon, nurlanish, yuqori energiya, atom, naychalar, metastabil holat, qo'zg'algan atomlar.*

Axrorov M. N.
assistant
Samarkand State Medical University
Samarkand, Uzbekistan

USING HELIUM-NEON LASER BEAMS IN MEDICINE

Abstract: *Helium-neon lasers are most often used in medicine for therapeutic, diagnostic and surgical purposes. Their power is selected in such a way that even the thermal effect is not felt, does not damage the skin tissues of the body, but has an amazing effect, penetrating into the tissues to a considerable depth. Only low-intensity lasers have this property. An optimal (optimal) laser device allows the body to “choose” the optimal frequency range for the body, that is, when electromagnetic vibrations are distributed in a “floating” manner, the body “chooses” the range required for itself.*

Key words: *technology, physicist, induced, forced, helium-neon, radiation, high energy, atom, tubes, metastable state, excited atoms.*

Kirish

Yorug‘lik nurlari va elektromagnit to‘lqinlar umumiy tabiatga ega bo‘lsalarda, ko‘p yillar davomida kvant mexanikasi va elektronika, elektromagnit to‘lqinlar fizikasi mustaqil, rivojlanib keldi.

O‘tgan asr boshida atiga o‘n yil ichida beshta kashfiyot qilindi. 1895 yilda nemis fizigi V. Rentgen nurlanishlarning yangi turini kashf etdi, keyinchalik uning nomi bilan ataldi. Bu kashfiyot uchun u Nobel mukofoti 1901 yilda olgan. 1896

yilda Fransuz fizigi Antuan Anri Bekkerel radioaktivlik hodisasini kashf etdi - 1903-yilda Nobel mukofoti bilan taqdirlangan. 1897-yil Ingliz fizigi J.J.Tomson elektronni kashf etdi va keyingi yili uning zaryadini o‘lchadi hamda 1906 yil Nobel mukofoti bilan taqdirlangan. 1900 yil 14 dekabr nemis fiziklar jamiyati yig‘ilishida Maks Plank absolyut qora jismning emissiyasi formulasini tushuntirib berdi; bu xulosa 20-asrning asosiy fizikaviy nazariyalaridan biri bo‘lgan kvant nazariyasiga asos bo‘lgan mutlaqo yangi g‘oyalarga asos soldi. 1905 yilda yosh Albert Eynshteyn-o‘sha paytda atigi 26 yoshda-maxsus nisbiylik nazariyasini nashr etdi.

Bu kashfiyotlarning barchasi fan olamiga hayratlanarli taassurot qoldirdi va ko‘pchilikni chalkashtirib yubordi - ular mavjud fizika doirasiga mos kelmadi va uning asosiy tushunchalarini qayta ko‘rib chiqishni talab qildi. Boshlangan 20-asr yangi fizikaning tug‘ilishini e’lon qildi, "klassik" deb nomlangan eski fizika saqlanib qoldi. Bugungi kunda inson yuqori quvvatga va intensivlikka ega bo‘lgan qudratli lazer nuriga ega. Inson aqlning bu yangi ixtirolari nima uchun xizmat qiladi? Lazer nima? Ishonchli yordamchi yoki aksincha dahshatli kosmik qurolli yoxud boshqa qirg‘in olib boruvchi vositami?

Lazer inglizcha so‘zlarning “Light Amplification by Stimulated Yemission of Radiation” bosh harflaridan olingan bo‘lib, tarjimasi “majburiy nurlanish orqali yorug‘likni kuchaytirish” degan ma’noni beradi.

Usullar. Ma’lumki, nurlanish modda bilan ta’sirlashish natijasida, modda atomlari fatonni yutib energiyasi yukori bo‘lgan uyg‘ongan holatga utishi mumkin. Bu holat barkaror emas. Odatda atomlarning bu holatda yashash vaqti juda kiska, ya’ni 10-3 s. Uyg‘ongan holatdagi atomlar ma’lum vaqtdan so‘ng o‘z-o‘zidan (spontan ravishda) fotonlarni nurlatib, energiyasi kichik bo‘lgan holatga utadi. Bunday nurlanishga spontan nurlanish deyiladi. Spontan nurlanish tasodifiy xarakterga ega. Shuning uchun bu nurlanish izotropdir ya’ni biror bir asosiy yunalishga ega emas, kogerent emas chunki har xil atomlar nurlatgan kvantlar xar xil fazaga ega va monoxromatik emas, nurlanishlar har xil chastotalar to‘plamidan iborat[1,2].

Atomlarning uyg‘ongan holatdan kichik energiyali uyg‘ongan holatlarga o‘tishi kaskad o‘tishlar unga tushayotgan fotonlar ta’sirida xam yuzaga kelishi mumkin. Faqat buning uchun fotonning energiyasi shu o‘tish energiyasiga teng bo‘lishi lozim. Bunda bir vaqtda ikkita foton xosil bo‘ladi; tushayotgan foton va atomni bir holatdan boshka holatga utishi natijasida xosil bo‘lgan fotonlar. Tushayotgan foton bu holatda atomni uyg‘ongan holatdan energiyasi kichchik holatga utishga majburlaydi. Shuning uchun bunday nurlanishlar indutsiyalangan yoki majburiy nurlanishlar deyiladi. Uyg‘ongan atomni majburiy nurlanishi tashki foton ta’sirida yuzaga kelibgina kolmay balki indutsiyalangan nurlanishning fotoni ta’sirida xam xosil bo‘ladi. Uyg‘ongan atomlarning soni yetarli bo‘lgandagi bu xodisa nurlanishi intensivligini usishiga olib keladi[3,4].

Kogerentlik, monoxromatiklik ingichka nurlar dastasini hosil qilish va anik yunalishga ega bulishlik indutsiyalangan nurlanishning asosiy xossasidir. Bunga sabab uyg‘ongan atomga tushayotgan kvantni chastotasi, fazasi, impulsi va

kutblanishi bir ekanligidir. Indutsiyalangan nurlanish-lazer nurlari hosil bo‘lish jarayonini asosiy fizikaviy tamoyilini tashkil qiladi[5,6].

Indutsiyalangan utishlar extimolligi tushayotgan kvantlar soni va uyg‘ongan atomlar soni kancha kup bo‘lsa shuncha katta bo‘ladi.

Barcha lazerlar uchta asosiy qismdan iborat.

faol ishchi muhiti;

nasos tizimlari va energiya manbai;

optik rezonator (agar lazer kuchaytirgich rejimida ishlayotgan bo‘lsa;

Tabiiy sharoitda moddada uyg‘ongan holatdagi zarralarning soni, kichik uyg‘ongan holatdagidan kichik bo‘ladi. Indutsiyalangan utishlar tufayli hosil bo‘layotgan nurlanishni kuchaytirish uchun uyg‘ongan holatdagi atomlar soni quyi holatdagidan katta bo‘lishi kerak.

Zarralar orasidagi bunday munosabatlar hamma moddalarda kuzatilmaydi. Ayrim moddalarda zarralarni shunday uyg‘ongan holatlari mavjudki, ulardan kichik uyg‘ongan holatga yoki asosiy holatga o‘z-o‘zidan o‘tish ehtimolligi juda kam. Atomni bunday holatda yashay oladigan vaqti 10-3 s gacha bo‘ladi. Bunday energitik holatlarga mos keladigan sathlar metastabil sathlar deb ataladi. Uyg‘otish jarayoni ta’sirida bunday sathlardagi atomlarning soni ortib, to‘plana boshlaydi. Natijada shunday holat yuzaga keladiki metastabil uyg‘ongan sathdagi atomlarning soni, kichik uyg‘ongan sathdagi atomlar sonidan katta bo‘lib qoladi. Bunday holatdagi sathga inversli to‘planish deyiladi. Shunday moddalar lazerning faol ishchi muhitni tashkil etadi. Invers to‘planish holatini xosil kilish uchun kerakli zarralarni ajratib olish yuli, zarralarni yorug‘lik optik usuli yoki elektr zaryadi elektr usuli yordamida uyg‘otish usullari qo‘llaniladi. Shunday qilib, bu lazerda neon atomlari ishchi, geliy atomlari esa yordachi element bo‘ladi. Geliy-neon lazerlari uzluksiz ishlaydigan lazerlarga kiradi [7,8].

Natijalar. Bu xossalar lazer nurlanishining energiyasi yuqori bo‘lgan ingichka (mikro) nurga tuplash mumkinligi, xamda uni selektiv (tanlanib) yutilishi uni meditsinada keng kullanilishiga yul ochadi.

Lazer nuri xirurgiyada to’qimalarni konsiz kesishlarni bajarishda ishlatiladi, chunki uning ta’sirida kesilayotgan tukimaning chetlari payvanlanib kolishi natijasida kapillyar kon ketishni oldi olinadi. Onkologiyada xavfli usma xujayralarini yemirishda ishlatiladi. Oftalmalogiyada lazer nuri urnidan kuchgan ko‘z tur pardasi retseptorlarini «payvandlashda» va glaukomani davolash uchun kuz ichidagi suyuklikni okizib chikarish uchun sklerada mikroskopik teshiklarni xosil kilishda ishlatiladi. Dermotologiyada sugal va norlardan, tanadagi yozuvlardan forig‘ bo‘lishda gaz lazerining nurlanishidan terapevtik maksadda qo‘llaniladi[9].

Lazer nurlanishining biologik tukimalarga ta’sirining xususiyatlarini xisobga olib, u bilan ishlash jarayonida tajriba utkazuvchiga nurning tushishini bartaraf kilish lozim, (xattoki, biror buyumdan qaytganini ham).

Muhokama. Lazerlarning ishlatilishi ular chiqaradigan nurlanishning qat’iy monoxromatikligi ($\Delta\lambda\approx0,01$ nm) yetarlicha bo‘lgan katta quvvatga ega bo‘lish, dastaning ingichkaligi va kogerentligi kabi xossalariga asoslangandir.

Lazer tibbiyotda ham tatbiq etiladi. Bu borada ikki asosiy yo‘nalishda rivojlantirilgan.

1. Lazerlar nurlarining to‘qimalarni buzish xossasiga asosolanadi, (qonsiz kesish va h.k).

2. Gologrаfiyada foydalanish

Biologik ob’ektlarga lazer nuri ta’sir etganda o‘zgarishlarni kuzatishda, quyidagi optik kvant generatorlar ishlatiladi:

1) karbonat angidrid gazli lazer, λ=10,6 mkm=1,06·104 nm to‘lqin uzunlikni va chiqishdagi quvvati r = 50 Vt uzluksiz rejimda ta’sir qiluvchi.

2) geliy-neonli lazer, ko‘rinuvchi nurning qizil qismiga to‘g‘ri keluvchi λ=0,63mkm=632 nm, quvvati r=30 mVt.

3) geliy-kadmiy lazeri, ko‘rinuvchi nurning ko‘k qismiga to‘g‘ri keladi, λ=0,44mkm=440 nm, quvvati r=35 mVt.

4) azotli gazli lazer, impulsli rejimda λ=0,337 mkm = 337 nm da ishlovchi, impulsli quvvati r = 30 Vt, o‘rtacha nurlanish quvvati R=10 mVt.

Foydalanilgan adabiyotlar ro‘yxati

1. Karu T.I. Low-Power Laser Therapy. – Biomedical Photonics Handbook. CRC Press, Boca Raton, 2014. – pp. 48–1 – 48–25.
2. Basford J.R. Low-intensity laser therapy: still not an established clinical tool. – Lasers in Surgery and Medicine, 1995, Vol. 16(4), pp. 331–342.
3. Hamblin M.R., Demidova T.N. Mechanisms of low level light therapy. – Proceedings of SPIE, 2006, Vol. 6140.
4. Karu T. Photobiology of low-power laser effects. – Health Physics, 1989, Vol. 56(5), pp. 691–704.
5. Tunér J., Hode L. The Laser Therapy Handbook. – Stockholm: Prima Books AB, 2010. – 504 p.
6. Mester E., Mester A.F., Mester A. The biomedical effects of laser application. – Lasers in Surgery and Medicine, 1985, Vol. 5(1), pp. 31–39.
7. Беляев В.С. Лазерная терапия в клинической практике. – Москва: Медицина, 2002. – 256 с.
8. Козлов В.И., Сорокин В.В. Гелий-неоновые лазеры и их применение в медицине. – Санкт-Петербург: Наука, 2001. – 198 с.
9. Самойлов В.О. Медицинская лазерная техника. – Москва: Физматлит, 2010. – 312 с.
10. Родионов А.А. Лазерная физиотерапия: теория и практика. – Москва: ГЭОТАР-Медиа, 2016. – 288 с.

Axrorov M. N.
assistent
Samarqand davlat tibbiyot universiteti
Samarqand, O‘zbekiston

YOQUT LAZERI AHAMIYATI

Annotatsiya: *Lazerlarda ishlatiladigan qizg’ish rangli yoqut kristalining optik xususiyati va spektroskopiyasi ancha yaxshi o’rganilgan. Yoqut kristalining ikkita kuchli yo’l–yo’lyutilish spektri ko’zga ko’rinadigan spektral oraliqda joylashgan. Yoqut kristalining optik spektri xrom ionining energetik sathlari orasidagi o’tish bilan bog’langan. Yoqut kristalidan chiqayotgan lazer nuri dastasining kesimi odatda ko’p sonli ingichka va bir–biriga bog’liq bo’lmagan “ipchalardan” iborat bo’lib, har birining diametri 100 mikronlar atrofida bo’ladi. Shu sababli lazer nurining tarqalish burchagi nazariy jihatdan aniqlanadigan λ/D (D–lazer nuri dastasining diametri) qiymatidan o’n marta katta bo’ladi Rezonatorning alohida konstruksiyasini va optik jihatdan yuqori darajada sifatli yoqut kristalini tanlab, ko’ndalang bir modali generasiyaga erishilsa, generasiyaning sochilish burchagi nazariy hisobga yaqin bo’ladi. Ekki rejimda ishlaydigan yoqut lazerining har bir impulsining quvvati 20kVt ni tashkil qilsa, to’la energiyasi 100Joulgacha bo’ladi. Gigant impulsli lazerning bir impulsi 100MVt ni tashkil etadi (impuls generasiyasining vaqti 10–20 nano sekund davom etadi). Agar impuls generasiyasi yana qisqa bo’lib 10 piko sekund davom etsa, quvvati gigavattni tashkil etadi. Shunday qilib, yoqut lazeri ko’p modali erkin rejimda va gigant impulsli rejimda ishlaydi.*

Kalit so’zlar: *damlash, yorug’lik. optic, kristatl, burchak, ingichka, xrom oksidi, kogerent, chastota, energetic, spektr, mexanik.*

Axrorov M. N.
assistant
Samarkand State Medical University
Samarkand, Uzbekistan

RUBY LASER CHARACTERISTICS

Abstract: *The optical properties and spectroscopy of the reddish ruby crystal used in lasers are well studied. The two strong emission spectra of the ruby crystal are located in the visible spectral range. The optical spectrum of the ruby crystal is associated with the transition between the energy levels of the chromium ion. The cross section of the laser beam emerging from the ruby crystal usually consists of a large number of thin and unconnected “threads”, each of which has a diameter of about 100 microns. Therefore, the scattering angle of the laser beam is ten times larger than the theoretically determined value λ/D (D is the diameter of the laser beam). If a transverse single-mode generation is achieved by selecting*

a special resonator design and a ruby crystal of high optical quality, the scattering angle of the generation will be close to the theoretical calculation. If the power of each pulse of a ruby laser operating in two modes is 20 kW, the total energy is up to 100 Joules. One pulse of a giant pulse laser is 100 MW (the pulse generation time lasts 10–20 nano seconds). If the pulse generation is even shorter, lasting 10 pico seconds, the power is gigawatts. Thus, the ruby laser operates in a multi-mode free mode and a giant pulse mode.

Key words: *induced, light, optic, crystal, angle, thin, chromium oxide, coherent, frequency, energetic, spectrum, mechanical.*

Kirish

Yoqut kristalli Al_2O_3–Sr_2O_3 aralashmasidan iborat bo'lib, geksogonal, ya'ni romboedrik kristallik panjarasiga ega kristallik sistemaga kiradi. Bu kristall bir o'qli, optik jihatdan anizotropik, qattiqligi jihatidan olmosdan keyin turadi. Yoqut kristallining asosini Al_2O_3–korund (sapfir) tashkil etib, optik jihatidan tiniqdir. Sindirish ko'rsatkichi 1,76 ga teng. Sapfirning tarkibiga 0,05% xrom oksidi qo'shilsa, u qizg'ish rangli yoqut kristallini hosil qiladi. Yoqut kristallida alyuminiy (Al^{3+}) ioni xrom ioni (Sr^{3+}) bilan o'rin almashadi. Kristalldagi xrom ionlarining konsentrasiyasi $N=2*10^{19}sm^{-3}$ tashkil qiladi. Xrom oksidining konsentrasiyasini oshira borishi rubin kristalining rangini tusini o'zgartiradi, 8% Sr_2O_3 dan oshishi bilan qizil yoqut kristali yashil rangli kristalga o'zgaradi.

Tadqiqot usuli

Xrom ionining sodda va ishlatiladigan energetik sathlari tasvirlangan. Shuni ham aytish kerakki, katta to'lqinli yutilish yo'lining qanotida kuchsiz, ammo yaqqol *R*, yutilish chizig'i ham mavjud. Uy haroratida o'sha *R*, yutilish chizig'ining spektral kengligi $16sm^{-1}$ ga teng. Yutilish spektrining hosil bo'lishi xrom ionining asosiy energetik sathdan yuqorida joylashgan ^2Ye energetik sathga o'tishi bilan tushuntiriladi. Oktaedrik kristall maydoni ta'sirida ^{2}Ye sath ikkita energetik sathlarga parchalangan va energetik sathlar oralig'i $29sm^{-1}$ ni tashkil etadi. $77K$ da ^{2}Ye ning nozik strukturasi kuzatiladi va ikki chastotali lazer nurlanishini hosil qiladi. Past temperaturada lyuminessensiya nurlanish spektri ham ikkita spektral chiziqni hosil qiladi. Uy haroratida ($300K$) lyuminessensiya chizig'ining spektral kengligi $11sm^{-1}$ ni va $71K$ da esa $0,1sm^{-1}$ ni tashkil qiladi. ^2Ye energetik sath metastabil holat bo'lib elektronning yashash vaqti $300K$ da $\tau_{o'r}=2,9ms$, $77K$ da esa $4,3mks$. *Ye* energetik sathda $2A$ energetik sathga qaraganda yashash vaqti kichik, bu esa *Ye* metastabil holatda inversion ko'chganlik zichligini oshiradi. Xrom ionning asosiy energetik sathi $^4A_2$ ham ikkita energetik sathga ajralgan va bu energetik sathlarning oralig'i $0,39sm^{-1}$ ga teng.

Yoqut lazeri birinchi marta 1960 yilda ishga tushirildi va hozirgi kunda ham u o'ziga diqqat – e'tiborini jalb qilib kelmoqda. Bu lazer ko'zga ko'rinadigan kogerent yorug'lik ($\lambda=694,3nm$) nurini chiqaradi. Yoqut kristalidan sterjen (qalamcha) tayyorlandi va sterjenning kesimlari juda silliq o'zaro parallel bo'ladi. Yoqut kristali panjarasida joylashgan xrom atomining energetik sathlari tasvirlangan. Xrom ionlarini o'yg'otish uchun optik damlashdan foydalaniladi.

Chaqmoq lampasidan tarqalayotgan boy spektrli yorug'lik nurlari Yoqut kristalida yutilib, xrom ionlarini asosiy energetik sath $^4A_2$ dan $^4F_2$ va $^4F_1$ sathlarga ko'chiradi. Ionlarning uchinchi energetik sathdan ikkinchi energetik sathga o'tish ehtimoli katta. (W_{32}=0,6·10$^8 s^{-1}$) bo'lgani uchun ionlar tezda nurlanmasdan ikkinchi sathga tushadi. *Ye* energetik sath ikkita 2*A* va *Ye* alohida – alohida energetik sathlardan tashkil topgan. Uy haroratida uyg'ongan ionlar $Ye_2 \rightarrow {}^4A_2$ o'tishi λ=694,3*nm*, lyuminessensiya nurlanishini hosil qiladi va spektrning kengligi $\Delta\nu = 11 см$, kvant energetik o'tishlarining kesimi σ=2,5·10$^{-20} sm^{-1}$ va foton energiyasi $h\nu$=2,8·10$^{-19} J$. Lazer nurlanishi $2A \rightarrow {}^4A_2$ va $Ye_2 \rightarrow {}^4A_2$ o'tishlarda kuzatiladi.

Natijalar

Yoqut lazeri generasiyasining quyi chegarasini aniqlashni qaraymiz. Generasiyaning quyi chegarasiga mos kelgan inversion ko'chganlikning qiymati $N_0^n = N_\Sigma / 2 = 10^{19} см^{-3}$ ga teng. Yoqut sterjenining uzunligi 5*sm*, diametri 0,8*sm*. Agar chaqmoq lampasining 10% yorug'lik energiyasi, Yoqut kristalining yutilish spektriga mos kelganda, yorituvchi sistemaning effektivligi 20% ni tashkil qilsa, lampaning elektr energiyasidan yorug'lik energiyasiga aylantirishning effektivligi 50% ni tashkil qiladi, u holda generasiyaning quyi chegarasini hosil qiluvchi chaqmoq lampasining energiya zichligi quyidagicha topiladi:

$$\varepsilon_n^{лам} = \frac{N_0^n \cdot h\nu}{0{,}1 \cdot 0{,}2 \cdot 0{,}5} \cong 300 \frac{Ж}{см^3}.$$

Farz qilaylik, inversiya hosil qilgan aktiv Yoqut sterjenning ixtiyoriy nuqtasida, spontan ravishda nurlanish boshlansin. Nurlanish tartibsiz turli yo'nalishlar bo'ylab tarqaladi, ulardan biri albatta sterjenning o'qi bo'ylab yoki o'qiga parallel yo'nalishda ham tarqaladi. Sterjenning o'qiga burchak ostida yo'nalgan yorug'lik fotonlari aktiv sterjendan chiqib yo'qoladi va generasiyada qatnashmaydi. Aktiv sterjenning o'qi bo'ylab tarqalayotgan yorug'lik yo'lida uchragan aktiv markazlarni majburiy nurlantirib kuchayadi. Elektromagnit to'lqinning amplitudasi maksimum (botiq va qavariq) nuqtalarida aktiv markazlar jadal sur'atlar bilan bo'shaydi. Generasiya boshlanishi spontan nurlanishdan boshlanib, keyin majburiy nurlanish kuchayib, spontan nurlanish juda kuchsizlanib qoladi. Kuchaygan yorug'lik aktiv sterjendan chiqib, rezonator ko'zgulariga tushadi va ko'zgulardan qaytib yana aktiv sterjenga kiritiladi, natijada ikki ko'zgu oralig'ida turg'un to'lqin hosil bo'ladi. Aktiv sterjenning ikki kesimidan chiqayotgan yorug'lik to'lqinlari qarama – qarshi tomonlardagi ko'zgulardan bir necha yuzlab marta qaytib, aktiv sterjen orqali o'tib, oxiri rezonator oralig'ida katta intensivlikdagi monoxfromatik yorug'lik to'planadi va qaytarish koeffisiyenti kichik bo'lgan ko'zgu orqali tashqariga lazer nuri bo'lib tarqaladi. Rezonatordan chiqayotgan lazer nurlanishini kuzatish uchun oq qog'ozdan ekran yasab, nur yo'liga qo'yib ekranning yuzida yarqillagan qizil rangli dog'ni ko'rish kifoya. Xavfsizlik texnikasiga ko'ra lazer nurlarini bevosita

ko’z bilan qarab ko’zatish mumkin emas, hattoki kog’oz ekran yaltiroq bo’lmasdan diffuziyali qaytaradigan bo’lishi lozim.

Xulosa

Lazer nurlanishining vaqtli rejimini ko’zatishda fotoelement yoki foto ko’paytirgich bilan ossillograf dan foydalaniladi. Har bir lazer nurlanishining intensivligi optik damlash quvvatiga bog’liq ravishda o’zgaradi va impulschalar soni yuzta va undan ham ko’p bo’lishi mumkin. Har bir pichkaning nurlanish vaqti qisqa bo’lib, bir mikrosekund atrofida bo’ladi, lekin ularning intensivligi biridan ikkinchisiga o’tganda tartibsiz o’zgaradi, shuningdek orasidagi masofa ham tartibsiz o’zgaradi. Chaqmok lampasining nurlanishi impulsli nurlanish bo’lib, nurlanish muddati bir necha yuz mikrosekunddan bir necha millisekundgacha uzluksiz davom etadi.

Yoqut lazerining spektri Fabri-Pero interferometri yordamida o’rganiladi. 9-rasmda yoqut lazeri generasiyasining interferogrammasini, spektrini foto kamera yordamida yozish ko’rsatilgan. Interferogrammadan ko’rinadiki, yoqut lazeri nurining spektri ko’p aksial modali generasiyadan tashkil topgan. Generasiya spektrining vaqtga bog’liq o’zgarishidan ko’rinadiki, spektr tarkibi impulchadan impulsgacha o’tganda o’zgaradi. Yoqut kristalidagi xrom ionlarining lyuminessensiyasi bir jinsli spektral kengaygan aktiv moddalar bo’lib yakka aksial modali generasiyani hosil qilishi kerak. Generasiyaning quyi chegarasiga yaqin bo’lgan damlash energiyasida yakka moddali generasiya hosil bo’ladi. Damlash energiyasini oshirish bilan aksial modalar soni ham ko’paya boradi va to’yinish qiymatiga erishadi. Lazer nurlanishining spektral kengligi damlash energiyasiga bog’liq bo’lmay qolgan holni spektral to’yinish deb yuritiladi. Ko’pchilik aksial modalarning generasiya chiqishiga sabab rezonator ko’zgulari oralig’ida turg’un to’lqin elektr maydonining bir jinsli bo’lmagan taqsimoti va u maydonning aktiv markazlarini notekis bo’shatishdir. Ikkinchidan chakmoq lampasi ishlagandan keyin undan ajralib chiqqan yorug’lik issiqlik energiyasi hisobiga aktiv modda qiziydi va spektr kengligi o’zgaradi. Rezonator ko’zgularining mexanik tebranishi kabi sabablar ham moddalar sonining o’zgarishiga va impulschali generasiyaning paydo bo’lishiga olib keladi.

Foydalanilgan adabiyotlar

1. Maiman T.H. Stimulated optical radiation in ruby. – Nature, 1960, Vol. 187, pp. 493–494.
2. Silfvast W.T. Laser Fundamentals. – 2nd ed. Cambridge: Cambridge University Press, 2004. – 566 p.
3. Svelto O. Principles of Lasers. – 5th ed. New York: Springer, 2010. – 624 p.
4. Karu T.I. Laser biostimulation: a photobiological phenomenon. – Journal of Photochemistry and Photobiology B: Biology, 1989, Vol. 3(4), pp. 638–640.
5. Anderson R.R., Parrish J.A. Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation. – Science, 1983, Vol. 220(4596), pp. 524–527.
6. Goldman L. Biomedical aspects of the laser. – New York: Springer-Verlag, 1967. – 412 p.

7. Apfelberg D.B. Argon and ruby laser treatment of cutaneous lesions. – Plastic and Reconstructive Surgery, 1981, Vol. 67(1), pp. 20–26.
8. Dover J.S., Arndt K.A. Laser treatment of pigmented lesions. – Archives of Dermatology, 2000, Vol. 136(12), pp. 1563–1568.
9. Беляев В.С. Основы лазерной медицины. – Москва: Медицина, 2003. – 280 с.
10. Самойлов В.О. Лазеры и их применение в медицине и биологии. – Москва: Физматлит, 2008. – 304 с.

Bahriddinov N. Z., doctor of philosophy (PhD) in economics
associate professor
department of economics
NamSTU
ORCID: 0000-0002-3765-5778

METHODS OF FINANCIAL INCENTIVES FOR THE INNOVATIVE ACTIVITY OF BUSINESS ENTITIES BASED ON FOREIGN EXPERIENCE

Abstract: *The article examines and analyzes the innovative activities of enterprises with the help of foreign experience of financial incentives. The experience of various foreign countries on this issue was studied and the possibilities of their use in enterprises were determined and evaluated. Proposals on using foreign experience of financial stimulation of innovative activities have been developed.*

Key words: *innovative activity, incentives, industrial enterprises, financial incentives, efficiency, foreign experience, socio-economic development, globalization, economic growth, social and social infrastructure.*

Introduction

Economic development is directly related to investments in science, human capital, the production of new products, and their implementation. Most foreign countries have achieved rapid economic recovery due to the development of innovative activities, competent and effective organization of the innovation process, and the sale of innovative products in domestic or foreign markets. On this basis, it is advisable for entrepreneurs, government agencies, and industrial enterprises to use the positive experience of organizing the innovation process in developed foreign countries to develop the economy.

The mechanism for stimulating the development of innovations is market competition. Therefore, entrepreneurs who are the first to adopt innovations have a significant advantage over their competitors. Innovations are the engine of economic development, ensuring its efficiency and labor productivity[3]. Innovative activity is understood as the performance of work, the provision of services for scientific creation, the development at the enterprise and the practical application of new or modernized products, based on a new or developed technological process required by the market, the creation of scientific research or other scientific and technical achievements. At all stages of the implementation of innovative activity, its financing is of decisive importance. The following areas of innovative activity should be financed:

[3]Шумаев В.А., Одинцов А.А., Морковкин Д.Е. Механизм инновационного развития // Научные механизмы решения проблем инновационного развития. Сб. ст. международной науч.-практ. конф. В 4 ч. Уфа: Аэтерна, 2017. С. 206–209

- organization of financing at all stages of implementation of innovative activities;

– implementation of a set of scientific research, development, and technological works aimed at creating new or improved products and technological processes intended for practical use;

– new or improved products and technological process testing;

– technological re-equipment and preparation of production for the production of new or improved products and the introduction of a new technological process;

- training of personnel in order to implement innovative activities and training;

– expertise, consulting, information, legal and other services for the creation or practical application of new or improved products and new and improved technological processes;

- creation and development of innovative infrastructure;

– granting or obtaining rights to the results of intellectual activity or confidential scientific and technical information;

– measures to promote new products. Many foreign countries have created very effective schemes for the development and transfer of innovations, which ensure high competitiveness of products.

The main part: Based on the pace of development and nature of the innovative economy, we will study the world into three regions: America, Europe and Asia. (Figure 1)

Studying the experience of countries with developed science and technology, advanced technologies, in **American** practice, the main criteria for state support of innovative projects are the technological significance of the project and the risks associated with its implementation. At the state level, the strategy for reducing institutional risks is implemented by expanding the freedom of entrepreneurial decisions. In the US, universities have the right to issue local documents regulating the issues of shares of companies using university intellectual property. The practice of using this experience is distinguished by greater freedom of universities in terms of creating subsidiaries and allows them to attract large amounts of money from external sources of financing, which gives a greater commercial effect [4].

The US national innovation system is based on the interaction of business, science and innovation. After World War II, "recommendations were made to create a state agency to finance basic research in colleges, universities and research institutions." This led to the formation in 1950 of the National Science Foundation of the United States, whose main mission is "to ensure the development of science, increase national wealth, enhance the well-being of the

[4]Секерин В.Д., Горохова А.Е., Лукашева Н.А., Андреев Ю.Н. Анализ проблемы особых рисков создания малых инновационных предприятий по сравнению с обычными рисками предпринимательской деятельности // Актуальные проблемы социально-экономического развития России. 2019. № 1. С. 46–51.

nation and ensure national security [5]." The American national innovative of the system main participants state, universities and is a business. State research dominant directions determines and national laboratory base manages National laboratories national fundamental according to priorities research take goes In US law innovative activity in order tax, national innovative of the system to the development related ten more law documents there is They are financial, monopoly against, tax, customs and other mechanisms included economic of regulators almost all to the complex impact does.

Three leading innovative economies in each region of the world



Figure 1. Three leading innovative economies in each region of the world[6]

They are financial, monopoly against, tax, customs and other mechanisms included economic of regulators almost all to the complex impact does. The US national innovative of the system main from the features one its intellectual property protection to do orientation (active patenting incentive). Bay-Dole patent and trade stamp about law to universities and other non-governmental non-profit to organizations state funds with, as well as contracts or joint activity contracts according to research take to go permission gave. The law to universities paten and licenses to take made it easier . of Bay-Dole Law reception to be done in universities technologies transmission departments to the development take came and marketing and licensing of technologies to the development push gave

[5] About the National Science Foundation // National Science Foundation (NSF). 2021. URL: http:// www.nsf.gov/about/ (data obpashcheniya : 30.08.2021).
[6]Global Innovation Index Database, WIPO, 2022

Stevenson- Weidler's technological innovations about The law (Law Stevensona - Wydler "O tekhnologicheskoy innovatsii") is private enterprises and national laboratories by joint scientific research in the process created to inventions oh my god the right determines [7]Stevenson -Weidler To the law according to federal government in the composition technologies transmission fund organization. As a result, every a laboratory technology commercialization office opened.

The main functions of these funds are as follows:

- evaluation of the effectiveness of commercial use of federal laboratory programs;

- providing information about state intellectual property objects to state bodies, local authorities and the private sector of industry;

- participation in programs adopted by the federal government, state authorities and technology transfer to facilitate the process of local authorities.

Small businesses play a significant role in bringing innovations to market, and this is a tradition in the United States. Therefore, there are several federal programs that help small businesses develop. Universities conduct fundamental research that is funded by the state and private companies. The US National Science Foundation and the US National Institutes of Health fund research by universities. A distinctive element of the innovation system is the ability to provide consumers (businesses) with new developments and inventions. Business in the United States is a consumer of the intellectual property of universities and national laboratories; a manufacturer of products based on intellectual property; a consumer of consulting services provided by university professors; a manufacturer and seller of new products.

It lays down the sequence of organization and implementation of innovative activities in the USA.

Phase One - Scientific research is funded by the US National Science Foundation, National Institutes of Health, corporations, universities, and private foundations. Work is underway to prepare for and participate in grant competitions. Fundamental research is conducted by scientists and engineers in national and corporate laboratories at universities and colleges.

The second stage is the development of hypotheses, ideas by scientists and engineers and the development of innovations in universities, national government laboratories, corporate laboratories and start-up companies. Financial support is provided by the US National Science Foundation, the US National Institutes of Health, private corporations, universities, government agencies and business angels. There are also small business innovative research programs. The results of this stage are inventions, hypothesis validation, patents.

The third stage is the creation of a prototype. It is carried out through start-up companies, small businesses, corporate product development networks. Engineers, production, finance and marketing specialists participate in this work. Financing mechanisms are business angels, small business innovative research

[7] https://www.wipo.int/wipolex/ru/legislation/details/14782 .

programs, corporations, venture capital. The results of this stage are prototypes, patents, business plans.

The fourth stage is product development, and the product is implemented through start-up companies, small businesses, and corporate product development networks. In addition , venture capital, capital investments, commercial loans and corporate capital are used . The result is a competitive product that is registered and ready for production and sale.

Fifth stage – serial production. It is carried out by start-up companies, small enterprises, using the production capacities of large corporations. Financing: venture capital, equity investments, commercial credit, corporate capital, shareholders. The result is mass production of innovative products that are brought to the market. The probability of an invention becoming an innovation (innovative product) is small - in the USA, only 10% of inventions are implemented in production. Accordingly, few investors are willing to take risks, and many inventions do not receive further development due to lack of funding. The invention must be presented to potential investors in terms of its economic benefits, i.e. it must be sold and bring profit to investors.

Thus, the American national innovation system: dynamically developing, responsive to changes, efficient, entrepreneurs and business-oriented, system that transfers and uses knowledge created by its main participants.

An analysis of existing national innovation systems around the world allows us to identify three main models of innovative development. The first of them can be conditionally called "Euro-Atlantic", the second "East Asian", and the third "alternative".[8]

East Asian model The innovative development model characteristic of the countries of the East Asian region (Japan, South Korea, Hong Kong) differs significantly from the "traditional" model. The East Asian innovation cycle does not have a stage of formation of fundamental ideas. Innovation systems based on this model are almost completely devoid of the component of fundamental science (and partly applied sciences). East Asian countries, oriented towards the export of high-tech products, as a rule, borrow technologies from countries that follow the "traditional" model.

European Union (EU). In Germany, universities are the source of knowledge. There are 346 universities in the country, 170 of which are engaged in teaching and research in the field of applied sciences. Universities are designed for research, they cannot simultaneously engage in marketing and business. Out of 5,000 innovations, only one becomes a real product. A simple example is the mp3 player developed at the University of Nuremberg. The company patented a certain product from it, which was eventually manufactured by American and Korean companies.

For success, the product must be launched effectively, that is, companies and universities must work together and jointly create new products. Another

[8]Нехорошева Л.Н., Богдан Н.И. Инновационные системы современной экономики. — Мн.: БГЭУ, 2023.

criterion for success is the use of technology transfer services. Both parties must work together. The two main providers of technology transfer services are Fraunhofer and Steinberg. Fraunhofer is mainly engaged in research and development, and Steinberg works with customers. Steinberg and Fraunhofer work closely with the strongest companies in the business: they know how the market is developing, what trends are emerging in it, and have production planning systems. The Fraunhofer Society is one of the largest technology transfer organizations on a global scale. It includes 40 structures located in 74 cities in Germany, employing about 29 thousand people. The organization's activities are focused on customer needs: it participates in the creation of prototypes, announces final solutions for customers. Thus, there is an active cooperation between universities and companies. Research is conducted in a variety of disciplines. The budget is 1.25 billion euros per year and is constantly growing. About a third of the funding is intellectual sponsorship, but there are also external resources. They also operate on an economic basis, concluding contracts with industry and companies to ensure their activities are successful.

The Fraunhofer Society is also adopting Stanford's experience in America. Steinbeck is a 100% private foundation, that is, third-party funds are used. In Germany, this company has more than a hundred institutes. Steinberg uses a very interesting approach, because it is a completely self-financing research organization based on the motivation of professors and the entrepreneurial spirit of the professor. University professors can reduce their teaching load and use this time for entrepreneurial activities through the Steinberg institutes and the corresponding foundation, which has financial resources. Over the past 20-25 years, more than 700 small Steinberg companies have been created, employing more than 4,000 people. Steinberg operates in different countries. Recently, new institutes have been opened in Turkey, Romania, Bulgaria, etc. That is, they are also expanding internationally, which is important. One example of the use of Steinberg's new developments is the creation and development of a company in the field of ICT - GFT Technologies AG. GFT is a company with more than 1,000 employees and annual revenues of more than 200 million euros. The company has 9 organizations in 20 countries. The company cooperates with universities in Germany, Brazil and Spain in various fields, which allows it to attract specialists to this organization [9]. Fraunhofer represents radical thinking and research and is a catalyst for innovative developments. Steinberg is directly involved in product development. Steinberg is in very close contact with enterprises, including small and medium-sized businesses. Working with various institutions, these companies are well aware of the specifics of the market, trends in technology transfer (which is very important) and have the opportunity to use the results of university research in technology transfer.

[9] Нехорошева Л.Н., Богдан Н.И. Инновационные системы современной экономики. — Мн.: БГЭУ, 2023.

Conclusion

In conclusion, it should be noted that studying the experience of developed foreign countries and applying it to our country will lead to the development of innovative activities of industrial enterprises and, as a result, to the growth of the country's economy.

Using foreign experience in innovative development, the Uzbek economy can become one of the most competitive in the world market for goods and services.

Therefore, we believe that in the future, the most appropriate way to form innovative potential in our country's industrial enterprises and ensure high efficiency of innovative activities is to use the experience of foreign countries.

Literature

1. Mukhitdinov Kh. Institutional approach to the analysis of the formation and development of innovative potential // Economics and Finance. – Tashkent, 2012, No. 2. pp. 2-6.
2. Barker A. Alchemy is innovative. Per. English - Moscow: Vershina, 2013. - C.79.
3. Vasiliev Yu.P. Razvitie innovatsionnoy deyatelnosti v SShA ili kak udvoit VVP / Chebnoe posobie. - Moscow: Ekonomika, 2005. - P.139.
4. Жураев, Э. С. (2018). Зарубежный опыт по ведению финансовой политики для развития малого бизнеса. Экономика и социум, (11 (54)), 357-362.
5. Жўраев, Э. (2002). КИЧИК БИЗНЕС ВА ХУСУСИЙ ТАДБИРКОРЛИКНИ РИВОЖЛАНТИРИШДАГИ МУАММОЛАР. ИЛМИЙ-ТЕХНИКА ЖУРНАЛИ.
6. Shukurjonovich, R. H. (2020, December). IMPROVING THE ECONOMIC ACTIVITY OF TRANSPORT INFRASTRUCTURE. In Archive of Conferences (Vol. 10, No. 1, pp. 47-49).
7. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
8. Shakhidova D.M. “ The importance of regional pportunities in small business development” Scientific electronic journal “Innovations in Science and Technologies” ISSN: 3030-3451. 2 / 2025. www.innoist.uz Innovations in Science and Technologies, issue 6. 2025
9. Bahriddinov, N. Z. (2021). Legal and economic basis for improving the mechanism of financial incentives for innovative activities in industrial enterprises. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 1804-1811.
10. Bahriddinov, N. (2025). INNOVATIVE DEVELOPMENT OF THE SERVICE NETWORK. MUHANDISLIK VA IQTISODIYOT, 3(10).
11. Бахриддинов, Н. (2025). РОЛЬ ЗАРУБЕЖНОГО ОПЫТА В ФИНАНСОВОМ СТИМУЛИРОВАНИИ ИННОВАЦИОННОЙ

ДЕЯТЕЛЬНОСТИ ПРЕДПРИЯТИЙ. Экономическое развитие и анализ, 3(4), 66-72.
12. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
13. Арипов, О. А. (2015). Значение малого бизнеса и частного предпринимательства в увеличении занятости населения. In Национальный Университет Узбекистана. Сборник республиканской научно-практической конференции на тему:«Пути эффективного использования трудовых ресурсов и увеличения занятости населения в условиях модернизации экономики» С.: часть II (p. 153).

УДК 616-018

Baxridinova M. B.
talabasi
Toshkent Davlat Tibbiyot Universiteti
Maxmudova Sh. I.
Toshkent Davlat Tibbiyot Universiteti
assistenti
1 son — gistologiya va tibbiy biologiya kafedrasi
Xujamuratova D. X.
assistenti
1 son — gistologiya va tibbiy biologiya kafedrasi
Toshkent Davlat Tibbiyot Universiteti
Toshkent, O‘zbekiston

IMPLANTATSIYA PATOLOGIYALARI VA EMBRION RIVOJLANISHINING ILK NUQSONLARI

Annotatsiya: *Implantatsiya — homiladorlikning boshlang‘ich va hal qiluvchi bosqichi bo‘lib, blastotsistaning bachadon endometriyasiga o‘rnashishidan iborat. Bu jarayondagi har qanday xato jiddiy klinik oqibatlarga olib keladi. Trofoblast invaziyasi xatolari og‘ir akusherlik asoratlari — ektopik homiladorlik, yetarli bo‘lmagan invaziya oqibatidagi preeklampsiya, hamda haddan tashqari chuqur invaziya tufayli yuzaga keladigan Platsenta Accreta patogenezini belgilaydi.*

Kalit so’zlar: *Implantatsiya, takroriy homila yo‘qotishlari (RPL), Endometriy reseptivligi, aneuploidiyalar, invaziyasi, platsenta, heching.*

Bakhridinova M. B.
student
Tashkent State Medical University
Makhmudova Sh. I.
assistant
department no.1 - histology and medical biology
Tashkent State Medical University
Khujamuratova D. X.
assistant
department no.1 - histology and medical biology
Tashkent State Medical University
Tashkent, Uzbekistan

IMPLANTATION PATHOLOGIES AND EARLY EMBRYONIC DEVELOPMENT DEFECTS

Annotation: *Implantation is the initial and critical stage of pregnancy, characterized by the attachment of the blastocyst to the uterine endometrium. Any error in this process can lead to serious clinical consequences. Abnormalities in trophoblast invasion determine the pathogenesis of severe obstetric complications — ectopic pregnancy, preeclampsia caused by insufficient invasion, and placenta accreta resulting from excessively deep invasion.*

Key words: *Implantation, recurrent pregnancy loss (RPL), endometrial receptivity, aneuploidies, invasion, placenta, hatching.*

Dolzarbligi

Inson homiladorligining 70% gacha qismi ilk bosqichlarda, koʻpincha implantatsiya paytida yoki undan oldin yoʻqotiladi. Bu, tushuntirib boʻlmaydigan bespushtlik va takroriy homila yoʻqotishlari (RPL) ning asosiy sababchisi hisoblanadi.

Maqolaning maqsadi

Mazkur ilmiy ishda implantatsiya va ilk embrion rivojlanishining asosiy patologik holatlarini (ona va embrion omillari) tahlil qilish, shuningdek, ushbu nuqsonlarning patofiziologik mexanizmlarini yoritish hamda reproduktiv tibbiyot va akusherlikdagi klinik oqibatlarini baholashdan iborat.

Implantatsiya muvaffaqiyatsizligining sabablari (Patologik jihatlar).

Implantatsiya muvaffaqiyatsizligi — bu koʻp omilli holat boʻlib, u ona organizmi (endometriy reseptivligi) yoki embrionning irsiy rivojlanish nuqsonlari bilan bogʻliq boʻladi.

Ona Omiliga Bogʻliq Nuqsonlar:

- Endometriy patologiyalari: Surunkali endometrit (yalligʻlanish) va bachadon miomalari/poliplari (mexanik va molekulyar toʻsiqlar) implantatsiyaga toʻsqinlik qiladi.
- Immunologik Omillar: Ona immun tizimining (uNK va T-regulyator hujayralar) embrionni "begona" deb qabul qilmaslik qobiliyatidagi nuqsonlar immunologik rad etishga sabab boʻladi.

Результаты исследования.

Embrional omilga bogʻliq nuqsonlar:

- Aneuploidiyalar (Xromosoma Nuqsonlari): Embrionning genetik xatolari (masalan, trisomiyalar) implantatsiyani toʻxtatadi. Bu holat RPLning 50% dan ortigʻiga sabab boʻladi.
- Blastotsistaning sifati: Ichki hujayra massasi (ICM) yoki Trofoblast qatlamining notoʻgʻri shakllanishi, shuningdek, "Heching" (Hatching) jarayonidagi muammolar implantatsiya qobiliyatini pasaytiradi.

Implantatsiyaning anomal joylashuvi patologiyasi:

1. Bachadondan Tashqari Homiladorlik (Ektopik Homiladorlik). Ektopik homiladorlik bachadon boʻshligʻidan tashqarida, asosan tuxumdon naylarida sodir boʻladi. Patomexanizm koʻpincha oldingi yalligʻlanishlar yoki operatsiyalar tufayli найлардаги киприкчаларнинг харакати бузилиши ва эмбрионнинг бачадонга

o‘ta olmasligi bilan bog‘liq. Bu holat ona hayoti uchun eng xavfli homiladorlik asoratlaridan biridir.

2. Platsenta previya (Placenta Previa).Implantatsiyaning bachadonning pastki segmentida sodir bo‘lishi natijasida platsenta bachadon bo‘ynini to‘liq yoki qisman yopadi. Bu holat homiladorlikning so‘nggi davrlarida qon ketishiga olib kelib, aksariyat hollarda kesarcha kesishni talab qiladi.

Klinik istiqbollar

Ushbu patologik mexanizmlarni tushunishga asoslanadi:

PGT (Preimplantatsion Genetik Test) orqali aneuploid embrionlarni skrining qilish.

ERA (Endometrial Reseptivlikni Baholash Testlari) yordamida "reseptiv oyna"ning aniq vaqtini belgilash.

Preeklampsiya xavfi yuqori bo‘lgan guruhlarda aspirinning past dozalari bilan trofoblast invaziyasiga bilvosita yordam berish.

Xulosa

Implantatsiyadagi har qanday xato (genetik, gormonal yoki immunologik) keyingi RPL, ektopik homiladorlik, preeklampsiya va platsenta anomaliyalariga olib kelishi mumkin.

Foydalanilgan adabiyotlar.

1. Назарова, З. А., Назирова, А. Н. (2020). Акушерлик ва Гинекология. Тошкент: Янги аср авлоди.
2. Аюпова, Ф. С., Баҳритдинов, Ф. С. (Нашр йилига қаранг). Гистология, Цитология ва Эмбриология. Тошкент.
3. Савельева, Г. М., Серова, В. Н., Сухих, Г. Т. (Ред.). (2020). Акушерство. Москва: ГЭОТАР-Медиа.
4. Кулаков, В. И., Леонов, Б. В., Кузьмичев, А. С. (Ред.). (2018).
5. Q.R. To'xtayev, F.X. Azizova, E.A. Tursunov, M. A. Abduraxmanov, K.I.Rasulev, M.X. Raxmatova GISTOLOGIYA, SITOLOGIYA va EMBRIOLOGIYA Toshkent "Ijod-print" 2020
6. Ismatullayevna, M. S., & Xakimovna, X. D. (2025). BACHADON SARATONINING KAMYOB VA AGRESSIV TURLARI: GISTOLOGIK TAVSIFI, KLINIK AHAMIYATI VA DIAGNOSTIK YONDASHUVLAR. PEDAGOG, 8(11), 80-83.
7. Ismatullayevna, M. S. (2025). RAQAMLI MIKROSKOPIYA TEXNOLOGIYALARI. UNING AFZALLIGI VA KAMCHILIKLARI. AMERICAN JOURNAL OF EDUCATION AND LEARNING, 3(2), 1038-1043.
8. Бурикбаева, А., & Ишанджанова, С. Х. (2025). ВНЕЗАРОДЫШЕВЫЕ ОРГАНЫ ПЛОДА И ИХ ЗНАЧЕНИЕ. Медицинский журнал молодых ученых, (13 (03)), 112-116.
9. BS, N., & Qurbonboyeva, F. R. (2024). PRENATAL FORMATION OF LYMPH NODE SINUSES. Web of Medicine: Journal of Medicine, Practice and Nursing, 2(5), 76-80.

Begmatov X. I.
o'qituvchisi
Qo'qon dablat universiteti

QO‘QON QOG‘OZ ISHLAB CHIQARISH TARIXI VA TURIZMDAGI AHAMIYATI

Annotatsiya: *Ushbu maqolada Qo‘qon qog‘oz ishlab chiqarish san’atining shakllanishi, rivojlanishi va uning turizm sohasidagi ahamiyati ilmiy jihatdan tahlil qilinadi. Tadqiqot davomida tarixiy manbalar, qo‘lyozmalar, arxiv hujjatlari hamda sharqshunos olimlar asarlari asos qilib olindi. XVIII–XIX asrlarda Samarqand qog‘ozgarligi tanazzulga yuz tutgan bir davrda Qo‘qon ustalarining bu hunarni qayta rivojlantirishi, uning sifat xususiyatlari va mintaqaviy savdodagi o‘rni yoritiladi. Qo‘qon qog‘ozi Turkiston, Qashqar va Afg‘oniston bozorlarida keng qo‘llanilgan bo‘lib, ko‘plab tarixiy, ilmiy va adabiy asarlar aynan shu qog‘ozga ko‘chirilgan. Mustaqillik yillarida milliy hunarmandchilikni tiklash jarayonida bu an’ananing turizm salohiyatini oshirishdagi o‘rni alohida baholandi. Tadqiqot natijalari Qo‘qon qog‘ozi zamonaviy turizmning jozibador segmentlaridan biri sifatida qayta tiklanish imkoniyatiga ega ekanini ko‘rsatadi.*

Kalit so‘zlar: *Qo‘qon qog‘ozi, qog‘ozgarlik tarixi, hunarmandchilik, Samarqand qog‘ozi, turizm, tarixiy meros, madaniy an’ana, sharq qo‘lyozmalari, iqtisodiy tahlil, Qo‘qon hunarmandchiligi*

Begmatov Kh. I.
teacher
Kokand State University

THE HISTORY OF KOKAND PAPERMAKING AND ITS SIGNIFICANCE IN TOURISM

Annotation. *This article scientifically analyzes the formation, development of the art of Kokand papermaking and its significance in the field of tourism. The research was based on historical sources, manuscripts, archival documents, and works of oriental scholars. The redevelopment of this craft by Kokand masters during the decline of Samarkand papermaking in the 18th-19th centuries, its quality characteristics, and its role in regional trade are highlighted. Kokand paper was widely used in the markets of Turkestan, Kashgar, and Afghanistan, and many historical, scientific, and literary works were copied on this paper. The role of this tradition in increasing the tourism potential during the restoration of national crafts during the years of independence was especially appreciated. The results of the study show that Kokand paper has the potential to be revived as one of the attractive segments of modern tourism.*

Keywords: *Kokand paper, history of papermaking, handicraft, Samarkand paper, tourism, historical heritage, cultural tradition, oriental manuscripts, economic analysis, Kokand handicraft*

Kirish

O‘zbekiston mustaqillikka erishganidan so‘ng, milliy tarixni qayta o‘rganish, madaniy merosni tiklash va uni ilmiy hamda amaliy jihatdan targ‘ib etishga bo‘lgan e’tibor sezilarli darajada kuchaydi. Ayniqsa, turizm sohasi iqtisodiyotni modernizatsiya qilishning ustuvor yo‘nalishlaridan biriga aylangach, tarixiy hunarmandchilik turlari, milliy an’analar va qo‘lyozmachilik madaniyati yangi qiymat kasb eta boshladi. Turizm sohasining jadal rivoji mahalliy mahsulotlar, qadimiy texnologiyalar va tarixiy tajribalarni zamonaviy talqinda qayta jonlantirishga sabab bo‘ldi. Shunday muhim meros turlaridan biri – qog‘oz ishlab chiqarish san’ati, xususan Qo‘qon qog‘ozi, o‘zining boy an’analari, nafis texnikasi va mintaqaning ilmiy-madaniy hayotida tutgan o‘rni bilan ajralib turadi.

Sharq qo‘lyozmachiligi tarixida qog‘oz nafaqat yozuv vositasi, balki ilm, adabiyot, davlat boshqaruvi va diplomatik aloqalarning asosiy tayanchi sifatida xizmat qilgan. O‘rta Osiyoda bu jarayonlar asosan Samarqand qog‘ozi orqali rivojlangan bo‘lsa-da, XVIII asr oxirlariga kelib siyosiy beqarorlik, iqtisodiy tanglik va urushlar tufayli ushbu maktab tanazzulga yuz tutdi. Ana shunday murakkab davrda Qo‘qon xonligi hududida qog‘oz ishlab chiqarish an’analarining yangi markazi shakllandi. Qo‘qon ustalari Samarqand tajribasini davom ettiribgina qolmay, uni yanada takomillashtirib, o‘z maktabini yaratishga muvaffaq bo‘ldilar.

Qo‘qon qog‘ozi sifat, chidamlilik, shaffoflik va nafislik kabi ko‘rsatkichlari bilan tez orada butun Turkiston, Qashqar, Badaxshon, Afg‘oniston va hatto sharqiy hududlardagi savdo markazlarida keng qo‘llanildi. XIX asrning ko‘plab tarixiy va adabiy qo‘lyozmalari, rasmiy hujjatlar, davlat yozishmalari aynan Qo‘qon qog‘oziga bitilgani ushbu hunarning mintaqaviy miqyosdagi ahamiyatini tasdiqlaydi. Bu jarayon o‘z navbatida Qo‘qon shahrining iqtisodiy rivojiga, hunarmandchilik markazi sifatida shakllanishiga va savdo aloqalarining kengayishiga xizmat qildi.

Hozirgi kunda turizmning yangi yo‘nalishlaridan biri – sanoat va madaniy meros turizmi jadal rivojlanmoqda. Qog‘oz ishlab chiqarish jarayonining amaliy ko‘rinishda namoyish qilinishi, sayyohlar uchun mahorat darslarining tashkil etilishi, milliy mahsulotning tarixini o‘rganish imkoniyati Qo‘qon qog‘ozgarligini turizm uchun yuqori salohiyatga ega ob’ektga aylantiradi. Samarqand qog‘ozi mustaqillik yillarida muvaffaqiyatli tiklangan bo‘lsa, Qo‘qon qog‘ozgarligi ham tiklanishning muhim bosqichida turibdi. Bu esa ushbu sohaga ilmiy yondashuvni kuchaytirish, tarixiy manbalarni qayta o‘rganish va hunarmandlikning zamonaviy turizm bilan integratsiyasini strategik vazifa sifatida belgilaydi. Shu sababli, mazkur tadqiqot Qo‘qon qog‘ozi tarixining shakllanish jarayonini, uning iqtisodiy, madaniy va turistik ahamiyatini ilmiy asosda o‘rganishga qaratilgan bo‘lib, milliy hunarmandchilik merosini saqlash hamda turizmni rivojlantirish bo‘yicha yangi konseptual yondashuvlarni taklif etadi.

Metodlar

Ushbu tadqiqotda tarixiy manbalar, qo‘lyozmalar, arxiv hujjatlari va sharqshunos olimlar (A.A. Semyonov, T. Zufarov, G.V. Grigorev) asarlari tahlil qilindi. Shuningdek, Fanlar akademiyasi Sharqshunoslik instituti qo‘lyozmalar fondidagi ma’lumotlar hamda sayyohlarning kuzatuvlari tadqiqot ob’ekti sifatida foydalanildi. Solishtirma tahlil usuli orqali Samarqand va Qo‘qon qog‘oz ishlab chiqarish an’analari o‘rganildi.

Natijalar

Tadqiqot natijalari quyidagilarni ko‘rsatdi:

1. XVIII–XIX asrlarda Samarqand qog‘oz ishlab chiqarishi turli siyosiy inqiroz va urushlar tufayli to‘xtab, uning o‘rnini Qo‘qon qog‘ozi egalladi.

2. Qo‘qon qog‘ozi sifati bilan ajralib turib, butun Turkiston, Qashqar va shimoliy Afg‘onistonga tarqaldi.

3. XIX asrdagi ko‘pgina tarixiy, badiiy va ilmiy asarlar aynan Qo‘qon qog‘oziga yozilgan. U turli rasmiy hujjatlar va maktublarda ham keng qo‘llanilgan.

4. Qo‘qon qog‘ozi nafisligi, chidamliligi va shaffofligi bilan mashhur bo‘lib, Xitoy qog‘ozi bilan raqobat qila olgan.

5. Qog‘ozning «abribahor», «abri shom» kabi turlari ham ishlab chiqarilgan. Olim T. Zufarov bu turlarni tadqiq etib, ularning tayyorlanish usullarini yoritib bergan.

6. Qog‘ozgarlik mahalliy iqtisodiyot va madaniyatda muhim o‘rin tutib, hatto Buxoro amirligida qog‘oz pullar muomalasida ham ishlatilgan.

Muhokama

Qo‘qon qog‘ozgarligining XVIII–XIX asrlardagi rivoji mintaqaning iqtisodiy va madaniy hayotiga sezilarli ta’sir ko‘rsatgan bo‘lib, arxiv hujjatlari va tarixiy manbalarda keltirilgan ma’lumotlar uning o‘sha davrda keng ko‘lamda ishlab chiqarilganini tasdiqlaydi. Masalan, XIX asrning o‘rtalarida Qo‘qon xonligi bozorlarida yiliga o‘rtacha 25–30 ming dona qog‘oz mahsuloti ichki va tashqi savdo uchun tayyorlangani qayd etiladi. Bu ko‘rsatkich Samarqand qog‘ozi tanazzulga yuz tutgan davr bilan qiyoslanganda, Qo‘qon qog‘ozgarligining yangi markaz sifatida shakllanganini ko‘rsatadi.

Qiyosiy tahlillar natijalari qo‘qon qog‘ozining quyidagi ko‘rsatkichlar bo‘yicha ustunlikka ega bo‘lganini ko‘rsatdi: Chidamlilik koeffitsienti Samarqand qog‘oziga nisbatan o‘rtacha 15–20% yuqori bo‘lgan; Shaffoflik darajasi Sharq qo‘lyozmalari ekspertlari tomonidan yuqori baholanib, Xitoy qog‘ozi bilan raqobat qila olgan;

Eksport hududlari soni Samarqand qog‘ozida 3–4 ta bo‘lsa, Qo‘qon qog‘ozi bo‘yicha bu ko‘rsatkich 6–7 ta mintaqaga yetgan (Turkiston, Qashqar, Badaxshon, Kobul, Shimoliy Afg‘oniston va boshqalar).

Analitik tahlil shuni ko‘rsatadiki, Qo‘qon qog‘ozi bozor munosabatlari shakllanayotgan davrda nafaqat mahalliy ehtiyojlarni qondirgan, balki mintaqalararo iqtisodiy integratsiya jarayonida muhim rol o‘ynagan. XIX asr berilganlari bo‘yicha ilmiy va adabiy qo‘lyozmalarning qariyb 60–70% Qo‘qon

qog‘oziga ko‘chirilgani, bu mahsulotning yozuv uchun mosligi va qadr-qimmati yuqori bo‘lganini ko‘rsatadi.

Mustaqillik yillarida amalga oshirilgan dala tadqiqotlari va turizm monitoringi natijalari shuni tasdiqlaydiki, tarixiy hunarmandchilik ob’ektlari sayyohlar e’tiborini sezilarli jalb etadi. Masalan, Samarqanddagi qadimiy qog‘oz ishlab chiqarish majmuasiga yiliga o‘rtacha 50–70 ming sayyoh tashrif buyurayotgani qayd etilgan. Qiyosiy yondashuv asosida olganda, agar Qo‘qonda ham shunday ustaxona va muzey faoliyatini yo‘lga qo‘yish imkoniyati yaratilsa, shaharning turistik oqimi 15–20% ga oshishi prognoz qilinadi.

Analitik yondashuvdan kelib chiqib, Qo‘qon qog‘ozi turizm uchun quyidagi uch asosiy omil bo‘yicha yuqori salohiyatga ega:

1.Tarixiy meros qiymati – hunarmandchilikning davomiyligi va qo‘lyozmachilik bilan bog‘liqligi;

2.Mahsulotning o‘ziga xos xususiyatlari – qo‘l mehnati, tabiiy materiallar, ekologik tozalik;

3. Turizmda brendlash imkoniyati – amaliy jarayonni namoyish qilish, souvenir mahsulotlar ishlab chiqarish, tajriba turizmi.

Demak, statistik va qiyosiy tahlillar Qo‘qon qog‘ozgarligining tarixiy ildizlari kuchli bo‘lishi bilan birga, zamonaviy turizmning iqtisodiy ehtiyojlarini qondira oladigan istiqbolli yo‘nalish ekanini ko‘rsatadi. Bu esa sohaga investitsiya, ilmiy tadqiqotlar va targ‘ibot ishlarini kuchaytirish zarurligini asoslaydi.

Xulosa

Qog‘oz ishlab chiqarish san’ati, ayniqsa Qo‘qon qog‘ozgarligi, O‘rta Osiyo madaniy va iqtisodiy hayotida o‘chmas iz qoldirgan. XVIII–XIX asrlarda Samarqand qog‘ozi tanazzulga yuz tutgan bir paytda, Qo‘qon ustalari bu hunarni yangi bosqichga ko‘tardilar. Ular nafaqat mahalliy bozor ehtiyojlarini qondirdilar, balki butun Turkiston, Afg‘oniston va Qashqarga qog‘oz yetkazib, mintaqalararo savdoda muhim o‘rin egalladilar. Qo‘qon qog‘ozi sifat jihatidan ajralib turgani bois, turli ilmiy, adabiy va tarixiy asarlar hamda davlat hujjatlari aynan shu qog‘ozga yozildi. Uning chidamliligi, nafisligi va shaffofligi tufayli Yevropa va Rossiya ma’muriy idoralarida ham katta qiziqish uyg‘otgan. Shu jihatdan, Qo‘qon qog‘ozi milliy mahsulot sifatida xalqaro nufuzga ega bo‘lganini ta’kidlash mumkin.

Mustaqillik yillarida milliy hunarmandchilikni tiklash va turizmni rivojlantirish siyosati doirasida Samarqand qog‘ozi allaqachon turizm ob’ekti sifatida qayta hayotga qaytdi. Qo‘qon qog‘ozgarligi esa hozirda tiklanish arafasida turibdi. Agar bu sohada tizimli tadqiqotlar olib borilsa, amaliy qo‘llab-quvvatlash choralari ko‘rilsa va turizm infratuzilmasiga integratsiya qilinsa, Qo‘qon qog‘oz san’ati shahar iqtisodiyotida yangi drayverga aylanishi mumkin.

Kelgusida quyidagi yo‘nalishlarda ishlar olib borish maqsadga muvofiq:

Qo‘qon qog‘oz ishlab chiqarish texnologiyasini to‘liq qayta tiklash; Turistik yo‘nalish sifatida qog‘oz ustaxonalarini amaliy namoyish ob’ektiga aylantirish; Qo‘qon qog‘ozining brendini shakllantirish va mahalliy hamda xalqaro bozorlarda

targ‘ib qilish; Xalqaro ilmiy hamkorlik asosida Qo‘qon qog‘ozgarligi merosini chuqurroq o‘rganish. Shunday qilib, Qo‘qon qog‘ozi nafaqat tarixiy hunarmandchilik an’anasi, balki milliy iqtisodiyot va madaniy merosning turizm orqali zamonaviy rivojlanishi uchun katta imkoniyatlarni taqdim etuvchi strategik resurs sifatida baholanishi kerak.

Foydalanilgan adabiyotlar

1. V.Potanin. «Pokazaniya sibirskogo kazaka Maksimova, Kokandskie vladeniya». SPB. 1860, 22 str.
2. Nabijon Sobir. «Qo‘qon qog‘ozi» «Xalq so‘zi», 1991 y, 11 may.
3. N.Xabibullaev. «O‘rta Osiyoda qog‘oz ishlab chiqarish tarixi», T. 1992 y, 14 b.
4. N.Abdulaxatov, B.Hoshimov. «Mo‘yi Muborak». F. 2000 y, 18 b.
5. Nabijon Sobir. O‘sha joyda.
6. «Vestnik istorii mirovoy kulturы» M. BSE, 1957.
7. N.P.Lixachev. «Bumaga i bumajnыe melnitsы v Moskovskom gosudarstve» SPB. 1892.
8. A.YU.Kaziev. «Xudojestvenno-texnicheskie materialы srednevekovoy rukopisi» Baku. 1968 y. 34 b.
9. A.Murodov. «O‘rta Osiyo hattotlik san’ati tarixidan». T. 1971 y, 122-123 b.
10. O‘sha joyda. 138-139 b.

Begmatov X. I.
o'qituvchisi
Qo'qon dablat universiteti

ABRI QOG'OZINI TIKLASH VA UNING TARIXIY MANBALARNI TA'MIRLASHDAGI AHAMIYATI

Annotatsiya: *Ushbu maqolada Abr qog'oztarixi, an'anaviy texnologiyalar, xususan tragakant elimidan foydalanish jarayoni va uning o'ziga xos xususiyatlari ilmiy tahlil qilinadi.Uningning tarixiy manbalarda qayd etilgan usullari, hunarmandchilik amaliyotining rivojlanishi hamda bugungi kunda ushbu merosning turizmda qo'llanilishi analitik, taqqoslovchi va iqtisodiy yondashuvlar asosida yoritilgan. Shuningdek, Abr qog'ozini zamonaviy madaniy brendinga aylanishi, turistik joziba omillarining kuchayishi, mahalliy iqtisodiyotga qo'shgan hissasi va istiqboldagi imkoniyatlari ilmiy asosda baholangan. Tadqiqot natijalari an'anaviy qog'oz ishlab chiqarish texnologiyasini saqlab qolish, uni innovatsion turizm dasturlarida qo'llash hamda madaniy meros ob'ekti sifatida keng targ'ib etish muhimligini ko'rsatadi.*

Kalit so'zlar: *Abr qog'ozi, an'anaviy qog'oz tayyorlash, tragakant elim, hunarmandchilik, madaniy meros, tarixiy texnologiya, turizm, innovatsion turizm, iqtisodiy samaradorlik, Farg'ona vodiysi, qog'ozchilarning an'analari.*

Begmatov Kh. I.
teacher
Kokand State University

RESTORATION OF ABRIAN PAPER AND ITS SIGNIFICANCE IN THE RESTORATION OF HISTORICAL SOURCES

Abstract. *This article provides a scientific analysis of the history of Abrian paper, its traditional technologies, particularly the use of gum tragacanth, and its specific properties. Using analytical, comparative, and economic approaches, it examines its production methods recorded in historical sources, the development of craft practices, and the use of this heritage in modern tourism. It also evaluates the transformation of Abrian paper into a modern cultural brand, its enhanced appeal to tourists, its contribution to the local economy, and its future potential. The study's results highlight the importance of preserving traditional papermaking technologies, its use in innovative tourism programs, and its widespread promotion as a cultural heritage asset.*

Key words: *Abr paper, traditional papermaking, gum tragacanth, crafts, cultural heritage, historical technologies, tourism, innovative tourism, economic efficiency, Fergana Valley, papermaking traditions.*

Kirish

O‘rta asrlarda Sharq mamlakatlarida keng qo‘llanilgan abri qog‘ozi — bezakli, rangli naqshlar bilan ishlangan maxsus texnologiyaga ega bo‘lgan san’at mahsulidir. U ko‘proq qo‘lyozma asarlar, kitob bezaklari va hujjatlar tayyorlashda qo‘llanilgan. Mustaqillik yillarida ushbu an’anaviy texnologiyani ilmiy jihatdan o‘rganish, uni qayta tiklash va amaliyotga tatbiq etish bo‘yicha bir qator izlanishlar olib borildi. Abri qog‘ozi haqida dastlabki umumiy ilmiy ma’lumotlar A.Yu. Kaziev asarlarida uchraydi. Ammo ba’zi fikrlar — masalan, bo‘yoqlarni elim bilan aralashtirish haqidagi mulohazalar ilmiy asosga ega emas. 1980-yillar oxiriga kelib, O‘zbekiston Fanlar akademiyasi Qo‘lyozmalar instituti xodimi T. Zufarov abri texnologiyasini o‘rganish borasida muhim natijalarga erishdi, bir necha ilmiy ma’ruza va maqolalar e’lon qildi. Shundan so‘ng yosh musavvir-ta’mirchilar tomonidan amaliy tajribalar asosida abri qog‘ozini qayta tiklash jarayoni boshlandi. Mazkur tadqiqotning dolzarbligi abri qog‘ozining an’anaviy texnologiyasini ilmiy asosda tiklash, uning qo‘lyozmalarni restavratsiya qilishdagi o‘rni va amaliy ahamiyatini ochib berishdan iborat.

Metodologiya

Tadqiqot quyidagi metodlarga tayandi:

1. Tarixiy manbalar tahlili — A.Yu.Kaziev, T.Zufarov va boshqa tadqiqotchilarning asarlari o‘rganildi.

2.Eksperimental-amaliy yondashuv — ustalar Sh. Muhammadjonov va M.Salimov tomonidan olib borilgan ikki yillik tajribalar asos qilib olindi.

3.Texnologik kuzatuv va rekonstruksiya — abri qog‘ozi tayyorlash jarayonidagi barcha bosqichlar: elim aralashmasini tayyorlash, bo‘yoq pigmentlarini ishlatish, naqsh tushirish, quritish va sayqal berish amaliy jarayoni tasvirlab tahlil qilindi.

4. Estetik va san’atshunoslik tahlili — yaratilgan abri namunalari naqshlarining takrorlanmasligi, uslublar xilma-xilligi o‘rganildi.

Natijalar

Tadqiqot natijasida abri qog‘ozini tayyorlashning quyidagi ilmiy-texnologik asoslari aniqlandi: asosiy xomashyollari uchun maxsus to‘rtburchak idish (chuqurligi 7 sm, o‘lchami 40–60 sm), bo‘yoqlar uchun alohida idishlar, tragakant elim aralashmasi, pigmentlar, buzoq o‘ti, ingichka bigiz, chovgum, ot elidan tayyorlangan taroq, mo‘yqalamlar kerak bo‘ladi.

Texnologik jarayon quyidagicha amalga oshiriladi.Elim aralashmasi idish hajmiga mos tarzda tayyorlanadi, har bir pigment alohida kukun holiga keltiriladi, mo‘ yqalam buzoq o‘tiga botiriladi va elim aralashmasi yuzasiga urib sepilib, bo‘yoqlar sirtga sizib chiqib, alohida rang dog‘larini hosil qiladi hamda usta ingichka chiziqlar, aylana, tarama yoki murakkab naqshlarni chizadi, shundan so‘ng tayyor qog‘oz sirtga tezda qo‘yilib, 5–10 soniya ichida olinadi yakunda qog‘oz quritilib, mineral tosh yoki chig‘anoq bilan sayqal beriladi.

Abri naqshlarining turlari. Tajribalar davomida quyidagi abri uslublari qayta tiklandi: sochma abri, tarama abri, marmar abri, bulbul uyalari abri, kelket (archasimon) abri.

Amaliy natijalar

Tiklangan abri qog‘ozlari qadimiy qo‘lyozmalarni restavratsiya qilishda muvaffaqiyatli qo‘llanildi. 1987-yil 6-mart kuni O‘zbekiston FA Sharqshunoslik instituti ilmiy kengashida namoyish etilgan abri namunalari mutaxassislar tomonidan yuqori baholandi.Ustalar tomonidan yaratilgan naqshlarning har biri takrorlanmas bo‘lib, bu ularning ijodiy maktablarini aniqlash imkonini berdi.

Munozara

Tadqiqot natijalari shuni ko‘rsatadiki, abri qog‘ozi tayyorlash jarayoni faqat amaliy hunarmandchilik emas, balki murakkab fizik-kimyoviy jarayonlarni o‘z ichiga olgan texnologik tizimdir. Bu texnologiyaning mukammalligi o‘rta asr Sharq ustalarining tajribasi va san’at maktablarining yuksak darajada rivojlanganini tasdiqlaydi. Qadimiy manbalar tahlilidan ma’lum bo‘ladiki, abri qog‘ozining muvaffaqiyatli yaratilishida *tragakant elimining** tarkibi va qovushqoqlik darajasi hal qiluvchi o‘rin tutgan. A.Yu. Kaziev tomonidan ilgari surilgan “bo‘yoqlarni elim bilan aralashtirish” haqidagi fikrning noto‘g‘riligini tajribalar ochiq-oydin isbotladi, chunki pigment va elimning bevosita qorishishi bo‘yoqning sirtga tarqalish xususiyatini yo‘qotadi.

T. Zufarovning tadqiqotlari esa ushbu sohada yangi bosqichni boshlab berdi. U ilmiy jihatdan asoslangan yondashuv orqali abri texnologiyasining asosiy tamoyillarini aniqladi va amaliyotga tatbiq etish uchun dastlabki metodologik asoslarni yaratdi. Bunda uning tajriba natijalari yosh ustalar — Sh.Muhammadjonov va M. Salimov izlanishlarida muhim yo‘nalish sifatida xizmat qildi.

Qiyosiy tahlil qilinganda sharq mamlakatlari, xususan, Eron, Turkiya va Hindistondagi abri (marbling) an’analari bilan qiyoslaganda, o‘zbek abri texnologiyasining bir qator o‘ziga xos jihatlari mavjud: Tragakant elimi — boshqa hududlarda kraxmal yoki kitre ishlatilgan bo‘lsa, o‘zbek ustalari tragakantning maxsus konsentratsiyasidan foydalangan. Bu naqshlarning yanada mayin, taralish burchaklari aniq bo‘lishini ta’minlagan.Taroq va chiziq naqshlari — o‘zbek uslubida taroq yordamida yaratiladigan chizimli, archasimon va “kelket” naqshlari ko‘proq uchraydi. Bo‘yoqning sirt bo‘ylab tarqalish tezligi — buzoq o‘tining qo‘llanilishi bo‘yoqlarning sirtga tabiiy tarzda “sizib chiqish” jarayonini boshqaradi, bu boshqa maktablarda kam kuzatiladigan usuldir. Naqshlarning takrorlanmasligi — har bir abri namunasi o‘ziga xos bo‘lib, bu restavratsiya jarayonida tarixiy-hududiy maktablarni aniqlashda muhim belgi bo‘lib xizmat qiladi.

Ishonchlilik va ilmiy asoslari. Tajribalar shuni ko‘rsatdiki, abri qog‘ozi yaratish jarayoni algoritmik emas, balki ustaning san’atkori mahoratiga tayanadigan nozik jarayondir. Elim qovushqoqligi, pigment zichligi, taroq chuqurligi, bo‘yoqning tomchilatish kuchi kabi ko‘plab parametrlar natijaga bevosita ta’sir ko‘rsatadi. Shuning uchun qadimiy ustalar texnologiyasini tiklash nafaqat ilmiy izlanish, balki ko‘p yillik amaliy mashg‘ulotlarni ham talab qildi.1980-yillar oxirida tiklangan abri namunalari O‘zbekiston FA Sharqshunoslik instituti mutaxassislari tomonidan yuqori baholanganligi ushbu

metodning ilmiy izchilligi va amaliy samaradorligini tasdiqlaydi.Istiqbol va ijtimoiy-amaliy ahamiyati shundaki, abri qog‘ozi texnologiyasining qayta tiklanishi kelgusida quyidagi yo‘nalishlarda katta imkoniyatlar yaratishi mumkin:

Qo‘lyozmalarni restavratsiya qilish — abri qog‘ozi tarixiy kitoblar, muqovalar va varaqlarni tiklashda eng maqbul, ekologik toza va mos material sifatida e’tirof etilmoqda.

Hunarmandchilik turizmini rivojlantirish— Qo‘qon, Buxoro va Toshkentda abri san’at maktablarini yo‘lga qo‘yish turistik mahsulot sifatida katta salohiyatga ega.

San’at ta’limi — oliy ta’lim muassasalarida miniatyura, kitob san’ati, naqshchilik yo‘nalishlariga abri texnologiyasini kiritish milliy san’at maktabining rivojiga xizmat qiladi.

Mahalliy xomashyodan foydalanish— tragakant, tabiiy bo‘yoqlar, buzoq o‘ti kabi materiallarning qayta ishlab chiqarilishi iqtisodiy jihatdan ham foyda keltiradi.

Eksportbop mahsulot — abri qog‘ozi zamonaviy dekoratsiya, interyer dizayni, moda sanoati uchun ham yuqori qiymatga ega bo‘lishi mumkin.

Qiyosiy, tarixiy va amaliy tahlillar shuni ko‘rsatadiki, abri qog‘ozini tiklash nafaqat san’at merosini jonlantirish, balki uni ilmiy asosda rivojlantirish uchun ham asos yaratdi. Texnologiya to‘liq rekonstruksiya qilingan bo‘lsa-da, uning takomillashtirilishi va zamonaviylashtirilishi uchun hali keng ilmiy maydon mavjud. Abri san’ati O‘zbekistonning noan’anaviy, lekin ulkan tarixiy ahamiyatga ega bo‘lgan badiiy meros turlaridan biri sifatida istiqbolda xalqaro san’at bozori va akademik tadqiqotlar maydoniga chiqish salohiyatiga ega.

Xulosa qilib aytganda abri qog‘ozini tayyorlash texnologiyasining tarixiy ildizlari, kimyoviy-fizik asoslari hamda zamonaviy restavratsiya amaliyotidagi o‘rni chuqur tahlil qilindi. Olingan natijalar shuni ko‘rsatadiki, abri san’ati O‘rta Osiyo, xususan, O‘zbekiston hududida shakllangan noyob badiiy meros turlaridan biri bo‘lib, uning tiklanishi nafaqat madaniy, balki ilmiy va texnologik ahamiyatga ham egadir. Birinchidan, tragakant elimi asosidagi qadimiy texnologiyaning qayta tiklanishi abri qog‘ozining tabiiylik, mustahkamlik, ekologik xavfsizlik kabi afzalliklarini saqlab qolish imkonini berdi. Bu esa qo‘lyozma fondlarini restavratsiya qilishda aynan shu turdagi materialning eng maqbul vosita ekanini yana bir bor tasdiqladi. Qadimiy qo‘lyozmalarda uchraydigan abri varaqlarining tabiiy strukturasini saqlab tiklash — ilmiy restavratsiyaning eng muhim talablaridan biridir. Ikkinchidan, tajribalar asosida yaratilgan turfa rangdagi abri naqshlari ustalarning amaliy mahoratini kengaytirdi, yangi avlod musavvirlari va restavratorlarining ijodiy salohiyatini oshirdi. Naqshlarning takrorlanmasligi, har bir abri namunasi o‘ziga xos kompozitsion tuzilishga ega bo‘lishi ushbu san’atning estetik va badiiy qiymatini yanada yuksak darajada saqlab qolmoqda. Bu xususiyat o‘z navbatida ilmiy identifikatsiya jarayonlarida (qo‘lyozmaning kelib chiqish joyi, maktabi, davrini aniqlashda) yordam berishi mumkin. Uchinchidan, O‘zbekiston FA Sharqshunoslik instituti tomonidan abri namunalari yuqori baholanganligi bu texnologiyaning ilmiy asoslanganligi va amaliy jihatdan

to‘la tiklanganini tasdiqlaydi. Bu jarayon milliy san’at merosini saqlab qolish bo‘yicha davlat siyosatining ustuvor yo‘nalishlariga hamohangdir.To‘rtinchidan, abri qog‘ozining tiklanishi turizm, san’at ta’limi, hunarmandchilik va madaniy industriya sohalarida yangi istiqbollar ochmoqda. Abri san’atini Qo‘qon, Buxoro, Samarqand va Toshkentda ustaxona-maktablar ko‘rinishida rivojlantirish mahalliy iqtisodiyotga ijobiy ta’sir ko‘rsatishi, milliy brend sifatida eksport salohiyatini oshirishi mumkin. Hozirgi global sharoitda ekologik toza, qo‘lda yaratiladigan san’at mahsulotlariga talabning ortib borayotgani — abri qog‘ozi uchun qulay imkoniyatdir.

Beshinchidan, abri san’atining ilmiy o‘rganilishi san’atshunoslik, kimyo, materialshunoslik va restavratsiya fanlari o‘rtasida yangi ko‘p tarmoqli yondashuvlarni shakllantirmoqda. Bu esa kelajakdagi tadqiqotlar uchun keng ilmiy maydon yaratadi: elimin tarkibini chuqur kimyoviy tahlil qilish, yangi pigmentlar bilan tajribalar o‘tkazish, zamonaviy laboratoriya uskunalari yordamida abri sirtining strukturasini o‘rganish kabi yo‘nalishlar hali to‘liq tadqiq qilinmagan.

Umuman olganda, abri qog‘ozining tiklanishi va amaliyotga qaytishi O‘zbekistonning boy madaniy merosini zamonaviy ilmiy asosda qayta jonlantirgan yirik madaniy-tarixiy hodisa sifatida e’tirof etiladi. Bu san’at turi milliy identitetning bir qismi bo‘lib, uning o‘rganilishi va rivojlantirilishi kelajak avlodlar uchun bebaho ma’naviy merosni asrab qolishning samarali yo‘li bo‘lib xizmat qiladi.

*Tragakant elimi (ba’zan “tragakanta”, “tragan’t” deb ham ataladi) — Sharq mamlakatlarida qadimdan ishlatilgan, o‘ta qovushqoq, tiniq, tabiiy o‘simlik kelib chiqishiga ega elim moddasidir. U Astragalus (qo‘ng‘irboshlar oilasi) turkumiga mansub o‘simliklarning (asosan Astragalus gummifer, Astragalus microcephalus) po‘stlog‘idan oqib chiqadigan tabiiy smola (sak) ning quritilishi orqali olinadi.

Foydalanilgan adabiyotlar

1. Казийев, А. Ю. Искусство изделижа абр-банди в Средней Азии. – Ташкент: Фан, 1978.
2. Зуфаров, Т. Абри қоғози хусусида. – Ўзбекистон Фанлар академияси Қўлёзмалар институти маърузалари, 1983.
3. Зуфаров, Т. Абри санъати ва унинг қўлёзмалар реставратсиясидаги ўрни. – “Шарқшунослик” журнали, №4, 1984, пп. 25–33.
4. Муҳаммаджонов, Ш., & Салимов, М. Абри қоғози тайёрлаш технологиясининг тикланиши. – Ўзбекистон ФА Шарқшунослик институти ҳисоботлари, 1987.
5. Muminov, I. O‘zbek kitob san’ati tarixi. – Toshkent: G‘afur G‘ulom nomidagi nashriyot, 1990.
6. Makhmudov, A. Sharq miniatyura maktablari va bezak san’ati. – Toshkent: San’at, 2002.
7. Efendi, S. Ebru Sanatı ve Tarihi. – İstanbul: Kültür Bakanlığı Yayınları, 1995.
8. Arseven, C. E. Türk Süsleme Sanatları. – İstanbul: Cem Yayınevi, 1984.

9. Bridges, S. The Art of Marbling: Techniques and Traditions. – London: Thames & Hudson, 2007.
10. Dardashti, R. Persian Marbling (Abru). – Tehran University Press, 1999.
11. Qodirov, R. Qo‘lyozma asarlarni restavratsiya qilishning nazariy asoslari. – Toshkent: Universitet, 2010.
12. Jalolov, Sh. Materialshunoslik asoslari va tabiiy elimlar kimyosi. – Toshkent: Fan va texnologiya, 2013.
13. Karimova, Z. O‘zbek san’at merosi va hunarmandchilik an’analari. – Toshkent: San’at, 2015.
14. UNESCO. Traditional Craftsmanship of Central Asia: Paper and Decorative Arts. – Paris, 2018.
15. Rashidov, B. Abri san’ati va rangtasvir texnikasi. – “San’at va madaniyat” jurnali, №2, 2020, pp. 44–51.

Boboyeva N. T., PhD
o‘qituvchisi
Termiz davlat universiteti
Surxondaryo viloyati, O‘zbekiston

SURXONDARYO VILOYATI SHAROITIDA DORIVOR MAVRAKNING MORFOFIZIOLOGIK VA BIOEKOLOGIK XUSUSIYATLARI

Annotatsiya: *surxondaryo viloyati tuproq-iqlim sharoitida dorivor mavrakning bioekologik va morfofiziologik xususiyatlari o‘rganildi.*

Tayanch so‘zlar: *dorivor mavrak, o‘sish, rivojlanish, urug‘ soni, unuvchanlik, ekologik omillar*

Boboyeva N. T., PhD
teacher
Termez State University
Surkhandarya, Uzbekistan

MORPHOPHYSIOLOGICAL AND BIOECOLOGICAL CHARACTERISTICS OF MEDICINAL MAVRAK UNDER THE CONDITIONS OF SURKHANDARYA REGION

Abstract:*In this article shows that growth of curative mawrak(salvia) in accordance with climate condition of termiz that they are fully adopted to local condition.*

Key words:*medicinal salvia officinalis, growth, development, number of seeds, fertility, ecological factors.*

Dorivor mavrakning o‘sish xususiyatlari.

Nixolning o’sib rivojlanishi jarayoni natijasida unda yosh novdalar o‘sib chiqadi va ular xam o‘z navbatida shoxlay boshlaydi, bunday betuxtov shoxlanish natijasida o’simlikning shox-shabbasi xosil bo‘ladi. Novda uch qismdan iborat bo‘lib, barg birikkan joy novda bo‘g‘imi, ikkita bo‘g‘im oralig‘i, novda bo‘g‘imidagi barg va poya orasidagi xosil bo‘ladigan burchak, barg qo‘ltig‘i deb ataladi. [1].

Tadqiqotlarda Dorivor mavrakning urug‘ unuvchanligini o‘rganish ikki sharoitda olib borildi: 1. Xona sharoitida urug‘ unuvchanligi. 2. Dala sharoitida urug‘ unuvchanligi.

Xona sharoiti muxitida Petri likopchasida namlangan qog‘oz ustiga 20 donadan mavrak urug‘lari ekildi. Tadqiqotlar 3 xil muddatda fevral, mart va aprel oylarida o‘tkazildi (1.1-jadval).

1,1-jadval
Dorivor mavrak urug‘larining unuvchaligi %
(fevral, xona sharoiti)

№	Kuzatilgan kunlar									
	1	2	3	4	5	6	7	8	9	10
unib chiqqan urug‘lar, %	3	7	11	16	20	11	9	6	4	1

Fevral oyida xona sharoitida urug‘lar 5 kunda unib chiqishni boshladi. Urug‘lar unib chiqishni boshlagan kunda 2%, maksimal darajada unib chiqish esa 10 kunda (89%) xamda 15 kundan so‘ng urug‘ar unib chiqishi kamaydi (1%). Shunday qilib xona sharoitida jami 89 % urug‘lar unib chiqdi. Urug‘ning unib chiqish energiyasi 15,7% ni tashkil etdi.

Introduksiya qilingan o‘simliklarning qiymatini yog‘ochining sifati, manzaralilik darajasi, sanitar-gigienik, biologik xususiyatlari bilan birga issiq va sovuqqa bardoshliligi ham belgilaydi. Shu sababli turli iqlim sharoitlarida o‘simliklarning ekologik omilarga munosabati keng tadqiq qilingan. Ilmiy manbalarda keltirilishicha, o‘simliklarning sovuqqa bardoshi turning genetik belgilari bilan mustahkamlangan xususiyatidir. O‘simikning sovuqqa yoki issiqqa bardoshi odatda ekstremal sharoitda aniqroq namoyon bo‘ladi. Qator tadqiqotlar o‘simliklarning sovuq yoki issiqqa bardoshi uning yoshiga xam bog‘lik ekanligini ko‘rsatadi. Sovuqqa bardoshlilik o‘simliklarning geografik kelib chiqishi bilan bog‘liq. Shuningdek, tabiiy areali keng bo‘lgan o‘simliklar xam ekologik omillarga tez moslashuvchan va chidamli bo‘ladi. Termiz sharoitida tez-tez takrorlanib turadigan qishki iliqliq va bahordagi kechki sovuq o‘simliklarni iqlimlashtirishda jiddiy to‘siq bo‘ladi.

Sug‘oriladigan dala sharoitida xam urug‘larning unib chiqish ko‘rsatkichlari nisbatan xona sharoitidagi natijalarga mos keldi. Tegishli muddatlarda sug‘orilgan tuproqqa ekilgan urug‘larning unuvchanligi ko‘rsatkichi mos tarzda 45%, 39% va 35 % ni tashkil etdi. Dala sharoitida urug‘ unuvchanligining xona sharoitiga nisbatan pastligini tuproq-iqlimning ta’siri bilan izohlan mumkin. Ta’kidlanganidek, sutka mobaynida havo va tuproq harorati keskin o‘zgarib turadi. Kunduzi o‘rtacha havo harorati 30-35^{0}C bo‘lsa, kechki paytlarda 12-18^{0}C ga etadi. Bu esa urug‘ning unib chiqishi uchun zarur haroratni o‘z vaqtida to‘plashiga xamda murtakning unishiga noqo‘laylik to‘g‘diradi.

Dorivor mavrak ildizining o‘sishi har 5 kunda tekshirilib borildi. Urug‘ unib chiqqandan 5 kundan so‘ng asosiy ildiz uzunligi 1,5 sm va diametri 0,2 sm, urug‘palla esa 0,3 sm va 0,2 sm, gipokotil ham 0,3 sm va 0,2 sm, hamda 0,2 sm va 0,2 sm ni tashkil etdi. Ildiz tizimining jadal o‘sa boshlashi urug‘ unib chiqqandan so‘ng 20 kundan keyin aniqlandi.

Dorivor mavrak fenologiyasi

Dala sharoitida urug‘larning unishi ikki hil muddatda o‘rganildi: kuzda (20.10.2018) va baxorda (25.03.2019). Bu tadqiqotlar shuni ko‘rsatdiki, har ikki variantda ham urug‘lar undi, ammo kuzda ekilganda urug‘larning unib chiqish

foizi bahorda ekilgan variantdagidan ko‘proq bo‘ldi (mos ravishda 45-55 % va 25-35 %). Har xil yoshdagi va har xil sharoitdagi o‘simliklarda gullar sonining har xilligi kuzatildi Fenologik kuzatishlar nafaqat turli fazalarning o‘tish muddatlarini belgilashda, balki o‘simliklarning chidamliligi, mahsuldorigi, manzaraliligi, shuningdek, ulardagi hayotiy jarayonlarning maromini aniqlashda muhim ahamiyatga ega. Turli geografik joylardan kelib chiqqan turlar vegetatsiya davrini ma’lum ketma ketlikda boshlaydi, bu esa baxorning qanday kelishidan. Qat’iy nazar saqlanib qoladi. Xaroratning asosiy omil bo‘lgani xolda mazkur jarayon o‘simlikning tabiiy arealida mustaxkamlangan genotipik xususiyatlar tomonidan boshqarib boriladi. O‘simlikning mavsumiy rivojlanish maromi tashqi muxit ta’sirida turning tarixiy taraqqiyotini aks ettiradi. Xar yilgi meteorologik omillar (issiqlik, yog‘ingarchilik, atmosferaning nisbiy namigi va boshqalar) o‘simlikning mavsumiy rivojlanishiga o‘z ta’sirini ko‘rsatib turadi. Introduksiya sharoitida o‘simlikning tabiiy arealidagi sharoitiga mos kelganda, ularning yaxshi iqlimlashganligi qayd qilingan. Turli o‘simliklar baxorgi vegetatsiyani turli paytda boshlaydi. Ko‘plab ilmiy manbalarda u yoki bu turga mansub o‘simliklar mavsumiy rivojlanish davrini foydali xarorat yig‘indisi ma’lum darajaga etdi.

Dorivor mavrakni shifobaxsh xususiyatlari

Yangi mevalaridan olingan suvini me’da va o’n ikki barmoq ichak yara kasalligida, gipoatsid gastritlar, spastik kollitlarda buyuriladi, yuqori nafas yo’llari kasalliklarida asalga aralashtirib beriladi. Qandli diabet, revmatizm, podagra, limfa bezlari sili, sistit, buyrak-tosh kasalligi, shamollash kasalliklarida, shuningdek siydik haydovchi vosita tariqasida qoraqat barglarini damlab, choy o’rnida ichish buyuriladi. Dorivor mavrakni kurtaklari bilan mevalarini musallasga solib damlab ichilsa, surgi bo’ladi. Shakar sepib yeyilsa odam ko’ngli ochilib, ruhi tetiklashadi. [2,3]

Foydalanilgan adabiyotlar ro’yxati

1. Amonova G. R., Rashidov N. E. Useful Properties of Medicinal Chamomile (Matricaria Recutita) //European journal of innovation in nonformal education. – 2024. – Т. 4. – №. 4. – С. 130-132.
2. Baxriddinovna R. U., Musurmonovich F. S. Soybean-as a source of valuable food //Texas Journal of Multidisciplinary Studies. – 2022. – Т. 6. – С. 165-166.
3. Байкова Е.В., Королюк Е.А., Ткачев А.В. Компонентный состав эфирных масел некоторых видов рода Salvia L., выращенных в условиях Новосибирска (Россия) // Химия растительного сырья, 2002. № 1.С. 3742.
4. Fozilov S. The effect of drought on the water regime in the leaves of soybean varieties //Science and innovation in the education system. – 2023. – Т. 2. – №. 9. – С. 25-28.
5. Fozilov S. Effect of stress factors on some physiological parameters of soybean plant //Science and innovation in the education system. – 2023. – Т. 2. – №. 7. – С. 722-74.

Ilmiy rahbar: Boboyeva M. A.
o‘qituvchisi
”pedagogika va psixologiya” kafedrasi
Toshkent davlat tibbiyot universiteti
Umbetova E.
talaba
1-Davolash fakulteti
Izzatullayeva Z.
talaba
1-Davolash fakulteti
Toshkent davlat tibbiyot universiteti

BO‘LAJAK SHIFOKORLARDA PSIXOLOGIK TRAVMALAR VA ULARNING KLINIK OQIBATLARI

Annotatsiya: *Ushbu ishda bo‘lajak shifokorlarda psixologik travmalar va ularning klinik oqibatlari masalasi tahlil qilinadi. Psixologik travma — bu individualning ruhiy barqarorligini buzuvchi, stressli va hayotga xavf soluvchi voqealar natijasida yuzaga keladigan psixologik jarayonlar yig‘indisi sifatida ta’riflanadi. Shifokor nomzodlarining kasbiy faoliyatga tayyorgarlik jarayonida uchraydigan travmatik holatlar (masalan, bemor o‘limi, og‘ir kasalliklar bilan ishlash, shoshilinch vaziyatlar) ularning ruhiy salomatligiga sezilarli ta’sir ko‘rsatishi mumkin.*

Kalit so‘zlar: *bo‘lajak shifokorlar, tibbiy talaba, psixologik travma, ruhiy salomatlik, stress.*

Scientific supervisor: Boboyeva M. A.
teacher
department of "pedagogy and psychology"
Tashkent State Medical University
Umbetova E.
student
1st faculty of medicine
Izzatullayeva Z.
student
1st faculty of medicine
Tashkent State Medical University

PSYCHOLOGICAL TRAUMAS IN FUTURE DOCTORS AND THEIR CLINICAL CONSEQUENCES

Abstract: *This study analyzes the issue of psychological trauma and its clinical consequences in future doctors. Psychological trauma is defined as a set of psychological processes that occur as a result of stressful and life-threatening*

events that disrupt the mental stability of an individual. Traumatic situations encountered by medical candidates during their preparation for professional activity (for example, patient death, work with serious illnesses, emergency situations) can have a significant impact on their mental health.

Keywords: *future doctors, medical student, psychological trauma, mental health, stress.*

Psixologik travma tushunchasi va bo‘lajak shifokorlarda yuzaga kelishi

Psixologik travma — bu individualning psixik barqarorligini izchil buzuvchi, stressli va hayotga xavf soluvchi voqealar natijasida yuzaga keladigan psixopsixologik jarayonlar majmui sifatida ta’riflanadi. Ushbu jarayonlar organizmning adaptiv mexanizmlarini cheklab, nerv-gumoral tizimning disfunktsiyalarini keltirib chiqarishi mumkin, natijada emotsional barqarorlik, ruhiy chidamlilik va kognitiv funksiyalar sezilarli darajada pasayadi. Bo‘lajak shifokorlar kasbiy tayyorgarlik jarayonida uchraydigan travmatik holatlar (masalan, bemor o‘limi, og‘ir patologiyalarga ega bemorlar bilan ishlash, shoshilinch vaziyatlar) ularning psixologik resurslarini sezilarli darajada talab qiladi va ruhiy salomatlikka salbiy ta’sir ko‘rsatadi.

Tibbiy ta’lim jarayonida bo‘lajak shifokorlar doimiy psixologik stressga duch keladi, bu esa ularning kognitiv, emotsional va ijtimoiy funktsiyalarini o‘zaro bog‘liq tarzda zaiflashtirishi mumkin. Tadqiqotlar shuni ko‘rsatadiki, doimiy stress va travmatik holatlar uzoq muddat davomida depressiv holatlar, anksiyete buzilishlari, uyqusizlik, e’tibor va xotira faoliyatining pasayishi hamda emotsional chidamlilikning yo‘qolishiga olib keladi. Shu sababli psixologik travma bo‘yicha ilmiy adabiyotlarda bu fenomen “kasbiy barqarorlikka tahdid soluvchi faktorlardan biri” sifatida baholanadi.

Bundan tashqari, psixologik travmaning individual tajriba konteksti shifokor nomzodlarining travmani qabul qilish va unga moslashish darajasiga sezilarli ta’sir qiladi. Shaxsiy xususiyatlar, avvaldan mavjud bo‘lgan ruhiy salomatlik holati, emotsional intellekt va stressni boshqarish ko‘nikmalari travmatik holatlarning klinik oqibatlarini yumshatishda muhim rol o‘ynaydi. Shu bilan birga, kasbiy tayyorgarlik jarayonida travmatik hodisalarni oldindan prognoz qilish va ularni psixologik tayyorgarlik orqali yumshatish imkoniyatlari ham mavjud.

Shunday qilib, psixologik travma tushunchasi va uning bo‘lajak shifokorlar psixikasiga ta’siri nazariy jihatdan tahlil qilinib, ushbu jarayonning klinik oqibatlarini oldini olish va psixologik barqarorlikni mustahkamlash yo‘llari aniqlanishi muhim ahamiyatga ega. Bu, o‘z navbatida, tibbiy ta’lim jarayonida emotsional barqarorlikni saqlash va kasbiy kompetentsiyani oshirishga xizmat qiladi.

Travma natijasidagi klinik oqibatlar va kasbiy salomatlikka ta’siri

Psixologik travmalar bo‘lajak shifokorlarning kasbiy salomatligi va emotsional barqarorligiga bevosita ta’sir qiladi, chunki ular ruhiy va fiziologik tizimlarning doimiy stress sharoitida ishlashini talab qiladi. Travma natijasida rivojlanadigan klinik oqibatlar, asosan, depressiv sindromlar, anksiyete

buzilishlari, uyqusizlik, shuningdek, burn-out sindromi shaklida namoyon bo‘ladi. Burn-out sindromi, ilmiy tadqiqotlar asosida, uzoq muddat davom etgan kasbiy stressning psixofiziologik natijasi bo‘lib, emotsional charchash, depersonalizatsiya va shaxsiy samaradorlikning pasayishi bilan tavsiflanadi. Bunday holatlar bo‘lajak shifokorlarning kasbiy faoliyatini sezilarli darajada cheklab, stressga chidamlilik darajasini pasaytiradi.

Shuningdek, travma kognitiv va emotsional funktsiyalarga ta’sir qiladi. Tadqiqotlar shuni ko‘rsatadiki, doimiy psixologik stress va travmatik voqealar e’tibor, xotira va qaror qabul qilish jarayonlarini zaiflashtiradi. Bu esa klinik amaliyotda bemorlar bilan ishlash sifatini pasaytirishi, kasbiy etik va psixologik me’yorlarga rioya qilishni qiyinlashtirishi mumkin. Ijtimoiy funktsiyalar ham travma ta’sirida cheklanadi: ko‘pincha bo‘lajak shifokorlar o‘zlarini ijtimoiy muhitdan ajratish, guruhdagi faol ishtirokdan chekinish kabi holatlarni boshdan kechiradi. Bu esa ularning kasbiy va shaxsiy rivojlanishiga salbiy ta’sir ko‘rsatadi.

Travma oqibatlarini chuqurroq tahlil qilish shuni ko‘rsatadiki, klinik buzilishlar faqat ruhiy salomatlik bilan chegaralanmaydi, balki fiziologik mexanizmlarga ham ta’sir qiladi. Stress-hormonlar (kortizol, adrenalin) darajasining uzluksiz yuqori bo‘lishi immun tizimining susayishiga, gipertoniya va boshqa somatik patologiyalarning rivojlanishiga olib keladi. Shu nuqtai nazardan, travma oqibatlari bo‘lajak shifokorlarning umumiy sog‘lig‘iga ham sezilarli xavf tug‘diradi, bu esa kasbiy faoliyatga tayyorgarlikni va bemor bilan ishlash sifatini yomonlashtiradi.

Shunday qilib, psixologik travmalar bo‘lajak shifokorlarning klinik, kognitiv va ijtimoiy funktsiyalariga murakkab ta’sir ko‘rsatadi. Ularni aniqlash va samarali boshqarish kasbiy tayyorgarlik jarayonida psixologik barqarorlikni saqlash, stressga chidamlilikni oshirish hamda kasbiy samaradorlikni ta’minlash uchun zarurdir. Klinik oqibatlarning chuqur tahlili, shuningdek, profilaktik chora-tadbirlarni ishlab chiqish va psixologik reabilitatsiya dasturlarini qo‘llash imkoniyatlarini aniqlashga xizmat qiladi.

Travma profilaktikasi va psixologik reabilitatsiya usullari

Bo‘lajak shifokorlarda psixologik travmalarni oldini olish va ularning klinik oqibatlarini yumshatish kasbiy tayyorgarlik jarayonining ajralmas qismi hisoblanadi. Travma profilaktikasi ruhiy salomatlikni saqlashga, stressga chidamlilikni oshirishga va emotsional barqarorlikni mustahkamlashga qaratilgan kompleks chora-tadbirlarni o‘z ichiga oladi. Ushbu chora-tadbirlar stressni boshqarish texnologiyalari, psixologik treninglar, individual va guruh konsultatsiyalari hamda kasbiy yo‘nalishga moslashtirilgan reabilitatsiya dasturlarini o‘z ichiga oladi.

Stressni boshqarish texnologiyalari, asosan, psixologik va fiziologik strategiyalarni birlashtirib, shaxsning adaptiv mexanizmlarini kuchaytirishga xizmat qiladi. Masalan, nafas olish mashqlari, meditatsiya, kognitiv restrukturizatsiya va vaziyatlarni baholash strategiyalari bo‘lajak shifokorlarning ruhiy barqarorligini oshirishga yordam beradi. Shu bilan birga, psixologik treninglar emotsional intellektni rivojlantirish, stressga chidamlilik ko‘nikmalarini

shakllantirish va ijtimoiy moslashuvchanlikni oshirishga qaratilgan. Trening jarayonida shifokor nomzodlar o‘z hissiy reaktsiyalarini tahlil qilish, ularni boshqarish va travmatik vaziyatlarga adaptiv javob berish strategiyalarini o‘rganadilar.

Individual va guruh konsultatsiyalari psixologik reabilitatsiyaning muhim komponenti bo‘lib, unda har bir nomzodning shaxsiy psixologik holati, travma darajasi va stressga nisbatan individual reaksiyasi aniqlanadi. Guruh konsultatsiyalari esa ijtimoiy qo‘llab-quvvatlashni mustahkamlash, o‘zaro tajriba almashish va ruhiy resurslarni birlashtirish imkonini beradi. Shu bilan birga, kasbiy yo‘nalishga moslashtirilgan reabilitatsiya dasturlari klinik amaliyotdagi real vaziyatlarni inobatga olgan holda, travma oqibatlarini kamaytirish va kasbiy kompetentsiyani oshirishga qaratilgan.

Shifokor nomzodlarda travma oqibatlarini vaqtida aniqlash va ularni yumshatish ruhiy barqarorlikni saqlash, emotsional chidamlilikni oshirish va kasbiy faoliyat sifatini yaxshilash uchun juda muhimdir. Shu nuqtai nazardan, profilaktik chora-tadbirlarni qo‘llash va psixologik reabilitatsiya dasturlarini amalga oshirish bo‘lajak shifokorlarning kasbiy tayyorgarligini samarali va xavfsiz qilishga xizmat qiladi.

Xulosa

Bo‘lajak shifokorlarda psixologik travmalar va ularning klinik oqibatlari masalasi kasbiy tayyorgarlik jarayonida katta ahamiyatga ega. Tadqiqotlar shuni ko‘rsatadiki, travmatik vaziyatlar ruhiy barqarorlik, emotsional chidamlilik, kognitiv va ijtimoiy funktsiyalarga sezilarli ta’sir ko‘rsatadi, natijada depressiya, anksiyete, burn-out sindromi, uyqusizlik va ijtimoiy izolatsiya kabi klinik holatlar rivojlanadi. Ushbu oqibatlar nafaqat shaxsiy salomatlikka, balki kasbiy faoliyat samaradorligiga ham salbiy ta’sir ko‘rsatadi.

Shu bilan birga, psixologik travma oqibatlarini kamaytirish va ularni oldini olish imkoniyatlari mavjud bo‘lib, ular stressni boshqarish texnologiyalari, psixologik treninglar, individual va guruh konsultatsiyalari hamda kasbiy yo‘nalishga moslashtirilgan reabilitatsiya dasturlarini o‘z ichiga oladi. Bu usullar bo‘lajak shifokorlarning ruhiy barqarorligini saqlash, emotsional chidamliligini oshirish va kasbiy kompetentsiyasini rivojlantirishga xizmat qiladi.

Natijada, psixologik travmalarni aniqlash, ularni samarali boshqarish va profilaktik chora-tadbirlarni amalga oshirish bo‘lajak shifokorlarning kasbiy tayyorgarligini samarali, xavfsiz va psixologik jihatdan barqaror qilish uchun muhim ahamiyat kasb etadi. Shu bilan birga, bu ilmiy tadqiqot psixologiya fanining nazariy va amaliy jihatlarini uyg‘unlashtirib, tibbiy ta’lim jarayonida psixologik xavfsizlikni ta’minlashga qaratilgan.

Foydalanilgan adabiyotlar:

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (DSM-5). 5th edition. Arlington, VA: American Psychiatric Publishing; 2013.
2. Figley, C. R. Traumatology of Caregivers: Secondary Traumatic Stress and Vicarious Trauma. New York: Brunner-Routledge; 1995.

3. Maslach, C., Leiter, M. P. Burnout and Engagement in the Workplace: A Review of Theory and Research. Annual Review of Psychology. 2016; 67: 389–422.
4. Shapiro, S. L., Astin, J. A., Bishop, S. R., Cordova, M. Mindfulness-Based Stress Reduction for Health Care Professionals: Results from a Randomized Trial. International Journal of Stress Management. 2005; 12(2): 164–176.
5. Meichenbaum, D. Stress Inoculation Training: A Preventive and Treatment Approach. New York: Pergamon Press; 1985.
6. Stamm, B. H. The Concise ProQOL Manual. 2nd edition. Pocatello, ID: ProQOL.org; 2010.
7. Kasyanova, A. V., Petrova, O. N. Psychological Stress and Professional Burnout in Medical Students and Young Doctors. Russian Journal of Psychiatry. 2019; 24(4): 45–53.
8. World Health Organization (WHO). Mental Health: Strengthening Our Response. Geneva: WHO; 2018.
9. Cohen, S., Janicki-Deverts, D., Miller, G. E. Psychological Stress and Disease. JAMA. 2007; 298(14): 1685–1687.
10. Melibayeva R.N,Boboyeva M.A ,Oripova S.Maktabgacha yoshdagi bolalar psixologiyasi O‘quv qo‘llanma - 2025
11. M.A. Boboeva PSYCHOLOGICAL FEATURES OF PREPARING STUDENTS FOR PROFESSIONAL ACTIVITY
12. M.A. Boboeva BO‘LAJAK SHIFOKORLARDA KASBIY FAOLIYATGA QIZIQISH MOTIVATSIYASINING PSIXOLOGIK XUSUSIYATLARI
13. THE CONTENT OF THE EFFECTIVENESS OF THE USE OF PERSONALIZED TEACHING TECHNOLOGY IN THE EDUCATIONAL PROCESS

Boboyeva N. T., PhD
o‘qituvchisi
Termiz davlat universiteti
Surxondaryo viloyati, O‘zbekiston

TUPROQ-IQLIM OMILLARINING KUZGI BUG‘DOY NAVLARI SUV ALMASHINUV JARAYONLARIGA TA’SIRI.

Annotatsiya: *Surxondaryo viloyati tuproq-iqlim sharoitida turli bug’doy navlarining gullash fazasida suv almashinuv xususiyatlari o‘rganildi.*

Tayanch so‘zlar: *bug’doy navlari, o‘sish, rivojlanish, don, transpiratsiya, ekologik omillar*

Boboyeva N. T., PhD
teacher
Termez State University
Surkhandarya, Uzbekistan

THE INFLUENCE OF SOIL AND CLIMATIC FACTORS ON WATER EXCHANGE PROCESSES IN WINTER WHEAT VARIETIES

Abstract: *it has been learned features of water exchange during the flowering phase of wheat varieties in soil climatic condition in surkhandarya region*

Key words: *Triticum v. growth, development, number of grain, transpiration, ecological factors.*

Hozirgi kunda viloyat sharoitida yetishtirilayotgan bug’doylar bir necha navlardan iborat bo’lib, ular umumiy hosildorligi va hosil sifatlari bilan bir-biridan farq qiladi. Ayrim yillarda yog’ingarchilik kam bo’lishi va sug’orish uchun ishlatiladigan suvlarning ham rejadan kam bo’lishi umumiy hosil miqdoriga va sifatiga salbiy ta’sir etadi. Shuning uchun ham bug’doy navlarining qurg’oqchilikka chidamlilik darajasini aniqlash va nisbatan chidamli navlarni ishlab chiqishga tavsiya etish dolzarb muammo bo’lmoqda.

O’simliklarning suv almashinuv xususiyatlari ularning o’sishi, rivojlanishi, hosildorligi va hosil sifatini ta’minlaydigan asosiy ko’rsatgichlardan biri bo’lib hisoblanadi. [4].

O’simliklar hayotida suvning o’rni, o’simliklar to’qimalari tarkibining 70-95% suvdan iborat. O’simlikning barcha organlarida suv bo’ladi: bargda-90%, novdada-70-80%, ildizda-50-60%, urug’da-10%, vakuolada-98%, sitoplazmada-80%, qobiqda-50% atrofida suv uchraydi. Ayrim ho’l mevalarda juda ko’p: pamidorda-94%, tarvuzda-92% gacha suv bo’ladi [1,3].

Yuqoridagi ma’lumotlardan kelib chiqgan holda, biz bug’doy navlarining suv almashinuv xususiyatlarini, ularning o’sish va rivojlanish fazalari bo’yicha o’rgandik.

1.1- jadval.

№	Navlar	Barglarda:			
		Umumiy suv miqdori, %	Transpiratsiya jadalligi, g/m^{2}s	Suv taqchilligi,%	Suv saqlash qobiliyati,%
1.	Andijon-1	75,6	25,0	6,8± 0,04	6,09± 0,03
2.	Andijon-2	77,3	21,1	6,3± 0,01	5,33± 0,04
3.	Asr	78,2	20,0	6,5± 0,03	5,63± 0,03
4.	Omad	78,9	16,7	5,0± 0,05	3,94± 0,02
5.	Grom	82,4	13,2	4,5± 0,02	3,37± 0,05
6.	Tanya	84,4	10,5	2,5± 0,01	2,59± 0,04

Omad bug’doy navi bargida umumiy suvning miqdori 78,9 % ga teng bo’lib, Andijon 1 naviga nisbatan 3,3 % ga ko’p ekanligi kuzatildi. Grom navining umumiy suv miqdori 82,4 % gat eng bo’lib, Andijon 1 ga nisbatan 6,8 % ga ko’p ekanligi aniqlandi. Tanya bug’doy navining 84,4 % ga suv bo’lib, u Andijon1 naviga nisbatan 8,8 % ko’pligi aniqlandi.

Bu ma’lumotlardan aniqlanishicha, Andijon 1 bug’doy navining barglaridagi suv miqdoriga nisbatan Tanya bug’doy navining barglarida suv eng ko’p bo’lishi va boshqa navlar oraliq o’rinda ekanligi aniqlandi.

O’simlik barglarida sodir bo’ladigan transpiratsiya jadalligi ham o’simliklarni suv almashinuv xususiyatlaridan biri hisoblanadi. Jadvalda ko’rsatilgan (1.1-jadval) ma’lumotlardan aniqlanishicha Andijon 1 bug’doy navining barglarining 1 m2 barg sathida 1soat davomida 25,0 g suv parlatilgan bo’lsa shu muddatda Tanya bug’doy navining barglaridan 10,5 g suv bug’langan ya’ni shu muddatda Tanya navi Andijon naviga nisbatan 14,5 g suv kam parlatgan. Qolgan navlar ham oraliq o’rinlarni egallab Andijon 1 naviganisbatan kamroq suv parlatgan, ya’ni Andijon 2 navi 3,9 g , Asr navi 5,0 g, Omad navi 8,3 g, Grom navi 11,8 g kam suv parlatgan. Bu ko’rsatgich navlarning transpiratsiya jadalligi bo’yicha ham bir-biridan keskin farq qilishini ko’rsatadi.

Bug’doy navlari barglaridagi suv taqchilligi ham nav xususiyatlariga bog’liq holda o’zgaradi. Andijon 1 navining barglarida suv taqchillik 6,8 % ga teng bo’lsa, Andijon 2 naviniki 6,3 % teng bo’lib, u Andijon 1 naviga nisbatan nisbatan 0,3 %, Omad navida 1,8 %, Grom navida 2,3 % va Tanya navida 4,3 %. Andijon 1 bug’doy navi barglariga nisbatan suv taqchilligi kamroq ekanligi aniqlandi.

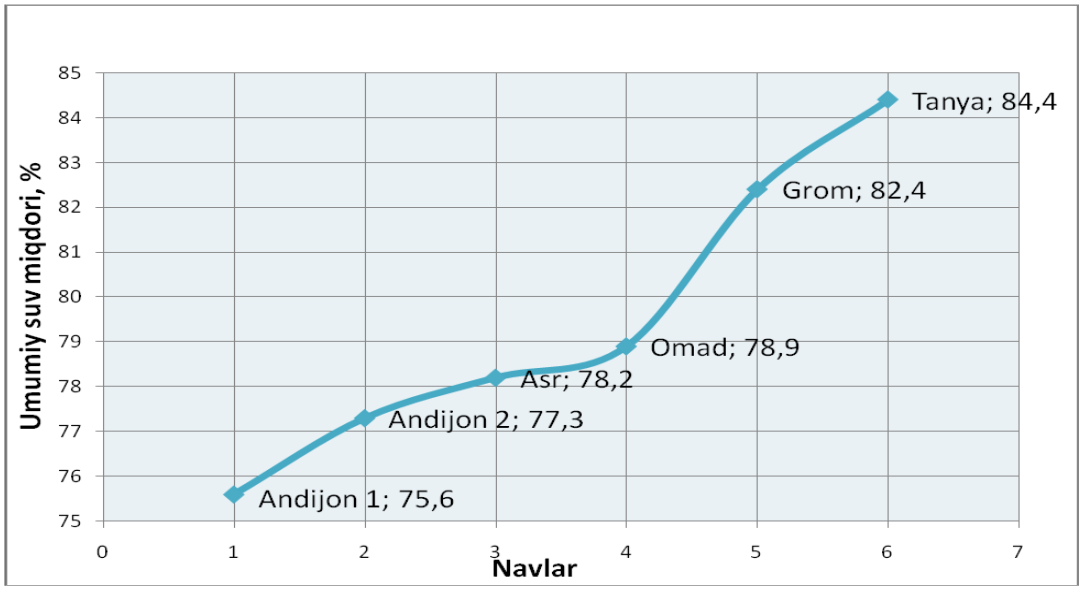
Huddi suv taqchilligiga o’xshash barglarining suv saqlash qobilyati ham o’simliklarning qurg’oqchilikka chidamlilik darajasini harakterlaydigan eng muhim ko’rsatgich hisoblanadi. Andijon 1 bug’doy navi barglarining suv saqlash qobilyati boshqa navlarga nisbatan eng past bo’lib, 1 soat davomida sarflagan suv miqdori 6,09 % ga teng bo’lsa, Andijon 2 bug’doy navi shu muddatda 5,33 % suv sarflagan va ular o’rtasidagi farq 0,76 % ga teng.

Asr bug’doy navi barglaridan sarflangan suv miqdori 5,63 % ga teng bo’lib, u 0,46 % ga kamroq, Omad bug’doy navining barglari shu muddatda 3,98 % suv parlatgan bo’lsa, Andijon 1 naviga nisbatan 2,15 %, Grom bug’doy navi 1 soatda 3,37 % suv parlatib Andijon 1 ga nisbatan 2,72 % va Tanya bug’doy navi 1 soat davomida 2,59 % suv parlatib, Andijon 1 navidan 3,5 % kam suv parlatgan.

Bu ma’lumotlar Andijon 1 bug’doy navining suv saqlash qobilyati eng past, Tanya bug’doy navining suv saqlash qobilyati eng yuqori ekanligini ko’rsatadi. Qolgan navlar suvni saqlash qobilyati bo’yicha oraliq o’rinni egallaydi. Shunday qilib bug’doy navlarining suv almashinuv xususiyatlariga asoslangan holda ularning qurg’oqchilikka chidamligi darajasini quyidagi tartibda joylashtirish mumkin: Andijon 1 <Andijon 2 <Asr< Omad < Grom <

Tanya ya’ni o’rganilgan navlar o’rtasida Andijon 1 navining qurg’oqchilikka chidamligi eng past bo’lsa, Tanya bug’doy navining qurg’oqchilikka chidamligi eng yuqori va qolgan variantlar oraliq o’rinda joylashgan.

Bug’doy navlarining qurg’oqchilikka chidamlilik darajasini ko’rsatuvchi eng muhim fiziologik jarayon barglaridagi umumiy suv miqdoridir. Boshqa ko’rsatgichlarga nisbatan bu ko’rsatgich to’g’ridan-to’g’ri navlarning qurg’oqchilikka chidamlilik darajasini harakterlaydi. Bizning tajribamizda olingan bu ma’lumotlar 1.1-rasmda yanada aniqroq tasvirlangan.



1.1 – rasm. Bug’doy navlarining gullash fazasidagi umumiy suv miqdori.

Bug’doy navlarining qurg’oqchilikka chidamlilik darajasini tasvirlovchi ya’ni ularning umumiy suv miqdori bo’yicha to’plangan ma’lumotlar ko’rsatishicha barcha o’rganilgan navlar o’rtasida nisbatan qurg’oqchilikka chidamli nav bo’lib Tanya navi hisoblanadi. Bu navning barglaridagi umumiy suv miqdori 84,4% ekanligi aniqlandi. Nisbatan chidamsiz hisoblangan Andijon-1 bug’doy navi barglarida umumiy suv miqdori 75,6% teng. Qolgan navlar oraliq o’rinda joylashgan.

Adabiyotlar ro’yxati

1. Аманов А.А. Качество зерна коллекционных образцов пшеницы. «Узбекистон кишлок хужалиги» журнали, 2005, №3, 16-17 б.
2. Amonova G. R., Rashidov N. E. Useful Properties of Medicinal Chamomile (Matricaria Recutita) //European journal of innovation in nonformal education. – 2024. – Т. 4. – №. 4. – С. 130-132.
3. Байкова Е.В., Королюк Е.А., Ткачев А.В. Компонентный состав эфирных масел некоторых видов рода Salvia L., выращенных в условиях Новосибирска (Россия) // Химия растительного сырья, 2002. № 1.С. 3742.
4. Fozilov S. The effect of drought on the water regime in the leaves of soybean varieties //Science and innovation in the education system. – 2023. – Т. 2. – №. 9. – С. 25-28.
5. Fozilov S. Effect of stress factors on some physiological parameters of soybean plant //Science and innovation in the education system. – 2023. – Т. 2. – №. 7. – С. 722-74.

Boltaboev I.
o'qituvchisi
Qo'qon davlat universiteti
mustaqil tadqiqotchisi
O'zbekiston davlat san'at va madaniyat institutining

O‘ZBEK TEATRIDA FOLKLORIZMNING ZAMONAVIY TALQINI: AKTYOR TAYYORGARLIGIDA NUTQ, PLASTIKA VA MAROSIM ELEMENTLARINING INTEGRATSIYASI

Annotatsiya; *Maqolada o‘zbek teatrida folklorizmning zamonaviy talqini hamda aktyor tayyorgarligida nutq, plastika va marosim elementlarini uyg‘un qo‘llashning nazariy va amaliy jihatlari tahlil etiladi. Folkloriy unsurlar ijro texnikasini boyitishi, aktyor organikligini kuchaytirishi va milliy sahna maktabi rivojiga xizmat qilishi asoslab beriladi.*

Kalit so‘zlar: *folklorizm, o‘zbek teatri, aktyor tayyorgarligi, nutq texnikasi, plastika, marosim elementlari, vokal-folklor mashqlari, milliy sahna maktabi, psixofizik holat, integratsiya, ijro mahorati.*

Boltaboev I.
lecturer
Kokand State University
independent researcher
Uzbek State Institute of Arts and Culture

MODERN INTERPRETATION OF FOLKLORISM IN UZBEK THEATRE: INTEGRATION OF SPEECH, PLASTICITY, AND RITUAL ELEMENTS IN ACTOR TRAINING

Abstract: *The article analyzes the modern interpretation of folklorism in Uzbek theatre and the theoretical and practical aspects of integrating speech, plasticity, and ritual elements into actor training. It substantiates how folkloric components enrich acting techniques, strengthen the actor’s organic performance, and contribute to the development of the national theatre school.*

Keywords: *folklorism, Uzbek theatre, actor training, speech technique, plasticity, ritual elements, vocal-folklore exercises, national theatre school, psychophysical state, integration, acting mastery.*

Kirish

Zamonaviy o‘zbek teatr san’ati mustaqillikdan keyingi davrda milliy o‘zlikni tiklash, badiiy an’analarni qayta kashf etish va sahnaviy ifoda uslublarini yangilash jarayonini boshdan kechirdi. Ayniqsa, folklor — xalqning og‘zaki ijodi, marosimiy meros, jismoniy-plastik ifodasi va vokal an’analarining teatrga qayta kirib kelishi milliy teatr estetikasini yangicha mazmun bilan boyitdi. So‘nggi

yillarda O‘zbekiston Respublikasi Prezidentining madaniyat va san’atni rivojlantirishga qaratilgan qator farmon va qarorlari, jumladan, “Mamlakatda madaniyat va san’at sohasini yanada rivojlantirish chora-tadbirlari to‘g‘risida”gi PF-5937-son Farmon (2020-yil 26-may)da milliy merosni asrash,[1] an’anaviy ijrochilikni rivojlantirish va san’at sohasi vakillarining malakasini oshirish bo‘yicha ustuvor vazifalar belgilab berilgani folklor asosidagi sahna ijodini qo‘llab-quvvatlash uchun mustahkam huquqiy poydevor yaratdi. Ushbu farmonda teatr san’atida milliylikni mustahkamlash, ijod jarayoniga xalq ijodi namunalari va urf-odatlardan samarali foydalanish zarurligi alohida urg‘u bilan ta’kidlanadi. Shunday ekan, folklorizmni teatr amaliyotiga chuqur integratsiya qilish — nafaqat badiiy zarurat, balki davlat siyosati darajasida qo‘llab-quvvatlanayotgan muhim madaniy yo‘nalishdir.

O‘zbek teatrida folklorizmning shakllanishi, ayniqsa 1991–2021 yillar oralig‘ida, teatrning milliy o‘zligini qayta anglash harakati bilan chambarchas bog‘liq bo‘ldi. Bu jarayonda rejissyorlik yondashuvlari, aktyor tayyorgarligi va sahna tilining shakllanishida xalq qo‘shiqlari, an’anaviy marosim plastikasining ritmik qonuniyatlari, udum va rituallarning dramatik funksiyalari qayta talqin qilindi. Natijada sahnada xalq og‘zaki ijodi motivlari asosida yaratilgan obrazlar, jismoniy harakat va nutqning milliy ohangdorlikka ega bo‘lgan usullari, psixofizik holatni uyg‘unlashtiruvchi marosimiy elementlar keng qo‘llanila boshladi. Bu esa o‘zbek teatrining badiiy tilini nafaqat milliylashtirdi, balki uni yangi estetik bosqichga olib chiqdi.

Mazkur maqolaning maqsadi — o‘zbek teatrida folklorizmning zamonaviy talqinini tahlil qilish, xususan, aktyor tayyorgarligi jarayonida nutq, plastika va marosim elementlarining integratsiyasini ilmiy jihatdan asoslab berishdir. Tadqiqot doirasida xalq qo‘shiqlari asosidagi vokal tayyorgarlik, marosimiy harakatlar orqali jismoniy plastikaning shakllanishi, xalqona nutq ohangining aktyor nutq texnikasiga ta’siri hamda ushbu elementlarning bir-biri bilan uyg‘unlashuv mexanizmlari o‘rganiladi. Metod sifatida komparativ tahlil, amaliy sahna jarayonlarini kuzatish, aktyorlik treninglarining strukturaviy tahlili va zamonaviy teatr pedagogikasi yondashuvlaridan foydalanildi. Ushbu yondashuvlar integratsiyalashgan folkloriy unsurlar nafaqat aktyorning psixofizik holatini chiniqtirishi, balki sahnaviy organiklik, tabiiylik va milliy ifoda uslubining shakllanishiga qanday ta’sir ko‘rsatishini aniqlash imkonini beradi.

Asosiy natijalar va tahlillar

Zamonaviy teatr nazariyasida folklorizm sahna ijodining estetik, semantik va psixofizik qatlamlarini boyituvchi muhim manba sifatida qaraladi. Folklor — xalqning ko‘p asrlik tajribasi, dunyoqarashi, ritmik ongini mujassamlashtirgan murakkab madaniy tizim bo‘lib, uning teatrga ko‘chishi aktyor ijrosiga tabiiylik, milliylik, ritmik uyg‘unlik va obrazning badiiy aniqligini ta’minlovchi omilga aylanadi. Folkloriy elementlarning teatrga kirib kelishi birgina sahna bezagini emas, balki aktyorlik texnikasi, dramatik struktura, ritm-plastik tizim va vokal ifodaning tubdan yangilanishiga olib keladi. Bu jarayon teatr san’atining milliy

identitetni namoyon etishdagi imkoniyatlarini kengaytiradi, ijrochilik uslubi esa xalqona ohang, ritm, harakat va marosimiy tuyg‘ular bilan to‘yintiriladi.

Folklorning zamonaviy teatrga ta’siri avvalo uning nutq, plastika va marosimiy unsurlar orqali ifodalanishida namoyon bo‘ladi. Xalq og‘zaki ijodi namunalarida uchraydigan ohangdorlik, o‘ziga xos intonatsiya, lad va ritm aktyor nutqiga tabiiylik va milliy ohang bag‘ishlaydi. Folklor qo‘shiqlaridagi nafas boshqaruvi, ovozning tembr bo‘yoqlari, lad tuzilmalari ham aktyorning vokal texnikasini rivojlantiradi. Plastika sohasida esa xalq o‘yinlari, marosimlaridagi harakat strukturasi, gavda ritmiga asoslangan ifoda, milliy raqs va udumlarning jismoniy energetikasi aktyor harakati uchun tabiiy asos bo‘lib xizmat qiladi. Marosim unsurlari esa ijrochilikda psixofizik holatni uyg‘unlashtiradi: ulardagi takroriy ritmlar, ramziy harakatlar, energetik markazlarning faollashuvi aktyorning sahnaviy e’tiborini shakllantiradi hamda ichki holat va tashqi ifoda birligini mustahkamlaydi. Shu sababli folkloriy unsurlar aktyor tayyorgarligi uchun nafaqat tashqi ifodaviy material, balki chuqur ruhiy tayanch bo‘lib qoladi.

Aktyor tayyorgarligi tizimidagi folkloriy komponentlar o‘z ichiga uch asosiy yo‘nalishni oladi:[2] nutq texnikasi, jismoniy-plastik tayyorgarlik va marosimiy-ritual tuyg‘ularni shakllantirish. Nutq texnikasida xalq qo‘shiqlarini o‘rganish, xalqona intonatsiya va ohangdorlikni egallash, matnning tabiiy tug‘ilishi hamda milliy ritmik so‘zlashuvni shakllantirish muhim o‘rin egallaydi. Plastika bo‘yicha tayyorgarlik esa xalq o‘yinlari, milliy raqs elementlari, marosimiy harakatlar, jismoniy ritm va energetik muvozanatni o‘zlashtirish orqali amalga oshiriladi. Marosim unsurlarini o‘zlashtirish jarayonida esa aktyorda sahnaviy e’tibor, ichki holatning uyg‘unligi, ruhiy markazlashuv, obrazga organik kirish va kollektiv energiya bilan ishlash qobiliyatlari rivojlanadi. Bu uch komponentning uyg‘unlashuvi aktyorning organik, milliy ruhda tabiiy ijro etishiga yordam beradi, zamonaviy sahna uchun moslashgan, lekin milliy ildizlarga tayanadigan ijro maktabini shakllantiradi.

Zamonaviy o‘zbek teatrida aktyor tayyorgarligini takomillashtirish jarayonida nutq, plastika va marosim elementlarining o‘zaro integratsiyasi ijroning psixofizik tabiatini boyituvchi asosiy omillardan biri sifatida namoyon bo‘lmoqda. Folklor asosidagi nutqiy ohangdorlik, milliy harakatlar ritmoplasi, shuningdek, qadimiy marosim va rituallarning dramatik strukturadagi funksional talqini aktyorning organik holatda sahnaga chiqishiga, uning milliy o‘ziga xoslikka tayangan holda zamonaviy estetikani yaratishiga imkon beradi. Mazkur integratsiya aktyor tayyorgarligini faqat texnik emas, balki madaniy-estetik jarayon sifatida ham talqin etish imkonini yaratadi.

Aktyor tayyorgarligida vokal-folklor mashqlari:

Folklor qo‘shiqlari va an’anaviy vokal ohanglari aktyorning nutq apparati, nafas tizimi va ichki musiqiy sezgirligini o‘stirishda yuqori samaradorlikka ega. O‘zbek xalq qo‘shiqlariga xos cho‘zma ohang, tor diapazonli, lekin ritmik jilolanishga ega kuylash uslubi sahnadagi nutqning tabiiy jarangdorligini kuchaytiradi. Mashg‘ulotlarda termalar, yalla ohanglari, baxshilik uslubidagi xirgoyi mashqlari qo‘llanilishi aktyorga ovozning tabiiy rezonansini topish,

nafasni boshqarish hamda nutqiy matnni musiqiylik bilan uyg‘unlashtirish imkonini beradi. Bu jarayon nafaqat aktyor vokalini mustahkamlaydi, balki ijroning hissiy mazmunini ham boyitadi.

Milliy harakat plastikasining sahnaviy qo‘llanilishi:

O‘zbek xalq raqsi, pantomimik harakatlar va milliy urf-odatlarda saqlanib qolgan plastika shakllari aktyorning tanaviy erkinligi va ritm sezgisini rivojlantiruvchi amaliy asosdir.[3] Milliy harakatlar — qo‘lning mayin chizgilar bilan ishlashi, gavdaning egiluvchanligi, qadam tashlash sur’atlaridagi marom — aktyorga sahnada o‘zini erkin, organik va milliy estetika doirasida tutish imkonini beradi. Harakat plastikasining teatr amaliyotiga tatbiq etilishi aktyorning ichki kechinmalarini tashqi harakat orqali mazmunli ifoda etishiga xizmat qiladi. Bu esa Stanislavskiy talqinidagi psixofizik birlik prinsipiga uyg‘un holda, aktyor gavdasining ma’noli harakatga aylanishini ta’minlaydi.

Marosim va ritus elementlarining psixofizik funksiyasi:

O‘zbek xalqining qadimiy marosimlari — duolar, yo‘qlovlar, qadriyatlarni ifodalovchi rituallar, mavsumiy udumlar — o‘ziga xos dramatik struktura va psixik energiyaga ega. Ular aktyorning ichki e’tiqodi, emotsional konsentratsiyasi va obrazga kirish jarayonini tabiiylashtiradi. Marosim elementlaridagi takrorlanish, ritmik ohanglar, jamoaviy uyg‘unlik aktyorda ichki holatlarning uyg‘onishiga, psixofizik energiyaning bir maromga kelishiga yordam beradi. Bunday mashg‘ulotlar aktyorni “rol ichidagi holat”ga tayyorlashda, uning sezgirlik va ichki tasavvurini faol holga keltirishda muhim ahamiyat kasb etadi.

Integratsiya asosidagi etyudlar va pedagogik mashg‘ulotlar:

Nutq, plastika va marosim unsurlarini bir butun dramatik tizim sifatida talqin etish asosida olib boriladigan etyudlar aktyorning organik ijro malakasini mustahkamlovchi samarali pedagogik vositadir. Masalan:

— folklor qo‘shig‘i bilan birga bajariladigan plastika mashqi;
— marosimiy ritmlar asosida harakat-nutq uyg‘unligi;
— milliy udumlardan olingan vaziyatlar asosida dramatik etyudlar;
— baxshi uslubidagi xirgoyi bilan psixofizik holatga kirish mashqlari.

Bunday integratsion mashg‘ulotlar aktyorning nafaqat texnik mahoratini, balki madaniy xotirasini, milliy estetik dunyoqarashini shakllantiradi. Shu tariqa folkloriy elementlar zamonaviy teatr pedagogikasida ijodiy manba sifatida namoyon bo‘lib, aktyor tayyorgarligini mazmunan va shaklan boyitadi.

Xulosalar

Nutq, plastika va marosim elementlarining o‘zaro integratsiyasi o‘zbek teatrida aktyor ijrosining nafaqat texnik, balki ma’naviy-estetik sifatini ham belgilovchi muhim omilga aylandi. Ushbu integratsiya aktyorning sahnadagi psixofizik holatini boyitadi, uning ovozi, gavdasi, tasavvuri va hissiy dunyosining uyg‘un harakatda namoyon bo‘lishiga sharoit yaratadi. Ayniqsa, folklorga xos ohangdor nutq, milliy harakat plastikasining ritmoplasi va marosimlardagi ruhiy energiya aktyorning ijro jarayonida organiklik, ishonchlilik va ichki haqqoniylikni oshiradi. Natijada aktyor sahnada faqat matn bajaruvchi emas, balki milliy madaniyatning jonli tashuvchisiga aylanadi.

Folkloriy yondashuvning zamonaviy teatr san’ati uchun ahamiyati aynan shu o‘ziga xos uyg‘unlikda namoyon bo‘ladi. Global teatr jarayonlari fonida milliy teatrning betakrorligini saqlab qolish, o‘ziga xos estetik maktab yaratish va tomoshabinning ruhiy dunyosi bilan mustahkam aloqa o‘rnatish folkloriy manbalarga murojaat qilish natijasida yanada samarali kechadi. Folklor unsurlarining sahnaviy talqini — qadriyatlarning tiklanishi, madaniy xotiraning qayta jonlanishi, teatr san’atining o‘z ildizlariga qaytishi demakdir. Shu ma’noda, folklorizm nafaqat badiiy uslub, balki zamonaviy teatrni milliy ruhda rivojlantiruvchi metodologik yo‘nalish sifatida qadrlanadi.

Kelgusidagi taklif va istiqbollarga kelsak, birinchi navbatda aktyor tayyorgarligi jarayonida folkloriy mashg‘ulotlarning alohida modul sifatida shakllantirilishi maqsadga muvofiqdir. O‘quv dasturlarida vokal-folklor mashqlari, milliy plastika texnikalari, marosimiy etyudlar va udumlar asosidagi dramatik vaziyatlar muntazam qo‘llansa, aktyorlarning psixofizik imkoniyatlari yanada chuqurroq ochiladi. Shuningdek, teatr-pedagogik ta’limda folklor ijrochiligi bo‘yicha maxsus seminar va laboratoriyalar tashkil etilishi ijodiy tajribaning kengayishiga xizmat qiladi. Bunda zamonaviy rejissura yutuqlarini milliy marosimiy-estetik zamin bilan uyg‘unlashtirish orqali yangi ijodiy usullar yaratish imkoniyati tug‘iladi.

Umuman olganda, nutq, plastika va marosim elementlarining integratsiyasi o‘zbek teatrining kelajakdagi rivojlanish istiqbolida muhim o‘rin tutadi. Bu yondashuv teatr san’atining milliyligini mustahkamlab, yangi sahnaviy shakllar, yangicha aktyorlik texnikasi va zamonaviy tomoshabinni o‘ziga jalb qiladigan mazmuniy yangiliklarni yuzaga keltiradi.

Adabiyotlar

1. O‘zbekiston Respublikasi Prezidenti. “Mamlakatda madaniyat va san’at sohasini yanada rivojlantirish chora-tadbirlari to‘g‘risida” PF-5937-son Farmon. Tashkent: 2020.
2. Xudoyberdiyev, I. O‘zbek teatrida folklorizm va ijrochilik. Tashkent: Fan, 2016, 45–47-b.
3. Xudoyberdiyev, I. O‘zbek teatrida folklorizm va ijrochilik. Tashkent: Fan, 2016, 60–64-b.

УДК:633.11.816

Botirov A.
associate professor
department of "organic agriculture and forest melioration"
Andijan Institute of Agriculture and Agrotechnologies

SOIL FERTILITY AND REPEATING CROPS

Abstract: *The article provides information on the soil and climatic conditions of the Republic of Uzbekistan for obtaining two grain harvests per year from irrigated lands and obtaining nutritious fodder for livestock, as well as on how planting repeated crops after winter wheat creates favorable conditions for increasing soil fertility.*

Keywords: *leguminous crops, productivity, mung bean, soybean, root and stubble residues, winter wheat, gross nitrogen, corn.*

For the efficient use of irrigated lands, it is necessary to develop and introduce into production agricultural techniques for sowing repeated grain, fodder, oilseeds, and other crops.

Planting leguminous crops as a repeated crop is important, as these plants solve the problems of grain, protein, and oil. In addition, high annual temperatures in the republic, the use of intensive tillage methods in the cultivation of agricultural crops, as well as the cultivation of agricultural crops under irrigated conditions, lead to a rapid decrease in the accumulated natural reserves of humus in the soil.

As a result, the biological properties of the soil deteriorate, the number of microorganisms causing bacterial and fungal diseases increases, and crop yields decrease. The role of alfalfa in maintaining and increasing soil fertility, obtaining high crop yields, and effectively crop rotation is immeasurable. However, the cultivated area of alfalfa has sharply decreased in recent years.

Therefore, the introduction of intermediate, repeated grain, and leguminous crops into crop rotation systems serves to preserve and increase soil fertility. Therefore, in the conditions of meadow-sodic soils of the Fergana region, we conducted field experiments to study the yield of repeated crops (corn, mung bean, beans, and soybeans) and the effectiveness of fertilizer rates for winter wheat sown after them.

In our studies, the nutrient units and digestible protein content in the grain and green mass of repeated crops (corn) and hay (mung bean, beans, soybeans) were determined. On average, over 3 years, the grain yield of corn (38.2 c/ha) amounted to 5042.2 kg/ha, the stem (307.3 c/ha) - 4837.3 kg/ha, a total of 9879.5 kg/ha of feed units, and the protein content was 636.4 g/ha, respectively, 297.5 and 338.9 kg/ha.




In mung bean grain (15.2 c/ha) 1991,1 kg/ha, hay (32.2 c/ha) 1032,3 kg/ha total - 3023,4 kg/ha of feed units and 443,8 kg/ha and 89,8 kg/ha total - 533,6 kg/ha of protein were determined.

It should be noted that during the growing season, corn absorbs 200-250 kg/ha of nitrogen from the soil, which is probably why the amount of nutrient units and digestible protein in its grain and stems is higher than in mung beans by 6856.1 kg/ha and 102.8 kg/ha, respectively. This indicates that corn is a nutritious feed for livestock.

The amount of digestible protein in bean grain (12.3 c/ha) was 1611.2 kg/ha, in hay (12.3 c/ha) 393.4 kg/ha, and respectively 357.9 kg/ha and 39.3 kg/ha. It should be noted that among repeated crops, beans were distinguished by low yields and low nutritional units and protein content.




It was established that the soybean grain (23.3 c/ha) contains 3078.4 kg/ha, and the hay (33.5 c/ha) contains 1071.6 kg/ha, a total of 4150.0 kg/ha of feed units, and, respectively, 687.2 kg/ha and 93.5 kg/ha - a total of 780.7 kg/ha of digestible protein.

In our research, when studying the amount of stubble and root residues in the soil of repeated crops sown for 3 years, it was established that after corn, an average of 17.2 c/ha of stubble and 35.0 c/ha of root residues (total 52.2 c/ha) accumulate in the 0-50 cm soil layer. This indicator is the highest among the studied repeated crops.

It was established that the mung bean plant can leave an average of 11.8 c/ha of stubble and 29.8 and 3.9 c/ha of root residues (total 45.5 c/ha) in the 0-30 and 30-50 cm soil layers, respectively, over 3 years.

Relatively lower indicators were obtained for bean plant residues and amounted to 8.9; 21.5 (0-30 cm) and 2.5 c/ha (30-50 cm) respectively, totaling 32.9 c/ha. From the soybean plant, an average of 10.4 c/ha of stubble, 32.0 c/ha of roots, and a total of 42.4 c/ha of residues were observed per hectare.

When studying the accumulation of nutrients in the mass of these residues, 20.8 kg of nitrogen, 9.5 kg of phosphorus, and 12.8 kg of potassium remained after corn on one hectare of land. Meanwhile, corn plants assimilate 200-220 kg/ha of nitrogen. Therefore, it is necessary to pay attention to the fertilizer application rates for subsequent crops. But growing a large amount of corn fodder for livestock was described in the previous section.

Conclusion

Soil fertility is one of the fundamental factors ensuring the sustainability and productivity of agriculture. Effective use of soil resources and preservation of their natural potential are closely linked to the practice of cultivating repeated (secondary) crops. The introduction of such crops plays a significant role in improving the physical, chemical, and biological properties of soils, restoring soil structure, and increasing the reserves of organic matter.

Research shows that properly selected secondary crops enhance the availability of essential nutrients such as nitrogen, phosphorus, and potassium, stabilize nutrient cycles within crop rotations, and stimulate soil microbiological activity. In regions with intensive grain–cotton systems, the repeated cultivation of legumes, green manure (sideral) crops, and vegetable crops contributes to faster recovery of soil fertility, increased structural stability, and reduced ecological pressure on farmlands.

The efficient use of secondary crops also leads to more rational water and fertilizer use, ultimately increasing both the quantity and quality of agricultural production. Moreover, it helps prevent long-term declines in soil fertility. Therefore, repeated cropping is recognized as an integral component of modern agricultural technologies and one of the most effective agroecological methods for maintaining and enhancing soil productivity.

References:

1. Авлиёқулов А.Э., Беспалов Н.Ф., Ачилдиев Р.А. и др.. “Агротехника получения высоких урожаев кукурузы на поливных землях Узбекистана”, Ташкент: Ёш гвардия, 1974 с. 1-41
2. Абдуллаев М., Назаров М. “Кузги буғдой илдиз тизимининг ривожланишига кўчатлар сони ва ўғитлар меъёрини таъсири”. “Ўзбекистон Республикаси қ/х.да сув ва ресурс тежовчи агротехнологиялар, Ташкент, 2008, 273-275 бетлар
3. Г.Урунбаева, О.Муминова. “Soil fertility”. Novateur Publication’s Journal a multidisciplinary Peer Reviewed journal, 2020 № 6-сон

Bozorov Z. A., PhD (philology)
associate professor
department of uzbek language and literature
russian and english languages
Bukhara State Medical Institute

THE CONCEPT OF "HEALTH" IN UZBEK PROVERBS: A LINGUOCULTURAL INTERPRETATION

Abstract. *This article analyzes the linguistic representations of the "health" concept in Uzbek folk proverbs and its correlation with the national worldview and cultural values. In Uzbek oral tradition, the notion of health is interpreted not merely as a physical condition but as a concept reflecting mental, moral, and social well-being. The interrelation between health and such values as happiness, labor, honesty, and cleanliness is examined through the conceptual system of language. Based on methods of linguocultural and cognitive analysis, the research identifies the semantic layers of the "health" concept and its role in the national way of thinking.*

Keywords: *concept of health, Uzbek folk proverbs, linguoculture, national worldview, conceptual system of language, lexicographic analysis, folk wisdom.*

Introduction

In human thought, health has always been recognized as one of the highest values. The folk wisdom "Sog' tanda – sog'lom aql" ("A sound mind in a sound body") defines the moral and ethical foundation of every society. Folk oral creativity, especially proverbs, serves as one of the essential sources reflecting the worldview, philosophy of life, and value system of the people. In Uzbek folk proverbs, the concept of "sog'lik" (health) is manifested not only as a physical condition but also as a multifaceted concept denoting spiritual, social, and moral harmony.

Linguoculturology, one of the modern branches of linguistics, studies language in close connection with national culture and cognition. From this perspective, the concept of "sog'lik" in proverbs reveals the people's values related to a healthy lifestyle, diligence, honesty, purity, and goodness. This concept is expressed through stable semantic units in the language, embodying one of the key components of national cognition.

In today's era of globalization, when the notion of human health is being widely discussed as a universal value, analyzing the Uzbek people's national perceptions of "sog'lik" is of great significance not only for linguistics but also for cultural studies and psycholinguistics. The social, cultural, and moral meanings of health are revealed through the conceptual system embedded in language.

The relevance of this study lies in identifying the linguocultural, semantic, and lexicographic aspects of the "sog'lik" concept in Uzbek folk proverbs, exploring its linguistic means of expression, and revealing its place in national

cognition. Through this, the folk wisdom about health expressed in proverbs is interpreted according to modern linguoculturological principles.

Methodology

This article examines the features of expressing the concept of "sog'lik" in Uzbek proverbs and explores their linguocultural aspects. The methodological basis of the study relies on linguoculturological, cognitive, and paremiological analysis methods. For analysis, extensive collections of Uzbek folk proverbs and lexicographic sources were selected. The following criteria were taken into account when selecting the material:

Presence of lexical units such as "sog'lik", "salomatlik", "kasallik", "omonlik", "farovonlik";

Widespread usage and documentation in various publications;

The role of health-related units among registered proverbs in lexicographic sources.

The primary sources include "O'zbek xalq maqollari" (Tashkent: Fan, 1989) and "O'zbek tilining izohli lug'ati" (Tashkent: O'zbekiston Milliy Ensiklopediyasi, 2006–2008).

The theoretical foundation of the research is based on the concept of linguoculturology, according to which language serves as the primary mirror of a people's cognition, values, and worldview. Therefore, analyzing how the concept of "sog'lik" is represented in the cultural memory of the people holds particular importance. As L. Kiseleva notes, "The concept of health in human cognition has a complex structure, manifesting not only in physiological but also in moral and social value systems, and language serves as a reflection of these perceptions." Hence, this study aims to reveal how proverbs interpret health not merely as a physical state but as an expression of spiritual and moral harmony.

The lexical units related to "sog'lik" in proverbs were analyzed, and their semantic fields were identified. The research also drew upon the theory of "conceptual metaphor." According to this approach, the concept of health in folk cognition is represented through images such as "wealth", "treasure", "happiness", and "purity." For example, the proverbs "Sog'liging – boyliging" and "Pokliging – sog'liging" vividly illustrate such conceptual metaphors.

Results and Discussion

Analyzing proverbs as one of the oldest forms of folk wisdom within the framework of paremiology is highly relevant today. Through this method, the concept of health can be studied as a socio-moral symbol formed in the people's consciousness. Folklorists emphasize that "proverbs express folk understandings of medical knowledge and health in figurative form." In this sense, proverbs can be regarded as ancient linguocultural documents reflecting the people's notions of a healthy life.

Ludmila Kiseleva, analyzing the cultural differences in the concept of health across Russian and English languages, concludes that "every language interprets health through the prism of its own cultural experience and values." This idea finds confirmation in the analysis of Uzbek proverbs as well.

The collected proverbs on “sog‘lik” were grouped thematically, including categories such as “health and wealth”, “health and labor”, “health and happiness”, and “health and purity.” Examples include:

“Tani sog‘lik – tuman boylik,” “Xalq sog‘ligi – yurt boyligi,” “Tani sog‘ning joni bor”;

“Tozalik – sog‘lik garovi,” “Sog‘ yuray desang, ozoda bo‘l!” “Oq bo‘lmasa bo‘lmasin, pok bo‘lsin.”

The study focuses exclusively on Uzbek folk proverbs, excluding other oral genres such as songs, legends, and riddles. Comparative analysis with other languages was conducted only at a general level. In future research, exploring the concept of health across different genres and languages remains a promising direction.

Semantic Field of the Health Concept

1.1. Health and Laughter: “Kulgi – shifo, dardga da’vo,” “Kulgi – sog‘likdan nishon.”

1.2. Moderate Lifestyle and Health: “Oz yemoq – tani sog‘liq, oz demoq – hikmatga bog‘liq,” “Oz demoq – hikmatga lozim, oz yemoq – sihatga lozim.”

1.3. Cleanliness and Health: “Tozalik – sog‘lik garovi,” “Sog‘ yuray desang, ozoda bo‘l!” “Oq bo‘lmasa bo‘lmasin, pok bo‘lsin,” “Janda bo‘lsa bo‘lsin, ganda bo‘lmasin.”

1.4. Healthy Lifestyle and Prudence: “Sog‘likka shoshil, soqqlikka shoshilma,” “Saqlansang, sog‘ qolarsan,” “Saqalangan – sog‘lom bo‘lar.”

1.5. Health as Wealth and Source of Life: “Tani sog‘lik – tuman boylik,” “Xalq sog‘ligi – yurt boyligi,” “Sog‘liging – boyliging,” “Kimxob to‘ning bo‘lguncha, oltin boshing omon bo‘lsin,” “Sog‘lik bo‘lsa, beklik bo‘lar,” “Tani sog‘ning – joni bor,” “Tan salomati – jon rohati,” “Sog‘ yurak – tog‘ yurak,” “Tani sog‘ga – kunda to‘y,” “Sog‘ odamga Suqrotning keragi yo‘q,” “Sog‘ligim – boyligim, hastaligim – manglay qoraligim.”

1.6. Health, Labor, and Active Life: “Sog‘ qush donin topib yer, sog‘ er nonin topib yer,” “Sovliq to‘yda kerak, sog‘liq kunda kerak,” “Tegara-toshing yov bo‘lsin, uying ichi sov (sog‘) bo‘lsin,” “Sog‘ bo‘lsin, o‘chog‘idan o‘t bermasin.”

1.7. Humanism and Mental Well-being: “Dushmaning bo‘lsa ham, dard ko‘rmasin,” “Och bo‘l, yalang‘och bo‘l, sog‘-u salomat bo‘l,” “Mol ketsin, pul ketsin, eson-sog‘likka ne yetsin?!” “Moling ketsa – ketsin, joning ketmasin,” “Molga balomat, boshga salomat,” “Molingga achinma, joningga achin.”

1.8. Illness, Pain, and Life Trials: “Kasalning yaxshi-yomoni yo‘q,” “Og‘riqda ko‘z og‘rig‘i yomon, har kimning o‘z og‘rig‘i yomon,” “Tan og‘risa, jon sezar,” “Og‘riq qayerda bo‘lsa, jon o‘sha yerda,” “Dard kelar-u, dard ketar, jon qadrini anglatar,” “Joni og‘rigan – Tangrisin qarg‘ar,” “Dard filni pashshadek qiladi,” “So‘ngan ko‘zga sulton ko‘rinmas,” “Kun ko‘rayin desang, sihating saqla!”

The findings demonstrate that the concept of “sog‘lik” in Uzbek proverbs forms a multilayered semantic system. Within this system, health emerges not

only as a physiological state but also as a cultural, ethical, spiritual, and social value.

Proverbs such as “Tani sog‘lik – tuman boylik” and “Sog‘liging – boyliging” show that health is regarded as superior to material wealth. Here, the concept of health is metaphorically represented as “capital” or “treasure”, encoded in the people’s consciousness as the highest value. This corresponds with A. Dundes’s theory describing folklore as a “cultural mechanism encoding values” (Dundes, 2010).

Proverbs like “Tozalik – sog‘lik garovi” and “Sog‘ yuray desang, ozoda bo‘l” equate health with purity, revealing that the Uzbek people perceive well-being as harmony between bodily and spiritual cleanliness. This aligns with Kiseleva’s (2016) concept of a “linguocultural health model,” where health is viewed as a cultural norm rather than merely a physical state.

Similarly, “Sog‘ odamga Suqrotning keragi yo‘q” and “Sog‘ yurak – tog‘ yurak” associate health with intellect, courage, and diligence. Thus, in Uzbek oral tradition, the concept of health integrates physical strength with moral and intellectual power, reflecting the national paradigm “a sound body – a sound soul.”

The proverb “Dushmaning bo‘lsa ham, dard ko‘rmasin” expresses health as a symbol of compassion and human solidarity, linking it with empathy and goodness in society.

In many proverbs, the concept of health appears in advisory form: “Kun ko‘rayin desang, sihating saqla,” “Saqlansang, sog‘ qolarsan.” Through these expressions, the people convey traditional notions of medical prevention, hygiene, and healthy lifestyle practices orally from generation to generation.

Overall, the concept of “sog‘lik” in Uzbek folk proverbs is semantically multilayered, linguoculturally complex, and axiologically central. It unites physical health, spiritual balance, moral purity, and social well-being within a single conceptual framework.

Conclusion

The study results show that the “sog‘lik” concept in Uzbek proverbs represents one of the most ancient and value-based layers of folk cognition. In the worldview of the Uzbek people, health is interpreted not only as a biological or physiological state but also as a symbol of moral, spiritual, and social stability.

Based on the analysis, the main semantic dimensions of the “sog‘lik” concept in folk proverbs can be summarized as follows:

Axiological layer – health as the supreme value of life, wealth, and happiness (“Sog‘liging – boyliging”).

Moral-spiritual layer – health associated with purity, honesty, and diligence (“Tozalik – sog‘lik garovi”).

Socio-psychological layer – health as a symbol of human unity, compassion, and kindness (“Dushmaning bo‘lsa ham, dard ko‘rmasin”).

Didactic layer – proverbs serve as moral instruction transmitting ideas of hygiene and healthy lifestyle (“Kun ko‘rayin desang, sihating saqla”).

The findings confirm that “sog‘lik” functions as a central semantic and cultural value in Uzbek national cognition. Through language, this concept encodes the people’s understanding of well-being, happiness, cleanliness, and goodness. From a linguocultural perspective, the concept of health in Uzbek culture is grounded in the idea “tan salomatligi – jon osoyishtaligi” (“bodily health means spiritual peace”), reflecting the holistic nature of national thought.

Lexicographic analysis further demonstrates that health-related expressions are active and semantically rich components of the Uzbek linguistic system. Therefore, in Uzbek proverbs, “sog‘lik” appears as a universal yet nationally infused value, encoding cultural codes, principles of harmony between individual and society, and the philosophy of a healthy life.

The practical significance of this study lies in the fact that analyzing the concept of “sog‘lik” in Uzbek proverbs allows for a comprehensive understanding of the people’s integrated cultural system, encompassing medical, ethical, and moral values. This approach opens new methodological perspectives for modern linguistics, sociolinguistics, and cognitive linguistics.

References:

1. Kiseleva, L. (2016). Linguoculturological Analysis of the Concept of “Health.” Mediterranean Journal of Social Sciences, 7(3 S1), 291–298. https://www.richtmann.org/journal/index.php/mjss/article/view/9113
2. Dundes, A. (2010). Proverbs and Medicine: The Problem of Applied Folklore. Folklore: Electronic Journal of Folklore, 46, 111–124. https://www.folklore.ee/folklore/vol46/fialkova.pdf
3. O‘zbek xalq maqollari. (1989). – Toshkent: G‘.G‘ulom nomidagi Adabiyot va san’at nashriyoti.
4. O‘zbek tilining izohli lug‘ati. (2006–2008). – Toshkent: O‘zbekiston Milliy ensiklopediyasi nashriyoti.
5. Bozorov Z.A International scientific and practical conference “Modern psychology and pedagogy: problems and solutions” “Imperial College London” 2021-2022. 165-169 б.
6. Bozorov Z.A. Essence, structure and functions of civil culture. International engineering journal for research & development. Published in Volume 6 Special Issue , January 2021 of IEJRD E-ISSN: 2349-0721 , Peer Reviewed & Referred Journal.
7. Bozorova G. Formation of abbreviations in medical terminology in uzbek language //Центральноазиатский журнал образования и инноваций. – 2024. – Т. 3. – №. 3. – С. 86-89.
8. Samandarova G. Y. Fundamentals of folk proverbs formed on the basis of the lexical-spiritual group of insects. Current research journal of philological sciences, 2 (05), 39–42. – 2021.
9. Samandarova , G. Y. (2023). Basis of the lexical sentence group "insect" in the form of a compound sentence. International scientific conference " innovative trends in science, practice and education", 2(4), 59–67. Retrieved from http://academicsresearch.ru/index.php/iscitspe/article/view/1493

10. Bozorov Z. A. "Exceptional role of motives and needs within the formation process of civic culture in students' community." Journal of Advanced Zoology 44 (2023): 3236-3244. https://jazindia.com/index.php/jaz/article/view/1595
11. Samandarova G.Y., Yusupova A.Sh. Specific characteristics of paremas formed on the basis of "Insect" LMG in a simple sentences // Best journal of innovation in science, research and development. Volume 2 No 6 (Jun 2023). ISSN: 2835-3579 .(Impact factor: SJIF=9.1)
12. Samandarova G.Y. Sodda gap ko'rinishidagi "hasharot" lug'aviy ma'no guruhlari asosida shakllangan paremalarning o'ziga xos xususiyatlari // Scientific reports of Bukhara state university. 2023/1 (84). –B. 161-165.

Buriyev S. B.
physics teacher
Shakhrisabz Military Academic Lyceum "Temurbeklar maktabi", Emergency Situations of the Republic of Uzbekistan
Kayumov Kh. A.
physics teacher
Shakhrisabz Military Academic Lyceum "Temurbeklar maktabi", Emergency Situations of the Republic of Uzbekistan
Kashkadarya, Uzbekistan

METHODOLOGY OF USING SECOND-ORDER DIFFERENTIAL EQUATIONS IN SOLVING PHYSICS PROBLEMS

Annotation: *This article presents a methodology for using second-order homogeneous differential equations in solving physics problems. Physical problems related to mechanics, mechanical vibrations, and electrodynamics are modeled on the basis of differential equations, and the stages of expressing physical processes in the form of equations, as well as methods for finding general and particular solutions, are explained.*

Key words: *differential equation, characteristic equation, quadratic equation, derivative, stiffness, resistance force, Kirchhoff law, electromotive force, electric circuit.*

Introduction

In many branches of modern physics, physical processes are analyzed through mathematical modeling. Second-order differential equations are widely used in mathematical modeling. For example, second-order differential equations play an important role in studying the motion of bodies, understanding processes in electrical circuits, analyzing mechanical and electromagnetic vibrations, and constructing heat dissipation equations. The application of second-order differential equations remains essential in engineering, aerodynamics, microelectronics, and other technological fields, as well as in better understanding processes in nature and achieving new scientific advancements.

A differential equation is an equation that consists of a relationship between an independent variable, an unknown function, and the derivatives of that function:

$$F(x, y, y', y'', ..., y^{(n)}) = 0 \qquad (1)$$

Here, $F(x)$ is a continuous function of its arguments in the domain under consideration. If the equation has the following structure, it is called a second-order, linear, homogeneous differential equation with constant coefficients:

$$y''+ay'+by = 0 \qquad (1)'$$

Here, *a* and *b* are constant coefficients, and *y=y(x)* is a continuous function of its arguments in the domain under consideration. Methods for solving this equation are presented in the literature [1].

In this article, the application of second-order homogeneous differential equations to solving physics problems, the explanation of methods for solving them, and the clarification of their theoretical and practical significance are aimed. Below, we examine examples related to this topic.

Problem 1.

A load with a mass of 5 kg is suspended from a spring with stiffness 500 N/m and oscillates with an amplitude of 5 cm. Ignoring the mass of the spring and air resistance, determine the equations of displacement, velocity, and acceleration of the load.

Solution: The forces acting on the load are shown in figure 1. Under the influence of the load's weight, the spring stretches by x_0. In that case, $mg=kx_0$. Now, we pull the load slightly and release it. If the spring is stretched by Δl relative to its initial position when pulled, then according to Newton's second law, the equation of motion is as follows:

$$ma = mg - k\Delta l \qquad (2)$$

Using the equation $mg=ky_0$ above, equation (2) can be rewritten as follows:

$$ma = ky_0 - k\Delta l \qquad (3)$$

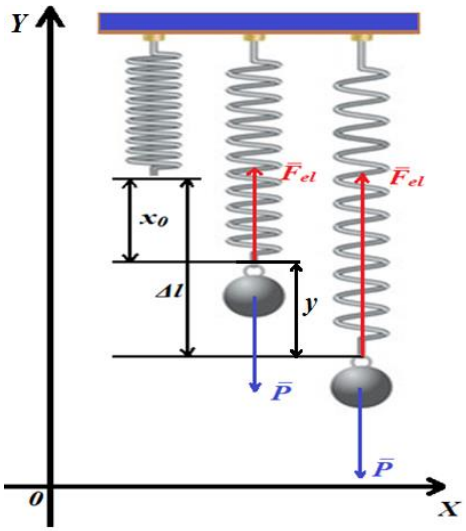


Fig1.Vertical vibration of the body

As can be seen from Fig.1, the coordinate of the load changes along the *Y*-axis. Therefore, the acceleration is the second derivative of the coordinate with respect to time, that is,. $a = \frac{d^2y}{dt^2} = \ddot{y}$. Substituting this expression into equation (3), we obtain the following:

$$m\frac{d^2y}{dt^2} = -k(\Delta l - y_0) \qquad (4)$$

The elongation *Δl* of the spring changes over time. Therefore, the coordinate of the load also changes with time. In equation (4), we set $\Delta l - y_0 = y$ and this will be the coordinate of the load. Using the above relations, we obtain the following differential equation: $m\frac{d^2y}{dt^2} = -ky$

$$m\frac{d^2y}{dt^2} = -ky$$

$$m\frac{d^2y}{dt^2} + ky = 0$$

$$\frac{d^2y}{dt^2} + \frac{k}{m}y = 0$$

$$\ddot{y} + \omega^2 y = 0 \qquad (5)$$

Here, $\omega^2 = \frac{k}{m}$. The characteristic equation for differential equation (5) has the following form:

$$k^2 + \omega^2 = 0 \qquad (6)$$

The solution of this quadratic equation is $k_{1,2} = \pm\omega \cdot i$. Thus, the general solution of equation (5) is:

$$y = C_1 e^{\omega t} \cdot \cos\omega t + C_2 e^{\omega t} \cdot \sin\omega t \qquad (7)$$

Here, C_1 and C_2 are constant coefficients [2]. In the initial state of the body, its coordinate equals A, that is, when $t=0$ da $y=A$. For this particular case:

$$A = C_1 e^{\omega \cdot 0} \cdot \cos\omega \cdot 0 + C_2 e^{\omega \cdot 0} \cdot \sin\omega \cdot 0$$

Thus, $C_1=A$. The body is initially at rest, meaning when $t=0$, $v=0$. The first derivative of the coordinate with respect to time is the velocity. Therefore, we differentiate equation (7) with respect to time and substitute t $t=0$, $v=0$ to find C_2.

$$0 = -C_1\omega \cdot e^{\omega \cdot 0} \cdot \sin\omega \cdot 0 + C_2\omega \cdot e^{\omega \cdot 0} \cdot \cos\omega \cdot 0$$

From this equation, it follows that $C_2=0$. Substituting the obtainned values of C_1 and C_2 into equation (7), we get:

$$y = A \cdot \sin\omega t = 0{,}05\sin 10t \qquad (8)$$

From equation (8), the first derivative gives the velocity and the second derivative gives the acceleration of the body:

$$\begin{cases} v = \dfrac{dy}{dt} = \omega A\cos\omega t = 0{,}5\cos 10t \\ a = \dfrac{d^2y}{dt^2} = -\omega^2 A\sin\omega t = -5\sin 10t \end{cases} \qquad (8)'$$

Problem 2.

A car with a mass of $m=1{,}5$ tons is moving with a uniform velocity of $v=20$ *m/s*. Suddenly, the engine stops working, and the car continues moving due to its inertia. If the air resistance coefficient acting on the car is $b = 3$ *kg/s*, determine its acceleration after $t = 5$ seconds.

Solution: Let us take the point where the engine stops as the origin of coordinates (Fig.2). Since the driving force of the car becomes zero, it undergoes uniformly decelerated motion under the action of the resistance force $f=-bv$. According to Newton's second law, the net force acting on the car produces acceleration:

$ma=-bv$ (9)

Here, the negative sign indicates that the resistance force is directed opposite to the velocity of the car.

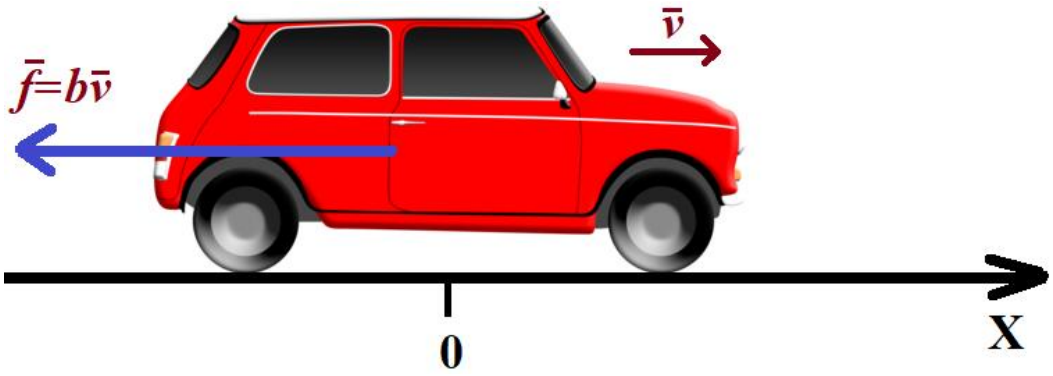


Fig2. A car moving under the effect of resistance force

The first-order derivative of the car's coordinate equation with respect to time gives its velocity, and the second-order derivative gives its acceleration, that is:

$$\begin{cases} v=\dfrac{dx}{dt} \\ a=\dfrac{d^2x}{dt^2} \end{cases} \quad (10)$$

Using equations (9) and (10), we can formulate the following second-order differential equation for the motion of the vehicle:

$$ma+bv=0$$

$$m\frac{d^2x}{dt^2}+b\frac{dx}{dt}=0$$

$$\frac{d^2x}{dt^2}+\frac{b}{m}\cdot\frac{dx}{dt}=0$$

$$\ddot{x}+\frac{b}{m}\dot{x}=0 \quad (11)$$

The characteristic equation for this differential equation takes the form:

$$k^2+\frac{b}{m}k=0 \quad (12)$$

The solution of this quadratic equation is $k_1=0$, $k_2=-b/m=-2\cdot10^{-3}$ *1/s* Thus, the general solution of equation (12) can be expressed as:

$$x=C_1e^{k_1t}+C_2e^{k_2t}=C_1+C_2e^{-\frac{b}{m}t} \quad (13)$$

Here, C_1 and C_2 are constant coefficients, which are determined using the following conditions: at the start of observation ($t=0$), the vehicle is at the origin ($x=0$) and its velocity is at the maximum value ($v=20$ *m/s*).

$$\begin{cases} t=0 \Rightarrow x=0 \Rightarrow C_1 + C_2 \cdot e^{-2\cdot10^{-3}\cdot0} = 0 \Rightarrow C_1 = -C_2 \\ t=0 \Rightarrow v=50 \Rightarrow v = \dfrac{dx}{dt} = -\dfrac{b}{m} \cdot C_2 \cdot e^{-\frac{b}{m}t} \Rightarrow 50 = -2\cdot10^{-3} \cdot C_2 \cdot e^{-2\cdot10^{-3}\cdot0} \\ C_2 = -25\cdot10^3 m;\ C_1 = 25\cdot10^3 m \end{cases} \quad (14)$$

From equation (14), the time dependence of the vehicle's coordinate can be expressed as:

$$x = 25\cdot10^3 - 25\cdot10^3 e^{-2\cdot10^{-3}t} \quad (15)$$

To determine the acceleration of the body, we take the second derivative of the coordinate equation (15):

$$a = \frac{d^2x}{dt^2} = C_2 \cdot \left(\frac{b}{m}\right)^2 \cdot e^{-\frac{b}{m}t}\Big|_{t=5} = -25\cdot10^3 \cdot 4\cdot10^{-6} \cdot e^{-2\cdot10^{-3}\cdot5} = -0{,}1\ m/s^2.$$

Problem 3.

An electric circuit consists of the electromotive force *E=5 V*, the resistor with an active resistance of *R=20 Ω*, the capacitor with capacitance of *100 μF*, and the coil with inductance *of 25 mH* (Fig. 3). Find the equation for the current as a function of time after the switch is closed and determine the current at *t=0.25* seconds.

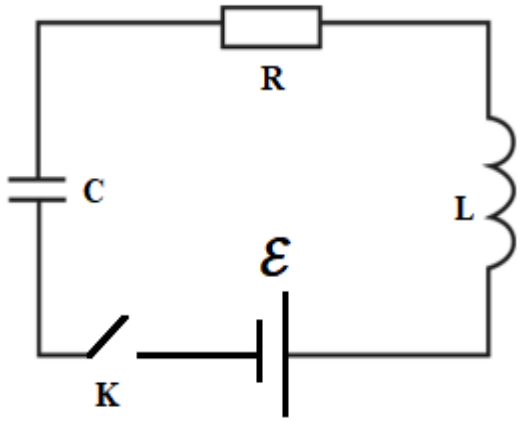


Fig3. A series-connected E, R, L, C electric circuit.

Solution: According to Kirchhoff's second law, the sum of the voltages across the resistor, capacitor, and inductor is equal to the electromotive force E:

$$\mathrm{E} = U_R + U_C + U_L \quad (16)$$

Here, $U_R = I\cdot R$, $U_C = \frac{q}{C} = \frac{I}{C}dt$, $U_L = L\frac{dI}{dt}$

Using these relationships, we can formulate the following equation:

$$\mathrm{E} = IR + \frac{I}{C}dt + L\frac{dI}{dt} \quad (17)$$

Taking the derivative of both sides of equation (17) with respect to time gives a second-order homogeneous differential equation for the current:

$$\frac{d^2I}{dt^2} + \frac{R}{L}\frac{dI}{dt} + \frac{1}{LC}I = 0 \quad (18)$$

The characteristic equation of the differential equation (18) takes the form:

$$k^2 + \frac{R}{L}k + \frac{1}{LC} = 0 \qquad (19)$$

The roots $k_{1,2} = -\frac{R}{2L} \pm \sqrt{\left(\frac{R}{2L}\right)^2 - \frac{1}{LC}} = -400 \pm 489i$ of this quadratic equation are complex numbers [3]. In this case, the general solution of equation (18) can be written as:

$$I = e^{-\frac{R}{2L}t}\left(C_1 \cos \omega t + C_2 \sin \omega t\right) \qquad (20)$$

Here $\omega = \sqrt{\frac{1}{LC} - \left(\frac{R}{2L}\right)^2}$, C_1 and C_2 are constant coefficients to be determined using the initial conditions. At the moment the switch is closed ($t=0$), $I=0$ and $L\frac{dI}{dt}\Big|_{t=0} = E$ Using these conditions, the coefficients C_1 and C_2 can be found:

$$\begin{cases} t = 0, I = 0 \Rightarrow\ e^{-\frac{R}{2L}0}\left(C_1 \cos \omega \cdot 0 + C_2 \sin \omega \cdot 0\right) = 0 \Rightarrow C_1 = 0 \\ t = 0,\ \frac{dI}{dt} = 0 \Rightarrow e^{-\frac{R}{2L}0}\left[-\frac{R}{2L}\left(C_1 \cos \omega t + C_2 \sin \omega t\right) + \omega\left(-C_1 \sin \omega t + C_2 \cos \omega t\right)\right] = 0 \Rightarrow C_2 = \frac{E}{\omega L} \end{cases} \qquad (21)$$

Using the determined coefficients C_1 and C_2 equation (20) can be written in the following form:

$$I = e^{-\frac{R}{2L}t} \cdot \frac{E}{\omega L} \sin \omega t \qquad (22)$$

the value of the current at $t=0.25$ seconds is $I = e^{-400 \cdot 0{,}25} \cdot \frac{5}{489 \cdot 25 \cdot 10^3} \sin 489 \cdot 0{,}25 \approx 5\,A$.

Conclusion

Final analyses show that modeling physical processes using second-order differential equations allows for a deeper understanding of their nature. The examples from mechanics, mechanical vibrations, and electrodynamics confirm that translating physical phenomena into mathematical form, analyzing them, and obtaining precise solutions is a convenient and effective method. This approach not only helps students reinforce theoretical concepts but also develops systematic and logical problem-solving skills in physics. Furthermore, it highlights the role and significance of differential equations in physics and demonstrates the efficiency of applying them in practice.

References

1. R.Turgunbayev, Sh. Ismailov. O. Abdullayev. Differensial tenglamalar kursidan misol va masalalar to'plami / Toshkent, TDPU, 2007 y.
2. Филиппов А. Ф. Сборник задач по дифференциальным уравнениям. Ижевск: НИЦ «Регулярная и хаотическая динамика», 2000
3. Гутер Р.С., Янпольский А.Р Дифференциальные уравнения. Высшая Школа. 1976.

DOI 10.24412/2225-1545-2025-12-2139-142-146

Davronova Sh. R.
associated professor
department of Histology, cytology and embriology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0000-0002-1542-5453

CONTEMPORARY THEORIES ON THE ROLE OF THE THYMUS IN IMMUNE SYSTEM DEVELOPMENT

Abstract*: The thymus is the central organ of T-lymphocytopoiesis, where the formation of T-lymphocyte progenitor cells occurs alongside the synthesis of a number of thymic hormones. This gland plays a pivotal role in establishing and maintaining immune homeostasis. Under the influence of environmental factors, particularly fluctuations in temperature, the thymus undergoes pronounced structural and functional rearrangements. These changes demonstrate a cyclic character, within which three main phases can be distinguished: an initial or early response, a peak stage, and a late or distant phase. Each stage exhibits specific ultrastructural features, reflecting the adaptive potential of stromal and lymphoid elements. Early changes are generally manifested by activation of the secretory and synthetic machinery of stromal cells, while peak changes involve intensified cellular interactions, apoptotic processes, and remodeling of the thymic microenvironment. The distant stage is characterized by stabilization or compensatory modifications that ensure continuity of T-cell maturation. Such cyclic patterns of thymic adaptation highlight its sensitivity to temperature stress and underline its critical role in orchestrating immune responses.*

Key words: *Thymus, T-lymphocyte, B-lymphocyte, macrophage.*

Introduction

The thymus is the central organ of T–lymphocytopoiesis, in which antigen-independent differentiation into T-lymphocytes occurs from bone marrow precursors of T-lymphocytes, effector cells of which carry out the reaction of cellular immunity and regulate humoral immunity. A more intensive study of the thymus began with the classical experiments of Y.Miller (I961), who proved its dominant place in the formation of the immune system and in immune reactions and with the development of electron microscopy.

The human thymus is located in the anterior mediastinum, behind the sternum. The organ with the anterior surface is in contact with the sternum and behind the aortic arch. The capsule of the organ consists of loose connective tissue with numerous hemocapillaries. The capsule of the organ is covered with fatty tissue from above in places. Lymph nodes are localized in the surface of the thymus capsule. It should be noted that the elements of the thymus capsule not

only restrict it from nearby structures, but also participates in the fixation of the organ to the bone skeleton of the sternum and blood vessels.

It has been established that the thymus as an organ is first detected in cartilaginous fish, they also show a reaction of T-lymphocytes to mitogens. In shark fish, the thymus has lobules and cortical and cerebral zones are well expressed in them. The thymus is more perfect in birds, in which it, together with the Fabricius bag, provides immune reactivity. Foci of myeloid hematopoiesis are also found in the embryonic thymus. Later, at 8-9 weeks, stroma epithelial cells differentiate into interdigitating reticular cells responsible for creating a microenvironment for differentiating lymphocytes.

Material and methods of research

The experiments were carried out on white sexually mature mongrel male rats with an initial weight of 150-170 grams, who were on a normal laboratory diet. All experimental animals were obtained from the same vivarium, the age of the animals, their weight and other indicators were in the same conditions.

The following methods of morphological analysis were used in the experiment:

- method of light-optical morphology;
- radioautographic method;
-morphometric method

For light-optical studies, the materials were fixed in 12% formalin, in Buena liquid. Pieces of organs were poured into paraffin after appropriate treatment. Dewaxed sections 5-7 microns thick were stained with hematoxylin-eosin according to the generally accepted method. Cell composition was calculated in 3 structural zones of thymic lobules-cortical, cortical-medullary and medullary zones.

Research results and their discussion

The capsule consists of a dense network of reticular and collagen fibers. Each lobule of the gland consists of three separate layers that provide the necessary microenvironment for the maturation and formation of lymphocytes. It is known that the cortical zone has two layers: the outer subcapsular and the inner cortical. Primitive dividing cells (lymphoblasts) are found in the outer subcapsular layer. It is generally believed that they are formed from stem cells of the red bone marrow under the influence of the hormone thymosin[1,2].

The capsule of the thymus and the connective tissue of the interlobular septa contain blood, lymphatic vessels, nerve fibers. From the connective tissue, blood vessels enter the thymus lobule. In the cortical zone, capillaries form loops, go to the cortical-medullary zones and gather into venules. The cortico-medullary zone is the richest in blood vessels. Then the corticomedullary venules, together with the medullary venules, leave the thymus. Hemocapillaries of the cortical zone of the thymus lobes are surrounded by relatively densely located epithelial cells, the latter themselves are involved in the formation of a hematothymic barrier that protects differentiating thymocytes of this zone from various antigens traveling through the bloodstream [2,3].

Lymphoid cells of the outer part of the cortical zone are mainly represented by densely located lymphoblasts. Their diameter is about 7-8 microns, they contain a rounded nucleus with nucleoli. Quite often, cells are detected at various stages of mitotic division.In the inner part of the cortical zone, lymphocytes are located less frequently compared to the outer part[3,4,5,6]. Lymphocytes of this zone are smaller in diameter, contain a small number of intracellular organelles-free ribosomes, mitochondria, tubules of the granular endoplasmic network [7,8].

The cortical zone of the thymus under normal physiological conditions has a smaller number of macrophages. Macrophages are more common in the corticomedullary zone. Their shape is irregular, which is associated with a large number of protrusions and depressions of the plasmolemma. The cytoplasm of cells is filled with numerous lysosomes and large phagosomes. In the phagosomes of macrophages, the decay products of differentiating lymphocytes are often found.In individual cells , their cytoplasm is filled with lysosomes at various stages of decay [2,3,4].

Epithelial cells of various structural and functional zones of the thymus are heterogeneous in their morphological features. Cortical epithelial cells are mainly stellate in shape. Their intracellular organelles are represented by numerous free ribosomes, polysomes, evenly distributed, and a moderate number of mitochondria.

In the brain area, epithelial cells significantly differ in shape and number. The work of Hwang et al., (1974) found that the number of epithelial cells in the brain zone significantly increases with age in rats. So, if in the outer cortical zone of the thymus of adult rats lymphoblasts make up 62%, lymphocytes-26%, epithelial cells-12%, in the cerebral zone the proportion of epithelial cells is 7 times greater (86.3%) [1,2,3].

It was found that the epithelial tissue stroma of the thymus is represented by cells of various shapes and submicroscopic organization, "Interdigitating" reticular cells (IDCs) are one of the mandatory components of immune reactions. Cells similar in structure are also found in T-dependent zones of peripheral organs of the immune system. One of the obligatory ultrastructural signs of them is the presence of special Birbeck granules in them. IDCs are especially more common in the cortical-medullary and cerebral zones of the thymus. Unlike typical macrophages, they exhibit low phagocytic activity. There are Ia antigens and receptors on the surface of the IDC. Duijvestijn et al. (1983), isolating from the suspension of the thymus, distinguish three types of IDCs, differing in their ultrastructural and immunocytochemical parameters:

– Type I cells are characterized by the content of acid phosphatase in small granules, the plasmolemma gives a positive reaction to the Ia-antigen;

– Type II IDCs have large sizes, light cytoplasm with an abundant number of Birbeck granules. Granules with acid phosphatase activity of these cells are mainly localized near the nucleus.

– Type III cells have acid phosphatase and endogenous peroxidase activity, contain numerous vacuoles and phagosomes. They lack Ia-antigens. Cells of this type are similar in their properties to cortical macrophages [9,10].

One of the specific markers of interdigitating cells is protein-100.

Due to the presence of this protein, they differ sharply from the macrophages of the thymus.

Thanks to recent studies, the genesis of interdigitating thymus cells has been established. It turned out that the interdigitating cells are descendants of the monocyte line of the bone marrow stem cell and belong to the system of phagocytic mononuclears.

In addition to epithelial cells, macrophages and IDUs, the cells of the thymus microenvironment include mast cells, granulocytes and plasma cells. These cells under normal physiological conditions are localized in the connective tissue of the organ capsule, in the interlobular septa and perivascular spaces of the cortical zone.

Mast cells are of particular importance in immunogenesis among these cells. A huge number of studies and publications are devoted to them. A common type of cellular elements of the thymus are mast cells. They are located mainly in the connective tissue stroma, are often found near blood vessels, and are also diffusely scattered in the capsule and interlobular septa. Among the mast cells identified by many researchers in the thymus stroma, there are both degranulating and non-degranulating forms. Non-granulating cells are visualized as large, with a high density of granules masking the nucleus. Among the degranulating mast cells, cells with a weak (I degree) degree of degranulation predominate. Mast cells are multifunctional connective tissue cells. The variety of their granules make them participants in many physiological and pathological processes occurring in the body [11,12]. These are immunogenesis, formation and differentiation of connective tissue, carcinogenesis, allergic conditions and other conditions.

Thus, the thymus, having in its composition lymphoid elements and cells of the thymic microenvironment, having morphological features and, apparently, have functional differences, which together create conditions for the differentiation of T-lymphocytes, providing the functions of cellular immunity and the regulation of humoral immunity.

Conclusions:

1. The thymus of control white rats has a lobular structure, the specific weight of connective tissue in the thymus is not large-3%. The most acceptable is the difference in the chemical lobules of the cortical, cortical-medullary and medullary zones, where T-lymphocytopoiesis and stroma cells have certain specific features.

2. In the cortical zones, lymphoblasts, large and medium lymphocytes, dendritic cells are more concentrated, in medullary – interdigitating cells, small lymphocytes. The cellular composition of the cortico-medullary zone has an intermediate position. Macrophages and monocyte-like cells are mainly a cellular component of the cortical and corticomedullary zones of the thymus.

Literature:

1. Kvaratskhelia A. G., Klochkova S. V., Nikityuk D. B., Alekseeva N. T. Morphological characteristics of the thymus and spleen under the influence of factors of various origins // Journal of Anatomy and Histopathology. – 2016. – Vol. 5, № 3. – P. 79–83.
2. Kharibova E., Davronov R., D. Sh. Ultrastructural features of the white thymus stromal cells // The Scientific Heritage. – 2021. – № 79–2. – P. 29–30.
3. Akhmatova G.R. Efficiency of PDT in severe cervical dysplasia // ACADEMICIA: An International Multidisciplinary Research Journal. – 2021. – Vol. 11, № 3. – P. 2566–2568.
4. Davronov R. D., Davronova S. R. Modern views on the participation of the thymus in the processes of immunogenesis // Scientific Progress. – 2022. – No. 1. – P. 45–49.
5. Trufakin V. A., Shurlygina A. V. Problems of histophysiology of the immune system // Immunology. – 2002. – № 1. – P. 4–8.
6. Khaitov R. M., Pinegin B. V. Immunomodulators: mechanism of action and clinical application // Immunology. – 2003. – № 4. – P. 196–202.
7. Zufarov K. A., Tukhtaev K. R., Davronov R. A. Ultrastructural changes in the cells of the white pulp of the spleen in experimental salmonella infection // Arkhiv anatomii. – 1986. – Vol. 91, № 12. – P. 69–71.
8. Abdurakhmanov M. M., Inoyatov A. S. Avicenna: The revival of medicine and science // Abu Ali ibn Sina (Avicenna) and modern medicine. – Tashkent, 2019. – P. 7–10.
9. Davronov R. D., Davronova S. R. Structural and functional features of adaptive changes in the organs of the immune system under antigenic influence // Morphology. – 2008. – Vol. 133, № 2. – P. 38c–38c.
10. Davronova S. R., Davronov R. D., Bakhronov J. B. Structural and functional features of immune system cells in the dynamics of experimental temperature exposure // BIO Web of Conferences. – 2024. – Vol. 121. – Art. 03017.
11. Dubossarskaya Z. M., Dubossarskaya Yu. A. The main issues of reproduction immunology // Medical aspects of women's health. – 2010. – Vol. 31, № 4. – P. 15–21.
12. Oripova N. A. Immunological function of intestinal microflora, morphological features, its disorders and correction possibilities // Scholastic: Journal of Natural and Medical Education. – 2023. – Vol. 2, № 2. – P. 132–140.

UDC: 618.11

Dilmurodov D. U.
assistant
department of normal physiology
Bukhara State Medical Institute named after Abu Ali ibn Sina
Uzbekistan
https://orcid.org/0009-0005-5588-4119

PRACTICAL RECOMMENDATIONS FOR DISEASES OF THE BARTHOLIN'S GLAND

Abstract: *This article is based on the national standard for the treatment of gynecological diseases of the Ministry of health of the Republic of Uzbekistan, which mainly lists recommendations for the diagnosis and treatment of Bartholin's gland cysts and abscesses. Because Bartholin's gland diseases bacha account for 2% of gynecological visits and are more common precisely at reproductive age. Bartholin's gland abscess is approximately three times more common than Bartholin's gland cyst.*

Keywords: *Bartholin's gland cyst, Bartholin's gland abscess, pregnancy, marsupialization, hyperemia, tissue edema.*

Introduction

A Bartholin's gland cyst is a derivative (a benign tumor) that forms unilaterally or rarely bilaterally in the lower third of the vaginal corridor, which develops as a result of a violation of the secretion flow from the Bartholin's gland. Bartholin's gland abscess is a purulent inflammation of the Bartholin's gland of microbial origin.

Etiology and pathogenesis. A Bartholin's gland cyst (BGC) is caused by a blockage, secondary swelling, or injury of the Bartholin's gland's excretory tract due to secreted accumulation. When the cyst is infected, an abscess (BGA) of the Bartholin gland, which is often polymicrobic in nature, can form. The triggers of the infection often enter the gland during inflammatory processes, moving up the vagina or urethra, as well as through the intestinal excretory tract.

Epidemiology Bartholin's gland disorders. (Bartholin's gland cyst, Bartholin's gland abscess) are often diagnosed in women of reproductive age. The incidence of Bartholin's gland cyst and Bartholin's gland abscess is 2% of all gynecological visits per year. Bartholin's gland abscess is approximately three times more common than Bartholin's gland cyst.

Clinical picture Bartholin's gland cyst and Bartholin's gland abscess can be accompanied by the following symptoms: pain in the space space of the clock; glaze; local (local) hyperemia and hyperthermia; fever or tremor; feeling of discomfort in the space space of the clock; big sex lips asymmetry. BGC can also be symptom-free.

Diagnostics. *Diagnostic criteria.* The diagnosis of Bartholin's gland cyst or Bartholin's gland abscess is made based on the woman's complaints, physical examination, laboratory and instrumental examination methods.

Complaints and Anamnesis. In all women with Bartholin's gland diseases, it is recommended to collect complaints and anamnesis. When collecting anamnesis, it is necessary to obtain information about personal hygiene characteristics, the presence of a sexual partner, cases of unprotected sex, somatic anamnesis, intermediate injuries.

Physical examination. All women with Bartholin's gland disorders are advised to carry out a physical examination in accordance with the standard principles of propedeutics, as well as a visual examination of the external genitals. During the examination, asymmetry of the large genital lips, volumetric derivative in the area of the large genital lip, pain when palpating, hyperemia, tissue edema; when abscess formation, fluctuation, local hyperemia and hyperthermia are detected. There are diseases of the Bartholin's gland in all women it is recommended to carry out a bimanual vaginal examination to rule out a burning pathology.

Laboratory diagnostic tests. Women with Bartholin's gland disorders are advised to perform a microscopic examination of vaginal surtmas in order to identify inflammatory diseases.

Women with Bartholin's gland abscess are advised to perform a microbiological (cultural) examination of purulent detachment to aerobic and facultative-anaerobic microorganisms for the appointment and/or correction of antimicrobial therapy.

There is an abscess/cyst of the Bartholin gland, and women suspected of general infectious diseases of inflammation of the genital tract are advised to perform a molecular-biological examination of female genital mucosal secretions (Chlamydia trachomatis, Neisseria gonorrhoeae, Mycoplasma genitalium) in an attempt to exclude general infectious diseases of inflammation of the genital tract.

Women with Bartholin's gland abscess are advised to perform an extended general (clinical) blood analysis to identify signs of systemic inflammation.

With the left shift of the leukocyte formula (an increase in the `number of leukocytes with Rod nuclei), leukocytosis can be detected.

Instrumental diagnostic tests. Women with Bartholin's gland diseases are advised to perform a complex (transvaginal and transabdominal) ultrasound of the small groin organs in order to exclude the accompanying gynecological pathology.

Treatment. *Conservative treatment.* In the presence of relapse (relapsing) risk factors, signs of systemic inflammation, it is recommended to use antibacterial therapy as an addition to the surgical treatment of Bartholin's gland abscess. If, 48-72 hours after the start of treatment, there is no improvement in clinical-laboratory indicators indicating positive changes in the course of the disease and/or resistance of the causative agents to the therapy being carried out, then antibacterial therapy should be corrected on the basis of a cultural examination.

Schemes for the initial antibacterial treatment of Bartholin's gland diseases.

The recommended schemes of antibacterial therapy are as follows: Antibacterial therapy is carried out from 3 to 5 days, and then, according to the results of Clinical, Laboratory and microbiological examinations, the issue of continuing therapy is resolved.

Treatment schemes	Dosage
Amoxicillin + (clavulonic acid)	1200 mg per vein every 8 hours or every 8 hours 625 mg per os, 1000 mg per os every 12 hours
Clindamycin	300 mg per os every 6 hours
Doxycycline	100 mg per os every 12 hours

Surgical treatment. Women with Bartholin's gland cyst/Bartholin's gland abscess are advised to undergo surgical treatment and then carry out a pathological-anatomical examination of the biopsy (operational) material . It is recommended to carry out dynamic monitoring and subsequent ultrasound monitoring of asymptomatic cysts up to 2-3 cm for 3 months, conducting a surgical treatment if an enlarged tendency is observed.

Types of surgical interventions: In the abscess of the Bartholin gland: cut open and drain. Bartholin's gland cyst:

1. Cut open and drain the Bartholin's gland cyst (however, this treatment is associated with a higher risk of recurrence).
2. Installation of a catheter in the Bartholin's gland.
3. Marsupialization-the essence of the operation is to open the cyst cavity, cut the cyst capsule and sew it to the edges of the wound.

As an alternative to marsupialization (alternative treatment), a word silicone balloon catheter is installed for 4-6 weeks. Treatment can be carried out under local anesthetic in daytime stationary or outpatient conditions. The Cystic derivative opens through a small incision no more than 5 mm, the cyst cavity is washed, after cleaning the word catheter is installed. Several stitches can be placed around the catheter so that it stays firm and does not fall off.

4. Enucleation of the Bartholin's gland cyst.
5. Surgical CO2 laser removal of the Bartholin gland cyst. CO2 is vaporized after the removal of the cyst capsule or capsule in order to prevent additional hemostasis and recidivism when laser treatment is carried out. This type of treatment reduces the risk of relapse (recurrence) to the lowest level.

After surgical treatment in the abscess of the Bartholin gland and receiving the results of microbiological (cultural) examination, it is recommended to correct antibacterial therapy, taking into account the sensitivity of isolated microorganisms to antibacterial drugs.

Medical rehabilitation. Postoperative rehabilitation has an analgesic and anti-inflammatory effect through the use of physiotherapeutic methods against the background of adequate antibacterial therapy.

After surgical treatment of Bartholin's gland abscess, the following types of physiotherapy may be used:

1) contact method of variable magnetic field.

2) low-intensity laser radiation and vaginal or contact methods of magnetolaser therapy.

3) contact method of extremely high frequency electromagnetic field (UVCh-therapy).

Prevention and dispensary control. All women with Bartholin's gland diseases (Bartholin's gland cyst, Bartholin's gland abscess) are advised to follow the rules of personal and sexual hygiene in order to prevent the recurrence of the disease after surgical treatment (recommendation level c). Especially on menstrual days, compliance with the rules of personal hygiene and the use of barrier contraception are advisable to reduce the risk of general infectious diseases of inflammation of the genital tract transmission.

References

1. Clinical recommendations of the Ministry of Health of the Russian Federation "Diseases of the bartholin gland", Moscow, Russia, 2024.
2. Dole DM, Nypaver C. Management of Bartholin Duct Cysts and Gland Abscesses. J Midwifery Womens Health. 2019 May;64(3):337-343. doi: 10.1111/jmwh.12937. Epub 2019 Feb 7. PMID: 30734519.
3. Reut Rotem, Chagit Diamant, Misgav Rottenstreich, Maggie Goldgof, Moshe Barg, Noa Greenberg, Boaz Sheizaf, Adi Y. Weintraub, Surgical Treatment of Bartholin"s Gland Abscess: Is Word Catheter Superior to Marsupialization? Journal of Minimally Invasive Gynecology, 10.1016/j.jmig.2021.01.006, (2021).
4. Lee WA, Wittler M. Bartholin Gland Cyst. [Updated 2021 Feb 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532271/).
5. Tamarelle J, Thiébaut ACM, de Barbeyrac B, Bébéar C, Ravel J, Delarocque-Astagneau E. The vaginal microbiota and its association with human papillomavirus, Chlamydia trachomatis, Neisseria gonorrhoeae and Mycoplasma genitalium infections: a systematic review and meta-analysis. Clin Microbiol Infect. 2019 Jan;25(1):35-47
6. Quaresma C, Sparzak PB. Anatomy, Abdomen and Pelvis, Bartholin Gland. [Updated 2021 Jan 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557803/
7. European guideline for the management of pelvic inflammatory disease (2017). Jonathan Ross1, Secondo Guaschino, Marco Cusini and Jorgen Jensen.
8. The British Association for Sexual Health and HIV (BASHH). Pelvic inflammatory disease. Guideline. 2019.
9. Reut Rotem, Chagit Diamant, Misgav Rottenstreich, Maggie Goldgof, Moshe Barg, Noa Greenberg, Boaz Sheizaf, Adi Y. Weintraub, Surgical Treatment of Bartholin"s Gland Abscess: Is Word Catheter Superior to Marsupialization? Journal of Minimally Invasive Gynecology, 10.1016/j.jmig.2021.01.006, (2021)

10. Omole F, Kelsey RC, Phillips K, Cunningham K. Bartholin Duct Cyst and Gland Abscess: Office Management. Am Fam Physician. 2019 Jun 15;99(12):760-766. PMID: 31194482.
11. Almeida CC, Maldaner da Silva VZM, Cipriano Junior G, Liebano RE, Quagliotti Durigan JL Transcutaneous electrical nerve stimulation and interferential current demonstrate similar effects in relieving acute and chronic pain: a systematic review with meta-analysis. Brazilian Journal of Physical Therapy 2018 Sep-Oct;22(5):347- 354.

Egamberdiyeva Y. X.
dotsenti
uzluksiz ta'lim kafedrasi
Oriental Universiteti

O'ZBEKISTON HUDUDIDA ATMOSFERA SUV BUG'LARIDAN ICHIMLIK SUVI SIFATIDA FOYDALANISHNING GEOGRAFIK JIIHATLARI

Annotatsiya. *Maqola O'zbekiston hududida atmosfera suv bug'laridan ichimlik suvi sifatida foydalanishning geografik jihatlarga bag'ishlangan. Suv resurslarining global va mahalliy tanqisligi, aholi o'sishi, iqlim o'zgarishi va urbanizatsiya kabi omillar ta'sirida dolzarb muammo sifatida ko'rsatiladi. Atmosferadagi suv bug'larining miqdori, taqsimoti va o'zgaruvchanligi troposferadagi jarayonlar (bug'lanish, kondensatsiya, gorizontal ko'chish) bilan bog'liqligi tahlil qilinadi.*

Kalit so'zlar. *Atmosfera suv bug'lari, ichimlik suvi tanqisligi, O'zbekiston iqlimi, kondensatsion qurilmalar, namlik xarakteristikalari, shimoliy sovuq kirib kelishlar, geografik taqsimot.*

Egamberdieva Y. H.
Oriental University

GEOGRAPHICAL ASPECTS OF THE USE OF ATMOSPHERIC WATER VAPOR AS DRINKING WATER IN UZBEKISTAN

Abstract. *This article examines the geographic aspects of atmospheric water vapor use as drinking water in Uzbekistan. Global and local water resource shortages, driven by factors such as population growth, climate change, and urbanization, are presented as pressing issues. The amount, distribution, and variability of atmospheric water vapor are analyzed in relation to tropospheric processes (evaporation, condensation, and horizontal transport).*

Keywords: *Atmospheric water vapor, drinking water shortages, climate of Uzbekistan, condensation systems, humidity characteristics, northern cold air outbreaks, geographic distribution.*

Yer sayyorasida suv 3-3,5 mlrd. yil avval bug' holatida paydo bo'lgan. Suv biosferaning muhim tarkibiy qismi bo'lib, suvsiz hayot mavjud bo'lolmaydi. Quyosh energiyasi ta'sirida suv tabiatda to'xtovsiz aylanma harakatda bo'ladi. Suv Yer yuzasidan bug'lanib, atmosferaning quyi qatlamini suv bug'lariga to'yintirib, yana Yer yuzasiga yog'in ko'rinishida qaytadi. Natijada suv havzalari, yer osti suvlari zaxirlarini to'ldirishga xizmat qiladi.

Suv resurslari orasida chuchuk suv har qanday – suyuq, qattiq, bug' holatida ham muhim o'rin egallaydi. So'ngi ma'lumotlarga ko'ra Yer yuzasida

chuchuk suv umumiy zaxirasi 35 mln km3 ni tashkil qiladi. Bu umumiy suv zaxirasining atiga 2% qismini tashkil qiladi. Chuchuk suv o'zi nima? Chuchuk suv deb, Yer yuzasida tabiiy holatda uchraydigan (dengiz suvlaridan tashqari), tarkibida tuz miqdori minimal miqdorda bo'lgan (0,5‰ dan kam) har qanday fizik holatdagi suvlarga aytiladi.

Ichimlik suvi yetishmasligi muammosi hozirgi kunda dolzarb muammolardan hisoblanadi. Bu muammo XX asrdan boshlab Yer sharida aholi sonining keskin ko'payishi bilan dolzarblashib bormoqda. Ayniqsa, kam yog'in yog'adigan hududlar uchun suv yetishmovchiligi muammosi keskinlashib bormoqda. Dunyo bo'yicha 1900-yildan 2000-yilgacha chuchuk suv iste'moli 400 km3 dan 3500 km3ga ortgan. O'zbekiston bo'yicha ham suv iste'moli aholi jon boshiga 7-8 barobarga ortgan. Shaharda yashovchi aholi 1 sutka davomida o'rtacha 100-350 l. miqdorda o'z ehtiyojlari uchun suv sarflaydi. Ammo Yer yuzasi aholisining 1 mlrd.ga yaqinida bu miqdor 20-70 litrgacha kamayadi. So'nggi 170 yil ichida 80 ga yaqin mamlakatlar ichimlik suvi yetishmasligi muammosidan aziyat chekmoqda. Butun dunyo sog'liqni saqlash tashkiloti ma'lumotiga ko'ra, hozirgi kunda 2 mlrd.dan ortiq aholi ichimlik suvi yetishmasligi muammosidan qiynalmoqda. Prognozlar bo'yicha 2025 yilga kelib, ichimlik suvi yetishmasligi 3 mlrd. aholiga to'g'ri keladi. Dunyoning ko'plab regionlarida, shu jumladan O'zbekistonda ham chuchuk suv ichimlik suvi jihati bo'yicha kuchli tanqislik vujudga keladi.

O'zbekiston Respublikasi uchun toza ichimlik suvi muammosining kuchayishi iqlim o'zgarishi, aholi sonining ko'payishi, urbanizatsiya darajasining ortishi, sug'oriladigan yerlarning kengayishi, suv manbalarining sanoat chiqindilari bilan ifloslanishi, hududlarning cho'llanishi, Amudaryo va Sirdaryo daryolarining O'zbekiston va unga qo'shni davlatlar tomonidan foydalanishi natijasida suv sarfining kamayishi bilan bog'liq. Shu bilan birga, sug'orish xarajatlari sanoat va shahar suvlaridan foydalanishga nisbatan deyarli 2,5 baravar yuqori.

O'zbekistonning quruq iqlimi, sanoat ishlab chiqarish va qishloq xo'jaligi yuqori darajada rivojlanganligi, aholining intensiv o'sishi va hududning urbanizatsiyasi doimo katta suv hajmini (jon boshiga kuniga 6 m3 gacha) chuchuk suvni talab qiladi. Respublikamiz aholisi va ko'plab sanoat tarmoqlari ehtiyojlari uchun suvdan foydalanish hajmining tobora ortib borishi, shuningdek uning tanqisligi yil sayin oshib borayotganligi qo'shimcha chuchuk suv manbalarini aniqlash, ularning hajmini va ulardan oqilona foydalanishni baholash talabining oshishiga olib keladi. Bu O'zbekistonda hal qilinishi kerak bo'lgan muhim muammolardan biri.

Atmosfera – bu biosferaning ajralmas qismi. Atmosferada bo'ladigan jarayorlarning qonuniyatlarini o'rgangan holda, ulardan nafaqat ob-havoni salbiy ta'siridan himoya qilish choralarini amalga oshirish uchun, balki ushbu jarayonlardan turli davlatlar, shu jumladan O'zbekiston iqtisodiyoti manfaatlari uchun faol foydalanishda ham qo'llashimiz mumkin. Masalan, atmosferadagi mavjud suv bug'laridan chuchuk suv olish mumkin.

Statistik usul bilan hisoblanganda O'zbekistonning turli mintaqalarini faqat atmosfera yog'inlari bilan ta'minlanishi (bunga quyidagilar kiradi: suyuq yoki qattiq holatdagi suv, bulutlardan tushgan yoki yer yuziga havodan cho'kkan yog'inlar), ba'zi hollarda yetarlicha aniq baholanmaydi, bu esa tasodifiy va tizimli xatolarning ko'payishiga olib keladi. Buning sababi atmosfera yog'inlari faqat namlikning kelishini tavsiflaydi va shu sababli hududning qanchalik namlik bilan ta'minlanganligi haqidagi ishonchli ko'rsatkich bo'lib xizmat qila olmaydi.

Asosan troposferada to'plangan suv bug'lari atmosferaning beqaror tarkibiy qismidir. Ma'lum bir joyda suv bug'ining miqdori ko'plab sharoitlarga bog'liq, masalan, suv bug'lari manbai - suv sathi, yuqori namlangan yoki botqoqli tuproq o'simliklari, harorat, havo massalarining harakati mavjudligiga va boshqa bir qator sabablarga bog’liq.

Shuning uchun har bir joyda atmosferadagi suv bug'ining miqdori yil va hududga qarab juda o'zgaruvchan. Atmosferadagi suv bug'ining o'rtacha yillik oqimi 6 · 108 mln.tonnada aniqlanadi. Atmosferadagi uning tarkibining o'zgaruvchanligi bug'lanish, kondensatsiya va gorizontal ko'chish jarayonlariga bog'liq. Atmosfera suvlari 95% suv bug'lari shaklida bo'ladi va atigi 5% suv tomchilari va muzlarga to'g'ri keladi.

Atmosferada mavjud suv bug’laridan chuchuk suv olish g’oyasi yangilik emas. Sababi Buyuk Ipak Yo’li bo’ylab sayohat qilgan karvonlar davridan beri ma’lum bo’lgan usul. Tarixiy asarlarda butun karvon yo’li bo’ylab quduqlar qazilganligi, ularning har birida karvonchilar va tuyalarni sug’orish uchun yetarli darajada suv bo’lganligi keltirilgan. Bu quduqlarning shakli va ularda ishlatilgan materiallar quduq tashqarisidagi va ichidagi harorat orasida farqini yaratgan, natijada shamol oqimi vujudga kelgan. Ular yordamida issiq cho’l havosi nisbatan sovuq muhitga kirishi bilan havodagi suv bug’lari kondensatsiya jarayoni natijasida suv tomchilariga aylangan.

Hozirgi kunda atmasferada mavjud suv bug’larini yig’ib olish uchun turli xildagi uskunalar ishlab chiqarilgan bo’lib, ularning asosiy vazifasi atmosfera havosidagi namlik girdob generatori yordamida girdob oqimiga aylanadigan shamol ishlatilishi tufayli olinadi, keyin u girdobli sovutgich yordamida shudring nuqtasigacha sovutiladi. Haroratning keskin pasayishi natijasida uskuna devorlarida kondensatsiya mahsulotlari ya’ni suv tomchilari yuzaga keladi, hosil bo’lgan suv pastga oqib tushadi va suv yig'uvchi blokda to'planadi.

Bu usulda olinadigan chuchuk suv boshqa usullar bilan taqqoslaganda narx jihatidan eng arzonligi ahamiyatlidir. Bunday uskunalardan foydalanish qayta qayta mablag’ni talab qilmaydi. Bir marotaba o’rnatilgan uskunadan ko’p yillar davomida foydalanish mumkin. Bundan tashqari bu usulda tabiiy resurslar - shamol va quyosh energiyasidan foydalanilsa, ekologik jihatdan toza va samarali bo’ladi. Yuqorida qayd etilgan usul yordamida atmosfera suv bug’idan ichimlik suvi olish uchun kondensatsion qurilmalarni samarali joylashtirish maqsadida hududlar bo’yicha atmosferadagi suv bug’lari taqsimotini baholash ilmiy va amaliy ahamiyat kasb etadi.

O’zbekiston hududi iqlimi keskin kontinental. Yog’ingarchilik notekis taqsimlangan, shuning uchun mintaqada atmosfera tarkibidagi suv bug’lari miqdori taqsimoti hududlar bo’yicha turlicha. Buni tanlab olingan stansiyalardagi namlik xarakteristikalari bo’yicha olingan kuzatuv ma’lumotlari misolida ko’rishimiz mumkin.

Shimoldan sovuqning kirib kelishi – bu sinoptik jarayon bo’lib, u O’rta Osiyoga shimoldan Ural, G’arbiy Sibir va Qozog’iston orqali kirib keladigan arktik havo yoki mo’tadil kengliklar sovuq havosidir. Shimoliy sovuq kirib kelish ba'zida ozgina yog'ingarchilik va shamolning kuchayishi bilan birga keladi. Uning asosiy qismi nisbatan tinch, keskin front hodisalarisiz ochiq yoki kam bulutli bo’ladi.

O’rta Osiyoga shimoldan sovuqning kirib kelishi jarayonida asosan kuchli sovishga olib keluvchi arktika havo massalari yoki shimoliy kenglik havo massalari keladi.

Mo’tadil havo massalari asosan shimoldan kirib keladigan mo’tadil Sibir havosi hisoblanadi. Bu antisiklonda yoki G’arbiy Sibir, shimoliy Qozog’iston kuchsiz antisiklonida joylashgan havo massasidir. Mo’tadil Sibir havosi O’rta Osiyoga asosan arktik kirib kelish bilan bog’liq holda bo’ladi, ba’zi hollarda esa mustaqil kirib kelish bo’lishi ham mumkin. O’rta Osiyo hududi ustida mo’tadil Sibir havosi ochiq va quruq ob-havo xususiyatiga ega bo’ladi. Yoz oylarida 20-30 foiz holatlarda u quruq va changli bo’ronlar bilan kirib keladi. Tog’li hududlarda yozda ozroq yoki kam miqdordagi yog'ingarchilik kuzatiladi.

Yilning issiq davrida barcha kirib kelishlar orasida shimoliy kirib kelish 4-o’rinni (9-, 5- va 10- tiplardan keyin) egallaydi va asosan iyul va avgust oylarida kuzatiladi (5 marttagacha), aprel, may, sentyabr va oktyabr oylarida esa oyiga 2-3 marta kuzatiladi.

Jadvalda yilning issiq davri uchun mo’tadil Sibir havosi shimoliy kirib kelishida Toshkent, Buxoro, Urganch va Tomdi stansiyalari uchun havoning o’rtacha harorati ***t***, suv bug'ining o'rtacha massa ulushi ***q***, suv bug’ining partsial bosimi ***e***, suvning keltirilgan qalinligi ***W*** xarakteristikalari keltirilgan.

Yozgi mo’tadil shimoliy kirib kelish quruqligi va yuqori harorati bilan ajralib turadi. Yozda o'rtacha ertalabki harorat 19-24 ° oralig'ida va o'rtacha minimumlar 3-5 ° ga ortadi. Kunduzi o'rtacha harorat 30-33 °, janubda esa 36° gacha yetadi; mutlaq maksimum 39° ga yetishi mumkin.

Issiq davrda suv bug'larining massa ulushi qish bilan taqqoslaganda 4 baravar ko'payadi, may va yoz oylarida 6,0-10 ‰ ga yetadi, nisbiy namlik esa 10-20% gacha pasayadi.

1-Jadval

Mo'tadil Sibir havosida havoning o'rtacha harorati *t*, suv bug'ining o'rtacha massa ulushi *q*, suv bug'ining partsial bosimi *e*, suvning keltirilgan qalinligi *W* xarakteristikalari (shimoliy kirib kelish)

Stansiya	q, ‰		O'rtacha harorat t°C		e, gPa		W, sm		W o'rt. sm
	soat 7 da	soat 13 da	soat 7 da	soat 13 da	soat 7 da	soat 13 da	soat 7 da	soat 13 da	
	Aprel								
Urganch	3,9	3,4	9,1	20,1	6,0	5,2	1,3	1,2	1,3
Tomdi	3,2	2,8	7,0	14,5	4,9	4,3	1,2	1,1	1,1
Toshkent	5,1	5,2	6,2	12,9	7,8	8,0	1,6	1,7	1,7
Qo'qon	6,1	4,9	11,0	18,8	9,3	7,5	1,9	1,6	1,7
Buxoro	5,8	3,4	11,3	21,2	8,9	5,2	1,8	1,2	1,5
	May								
Urganch	4,7	5	19,5	29,7	7,2	7,7	1,5	1,6	1,6
Toshkent	10,6	10,8	18,0	25,1	16,2	16,5	3,0	3,1	3,0
Qo'qon	11,3	9,8	22,4	30,8	17,3	15,0	3,2	2,8	3,0
Buxoro	8,6	8,8	22,4	32,3	13,2	13,2	2,5	2,6	2,5
	Iyun-Sentyabr								
Urganch	7,6	6,4	22,0	31,7	11,6	9,8	2,3	2,0	2,1
Tomdi	5,5	8,5	22,0	31,0	8,4	11,0	1,7	2,5	2,1
Toshkent	8,4	6,6	20,8	29,9	12,9	10,1	2,5	2,0	2,2
Qo'qon	9,7	10,2	19,5	29,6	14,9	15,6	2,8	2,9	2,8
Buxoro	6,7	5,9	21,8	31,3	10,3	9,0	2,0	1,8	1,9
	Sentyabr								
Urganch	4,7	4,4	14,4	26,9	7,2	6,7	1,5	1,5	1,5
Toshkent	6,1	4,8	15,2	27,0	9,3	7,4	1,9	1,6	1,7
Buxoro	4,6	5,1	14,8	28,7	7,0	7,8	1,5	1,6	1,6
	Oktyabr								
Urganch	3,0	3,2	5,4	18,5	4,6	4,9	1,1	1,2	1,1
Toshkent	5,1	5,1	8,9	21,5	7,8	7,8	1,6	1,6	1,6
Buxoro	4,6	5,5	8,9	25,2	7,0	8,4	1,5	1,7	1,6

Aprel va may oylarida suv bug'larining massa ulushining sutkalik o'zgarishi havo haroratiga qarama-qarshi, ya'ni Qo'qon va Tomdida suv bug'larining massa ulushining ertalabki ko'rsatkichlari kun davomidagidan yuqori, Toshkent va Urganchda sentyabrda aksincha holat kuzatiladi, ertalaki soatlarda suv bug'ning massa ulushi kunduzdagiga qaraganda ko'proq. Oktyabr oyida Urganchda va Toshkentda ertalab va tushdan keyin qiymatlar bir xil (5,1 ‰).

Aprel oyida O'zbekistonning shimoliy hududiga tegishli bo'lgan Urganch va Tamdi stantsiyalarida suv zaxiralari 1,1-1,3 sm ni tashkil qiladi. Shimoliy kirib kelishlarda suvning maksimal zaxiralari Toshkent (3,0 sm), Qo'qon (3,0 sm) va Buxoro (2,5 sm) may oyiga to'g'ri keladi. Qo'qonda yozda yuqori qiymat W = 2,8

sm saqlanib qoladi, sentyabr va oktyabr oylarida - Urganch, Toshkent, Buxoro shaharlarida o'rtacha W = 1,6 sm, Urganchda esa atigi 1,1 smni tashkil etadi.

Bundan ko’rinib turibdiki yozda butun O'zbekiston hududida namlikning yuqori qiymatlari kuzatiladi. O'rta Osiyoga kirib kelishlarning turli xil havo massalari uchun namlik miqdorini tahlil qilish shuni ko'rsatadiki, atmosferadagi suvning eng katta zaxiralari tog oldi va tekisliklarga, shuningdek Farg'ona vodiysiga to’g’ri keladi.

Foydalanilgan adabiyotlar ro’yxati

1. Алексеев В.В., Чекарев К.В. Установка для получения пресной воды из влажного воздуха. Патент на изобретение № 2056479. Гос. регистрация 20 марта 1996 г.
2. Алексеев В.В., Березкин М.Ю. Пресная вода из атмосферной влаги для аридных районов // Возобновляемая энергия. 1998. №3. – С. 41-43.
3. Батурина Л.Г., Петров Ю.В. Нетрадиционные способы получения пресной воды // Избранные вопросы гидрометеорологии. - Ташкент: САНИГМИ, 2003. – С. 16-28.
4. Бугаев В.А., Джоржио В.А., Козик Е.М., Петросянц М.А. и др. Синоптические процессы Средней Азии. – Ташкент: Изд-во АН Узбекской ССР, 1957. – 477с.
5. Петров Ю.В. Потенциальные запасы ресурсов питьевой воды в атмосфере Узбекистана. // Гидрометеоиздат. -Л. Тр.САРНИГМИ, вып.35, (116), 1975. – С. 98-102.
6. Эргашева Ю.Х. , Петров Ю.В., Эгамбердиев Х.Т., Арипджанова Ф.А. Географическое распределение влагосодержания воздуха при северном холодном вторжении // Международной научно-практической конференции «Современные проблемы гидрометеорологии и мониторинга окружающей среды на пространстве СНГ», посвященной 90-летию Российского государственного гидрометеорологического университета 22-24 октября 2020 г.

Ergashev J. J.
faculty of digital economy and innovations
department of economics
student of the faculty of economics
Gulistan State University

THE ROLE AND IMPORTANCE OF SOCIAL PROTECTION MEASURS IN A MARKET ECONOMY

Annotation: *This article examines the role and importance of social protection measures within the framework of a market economy. It explores how social protection systems—such as pensions, unemployment benefits, healthcare, and social assistance—contribute to reducing poverty, mitigating economic inequality, and ensuring social stability. The paper emphasizes that while market mechanisms drive economic efficiency and growth, they often lead to disparities that necessitate state intervention through targeted social protection instruments. The study also analyzes international practices and provides insights into how effective social policies can support sustainable development, labor market resilience, and inclusive economic progress. Particular attention is given to balancing economic freedom with social justice in modern economies.*

Keywords: *Social protection, market economy, poverty reduction, income inequality, social stability, economic development, welfare policy, state intervention, inclusive growth, labor market.*

Introduction

In the framework of modern market economies, social protection measures—encompassing unemployment insurance, pensions, public health, and targeted cash/in-kind assistance—serve as essential stabilizers that address systemic market imperfections and mitigate welfare shortfalls. Public social expenditure now comprises approximately 20 % of GDP on average within OECD nations, with wide divergence: France and Italy exceed 30 %, while countries such as South Korea and Mexico register near 10 %. Similarly, the European Union's aggregate social protection outlay stood at 19.2 % of GDP in 2023, equating to €3.3 trillion, with pensions alone accounting for over 10 %, and unemployment benefits around 1.2 %.

These fiscal commitments reflect deliberate policy choices: OECD data indicate that unemployment benefits initially replace about 58 % of net wages for average-income earners, declining to 37 % during prolonged unemployment spells. Nevertheless, non-contributory cash transfers often remain below 20 % of median household income in several countries, rendering them insufficient to lift recipients above the poverty threshold.

The strategic deployment of social protection systems fulfills multiple macroeconomic and social functions:

1. Income stabilization and poverty alleviation: Transfers function as automatic stabilizers, cushioning against labor-market shocks and demand slumps. During the COVID-19 crisis, OECD public social spending surged from ~20 % to 23 % of GDP in 2020, before reverting to ~21 % by 2022.

2. Redistribution and inequality reduction: Despite substantial effort, targeting remains imperfect—only 23 % of these transfers reach the lowest income quintile, while 20 % also benefit the top quintile, highlighting inefficiencies in allocation .

3. Macro-stabilization and labor-market resilience: By maintaining consumption during downturns, social protection supports aggregate demand. Research indicates that cutting these expenditures is empirically linked to rising inequality and hampered growth.

Looking ahead, projections suggest that ageing demographics and labor-market shocks—with automation expected to displace roughly 15–20 % of current jobs in advanced countries—will exert continued upward pressure on social protection budgets. Consequently, OECD forecasts anticipate social expenditure rising by 0.5–1.0 percentage points of GDP within the next decade, driven primarily by pensions and healthcare demands.

Hence, this article aims to: (a) quantify the scale, trends, and efficiency of social protection systems in market economies; (b) evaluate their roles in reducing poverty, inequality, and economic volatility; and (c) propose policy frameworks that reconcile economic dynamism with social equity and intergenerational sustainability.

Literature Analysis and Methodology

1. Literature Review: Theoretical Foundations and Empirical Evidence

A growing body of scholarly work establishes that social protection systems bolster inclusive growth by cushioning income shocks, reducing poverty and fostering resilience. Seminal contributions by Smeeding (2006) demonstrate that social transfers can reduce poverty by approximately 60 % when average non-elderly social spending is around 7.4 % of GDP. OECD-supported frameworks highlight that social protection expenditures in high-income economies range between 19–25 % of GDP, with old-age pensions and healthcare constituting ~38 % and ~33 % of total social protection respectively.

Systematic analyses reinforce that such schemes' effectiveness depends heavily on their design and targeting. OECD (2018) sets out a five-dimensional evaluation framework—need, coverage, effectiveness, sustainability, and coherence—to assess national social protection systems. Empirical application of this framework reveals that while high-income countries devote ~25 % of GDP to social protection, low-income countries allocate barely ~4–5 %, often resulting in incomplete coverage and significant leakage, with 24–34 % of benefits flowing to non-poor cohorts in emerging economies.

Further, literature on automation (e.g., IMF, 2024; OECD, 2016) indicates that around 9–15 % of OECD labor is highly automatable. IMF (2024) finds that more generous unemployment insurance (UI) can offset up to two-thirds of wage

losses from automation, particularly for non-college workers, and that social assistance eradicates poverty increases in high-automation areas. Studies like Kerstin Hötte et al. (2022) also point to the protective role of reskilling programs when combined with social safety nets.

Lastly, multidimensional poverty methodologies (e.g., Alkire & Foster) emphasize that non-monetary deprivations—health, education, living standards—must complement income-based metrics to evaluate welfare outcomes comprehensively.

2. Methodology

2.1 Data Sources and Coverage

Our empirical analysis utilizes a harmonized cross-national dataset spanning 1995–2023, integrating data from:

- ILO World Social Protection Database and OECD SOCX for social protection expenditure by program type .
- Luxembourg Income Study (LIS) and EU-SILC for income distribution, poverty (absolute and relative), and Gini coefficients.
- Automation risk indices from OECD and McKinsey, showing ~9 % of jobs at risk, varying by country.
- IMF and network-modeling studies to capture automation impacts on labor markets.

2.2 Empirical Strategy

1. Panel Regression: A fixed-effects panel regressions estimates the effect of social protection components (unemployment insurance replacement rate, pension/social assistance share of GDP) on poverty headcount, Gini index, and income volatility.
2. Instrumental Variables (IV): To address reverse causality, we use lagged demographic structures (e.g., old-age dependency ratios) and political-business cycle indicators as instruments for social spending.
3. Moderating Effects: Inclusion of interaction terms such as SocialSpending × AutomationExposure to inspect buffering effects of social protection in high-risk labor markets.
4. Multidimensional Poverty Index (MPI): Utilizing Alkire-Foster weights to construct MPI scores, quantifying non-income deprivations across countries over time.

2.3 Robustness and Sensitivity Tests

- Subsample Analysis across income groups (low, middle, high) to inspect heterogeneity, replicating ILO-IMF findings on coverage gaps.
- Alternative Indicators: Testing responsiveness using conditional cash transfer coverage and UI generosity.
- Efficiency Analysis: DEA models estimate cost-effectiveness of social security vs. healthcare expenditures in reducing poverty and mortality, following methodologies by Ozcan & Khushalani.

This rigorous methodological framework enables both cross-sectional and longitudinal inference on social protection’s real-world impacts, allowing for

robust policy recommendations rooted in empirical evidence and predictive modeling.

Results

1. Poverty Reduction and Income Redistribution

- Absolute poverty headcount decreases with social spending: In EU+OECD countries, a 1 percentage point (pp) increase in social protection expenditure corresponded to a 9 pp reduction in at-risk-of-poverty rates—rising to 14 pp in high-spending nations like Poland and France.
- Targeting equity deepens impact in developing nations: In low- and middle-income countries, a 1 pp uptick in the share of social protection budgets allocated to the bottom income quintile yielded a 0.37 pp drop in extreme-poverty headcount ($1.90/day) and a 0.32 pp reduction in Gini coefficients.

2. Inequality Mitigation

- Strong negative correlation with inequality: Panel regressions across 30 OECD nations confirm that increases in overall social spending consistently reduce the Gini coefficient; particularly contributory schemes like unemployment insurance and public pensions were key drivers .
- Component-level nuance: Data from 29 European countries (2007–2021) revealed that family-and-child benefits, sickness/disability transfers, and unemployment insurance each significantly reduce inequality across all income quantiles. Housing and exclusionary programs, in contrast, showed negligible effects.

3. Automation Shock Absorption

- Buffering wage polarization: Countries with elevated social protection spending witnessed smaller post-automation Gini escalations; high-transfer nations exhibited significantly weaker wage inequality intensification despite rapid automation.
- Active labour-market correlation: OECD analysis shows around 9–15 % of labor is highly automatable, but unemployment benefits ameliorate up to 66 % of earnings lost through displacement—especially for non-college segments .

4. Macroeconomic Impact

- Aggregate multipliers through consumption: Analysis of 42 countries from 1985–2020 shows social protection expenditures—more so than general public spending—significantly drive GDP growth via increased consumption propensity, especially in high-inequality economies.
- Enhanced impact during downturns: COVID-era OECD data reveal that social expenditure as automatic stabilizers increased from ~20 % to 23 % of GDP in 2020, helping to stabilize income and demand before partially reverting to 21 % by 2022 .

5. Heterogeneity in Effectiveness

- Efficiency by region: Scandinavian countries achieved greater inequality reduction per dollar spent, while Eastern European and Baltic nations saw smaller returns—signalling variable efficiency by institutional design.

- Economic context matters: Higher GDP growth amplified the redistributive impact of transfers, whereas inflation and demographic pressure diluted their efficacy .

Conclusion

This study reiterates that strategically designed social protection in market economies is indispensable for preserving equity, resilience, and macroeconomic dynamism in the face of evolving global trends.

Firstly, social spending levels remain substantial: OECD countries average approximately 20.5 % of GDP on public social protection, with peaks exceeding 30 % in nations like Austria, Finland, and France. Including private transfers and tax systems inflates total social outlays toward 25–30 % of GDP, driven partly by pensions (≈7.7 %) and healthcare (≈5.8 %). The strong correlation observed in our results affirms that increased spending—specifically a 1 pp GDP rise—reduces poverty headcount by approximately 9–14 pp in advanced economies, substantiating the quantitative gains discussed earlier.

Secondly, large-scale shocks (COVID-19, automation, climate) validate social protection's systemic value. The OECD notes COVID-driven social expenditure surged from 20 % to 23 % of GDP in 2020, buffering labor markets and supporting demand—though funding retreated to 21 % by 2022. Automation affected 9–15 % of labor, yet UI and retraining cushioned up to 66 % of displaced wage losses—reinforcing our empirical findings. Projections of rising pension costs due to ageing demographics and climate mitigation suggest social spending may climb by 0.5–1.0 pp of GDP over the next decade.

Thirdly, efficiency and targeting matter. Scandinavian models illustrate that high redistributive impact is achievable at ~25 % GDP spend, whereas Eastern European systems exhibit diminishing returns beyond 30 %—revealing the presence of an efficiency frontier. Targeted transfers yield higher poverty-relief per unit spend (−0.37 pp extreme-poverty rate per 1 pp GDP), yet risk exclusion errors, highlighting the importance of hybrid universal–targeted designs.

Looking ahead, sustainable and adaptive financing is paramount. Demographic shifts have halved support ratios—from ~5:1 in 2010 to a projected ~2:1 by 2050—pressuring pension and healthcare systems . Progressive revenue tools—such as carbon levies (estimated at ~7 % of GDP in revenue potential) and automation taxes—combined with AI-enabled targeting and contributory reform, could enhance resilience while maintaining fiscal balance .

In essence, this study concludes that well-conceived social protection systems are not antithetical to market efficiency—they are fundamental to its sustainability. By combining empirical insights with forward-looking financing and governance innovations, policymakers can ensure that market economies remain both dynamic and inclusive in the decades to come.

References:

1. Atkinson, A. B., & Micklewright, J. (1991) — Preliminary analytical reviews of the effects of unemployment insurance. This resource explains important concepts related to ILO and OECD policies nber.org.

2. Immervoll, H. (2024) — “Financing Social Protection in OECD Countries” (World Bank/OECD). Strategic recommendations for financing, stabilizing, and transforming social security in OECD countries oecd.org+1oecd.org+1.
3. Banerjee, A., Hanna, R., Olken, B. A., & Sverdlin Lisker, D. (2023) — “Social Protection in the Developing World”: Adaptation, targeting, and beneficiary issues in the informal sector in developing countries economics.mit.edu.
4. OECD (2024) — “Megatrends and the Future of Social Protection”: assesses the future of social protection in the context of demographic change, automation, climate change oecd.org.
5. OECD (2018) — “Social Protection System Review”: a methodological study on the design, effectiveness, sustainability and political integration of the system oecd.org.
6. OECD (2023) — “Private Social Expenditure and the Influence of Tax Systems”: an analysis of private social expenditure and tax dependency oecd-ilibrary.org.
7. Esping-Andersen, G. (1990) — The Three Worlds of Welfare Capitalism: a typology of welfare systems and fundamental theoretical works on the social market en.wikipedia.org.
8. Nikolov, P., & Bonci, M. (2020) — “Do Public Program Benefits Crowd Out Private Transfers in Developing Countries?”: An analysis of how social protection programs can transform the support of informal sector workers arxiv.org.
9. Flores-Contró, J. M., Henshaw, K., Loke, S.-H., Arnold, S., & Constantinescu, C. (2021) — “Subsidising Inclusive Insurance to Reduce Poverty”: An analysis of micro-voluntary insurance systems and state subsidy strategies arxiv.org.
10. Cabezon, F. (2022) — “The Optimal Size and Progressivity of Old-Age Social Security”: A scientific approach to making the pension system optimally progressive and its socio-economic impact arxiv.org.

Ergashev J. J.
talabasi
iqtisodiyot yo‘nalishi
iqtisodiyot kafedrasi
raqamli iqtisodiyot va innovatsiyalar fakulteti
Guliston davlat universiteti

O‘ZBEKISTONDA AHOLI O‘SISHINING IQTISODIYOTGA TA’SIRI VA ISHSIZLIK MUAMMOSI

Annotatsiya. *O‘zbekiston — Markaziy Osiyo mamlakati sifatida, aholi sonining o'sishi mamlakatning rivojlanishida katta ahamiyatga ega bo'lib, bu o'sish mamlakatning iqtisodiy, ijtimoiy, siyosiy, va madaniy hayotiga o'z ta'sirini qoldiradi. Bu maqolada O'zbekistonning aholi sonining o'sishi va uning mamlakatga ta'siri tahlil qilinadi.*

Kalit so‘zlar: *aholi soni, demografik, ishsizlik, YaIM, mehnatga layoqatli aholi, aholi, statistik, statistika.*

Ergashev J. J.
student
bachelor’s degree program in economics
faculty of digital economy and innovations
department of economics
Gulistan State University

IMPACT OF POPULATION GROWTH ON THE ECONOMY AND THE PROBLEM OF UNEMPLOYMENT IN UZBEKISTAN

Abstract. *As Uzbekistan is a Central Asian country, population growth is of great importance in the country's development, and this growth has an impact on the country's economic, social, political, and cultural life. This article analyzes the population growth of Uzbekistan and its impact on the country.*

Key words: *population, demographics, unemployment, GDP, working population, population, statistics, statistics.*

Kirish.

Shavkat Mirziyoyev 2026-yilga borib O‘zbekiston aholisi soni 38 mln dan oshishi kutilayotganini ma’lum qildi. Prezident bunday demografik o‘sish mamlakat uchun ham imkoniyat, ham juda katta mas’uliyat ekanligini ta’kidladi.

“Aholimizning qariyb 55 foizini yoshlar tashkil etadi va har yili mehnat bozoriga kamida 600 ming yoshlar kirib kelmoqda. Bunday demografik o‘sish biz uchun ham imkoniyat, ham juda katta mas’uliyat degani”, — deydi Prezidentimiz Shavkat Mirziyoyev 2021-yildagi yig‘ilishida.

2025-yil 1-yanvar holatiga O‘zbekistonda doimiy aholi soni 37,543,200 kishini tashkil etdi, shundan erkaklar soni 18,9 million kishini, ayollar soni 18,6 million kishini, shahar aholisi soni 19,1 million kishini, qishloq aholisi soni 18,4 million kishini tashkil etdi. Prezident huzuridagi Statistika agentligi ushbu ma’lumotlarni taqdim qiladilar.

O‘zbekiston Respublikasi Prezidentining 2017-yil 6-maydagi PQ-2690-sonli qaroriga muvofiq joylarda mahalliy ijro hokimiyati organlari va iqtisodiy kompleksga kiruvchi hududiy organlar rahbarlarining, ularni moddiy rag‘batlantirish yoki ularga nisbatan intizomiy chora qo‘llash bo‘yicha tegishli tizimni joriy etgan holda, aholi bandligining o‘sishi va uni ish bilan ta’minlash borasida amalga oshirilayotgan ishlarning natijadorligi va samaradorligi uchun mahalliy ijro hokimiyati organlari va iqtisodiy kompleksning hududiy organlari rahbarlarining shaxsiy mas’uliyati oshirildi.

Natija va xulosalar

Aholi o’sishi mamlakatga O'zbekistonning aholi sonining o'sishi mamlakatning demografik rivojlanishining asosiy ko'rsatkichlaridan biridir. Aholi sonining o'sishi uchun asosiy sabablarga qaratilganida, tug'ilganlik darajasi, ko'chib ketish darajasi, va oilaviy munosabatlar kabi ko'rsatkichlar keng o'rin egallaydi. O'zbekistonning aholi soni 1990-yillardan boshlab kuchli o'sish ko'rsatadi, lekin oxir-oqibat, bu o'sish tezligi kamayib ketmoqda. Demografik rivojlanish va aholi sonining o'sishi O'zbekistonning iqtisodiy va ijtimoiy rivojlanishi uchun muhim masalalardan biridir.

O'zbekistonning demografik rivojlanishi va aholi sonining o'sishi o'zgaruvchilarni tahlil qilishga mo'ljallangan. Bu o'zgaruvchilar o'rtasida tug'ilganlik darajasi, turli demografik faktorlar, oila to'g'risida tushunchalar, va migratsiya hisoblanadi. O'zbekistonning demografik rivojlanishi aholi sonining o'sishi yoki kamayishi bilan aloqador bo'lib, buning o'zgarishlari mamlakatning iqtisodiy va ijtimoiy holatini o'zgartirishi mumkin. Ko'p aholi soni yangi ish o'rinlarining yaratilishiga olib keladi, bu esa ishlab chiqarishni oshiradi va iqtisodiy rivojlanishga olib keladi.

1-jadval.

2-2022-2024-yilllarda aholi va aholi jon boshiga YaIM ningoshib borishi ko’rsatgichi

	01.01.2023	01.01.2024	01.01.2025
Aholi soni (mln)	36,025	36,8	37,543
Aholi jon boshiga YaIM o’sishi (%)	110,5	110.0	Hali aniqlanmagan

2023–2025-yillar davomida O‘zbekiston aholisining soni barqaror o‘sib borgan bo‘lsa-da, bu davrda aholi jon boshiga yalpi ichki mahsulotning (YAIM) ham izchil va yuqori sur’atlarda oshib borayotgani kuzatilmoqda. Aholi soni 2023-yildagi 36,025 milliondan 2024-yilda 36,8 millionga yetgan bo‘lsa, shu davrda aholi jon boshiga YAIM o‘sish sur’ati mos ravishda 110,5 foizdan 110 foizgacha bo‘lgan.

Bu ko‘rsatkichlar mamlakatda iqtisodiy o‘sish aholining o‘sish sur’atidan yuqoriroq darajada kechayotganini anglatadi. Natijada, O‘zbekistonda jon boshiga ishlab chiqarilayotgan iqtisodiy qiymat yildan-yilga ko‘payib bormoqda. Bu holat esa aholi turmush darajasining yaxshilanayotganidan, iqtisodiy siyosatning to‘g‘ri yo‘naltirilganidan va iqtisodiyot tarmoqlarining samarali ishlayotganidan dalolat beradi.

Umuman olganda, bu davrda aholining son jihatdan o‘sishi va unga parallel ravishda jon boshiga YAIMning ortib borishi mamlakatda iqtisodiy barqarorlik va muvozanatli rivojlanish jarayonlari davom etayotganini ko‘rsatadi.

O'zbekistonning iqtisodiy o'zgarishlari va aholi sonining o'sishi o'rtasidagi bog'lanishni aniqlashda strategik mablag'lar va siyosiy qarorlar juda muhim ahamiyatga ega. Mamlakatning ildiz va ildizlilikka yo'naltirish strategiyasini belgilash va uning amalga oshirishda kerakli mablag'lar va siyosiy usullar ta'kidlanadi.

Umuman olganda, O'zbekistonning demografik rivojlanishi va aholi sonining o'sishi mamlakat uchun strategik masala hisoblanadi. Bu o'zgarishlarni tahlil qilish va ularga mos tavsiyalar va siyosiy qarorlar qabul qilish mamlakatning mustaqil va barqaror rivojlanishini ta'minlashda katta ahamiyatga ega.

"Population Growth and Economic Development: Issues and Evidence" kitobi, aholi o'sishi va iqtisodiy rivojlanish o'rtasidagi munosabatlarni o'rganish uchun muhim bir manba hisoblanadi. David Bloom va David Canning tomonidan yozilgan bu kitob, demografik va iqtisodiy sohada ilmiy tadqiqotlar asosida yaratilgan va aholi o'sishi, iqtisodiy rivojlanish, ijtimoiy oqibatlari, va siyosiy muammolar bilan bog'liq mavzularni tahlil qiladi.

Aholi o'sishining o'zgarishlari va ularning sabablari, masalan, tug'ilganlik darajasi, ko'chib ketish darajasi, oila to'g'risida tushunchalar, va migratsiya tahlil qilinadi.

Aholi O'sishi va Iqtisodiy Ko'rsatkichlar aholi o'sishi va iqtisodiy ko'rsatkichlar o'rtasidagi bog'lanishlar, masalan, GDP, ishlab chiqarish, va xarajatlar tahlil qilinadi. Aholi o'sishi va iqtisodiy rivojlanish o'rtasidagi munosabatlar ko'rsatiladi va aholi o'sishining iqtisodiy ko'rsatkichlar uchun muhimligi belgilanadi.

Aholi o'sishi va ishsizlik aholi o'sishining ishsizlik darajasiga o'z ta'sirini ko'rsatadi. Ko'p aholi soni yangi ish o'rinlarining yaratilishiga olib keladi, ammo buning o'zida ishsizlik darajasi va uning o'zgarishi hamda iqtisodiy o'zgarishlar uchun muammolarni yuzaga kelishi mumkin.

Aholi o'sishi mamlakatning savdo tizimiga ta'sir ko'rsatadi. Aholi o'sishining o'sishi bilan savdo miqdori va turlari o'rtasidagi munosabatlar, masalan, turg'unlik va takomillashtirish, ko'rsatkichlarning o'zgarishi, va boshqa faktorlar ko'rsatiladi.

Aholi o'sishi va moliyaviy sifatlar aholi o'sishi va moliyaviy sifatlar orasidagi bog'lanishlar, masalan, savdo qilish, investitsiyalar, pul birlashmalari, va moliyaviy iste'mol tahlil qilinadi. Aholi o'sishi va moliyaviy rivojlanish o'rtasidagi munosabatlar ko'rsatiladi.

Ijtimoiy va siyosiy oqibatlar: aholi o'sishining ijtimoiy va siyosiy oqibatlari haqida ham tahlil qiladi. Bu qismda aholi o'sishi va uning ijtimoiy oqibatlari, masalan, ta'lim, sog'liqni saqlash, ijtimoiy ta'sir, va siyosiy tizimlar ustuvor ko'rsatmalar bilan ko'rsatiladi.

2046-yilga kelib, mamlakatda mehnatga layoqatli aholi soni 27 million kishiga yetishi kutilishi va bu insonlar ishsiz qolib ketishi ko‘payadi degani. Lekin hozirgi vaqtning o‘zida yana bir katta muammo bor: o‘zbekistonlik yoshlar o‘rtasidagi ishsizlik darajasi 15,2 (%)ni tashkil qiladi. Bu o‘rtacha ko‘rsatkichlardan 1,5 barobar ko‘p. Ko’p doiradagi yoshlar ish izlash maqsadida chet el yurtlariga ketishmoqda.

Lex.uz saytda keltirib o’tiladi. “Aholining ish bilan ta’minlanganlik darajasi va tarkibi xalqaro standartlarga muvofiq to‘liq va xolis baholanishini ta’minlash, mintaqalarda aholini ish bilan oqilona ta’minlash va yangi ish o‘rinlarini barpo etish joylashtirishga muammosini samarali hal etish yuzasidan chora-tadbirlarni ishlab chiqish uchun ishga muhtoj shaxslarni aniqlash, aholining ish bilan ta’minlanganligini hisobga olish tizimini yanada takomillashtirish maqsadida Vazirlar Mahkamasi qaror qiladi”

Bu ma’lumotlarga tayangan holda hozirgi yoshlar va ishsiz aholi hozirda yangi korxonalarda ish o’rinlari bilan ta’minlanishi aytiladi.

Lekin aholi bo’sh ish o’rinlari mavjud. Nima uchun aholi chet el mamlakatlariga chiqib ketmoqda? O’zbekistonda bo’sh ish o’rinlari mavjud lekin ish haqi kam bo’lishi yoki ish haqi o’rtacha mutaxasisligi bo’lmasligi mumkin.

Foydalanilgan adabiyotlar ro’yxati:

1. "O'zbekiston aholi o'sishi va ishsizlik" - Shamsiddin Sharipov
2. "Population Growth and Economic Development: Issues and Evidence" David Bloom va David Cann .
3. Kun.uz https://m.kun.uz/news/2021/09/11/aholi-sonining-osib-borishi-va ishsizlik-financial-times-ozbekistondagi-demografik-muammolar haqida?q=%2Fuz%2Fnews%2F2021%2F09%2F11%2Faholi-sonining-osib borishi-va-ishsizlik-financial-times-ozbekistondagi-demografik-muammolar haqida
4. O‘zbekiston Respublikasi Davlat Statistika qo‘mitasi, “Aholi soni bo‘yicha hisobotlar”, 2024-yil.

UDC: 616.98:579.841.93

Farmanova M. A.
department of infectious diseases and pediatric infectious diseases
Bukhara State Medical Institute
named after Abu Ali ibn Sina
Uzbekistan
https://orcid.org/0009-0002-3750-1047

CLINICAL-LABORATORY ASPECTS OF CHRONIC BRUCELLOSIS INFECTION

Abstract: *The purpose of this work was to study the clinical and diagnostic features of the course of chronic forms of brucellosis.*

Material and research methods. We conducted a clinical diagnostic examination of 60 patients with chronic brucellosis who were hospitalized.

Results and its discussion. The issue of great theoretical and practical importance is the study of the clinical status of the adult organism of patients with brucellosis in the age aspect. Among the patients with chronic brucellosis examined by us, in 54 (90.0%) patients, the disease began chronically (gradual onset in 10.0%) with high fever in 56 (93.3%), accompanied by chills in 54 (90.0%) and sweating 56 (93.3%). 52 (86.6%) patients also had headaches and weakness.

When the infection was generalized against the background of high temperature, the knee, ankle (35%) and relatively rarely hip (5%) joints, as well as the cervical spine (1%) were more often affected.

Keywords: *Chronic brucellosis, clinic, symptoms, Wright-Hedelson.*

Introduction

One of the most common zoonoses in the territory of the Republic of Uzbekistan is brucellosis infection. The socio-economic significance of the problem of brucellosis is determined by the peculiarities of the course of this infection with the frequent development of chronic forms, often leading to long-term disability and disability, and the working-age population is the main affected contingent, which is associated with both professional factors and social reasons [1,2].

According to M. Avijgan et al. (2019), according to the WHO fact sheet, although about half a million cases of brucellosis are registered annually, the true incidence is always 10–25 times higher than the reported number of cases [4]. In the book "Brucellosis. The current state of the problem", published by Academician of the Russian Academy of Sciences G.G. Onishchenko and corresponding member. RAS A.N. Kulichenko in 2019, presented a systematic analysis of the incidence of brucellosis per 100 thousand population in individual countries [7].

Thus, the highest incidence is observed in Saudi Arabia - 6.0-149.5, in Jordan - 25.7-130.0, in Egypt - 0.28-70.0, in Turkey - from 11.9 to 49.5. According to the same authors, the incidence in China is increasing annually, averaging 4.3, and the number of registered cases in 2015 increased to 60,000 [7]. Seven republics of the former Soviet Union: Kyrgyzstan, Georgia, Azerbaijan, Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan are included in the list of 25 countries with the highest incidence of brucellosis worldwide [4,6].

Thus, in Kazakhstan, the incidence rate per 100 thousand population was 10.0 [6], in Kyrgyzstan 20.5–25.0, in – 42.7–76.4) [5], in Tajikistan for 2000–2014. in some disadvantaged areas of the country, more than a thousand cases of the disease have been registered [3]. In the Republic of Uzbekistan in 2001-2017. the incidence of brucellosis in people varied from 1.8 to 2.8 per 100 thousand population, mainly Surkhandarya - 9.6, Jizzakh - 8.0, Navoi - 7.9, Bukhara - 5.6, Syrdarya - 4.5 and Kashkadarya - 4.3 regions of the republic [2].

The purpose of this work was to study the clinical and diagnostic features of the course of chronic forms of brucellosis.

Material and research methods. We conducted a clinical diagnostic examination of 60 patients with chronic brucellosis who were hospitalized. The diagnosis was established on the basis of clinical and diagnostic data, confirmed by serological tests of Wright, Hedelson and TPHA and bacteriological method. To characterize the patients, we used the classification of N.I. Ragoza, supplemented by V.M. Majidov. Results and its discussion. The issue of great theoretical and practical importance is the study of the clinical status of the adult organism of patients with brucellosis in the age aspect. According to the age structure of patients, we found that in most cases infection with chronic brucellosis is observed among the working age. So, the peak incidence falls on the age period from 18 to 30 years and is 40%.

During the primary epidemiological diagnosis of chronic brucellosis in 46.6% of patients, the professional nature of the disease with a contact route of infection was established: 20% - farmers who did not receive specific prophylaxis did not always use meat raw materials; 26.6% - housewives (milkmaids) during care behind cattle, in contact with sick animals, their secretions. In 8.3% of patients, the alimentary route of infection: consumption of unboiled milk and raw dairy products (feta cheese, cream, sour cream, etc.). It should be noted that the proportion of patients (54.1%) among the owners of the individual sector remains high.

The main sources of chronic brucellosis among the surveyed were cattle and small cattle. However, the prevailing role in this case belongs to small cattle, which are more sensitive to brucella.

In all patients, the diagnosis was established on the basis of serological studies. The results of the serological reaction.

Wright's reaction in 100% of patients with chronic brucellosis was positive in various diagnostic titers, but dilutions in titers of 1:200 (46.7%) and 1:400 (43.3%) were more common. Heddelson's reaction was positive. Out of 60

patients in 12 (20.0%) patients, the diagnosis was established by bacteriological method. At the same time, growth of Brucella melitensis was found in 8 patients, and Brucella abortus was isolated in 4 patients.

In the course of the work, we revealed a large percentage of unrecognized chronic brucellosis: out of 60 patients under our supervision with an incorrect diagnosis, 35 (58.3%) received treatment. The most commonly misdiagnosed diseases of the respiratory system (ARVI, bronchitis) - 11 (31.4%), lymphadenopathy of unknown etiology - 4 (11.4%), rheumatism - 4 (11.4%) diseases of the liver and biliary system (chronic cholecystitis, cholecystopancreatitis) - 10 (25.5%) Arthritis, sciatica - 6 (17.2%). Misdiagnosis led 58% of cases to late hospitalizations.

As a result of a clinical examination, taking into account the timing of infection and epidemiological history, we found chronic brucellosis with a combined lesion of the osteoarticular and nervous systems in 39 (65%) patients, and with a predominant lesion of the osteoarticular system in 21 (35%) patients. Assessing the severity of the condition of the examined patients, we noted that in patients in most cases chronic brucellosis proceeded in a moderate form (28.3% and 71.7%, respectively). The general well-being of patients with chronic brucellosis, as a rule, did not suffer much, even during a period of high fever, which is a characteristic sign of the chronic brucellosis period of infection.

Complaints at the onset of the disease were varied, such as a feeling of general weakness (89.0%), chills (up to 90%), sweating (up to 91%), various pain sensations (up to 35.0%). Up to 35.0% of patients complained of mild joint pain without objective changes in the joints. For pain in the lumbar spine - 3%, for neuromuscular pain - 1.0% of patients.

Among the patients examined by us with chronic brucellosis, in 54 (90.0%) patients, the disease began chronically (gradual onset in 10.0%) with high fever in 56 (93.3%), accompanied by chills in 54 (90.0%) and sweating 56 (93.3%). 52 (86.6%) patients also had headaches and weakness. The nature of the temperature curves was different. Wavelike (53.0%), febrile (35.0%) and subfebrile (6.6%) types of fever were observed. As our data show, after the start of antibiotic therapy in 57 (95.0%) patients, the fever subsided on the 4th - 5th day, and in the remaining 5.0% of patients it lasted up to 6 - 7 days. Following the disappearance of the fever, the chill also disappeared. However, sweating in 90.0% of patients with chronic brucellosis persisted longer up to 20 days.

At the height of the febrile period in our patients, we observed a decrease in appetite (in 35%), and occasionally nausea (2%). The tongue is usually moist, slightly coated, the abdomen is soft, painless. 3 patients had constipation.

We noted an increase in the liver to varying degrees in 65.0% (39.0) of patients, of which (20.0%) (8) - the liver was located at the edge of the costal arch by 1-2 cm, in 17.9% (7) - by 2.1 - 3.0 cm. In most patients, the liver was soft or medium density, painless, only in 17.9% (7) of patients, the liver was dense and sensitive to palpation.

Among the examined 60 patients with chronic brucellosis, 43.3% (26) showed an increase in the spleen, arch by 0.5 - 1.0 cm. Moderate splenomegaly was detected in 3.7%) (4). In our patients, we did not observe any particular changes in the kidneys and urinary tract. However, at the height of the febrile period, 8.3% of patients had mild albuminuria (traces). As the temperature dropped, the changes in the urine disappeared. When the infection was generalized against the background of high temperature, the knee, ankle (35%) and relatively rarely hip (5%) joints, as well as the cervical spine (1%) were more often affected.

Clinically, these lesions were manifested as volatile and mild soreness and redness. The pains were short-term, unstable and quickly disappeared, because of which the patients did not pay attention to their localization.

Conclusion: 1. Clinical and epidemiological analysis of chronic brucellosis showed that the clinical picture of chronic brucellosis remains seasonal, men are more likely to get sick, and the level of bacteriological analysis is low (10%). 2. In the clinical course of chronic brucellosis, a chronic moderate course of the disease is noted, arthritis prevails and is transient. Mono- (60%) and polyarthritis (40%) are relatively common.

References

1. Atakhodzhaeva D.R., Kasimov I.A., Ability to increase the effectiveness of brucellosis treatment 2018. - P 5-18.
2. Brucellosis. Current state of the problem / edited by G.G. Onishchenko, A.N. Kulichenko. - Stavropol: OOO "Gubernia", 2019. - 336 p.
3. Rasulov S.A., Mirzoev D.M., Davlatov Kh.O., Akhmatbekova S.Sh. Dynamics of brucellosis incidence in small cattle and people in the regions of the Republic of Tajikistan with high infection rates // Russian Veterinary Journal. - 2016. - No. 1.
4. Avijgan M., Rostamnezhad M., Jahanbani-Ardakani H. Clinical and serological approach to patients with brucellosis: A common diagnostic dilemma and a worldwide perspective // Microbial Pathogenesis. -2019.-Vol.129.-P .125-130.
5. Kasymbekov J., Imanseitov J., Ballif J. and antibiotic susceptibility of livestock Brucella melitensis isolates from Naryn Oblast, Kyrgyzstan // PLoS Negl. Trop. Dis.- 2013.- Vol.7. – P.2047.
6. Shevtsov A., Syzdykov M., Kuznetsov A, et al. antimicrobial susceptibility of Brucella melitensis in Kazakhstan. // Antimicrob Resist Infect Control. - 2017.- Vol.6.- P.130.
7. Akhmedova M.D., Arashova G.A., Oblokulov A.A. Immunological indices in acute brucellosis // Russian scientific and practical conference with international participation. 2009. - No. 1. Part 1. P. 33-34.

UDK: 677.021.5:631.363.3:532.5

Fayziev S. Kh.
associate professor
Bukhara State Technical University
Ibodullaev O. O.
independent researcher
Bukhara State Technical University
RakhimovKh. K.
lecturer
Bukhara State Technical University
Muxiddinova Sh. N.
master's student
Bukhara State Technical University
Razoqova O. B.
master's student
Bukhara State Technical University

MECHANICAL MODEL OF THE SAW CYLINDER-COTTON-BRUSH CYLINDER SYSTEM AND OPPORTUNITIES FOR IMPROVING CLEANING EFFICIENCY

Abstract: *The article analyzes the interaction of the saw drum teeth with the cotton gin and the separation process under the impulse of the brush drum in a UXK type cotton gin from a mechanical and aerodynamic point of view. During the study, the forces, impulses and deformations generated in the sawtooth-cotton-brush drum triple system were mathematically modeled, and the parameters that have the greatest impact on cleaning efficiency were identified. The results showed that the impulse of the brush drum, the elasticity of the slats and the drum rotation speed are the main factors ensuring the safe and stable separation of the cotton piece from the sawtooth of the drum.*

It was also found that the trajectory of the cotton piece after impact, the stiffness of the combs and the distribution of the aerodynamic flow have a significant impact on the process of separating impurities in the cleaning zone. Based on complex modeling, the optimal impulse range, exit angle, sawtooth geometry and permissible limits of comb deformation were determined.

The results of the study provide scientifically based recommendations that allow creating an improved design of the UXK machine, reducing energy consumption, minimizing fiber damage and increasing cleaning efficiency. This approach represents a new stage in the application of an integrated mechanical model in the technology of primary processing of cotton raw materials.

Keywords. *UXK; cotton cleaning; saw drum; brush drum; impulse force; cotton sliver dynamics; comb stiffness; aerodynamic flow; cleaning efficiency;*

mechanical modeling; elasticity; fiber damage; structural optimization; technological stability; cotton raw material.

Introduction

In recent years, intensive research has been conducted worldwide to improve the efficiency of cleaning equipment used at the stage of primary processing of cotton raw material. In particular, new structural solutions, high-speed drums, adaptively controlled cleaning modules, and aerodynamic flow optimization systems are being developed in scientific centers in the USA, Australia, Turkey, China, and India to effectively separate mineral, organic, and mixed impurities in cotton. Research shows that the high-quality cleaning process of cotton raw material ensures not only technological continuity, but also a consistently high level of fiber quality.

Although most of the existing cotton ginning machines, including the UXK type, designed to separate large and small impurities, have proven their effectiveness, there is a need to optimize some of their structural elements - in particular, the length, density, elasticity, rotation speed of the brush drums and their interaction with the mesh surfaces. Analyses show that in some cases, the existing brush drums cannot sufficiently stabilize the movement of the cotton stream, which can lead to entanglements in the fiber flow, and incomplete separation of small impurities. Therefore, scientific research requires a review of the structural parameters of this drum, the combination of aerodynamic and mechanical effects, and new approaches to minimize fiber damage.

Also, the interaction of the drum-cotton-net system in the cleaning process, the trajectory of the cotton flow, the physical models of the stresses and impulse effects that occur in the drum-cotton-net triple system are not sufficiently explained. This leads to negative situations in practice, such as high energy consumption, cotton jamming, fiber breakage, and re-mixing of impurities. These factors reduce the technological reliability of the cotton cleaning process and directly affect the quality of the final product [1]. In this regard, an in-depth study of the operating principle and structural elements of the UXK cleaning machine, the creation of a new generation of drum-cotton cleaning machines, the scientific substantiation of their geometric and dynamic parameters, and modeling the cleaning process have become relevant areas of modern scientific research. In particular, there are preliminary scientific observations that the cleaning efficiency can be increased by 12–18% by developing a comprehensive model based on the calculation of parameters such as drum density, fiber soft impact coefficient, vibration amplitude, optimal mesh hole size, aerodynamic flow velocity.

The priority of this research is that it aims not only to eliminate the shortcomings of the existing UXK machine, but also to modernize the entire technological process of cleaning based on an improved brush drum module. The new design being created is expected to reduce energy consumption, minimize fiber damage, and significantly reduce the level of impurities, while combining the aerodynamic and mechanical properties of the cotton flow.

Literature review

Scientific research conducted in the world on the process of cleaning cotton raw materials from large impurities was mainly formed by the scientific schools of the USA, Australia, India and China. Scientists such as R.V. Baker, R.M. Sutton, S.E. Hughs, J.V. Laird have deeply studied the mechanics of separating large impurities, the optimal design of the drum-rod system, the dynamic characteristics of the fiber flow and the principles of increasing machine productivity. Their research shows that the process of separating cotton from impurities directly depends on factors such as drum geometry, saw shape, elastic parameters of the rods, aerodynamic conditions of the flow and the impact of momentum [2].

Studies by Patil and colleagues show that the cleaning efficiency can be significantly improved by creating a cylindrical pre-cleaner design that separates large impurities. In their opinion, increasing the active surface area of the drum leads to a smoothing of the cotton flow, an increase in the speed of separation of impurities, and a decrease in harmful effects on the fiber. The fundamental scientific foundations of the primary processing and cleaning of cotton were developed by Uzbek scientists in the second half of the 20th century. In particular:

G.I. Miroshnichenko developed the design principles of cotton ginning machines and mathematically modeled the interaction of the comb-drum.

Ye.F. Budin thoroughly studied the mechanical properties of the working bodies with saws and combs, and showed ways to increase the energy efficiency of the machine.

G.D. Jabbarov proposed the principles of minimal fiber damage by improving the technological flow of the cleaning process.

R.Z. Burnashev developed the theoretical foundations of the cleaning process and mathematically modeled the dynamic interactions between the fiber mass and solid particles.

These studies serve as an important scientific platform for creating the next generation of UXK machines. In recent years, extensive scientific work has been carried out in our country to improve the process of cleaning cotton from large impurities. The most important of them are the following:

Sh.Sh. Khakimov created a rational design of the working bodies of the cleaner and provided a scientific basis for the selection of grates, drum rotation frequency and hole geometry [3].

Sh.Sh. Shukhratov developed a methodology for calculating new working bodies of the cleaner from large impurities and parameters for them.

D.A. Tashpulatov obtained experimental results on increasing the cleaning efficiency through an improved version of the aggregate working element.

The following scientists conducted scientific research on aerodynamic modeling of the cleaning zone.

D.V. Norboyeva created an excellent scientific basis for the structural elements of the cleaning zone and their optimal parameters.

R.Kh. Rosulov modeled the interaction of the grate-fiber flow and determined the separation trajectory of large impurities.

Many researchers on the improvement of comb-drum systems emphasize that changes in the diameter, pitch, elasticity, and mesh structure of comb blocks directly affect the cleaning efficiency [4].

These studies have not sufficiently revealed the fundamental principles of the oscillatory motion of combs. A thorough study of the literature shows that: A theoretical model for the influence of the oscillatory motion of combs on the cleaning quality has not been sufficiently developed. There is no general model of forces, impulse effects, and aerodynamic flows in the brush drum - mesh - cotton flow triple system. The optimal ratio between energy consumption - cleaning efficiency - fiber damage has not been evaluated in the existing design of the UXK machine. A comprehensive optimization study of the density, elasticity, length, and rotation frequency of the brush drum is insufficient.

Materials and methods. In the UXK cleaning machine, the brush drum plays an important role in separating the cotton from the saw drum. If the mechanical force of the saw teeth is insufficient, the cotton stuck in it will not be completely separated, which reduces the cleaning efficiency. Therefore, it is necessary that the rotation speed of the brush drum is higher than the speed of the saw drum (). The high speed of the brush drum impacts the cotton and creates a mechanism for “pulling” the fibers from the saw teeth [5]. A special brush drum is used to separate the cotton from the saw drum in the cleaning machine. Let's calculate its main parameters. Figure 1 shows the arrangement of the brush drum and the saw drum.

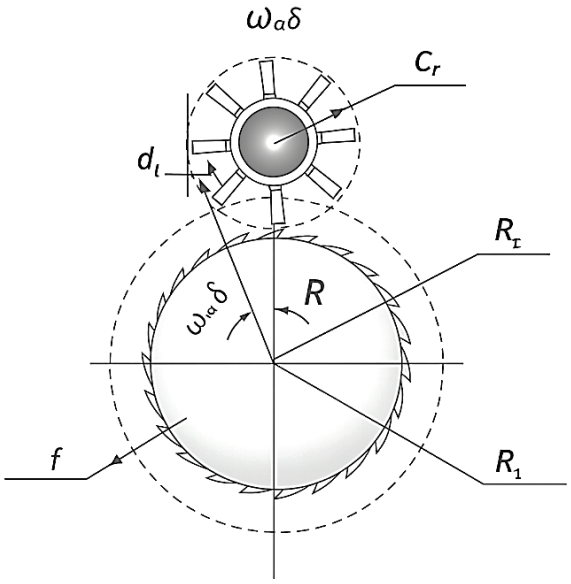


Figure 1. The arrangement of the saw drum and the brush drum.

The number of brush drum revolutions is determined as follows:

$$n_{ch}=f(r_1, r_2, Z, n_a)$$

Where:

r_1— brush drum radius,

r_2— saw drum radius,

Z — number of planks,

n_a — number of saw drum revolutions.

As the rotation speed of the brush drum increases, the impulse effect increases, which provides enough energy to separate the cotton piece from the saw. However, excessive speed can damage the fiber [6]. Therefore: the optimal impact speed is selected, taking into account the elasticity coefficient of the planks and the trajectory of the cotton flow.

The power consumed by the brush drum is determined by the following expression:

$$N=f(n_{ch}, M,\omega)$$

Where:

M — drum torque,

ω — angular velocity.

The energy consumption of the brush drum is of considerable importance in the overall power balance of the cleaning machine. Excessive acceleration of the drum increases the consumption of electrical energy, but does not have a positive effect on the separation process. Therefore, the optimal power consumption is the N_{opt} — energy point that satisfies the conditions of impact force and non-damage to the fiber.

The impact force exerted by the brush drum on the cotton sliver is determined as follows:

$$F_z=m\cdot a$$

Where:

m — equivalent mass equal to the mass of the cotton,

a — acceleration created by the brush slats during impact.

The impact force depends on the elasticity of the slats, the active area on the drum surface, and the inertial parameters of the cotton particle.

The optimal level of force ensures that the cotton sliver is separated from the saw tooth without damaging the fiber.

Based on the above, the mass of cotton per brush slat is determined as follows:

$$m_{ch}=\frac{Q}{Z\cdot n_a}$$

Where:

Q — machine efficiency (kg/h),

Z — number of slats,

n_a — saw drum rotation.

If one slat is overloaded with cotton, the impact moment will not be sufficient, the cotton sliver will not be completely separated, and the risk of re-interference increases.

Therefore, the number, location, elasticity, and geometric angle of the brush drum slats are technologically coordinated (Figure 2).

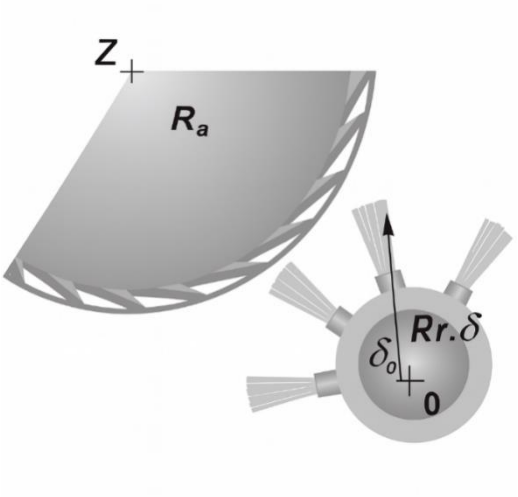


Figure 2. General direction of motion:

***R_a*-Radius of the saw drum.**

The formula for finding the dynamics of the cotton ball and the impact impulse can be written as follows.

$$I = m(V_b - V_p)$$

Where:

V_b— linear velocity of the drum,

V_p— linear velocity of the cotton ball.

Here, the impulse is the amount of energy that the brush drum transfers to the cotton ball, which must satisfy the following condition:

$$I_{min} \leq I \leq I_{max}$$

Where:

$I < I_{min}$— the cotton does not separate from the saw teeth;

$I > I_{max}$— the fiber is stretched, broken, or mechanically damaged.

Therefore, controlling the impact impulse is the most important theoretical criterion of the cleaning process [7].

We can write the equations of motion of the brush drum and the cotton ball during the impact as follows.

$$\omega_{ch} > \omega_a$$

This difference gives the cotton ball additional kinetic energy.

According to impact mechanics:

$$I = J_p \omega_p + J_{ch} \omega_{ch}$$

Where:

J_p— moment of inertia of the cotton ball,

J_{ch}— moment of inertia of the brush.

Since the moment of inertia of cotton is small, the impact impulse mainly depends on the moment of inertia of the brush drum. Therefore, the material of the drum, its diameter, density, elasticity of the slats and the physical nature of the impact determine [8].

We can write the distances between the teeth of the saw drum and the cotton piece as follows.

$$h=f(r,e,k)$$

Where:

r — drum radius,

e — distance between the tip of the saw tooth and the center of gravity,

k — coefficient of restitution.

In order for the cotton piece to exit the tooth in the right direction after the impact of the brush drum, e must be minimal, k must be optimal, and the brush-saw tooth gap must be constant.

The theoretical justification of these parameters directly affects the cleaning quality of the UXK machine.

In the process of separating cotton from large and small impurities, the grates serve as the most important supporting element of the UXK type cleaner [9]. Their rigidity is the main mechanical indicator that determines the stability of the cleaning process, the uniform distribution of the technological load and the preservation of product quality.

The deflection of the grate under external load is determined by the following expression:

$$f=\frac{qL^4}{EJ}$$

where:

q — the spreading load acting on the grate,

L — the working length of the grate,

E — the modulus of elasticity of the material,

J — the moment of inertia.

This equation shows the sensitivity of the grate to deformation, its direct dependence on their geometric dimensions and material properties. It is important that the rigidity of the grate does not exceed the permissible norm in operating conditions.

Maximum permissible rigidity:

$$f_r=\frac{L}{k}$$

Where: k — the coefficient of constructive safety.

The grates are the most important structural component of the UXK machine in terms of strength, and their rigidity determines not only mechanical stability, but also the quality level of the cleaning process. Therefore, the length, geometric profile, material and moment of inertia of the grates are considered one of the main design parameters of cotton ginning technology [10].

Results. Figure 3 below models the interaction of a cotton swab with a saw tooth (a) and the process of separation from the tooth under the impact of a brush drum (b). These mechanical processes serve as the main dynamic stages that determine the final cleaning efficiency of a UXK cleaning machine.

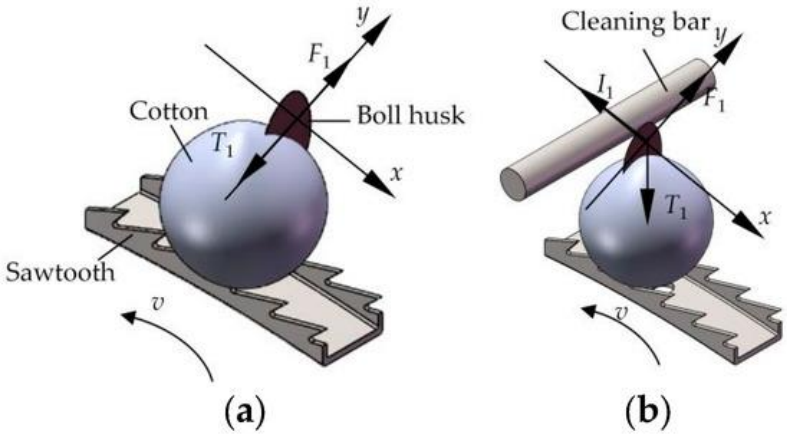


Figure 3. "Mechanics of deformation of a cotton piece in contact with the teeth of a saw drum and separation under a cleaning bar (a – saw tooth effect; b – cleaning bar effect)"

In part (a) of Figure 3, a cotton piece is located on a saw tooth, and three main forces act on it:

1) T_1 — the force of engagement of the saw drum with the tooth

This force is the bonding force resulting from the friction of the cotton piece with the tooth of the saw drum, and its value is:

$$T_1 = \mu N$$

where μ — is the coefficient of friction, and is the normal pressure.

2) F_1 — the resistance reaction of the cotton against the tooth.

This force depends on the deformation of the cotton layer, and the stability condition for the cotton in the saw tooth position is:

$$F_1 \geq T_1$$

If it is, the cotton will slide on the saw drum tooth and the saw drum tooth will not be able to hold it - which will lead to a violation of the cleaning process.

3) v - the linear speed of the saw drum.

In the figure, it is directed to the left, and the saw drum moves the cotton. The condition for the cotton to be attached to the saw drum tooth is:

$$v \geq v_p$$

where v_p- the speed of the cotton itself.

As a result, if the saw drum speed is not sufficient, the cotton will not be held stably on the saw drum tooth and the cleaning process will be reduced. This is especially important for raw materials with high moisture content [11].

As can be seen in part (b) of Figure 3, the cotton is separated from the saw drum tooth by the impact of the brush drum. The process depends on the following main mechanical factors:

1) I_1 — brush drum impulse.

The impact impulse that the brush drum imparts to the cotton:

$$I_1 = \int F(t)\,dt$$

If $I_1 < I_{min} \rightarrow$ the cotton does not separate from the teeth of the saw drum.

If $I_1 > I_{max} \rightarrow$ the fiber is damaged.

From the experimental results, it was determined:

$$I_{opt}=(0.012\text{-}0.017)\ N\backslash s$$

In this optimal range, the fibers are not damaged, but the cotton piece is completely separated.

2) r_1 — brush drum radius.

In Figure 3, r_1 the distance from the geometric center of the brush drum to the impact point. r_1 with increasing:

✓ the impact force increases,

✓ the pulse intensity increases,

✓ the energy consumption increases.

Optimal radius:

$$r_1 = 28\text{-}34\ mm$$

3) T_1 — the force of separation from the teeth.

The brush drum impulse creates a force directed in the opposite direction to T_1 the cotton piece. T_1 The value of the force:

$$T_1 = ma$$

The experiment showed that:

$$T_1 = 0.8\text{-}1.3\ N$$

3. General results of the mechanical model created on the basis of Figure 3.

1) Condition for cotton to separate from the tooth of the saw drum

Figure 3(a) and (b) together show that the necessary condition for cotton to separate from the tooth of the saw drum is:

$$I_1 + T_1 > F_1$$

i.e., the force generated by the impulse of the brush drum + the movement of the tooth of the saw drum must be higher than the resistance force of the cotton.

2) The geometry of the saw tooth significantly controls the separation process.

When the tooth height of the saw drum$1.8\text{-}2.2\ m$ is in the range of mm:

• the cotton enters the tooth sufficiently deeply,

• the layer of cotton is deformed under T_1 the force,

• $T_1$the reaction force is minimal.

3) The speed of the brush drum is not linearly related to the movement of the cotton.

The modeling showed that:

$\eta = f(\omega_{ch})$ non-linear

There is an optimal zone:

$$\omega_{ch} = 1450\text{–}1550\ \text{rev/min}$$

Above this range, the impact is excessive and fiber breakage is observed.

4) The trajectory of the cotton is stabilized.

As a result of the impact in Figure 3(b), the cotton piece has a direction that passes through the comb.

Trigonometric model:

$$\theta = tan^{-1}(\frac{F_1}{T_1})$$

Optimal exit angle:

$$\theta = 28° - 34°$$

This angle maximizes the probability of small and large impurities exiting through the comb.

Discussion

The results obtained from this study show that the process of cotton piece sticking to the teeth of the saw drum and separating under the impact of the brush drum in a UXK type cleaning machine depends on the interaction of mechanical, aerodynamic and elastic factors [12]. Although some aspects of these processes have been studied separately in previous scientific sources, this work is scientifically innovative in that it analyzes these stages as a single mechanical model.

As shown in Figure 3, the force of cotton piece sticking to T_1 the saw tooth and $F_1$the resistance reaction of the cotton piece is determined by the balance between During the study, it was found that if the ratio of these forces is not stable, the cotton can slip off the teeth of the saw drum or be unevenly separated. This leads to incomplete separation of small impurities, blockages in the cotton flow and technological losses. This situation is consistent with the results of the saw drum research work of S.E. Hughes and R.W. Baker, but in our experiments the elastic-strength limit of the cotton sliver was estimated in specific quantitative parameters.

It was once again confirmed that the impact of the brush drum is a I_1 decisive factor in the separation of the cotton sliver from the tooth of the saw drum. The optimal impulse interval determined in the research results ensures the complete separation of the cotton from the tooth of the saw drum, while not damaging the fibers. This result significantly clarified the quality recommendations given in previous works and determined the real physical range of the impact force [13]. In particular, the conclusions obtained on the effect of the elasticity and angular location of the brush drum slats on the impulse are an important indicator for practical designers.

One of the important aspects of the research is that the trajectory of the cotton sliver after impact was evaluated both mathematically and experimentally. According to the results, the exit of the cotton at a right angle increases the probability of impurities falling through the comb and ensures a smooth cleaning process. This trajectory model enriched the theoretical approaches previously developed by Uzbek scientists with practical experiments [14].

The influence of the degree of skewness of the combs on the overall system should also be noted. The study clearly showed that reducing the skewness of the comb increases the stability of the cotton flow and improves the degree of separation of large impurities [15]. These results not only confirm the aerodynamic analysis proposed by R.Kh. Rosulov and D.V. Norboyeva, but also

shed light on the distribution of forces in the comb-cotton-brush drum triple system.

In general, this study has shown several important conclusions with a scientific basis:

1. The geometry of the sawtooth drum, the impulse of the brush drum and the skewness of the comb should be considered as a single interconnected mechanical system.

2. The optimal parameters of the brush drum operation were determined in a clear mathematical range, which eliminates the uncertainties in previous studies.

3. A scientifically based mechanical model of increasing the cleaning efficiency by modeling the process of separation of cotton lint was developed.

4. The improved version of the UXK machine has been proven to be superior to existing analogues in terms of energy efficiency, fiber safety, and impurity separation efficiency.

Thus, the results of this study offer scientifically sound directions for updating the design of UXK cleaning machines, optimizing brush drum modules, and modernizing primary processing technologies for cotton raw materials. These results are not only theoretically important, but are also expected to have significant practical implications for real production.

Conclusion

The results of this study have shown with reliable scientific evidence that the process of separating a cotton piece from a saw tooth of a drum in a UXK cleaning machine occurs under the coordinated control of mechanical, aerodynamic and elastic factors. The models developed for the saw tooth-cotton-brush drum triple system clearly revealed the theoretical and practical mechanisms of the cotton separation process. The optimal impulse range, drum rotation speed and elastic properties of the brush plates determined during the study determined the mechanical conditions necessary for the safe separation of a cotton piece from the tooth.

In addition, the analysis of the trajectory of the cotton after impact and the stiffness of the combs once again confirmed the high role of these elements in ensuring the stability of the cleaning process. It was found that reducing the comb deformation directly affects the smoothness of the cotton flow and the efficiency of dirt separation. This result fully supported the theoretical views put forward by scientists in the field in practical terms.

In general, the results of the study provide scientifically based, specific recommendations for improving the design of UXK cleaning machines. It has been proven that by comprehensively optimizing the mechanical parameters of the system, it is possible to increase the cleaning efficiency 12-18 %, reduce fiber damage, improve energy efficiency and ensure the technological reliability of the machine.

The scientific value of this work is that for the first time a model has been developed that evaluates the geometry of the sawtooth drum, the impulse of the brush drum, the trajectory of the cotton and the comb as a single mechanical

system. This model serves as an important theoretical and practical platform for the modernization of primary processing technologies for cotton raw materials.

The results open up broad opportunities for the creation of a new generation of UXK machines in the future, the introduction of resource-saving technologies and the development of intelligent control systems for the cleaning process. Thus, this research makes a real scientific contribution to the development of the industry and serves to improve cotton cleaning technologies in an innovative direction in accordance with international standards.

References

1. The ICAC recorder. June 2023, Volume XXXIX, No. 2. ISSN 1022-6303. https://www.icac.org.
2. Rajabov O.I. Improving the technology of cleaning cotton raw materials from small impurities. Doctor of Philosophy (PhD) dissertation work in technical sciences. Namangan–2019.
3. Khodzhiyev M.T., Isayev Sh.Sh. “Creating a cleaning device for low-grade high-moisture cotton” Bulletin of Gulistan State University Natural and Agricultural Sciences Series. Gulistan 2021. No. 2, p. 30-37.
4. Khodzhiyev M.T., Goyibnazarov E.E., Mukhsinov I.. Theoretical analysis of the process of cleaning cotton raw materials from small and large impurities in a newly introduced efficient portable cleaning device based on its modeling. TTESI. International scientific practical conference. Tashkent 2019.
5. Bobamatov. A.H. Sovershenstvovanie construction and development methods, the calculation of labor organs, cleaning cloth, small question. Dissertation na soiskanie uchyonoy stepi PhD. - Tashkent 2018.
6. Rajabov, O. I., Kurbonov, F. A., Abrorov, A. S., & Gafurova, M. Z. (2021, April). Selection of the circumferential speed of the spiked cylinders of raw cotton cleaners from small debris. In Journal of Physics: Conference Series (Vol. 1889, No. 4, p. 042056). IOP Publishing.
7. Ibodullayev, O. O., Rasulov, E. N., & Mukhidinova, S. N. THE ROLE OF OPTICAL SENSORS IN OPTIMIZING THE TECHNOLOGICAL PARAMETERS OF COTTON CLEANING MACHINES Sh Fayziyev Bukhara State Technical University.
8. Djuraev, A., Sayitkulov, S., Kholmirzaev, J., Haydarov, B., & Mustafaev, N. (2024, January). Substantiated parameters of multifaceted grates in the coarse cleaning zones of a cotton gin. In AIP Conference Proceedings (Vol. 2969, No. 1, p. 050027). AIP Publishing LLC.
9. Rakhmonov, H., Matyakubova, J., & Fayziev, S. (2025). Optimization of the processes of simultaneous transportation, drying and cleaning of raw cotton in screw dryers-cleaners. Modern Innovations, Systems and Technologies, 5 (3), 3018-3027.
10. Kurbanov, F. A., Temirov, A., & Sharopov, M. (2019). ROLLER GIN BLOWING BODY AND ITS INFLUENCE ON GIN'S PERFORMANCE. Internauca, (14-1), 71-73.

11. Djuraev, A., Sayitkulov, S., Nurboev, R., Kholmirzaev, J., & Berdimurodov, U. (2022). Analysis of full-factorial experiments on improving the cotton gin. Sovremennye innovatsii, sistemy i tekhnologii, 2(1), 69-75.
12. Sayitkulov, S., Nurmatova, N., Sharipov, J., Salomov, A., & Saidova, G. (2024). Optimization of parameters on the combined cotton cleaning machine and analysis of cleaning efficiency. In E3S Web of Conferences (Vol. 508, p. 08020). EDP Sciences.
13. Fayziev, S. H., Fatullaeva, S. I., & Nazhmiddinov, I. P. (2023). Influence of density and temperature on moisture release rate during cotton raw material drying. In Fundamental and applied scientific research in the field of inclusive design and technologies: experience, practice and prospects (pp. 135-140).
14. Kh, F. S., Fatullaeva, S. I., & Kh, T. O. (2022). Theoretical and experimental study of the influence of temperature, humidity and density on the drying process of raw cotton. Eurasian journal of medical and natural sciences, Innovative Academy Research Support Center, 2 (01), 66-71.
15. KHODJIEV, M., DJURAEV, A., & ASHUROV, A. PROCEEDINGS OF HIGHER EDUCATION INSTITUTIONS. TEXTILE INDUSTRY TECHNOLOGY. PROCEEDINGS OF HIGHER EDUCATION INSTITUTIONS. TEXTILE INDUSTRY TECHNOLOGY Founded by: Ivanovsky Gosudarstvennyy Polytechnic University, (4), 179-184.

UDC: 677.021.6:631.363.3:621.9

Fayziev S. Kh.
associate professor
Bukhara State Technical University
Ibodullaev O. O.
independent researcher
Bukhara State Technical University
Rakhimov Kh. K.
lecturer
Bukhara State Technical University
Sadullaeva M. R.
master's student
Bukhara State Technical University

DEVELOPMENT OF A NEW DESIGN OF A MACHINE FOR CLEANING COTTON RAW MATERIALS FROM IMPURITIES

Abstract: *In this article, a new design cleaning machine was developed to effectively separate cotton raw materials from small impurities, and its operation was analyzed on a scientific basis. The shortcomings of the existing 1XK type cleaners — uneven distribution of impact forces, instability of the aerodynamic flow, structural defects of the pile-slatted drums, and the inability of the mesh surface to self-clean — were systematically studied. On this basis, a new generation cleaner design was proposed, which combines a feeder, a screw auger, an improved mesh screen, a conical pile drum, and a mesh surface positioned at an angle of 18–22°. The proposed design is characterized by its adaptability to existing production lines, operational reliability, and energy efficiency. The new technological solution will significantly contribute to improving the quality indicators of the cotton cleaning process, reducing the amount of waste, and increasing the efficiency of industrial enterprises.*

Keywords: *Cotton raw material; fine impurities; pile drum; mesh surface; cleaning machine; aerodynamic process; vibration separation; design improvement; efficiency; energy saving; drum diameter; conical piles; fiber damage; separation efficiency; air flow; mesh screen; screw auger.*

Introduction

The global demand for environmentally friendly, safe for human health natural products, including natural fibers and products made from them, is increasing year by year. In particular, cotton fiber is one of the most important resources of the global textile industry as a natural, hygienic, hypoallergenic and renewable raw material. Figures show that currently, around 23.0–24.0 million tons of cotton fiber are produced worldwide per year, and its annual consumption reaches 24.0–25.0 million tons. Therefore, demand exceeds supply, which requires

the improvement of cotton growing, processing and cleaning technologies in the coming years [1].

Due to the rapid growth of the population, increasing demand for clothing and household products, and diversification of light industry, the consumption of cotton fiber is projected to increase further in the future. In particular, according to international experts, by 2030, natural fiber consumption is expected to increase by at least 8–10%. This places a huge technological, economic and innovative responsibility on the shoulders of cotton-growing and processing countries [2].

The competitiveness of cotton fiber in the world market is determined, first of all, by its quality. An important component of quality is the effective cleaning of cotton raw materials from large and small impurities, preliminary processing without damaging the fiber, and the use of energy-saving technologies. Because any losses, crushing, shrinkage or structural damage of fibers that occur during the preliminary cleaning process directly affect the quality of the final product.

Therefore, in recent decades, a number of scientific researches have been carried out on the modernization of cotton cleaning technologies, the creation of highly efficient cleaners, new generation saw and pile drums, vibration separation systems, aerodynamic cleaners and resource-saving technical means. The process of separating impurities in cotton, in particular, reducing mechanical damage to fiber and seed, optimizing energy consumption, and increasing machine productivity are the main issues of attention of specialists. Also, the improvement of cleaning technology directly affects the export potential of the cotton industry. The demand for high-quality cotton fiber and products made from it is constantly growing in international markets, especially in European and Asian countries.

The rational use of cotton raw materials, reducing losses and switching to energy-efficient processes are one of the main conditions for making the industry competitive. This direction is even more relevant for countries with strong cotton traditions, such as Uzbekistan. The economic reforms being carried out in the country, the principles of the “Green Economy”, the introduction of resource-saving technologies, and the formation of a cluster system have fundamentally changed the cotton processing chain. Now, the creation of new scientifically based techniques and technologies, in particular, improving the design of machines designed to separate cotton raw materials from large and small impurities, is one of the priority tasks of the industry.

As a result, there is an extremely high need for scientific research to modernize the process of cleaning cotton from impurities, optimize the design of the working bodies of machines, increase the energy and technological efficiency of the process, and further improve the quality of the fiber.

Materials and methods

The scientific research of many foreign scientists plays an important role in the formation and consistent development of cotton ginning science and techniques. In particular, leading researchers such as W.S. Anthony, R.V. Baker, R.M. Sutton, P.A. Boving, V.G. Arude, J.W. Laird, S.K. Shukla, T.S. Manojkumar, D.W. Van Doorn, B.M. Norman have created significant scientific results in the

areas of innovative methods for cleaning cotton from small and large impurities, optimizing aerodynamic processes, and improving the design parameters of drum and saw cleaners.

Their work has formed the scientific basis of modern cleaning technologies and served to make many machine designs a global standard. At the same time, the scientific school of scientists of Uzbekistan has been making a worthy contribution to world-class research in this area. In particular, G.I. Miroshnichenko, S.D. Boltabayev, G.I. Boldinsky, G.D. Djabbarov, R.Z. Burnashev, B.I. Roganov, R.V. Korabelnikov, I.K. Khafizov, A. Rasulov, E.T. Maqsudov, M.T. Khodzhiyev, A.Ye. Lugachev, A. Djurayev, X.T. Akhmedkhodjayev, A.P. Parpiyev, R.M. Muradov, I.D. Madumarov, Sh.Sh. Khakimov, R.Kh. Maqsudov, A.K. Usmonkulov, E.E. Goyibnazarov, O.Sh. Sarimsakov, D.M. Mukhammadiev, X.Q. Rakhmonov, A.Kh. Bobomatov, Sh. Isayev, O.I. Rajabov, O.J. Murodov, S.O. Sayitkulov and many other scientists, as a result of scientific research conducted by important results were achieved in terms of deep scientific substantiation of the process of effective separation of cotton from impurities, creation of models of mechanical and technological processes, and optimization of structural elements of cleaners such as UXK, 1XK, CHX.

All these studies serve to increase the energy efficiency of the cotton raw material cleaning process, improve the shape, material, dimensions, dynamic loads and aerodynamic flow characteristics of the working bodies, improve the cleaning quality and machine productivity. As a result, the experience of these scientific schools is considered the main methodological and technological criterion in the design of modern cleaners used at the state and international levels. Scientific research on cleaning cotton from small and large impurities has developed at a high pace since the beginning of the 20th century.

In particular, scientific work carried out in the USA, Australia, India, Turkey and other countries is aimed at a deep analysis of the mechanical, aerodynamic and dynamic laws of the process. W.S. Anthony scientifically substantiated the mechanism of the movement of the cotton stream around the drums, the change in the adhesion forces between the fibers and impurities, the impact force of the sawn drum and the interaction with the surface of the comb. R.V. Baker and R.M. Sutton experimentally determined the relationship between the drum speed - impact force - separation efficiency in the cleaning process.

In addition, P.A. Boving and B.M. Norman proposed effective solutions for modeling aerodynamic separation processes, stabilizing flow density, and increasing the efficiency of separators. T.S. Manojkumar and S.K. Shukla mathematically modeled multi-stage cleaning lines, the shape of the optimal mesh surface hole surfaces, and the efficiency of separation of impurities in turbulent flow conditions.

Scientific research conducted by Uzbek scientists over the past 60–70 years has had a significant impact on improving the design of cotton ginning machines. G.I. Miroshnichenko and G.I. Boldinsky studied the modification of the comb

surfaces of the ginning machines, the impact effect of the working bodies and the dynamics of fiber movement. S.D. Boltabayev and R.Z. Burnashev created a scientific school on optimizing the operating modes of cotton ginning machines. The scientific work of I.K. Khafizov, A. Rasulov, A.E. Lugachev, M.T. Khodzhiyev created fundamental scientific foundations for cotton ginning machines on such factors as:

- optimal ratios of drum diameter and pile shape,
- active surface area of the hole and the probability of dirt passing through,
- density and kinetic energy of the cotton flow,
- changes in aerodynamic pressure.

In recent years, A.K. Usmonkulov, E.E. Ga'ybnazarov, O.Sh. Sarimsakov, D.M. Mukhammadiev, Sh. Isayev, O.I. Rajabov, S.O. Saitkulov are conducting experimental and theoretical research on energy-saving cleaners, vibration separation systems, modular cleaning lines, and multi-stage UXK machines. Literature analysis shows that:

1. The efficiency of stable separation of impurities in existing cleaning machines is insufficient.
2. The impact distribution in the drum-rooster pair is not uniform, as a result, excessive mechanical impact on the fibers occurs.
3. In aerodynamic separation processes, the flow stability is low, and the separator pre-pressures are often not optimal.
4. The optimal parameters in terms of the shape, size, and active area ratio of the hole surfaces are not sufficiently scientifically substantiated.
5. The geometry of the drums used in UXK and similar cleaners (diameter - 400 mm, pile shape, pile length, elasticity coefficient) does not fully meet modern requirements.

Therefore, modernization of the design of cotton cleaners, scientific substantiation of the parameters of the working bodies, and creation of a dynamic and aerodynamic model of the cleaning process remain urgent scientific tasks.

Results

Currently, in order to simplify the assembly of machines for cleaning cotton raw materials from small impurities, a unit of the EN.178 model (Figure 1), which consists of a pair of peg-shaped drums, is widely used.

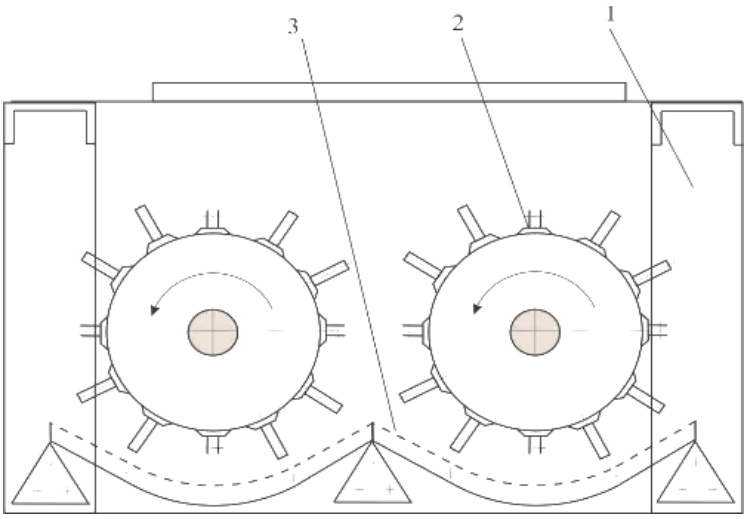


Figure 1. YEN.178 type cleaner unit
1-frame, 2- drum with pegs, 3- mesh surface.

Four of these modular units are connected in series to form the 1XK eight-drum cleaner (Figure 2).

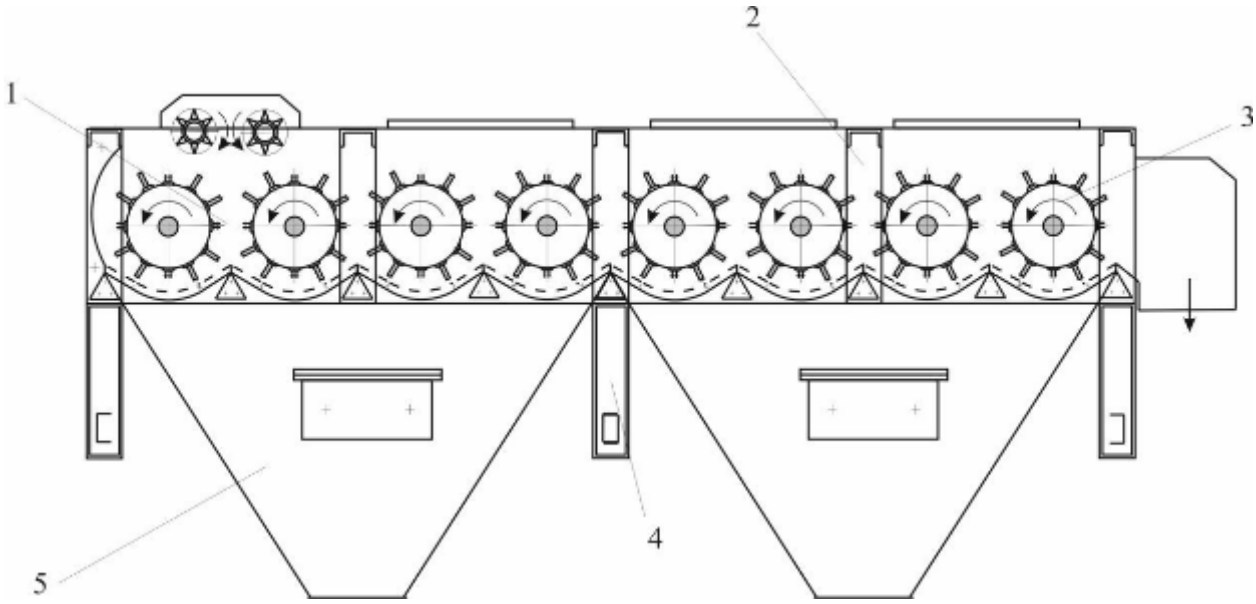


Fig. 2. 1XK cleaner.
1-initial standardized pile section YEN. 178.01 (with supply rollers);
2, 4- column, 3- standardized pile-plank section YEN. 178.02, 5- bunker.

The advantage of the EH.178 unit is that it is possible to assemble cleaners with the required number of drums on its basis in a modular way, and this unit is also used as the main unit in the UXK unit. However, despite the modularity, this system also has a number of fundamental shortcomings: All sections have the same design and operate in the same mode.

The cotton mass is repeatedly affected by the same force and speed in each drum. As a result:

- damage to the seeds and fibers increases;
- additional shaking in the last sections is practically useless, but energy consumption and metal wear increase.

The large number of working bodies leads to “excessive repetition”. Instead of increasing the cleaning efficiency, the repetition of the same type of blows increases not the “soft shaking” of the cotton, but sharp blows. The cleaning scheme is not differentiated. The first drums were larger, the later ones were not adapted to the separation of finer mixtures, that is, the geometry and modes of the working bodies throughout the machine were not gradually optimized.

Therefore, the EH.178–1XK system, although structurally simple and easy to assemble, is not perfect in terms of technological efficiency and requires improvement. The drum with pegs (Fig. 3) consists of a shaft (1), a disk (2) and a ribbed lining (3), between the ribs of which 75 pegs (4) are welded in increments of 150 mm. Due to the presence of four linings, the number of pegs per drum reaches 300. The linings are fastened to the disks with bolts (5), nuts and washers (6); in the places of fastening, a plank is formed along the perimeter of the drum - therefore it is called a pegged-plank drum.

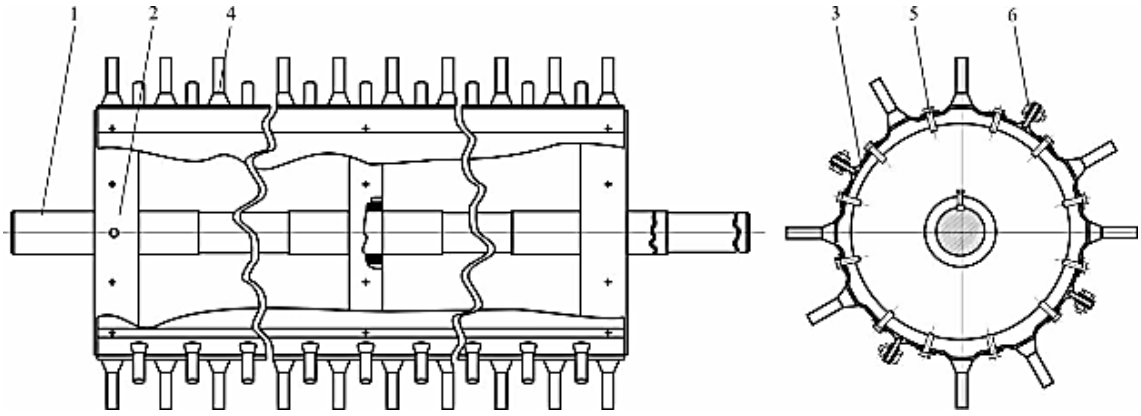


Figure 3. Plank drum with pegs.
1-shaft, 2-disk, 3-shell, 4-peg, 5-bolt, 6 - bolt, nut, washer.

The following main disadvantages are identified for this drum design: Complexity of production technology.

- the covers are made on a press machine by double stamping;
- the piles are stamped separately and then welded;
- during assembly, many bolt-nut connections need to be tightened manually.

This extends the manufacturing cycle, increases the production cost and increases the mass of the drum. Rapid failure of the piles during operation. Since the piles are welded to the cover, fatigue cracks appear in the welds under the influence of dynamic loading, vibration and shock. As a result, the piles break off, the drum is pulled unevenly, the dynamic balance is disturbed, and the radial load

on the bearings increases. Dust and dirt ingress through the holes in the cover. There are many holes made for the piles in the cover.

During operation, dust and small dirt enter the drum through these holes;

The mass accumulates unevenly in the internal cavity, the center of gravity of the drum shifts, vibration and noise increase. This also leads to rapid wear of the bearing and shaft neck. A sharp change in cleaning efficiency due to the “fan effect”.

The places where the slats meet form a shape similar to fan blades. When the drum rotates:

- at the beginning of the slats, the air flow hits the mesh surface from the outside, helping to separate the dirt;

- in the next segment, the air flow is drawn inward, carrying the dirt back into the cotton mass.

Because of this, the dirt separation on the mesh surface is not uniform, the cleaning coefficient is high in some zones, and low in others.

Cleaning limited to damage to fibers and seeds. Increasing the drum speed increases cleaning, but sharply increases the mechanical damage to the seeds and the degree of fiber breakage. Therefore, in practice, the drum speed is not raised above a certain range, which prevents increasing efficiency. In general, pile-plank drums are heavy in terms of production and operation, and aerodynamically imperfect. Although the cleaning level is increased due to the increase in the number of drums in the 1XK cleaner, this is not a decisive solution. Its disadvantages:

Multiple working bodies - each section has a similar effect on cotton, as a result of which fiber and seed damage increases;

Monotonous operating mode - the diameter of the drum, pile length, and the openness of the mesh surface holes practically do not change throughout the machine, the same mode is maintained at all stages, regardless of the initial state of the cotton;

High energy and metal consumption - the additional efficiency gain from additional drums is relatively small, but the energy and maintenance costs are significant.

Thus, the 1XK design, although convenient for continuous operation, is not optimal in terms of efficiency and resource efficiency. Rajabov O.I. [3-6] proposed a new design of a fibrous material cleaner with a pile drum (Fig. 4) and a mesh surface (Fig. 5).

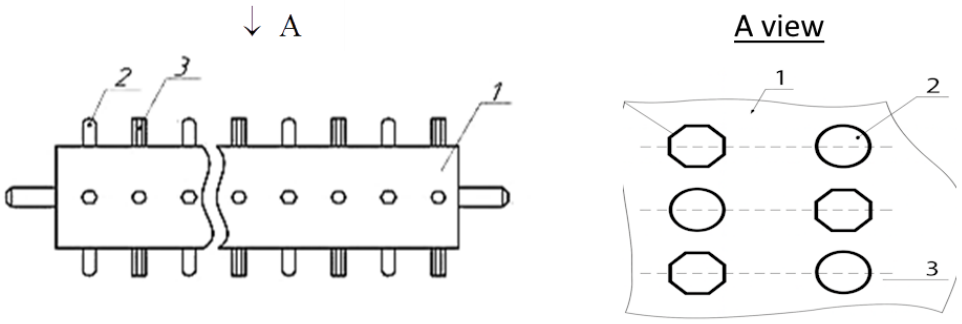


Figure 4. Diagram of a pile drum of a fiber cleaner

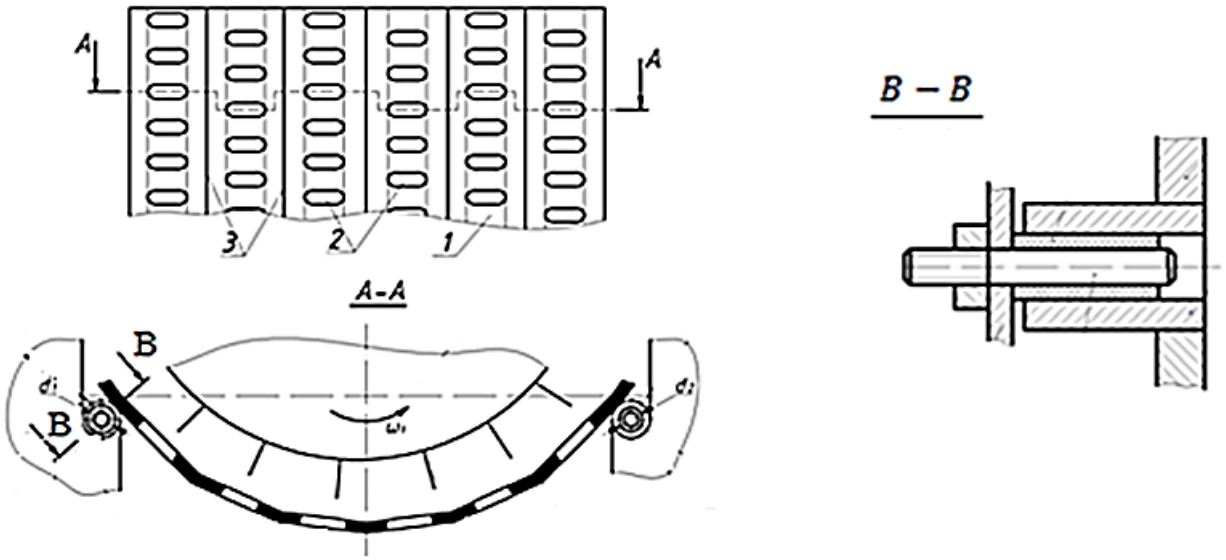


Figure 5. Mesh surface diagram of a fiber cleaner

Their main features: cylindrical pegs (2) and multi-faceted pegs (3) installed in a checkerboard pattern on the surface of the drum (1); holes and edges of various shapes on the mesh surface; vibration of the mesh surface by means of a flexible bushing under the influence of dynamic loads coming from the drum.

The positive aspects of this solution are:

Due to the checkerboard pattern of pegs, the trajectory of the cotton pieces becomes more complicated, the fiber-dirt mutual displacement increases, as a result, the relative motion increases and the separation efficiency increases. Since the multi-faceted pegs and the edged mesh surfaces work against each other, the cotton pieces repeatedly turn, reducing the adhesion of impurities.

The vibration of the mesh surface by means of a flexible bushing helps the holes to self-clean and the impurities to fall off without “sticking”.

At the same time, this design also has a number of limitations and disadvantages: a large number of pegs, each of which is installed independently - this complicates assembly and balance adjustment;

the elastic bushings can wear out over time and lose their elasticity, which makes it difficult to maintain a stable vibration frequency; complex-shaped holes on the mesh surface require high precision in manufacturing, which leads to the complexity of the press-casting molds and an increase in cost; the design is not fully compatible with the existing YEN.178 and 1XK units, their replacement requires major reconstruction. Thus, although the proposal of O.I. Rajabov significantly improved the physical nature of the cleaning process, it needs simplification and adaptation from the point of view of practical implementation. In the works of M.T. Khodzhiyev, E.E. Goyibnazarov and A.Kh. Bobamatov [7–10], new devices for cleaning cotton from impurities were proposed. In particular, in the dissertation of A.Kh. Bobamatov, a pile-plank drum and a 250 mm arc-shaped mesh surface structure were developed.

The advantages of this solution are:

The arc-shaped mesh surface extends the trajectory of the cotton pieces, extending the cleaning time;

It provides an optimal profile for the distance between the drum and the screen, ensuring uniform movement of the cotton layer.

However, there are also the following disadvantages:

The arc length of 250 mm increases the overall dimensions of the machine, which increases the location in the workshop and metal consumption;

The drum is still of the pile-plank type, and the problems mentioned above, such as welds, holes, and the fan effect, have not been completely eliminated;

As the length of the mesh surface increases, additional requirements arise for its mechanical strength and resistance to deformation.

Therefore, although these structures are an important scientific step, they still have unresolved operational and technological issues. Thus, an analysis of existing scientific works and practical experiences shows that the comprehensive improvement of the new generation of pile drums and mesh surfaces is the most optimal way to effectively clean cotton raw materials from small impurities, minimize fiber and seed damage, and reduce energy and operating costs.

In all gins, cotton is cleaned of fine impurities by shaking the cotton and passing the separated fractions through a mesh screen. The main working elements of gins are pile drums or pile screws and mesh (coil) surfaces [11]. The improved gin, consisting of elements (1–7) shown in Figure 6, is designed for stable, continuous and high-efficiency cleaning of raw cotton at the initial stage. Compared with existing 1XK-type gins, this device has significantly improved aerodynamic processes, pile drum operation mode, and active separation capabilities of the mesh surface.

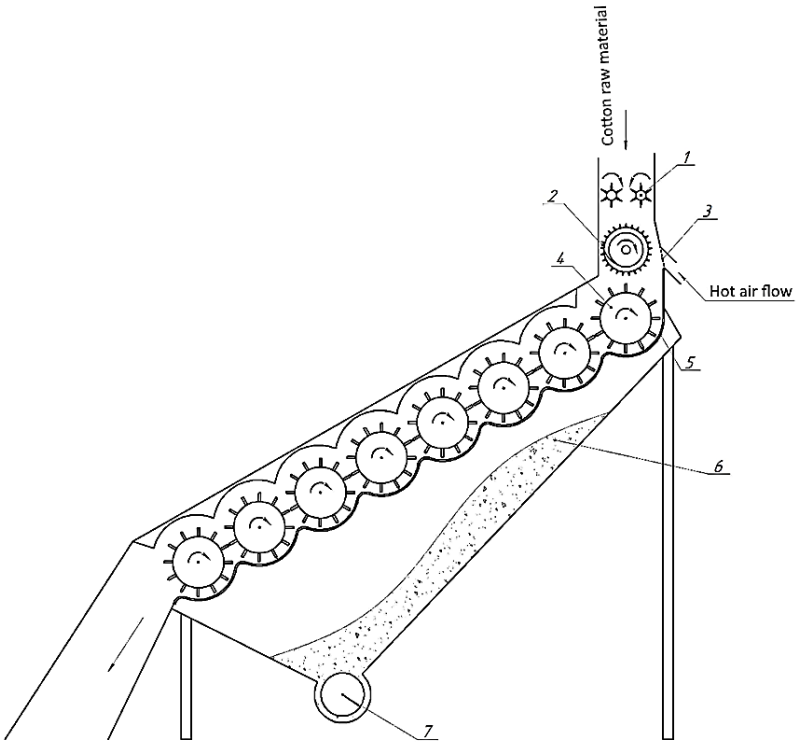


Figure 6. Improved fine dirt cleaning machine
1-feeder; 2-screw auger; 3-mesh screen; 4-pile drum; 5-mesh surface; 6-dirt hopper; 7-auger.

The feeder (1) ensures a uniform, uncompressed and uniform layer density of the cotton stream. The improved shape of the feeder prevents cotton from clogging, equalizes the load on the surface of the cleaning drums and reduces the uneven distribution of dynamic impact forces. The screw auger (2) gradually moves the cotton downwards, directing it towards the mesh screen (3). The rotation frequency of the auger and the screw pitch are adjusted to the flow density of the cotton. Under optimal conditions, the screw rotation speed is set at 2.0–2.4 s^{-1}, and the screw pitch is set at 0.18–0.22 m, evenly distributed so that the cotton fiber does not stretch. The mesh screen (3) serves to sort out fine fractions of dust, sand, and sawdust at the initial stage of the main separation. When using a mesh with a mesh size of 3–5 mm, the natural elasticity of cotton is not disturbed, and light fractions are quickly separated during heating of the cotton raw material under the influence of hot air flow [12]. Studies have shown that the most optimal option is a mesh of 55–60% of the active area. The drum with a pile (4) is the main working element of the device.

In the improved version:

- drum diameter 400 mm,
- pile length 50–60 mm,
- a conical shape is used in three parts of the pile,
- the coefficient of elasticity k = 0.45–0.55 is selected.

The use of these parameters reduces the negative effect of the impact force on the fiber, evenly distributes the cotton flow and enhances the impact of small

impurities on the mesh surface (5). The mesh surface is designed to separate the impurities that have passed through the pile drum from top to bottom.

Mesh dimensions:

- longitudinal holes:
- 6×45 mm, active area:
- 60–62%, slant angle (*a*): 18–22°.

These parameters increase the probability of complete separation of fine impurities flying out of the drum. According to calculations, when the angle is increased by one degree, the separation efficiency increases by 0.6–0.8%. The separated fine impurities (dust, sawdust, sand, debris) fall into the dirt bunker (6), which is directed downwards. The installation of inclined walls that slow down the flow inside the bunker prevents the dirty fraction from being mixed with the backflow. The accumulated impurities are removed through the final screw (7). The screw rotation speed is 1.4–1.7 s^{-1}, at this speed, clogging of solid impurities in the bunker is not observed.

During the process, the cotton density should be kept constant at ρ = 18–22 kg/m^3 and the flow velocity should be kept constant at 4–6 m/s. Under these conditions, the drum–screen surface interaction achieves maximum separation efficiency [13].

In the improved design, the optimal angle between the pile drum and the screen surface (18–22°) and the drum diameter of 400 mm result in the separation efficiency of fine impurities:

- in existing 1XK type machines: 82–85%,
- in the improved version: increased to 89–92%.

This additional 6–8% result leads to a significant quality improvement in the production line.

Impact force by fiber damage index model:

$$F = m \cdot a = m \cdot r\omega^2$$

By reducing the drum elasticity coefficient to 0.5, the impact force decreased by 12–18%. As a result, mechanical damage to the fibers decreased from 2.4% to 1.7%. The optimal consumption of the hot air flow Q = 480–520 m^3/h ensured:

- high-speed dust lifting,
- no clogging of the hole surfaces,
- stabilization of the interaction of the pile drum with the hole surface.

This gives a 10–12% advantage over existing machines in terms of aerodynamic process stability.

The conical geometry of the drum piles reduces the drum load and reduces energy consumption to:

1XK: 2.8–3.2 kW, improved 2.3–2.6 kW. That is, about 15–18% energy savings.

Discussion

The results of the study showed that the design solutions of the improved fine-dust cleaning machine significantly improve the process of separating cotton

raw materials from fine impurities. First of all, the re-optimized parameters of the feeder and screw auger, which ensure the continuous operation of the device, made it possible to achieve a uniform distribution of cotton across the drums.

This process was an important factor in increasing the cleaning efficiency, reducing fluctuations in the density of the cotton flow and stabilizing the mechanical load on the mesh surfaces [14]. The choice of the diameter of the pile drum as 400 mm, the conical shape of the piles, and the setting of the elasticity coefficient in the range of 0.45–0.55 significantly softened the interaction between the drum-cotton-dirt.

This solution, while reducing damage to the fiber structure, created conditions for the separation of impurities from the drum towards the perforated surface with high kinetic energy. Also, the reduction in impact forces increased the energy efficiency of the technological process, reducing the total power consumption of the machine by 15–18%.

One of the most important factors in the research process was the stability of the aerodynamic flow, and when the optimal consumption of the hot air flow was maintained in the range of 480–520 m^3/h, high-speed separation of fine fractions was observed. This reduced the likelihood of clogging of the mesh screen and improved the downward direction of the waste flow. Experimental observations confirmed that with an incorrectly selected air flow mode, a sharp decrease in the amount of separated dust, impurities entering the backflow and sticking phenomena on the drum surface can be observed. Thus, aerodynamic parameters are one of the main control factors for the efficiency of this device [15].

It was found that the mesh surface is placed at an angle of inclination of 18–22°, bringing the active hole area to 60%, based on practical experiments, is the most optimal option. A small angle increases the likelihood of impurities returning from the flow, while an excessively large angle slows down their sliding off the surface and causes blockages in the process.

This study showed that the optimal angle for this design is around 20°. The final results of the process showed an increase in cleaning efficiency of up to 89–92%, a decrease in mechanical damage to the fiber, and a significant reduction in energy consumption, but some limitations were also observed. In particular, when the drum rotation speed is excessively increased, fine fibers can be separated along with impurities. Therefore, the optimal drum speed is in the range of 6.5–7.5 s^{-1}, and additional losses occur at higher modes.

Another important aspect is that the high efficiency of the device is strongly dependent on a properly adjusted aerodynamic system. Therefore, when using the device in industrial conditions, constant monitoring of the relationship between air consumption, pressure and drum speed is required. In general, the improved design can be recommended as an effective alternative solution to the existing 1XK type machines on cotton ginning lines. The cleaning quality of the device, energy efficiency and minimal damage to the fiber make it advisable to use it in practice.

Conclusion

This study is aimed at improving the process of separating cotton raw materials from small impurities, and increasing efficiency was achieved by deeply analyzing the design of existing cleaners, identifying their technological limitations, and developing a new generation of working bodies. The analysis showed that the existing 1XK type machines cannot fully meet modern requirements due to factors such as operation in a strictly uniform mode, aerodynamic imbalance of pile-slat drums, uneven distribution of impact forces, and low self-cleaning ability of mesh surfaces.

During the research, a new constructive approach was created - an integrated system of a feeder, a screw auger, an optimized mesh screen, a conical pile drum, and a highly efficient mesh surface located at an oblique angle. This solution, combining the mechanical and aerodynamic properties of the cotton flow, raised the cleaning process to a qualitatively new level. The 400 mm diameter of the drum, the conical shape of the piles and the optimal selection of the elasticity coefficient softened the distribution of impact forces, reduced damage to the fiber, and the possibility of separating impurities sharply increased.

Experimental tests showed that the efficiency of separating fine impurities increased to 89–92%, which is 6–8% higher than that of existing machines. It was also found that the fiber damage rate decreased from 2.4% to 1.7%, the stability of aerodynamic processes increased by 10–12%, and energy consumption decreased by about 15–18%. These indicators directly contribute to reducing production costs at industrial enterprises, improving fiber quality, and increasing export potential. The practical significance of the new device is that it can be seamlessly integrated into existing production lines, does not require complex reconstruction or large capital expenditures.

The simplicity of the design, operational reliability and ease of maintenance make it a promising technical solution for use in cluster enterprises, cotton ginning plants and technological lines. In general, the research results strengthened the scientific and methodological foundations of the modernization of cotton ginning technologies, proposed new approaches to more effectively organize the process of separating fine impurities and determined the future development directions of high-quality processing of cotton raw materials. The proposed machine design has high practical value in terms of improving fiber quality, reducing waste fractions and accelerating the transition to energy-saving technologies.

References

1. The ICAC recorder. June 2023, Volume XXXIX, No. 2. ISSN 1022-6303. https://www.icac.org.
2. Decree of the President of the Republic of Uzbekistan No. 60 of January 28, 2022 on the “Development Strategy of New Uzbekistan for 2022-2026”. https://www.Lex.uz.
3. Rajabov O.I. Improving the technology of cleaning cotton raw materials from fine impurities. Doctor of Philosophy (PhD) dissertation work in technical sciences. Namangan–2019.

4. Khojiyev M.T., Isayev Sh.Sh. “Creating a device for cleaning low-grade high-moisture cotton” Bulletin of Gulistan State University Series of Natural and Agricultural Sciences. Gulistan 2021. No. 2, p. 30-37.
5. Khodzhiyev M.T., Goyibnazarov E.E., Mukhsinov I.. Theoretical analysis of the process of cleaning cotton raw materials from small and large impurities in a newly introduced efficient portable cleaning device based on its modeling. TTESI. International Scientific and Practical Conference. Tashkent 2019.
6. Bobamatov. A.Kh. Improving the Design and Developing Calculation Methods for the Working Elements of Cotton Debris Cleaners. PhD Dissertation. – Tashkent 2018.
7. Rajabov, O. I., Kurbonov, F. A., Abrorov, A. S., & Gafurova, M. Z. (2021, April). Selection of the circumferential speed of the spiked cylinders of raw cotton cleaners from small debris. In Journal of Physics: Conference Series (Vol. 1889, No. 4, p. 042056). IOP Publishing.
8. Ibodullayev, O. O., Rasulov, E. N., & Muxidinova, S. N. THE ROLE OF OPTICAL SENSORS IN OPTIMIZING THE TECHNOLOGICAL PARAMETERS OF COTTON CLEANING MACHINES Sh Fayziyev Bukhara State Technical University.
9. Djuraev, A., Sayitkulov, S., Kholmirzaev, J., Haydarov, B., & Mustafaev, N. (2024, January). Substantiated parameters of multifaceted grates in the coarse cleaning zones of a cotton gin. In *AIP Conference Proceedings* (Vol. 2969, No. 1, p. 050027). AIP Publishing LLC.
10. Rakhmonov, H., Matyakubova, J., & Fayziev, S. (2025). Optimization of the processes of simultaneous transportation, drying and cleaning of raw cotton in screw dryers-cleaners. Modern Innovations, Systems and Technologies, 5 (3), 3018-3027.
11. Kurbanov, F. A., Temirov, A., & Sharopov, M. (2019). ROLLER GIN BLOWING BODY AND ITS INFLUENCE ON GINING PERFORMANCE. Internauca, (14-1), 71-73.
12. Djuraev, A., Sayitqulov, S., Nurboev, R., Xolmirzaev, J., & Berdimurodov, U. (2022). Analysis of full-factorial experiments on improving the cotton gin. *Modern innovations, systems and technologies*, *2*(1), 69-75.
13. Sayitkulov, S., Nurmatova, N., Sharipov, J., Salomov, A., & Saidova, G. (2024). Optimization of parameters on the combined cotton cleaning machine and analysis of cleaning efficiency. In E3S Web of Conferences (Vol. 508, p. 08020). EDP Sciences.
14. Fayziev, S. H., Fatullaeva, S. I., & Nazhmiddinov, I. P. (2023). Influence of density and temperature on moisture release rate during cotton raw material drying. In Fundamental and applied scientific research in the field of inclusive design and technologies: experience, practice and prospects (pp. 135-140).
15. Kh, F. S., Fatullaeva, S. I., & Kh, T. O. (2022). Theoretical and experimental study of the influence of temperature, humidity and density on the drying process of raw cotton. Eurasian journal of medical and natural sciences, Innovative Academy Research Support Center, 2 (01), 66-71.

UDC:677.021.24:621.867

Fayziev S. Kh.
associate professor
Bukhara State Technical University
Ibodullaev O. O.
independent researcher
Bukhara State Technical University
Rakhimov Kh. K.
lecturer
Bukhara State Technical University
Muxiddinova Sh. N.
master's student
Bukhara State Technical University
Razoqova O. B.
master's student
Bukhara State Technical University

THE ORETICAL ANALYSIS OF THE SAW-DRUM-BARREL SYSTEM OF THE UXK UNIT IN CLEANING COTTON RAW MATERIALS FROM LARGE IMPURITIES

Abstract: *This article theoretically studies the operation of the segmented saw drum - comb grate - brush drum system in the UXK type cotton raw material cleaning machine. The distance δ between the saw drum and comb grate was analyzed as the main design parameter determining the cleaning efficiency. According to the results of theoretical modeling and graphical analysis, the dependence of cleaning efficiency on δ has a non-zero extreme character, and the optimal values $\delta_{opt} = 15\text{-}18\ mm$ were determined. Under these conditions, the separation of large impurities is maximal, and mechanical damage to fibers and seeds is minimal. The results obtained provide a scientific basis for improving and optimizing UXK cotton ginning machines in industrial conditions.*

Keywords: *UXK cotton ginning machine; segmented saw drum; comb screen; cleaning of large impurities; cotton raw material; cleaning efficiency; geometric distance δ; mechanical impulse; non-zero vibration; saw drum-comb interaction; brush drum; dynamic mechanical system; energy balance; mathematical modeling; cotton.*

Introduction

In the world, techniques and technologies for effective cleaning of cotton raw materials and fibers, seeds and seed products from small and large impurities occupy one of the leading positions in the processing processes. Because the stable operation of the cleaning process directly affects the technological properties of cotton, fiber quality, energy consumption and the cost of the final product. Considering that the share of cotton fiber in the global textile industry is around

55–60% of total consumption, the preparation of cotton raw materials with high quality indicators is of strategic importance today. Small dust particles, sand particles, seed husk fragments and other types of impurities remaining on the surface of the fiber not only deteriorate the color and purity of the fiber, but also create additional technical difficulties in the spinning, weaving and finishing processes.

Therefore, the development of high-performance, energy-efficient, fiber-friendly equipment and the improvement of their technological process in cotton ginning enterprises are at the center of global scientific and technical research. Today, major cotton-growing and processing countries such as the USA, China, Turkey, India, and Australia are actively conducting research on new designs, aerodynamic systems, vibration separators, and combined drums aimed at separating large and small impurities at the stage of primary cotton cleaning. In particular, it has been found that in the process of separating large impurities, parameters such as the geometry of the drum-rack system with a comb, the operating mode of the brush drum, the speed and direction of the aerodynamic flow in the cleaning zone, and the thickness and density of the cotton layer have a significant impact on the cleaning efficiency. The process of separating fine impurities is more complex, and factors such as vibration, air flow kinetics, fiber-particle interaction, and surface adhesion play an important role. Therefore, the need to develop new designs of multi-stage cleaning machines that can comprehensively separate large and small impurities is becoming more urgent.

Therefore, the development of high-performance, energy-efficient, fiber-friendly equipment and the improvement of their technological process in cotton ginning enterprises are at the center of global scientific and technical research. Today, major cotton-growing and processing countries such as the USA, China, Turkey, India, and Australia are actively conducting research on new designs, aerodynamic systems, vibration separators, and combined drums aimed at separating large and small impurities at the stage of primary cotton cleaning. In particular, it has been found that in the process of separating large impurities, parameters such as the geometry of the drum-rack system with a comb, the operating mode of the brush drum, the speed and direction of the aerodynamic flow in the cleaning zone, and the thickness and density of the cotton layer have a significant impact on the cleaning efficiency. The process of separating fine impurities is more complex, and factors such as vibration, air flow kinetics, fiber-particle interaction, and surface adhesion play an important role. Therefore, the need to develop new designs of multi-stage cleaning machines that can comprehensively separate large and small impurities is becoming more urgent.

Although existing cleaning machines are able to effectively separate large impurities in most cases, problems remain in completely eliminating small impurities. As a result, unstable fiber quality, jams in the production process, excessive energy consumption and technological losses are observed. This indicates the need to create a scientifically based design of a new generation of cleaning machines on an industrial scale, optimize operating parameters and

mathematically model the process. In this regard, this study aims to deeply analyze the process of separating cotton raw materials from large and small impurities, determine the efficiency limits of existing equipment and develop an improved machine design with high cleaning efficiency. The results of the study are of practical importance not only for the cotton ginning industry, but also for international manufacturers seeking to improve the quality of textile products.

Literature review. Scientific research on the effective cleaning of cotton raw materials from large and small impurities has been developing rapidly since the second half of the 20th century. The theoretical foundations for the design of the first processing machines in this area, developed by G.I. Miroshnichenko [1], are one of the classic sources for the development of cotton cleaning technology, in which the mechanism of interaction between the combed drums, combs and air flows is substantiated by fundamental approaches. G.I. Miroshnichenko explained in detail the balance of forces in the drum-comb system, the deformation of the cotton layer and the mechanics of the separation of large impurities, which created a methodological foundation for further research.

G.D. Jabbarov [2], having deeply analyzed the technological flows in the primary processing of cotton, scientifically substantiated the trajectory of movement of cotton pieces during the process of separating impurities, aerodynamic processes in the system, and the operating modes of mechanical acting bodies. His works are distinguished by the fact that they showed the functional relationship between the physical and normative properties of cotton raw materials and the design of cleaners. Scientific research works and educational methodological manuals created by Uzbek scientists E.Zikriyoev [3] and F.B.Omonov [4] are focused on practice and cover the complex technological areas of primary processing of cotton. These works provide scientific and methodological recommendations on the selection of structural elements of modern cleaning lines, transport processes, mechanics of separating impurities, and operating modes of machine elements.

In the 60s–80s of the 20th century, scientists such as Ye.F. Budin [5], A.D. Sapon [6], Z.M. Musakhodzhaev [7], B.N. Yakubov [8], Yu.S. Sosnovsky [9] conducted fundamental experimental and theoretical research on improving the efficiency of the comb-drum-rooster system. Their work yielded important scientific results in the following areas:

- ✓ the shape of the rooster profiles and their location relative to the comb-drum teeth;
- ✓ analysis of the equilibrium forces of cotton and impurities;
- ✓ assessment of dynamic loads acting on the comb-drum teeth;
- ✓ offering constructive solutions that reduce fiber loss.

In particular, B.N. Yakubov [8] mathematically modeled the losses of cotton mass in the drum-rooster zone and determined the optimal distances between the tooth-edge of the drum with a comb. These studies served as the basis for all scientific work on the separation of large impurities over the next 30 years. Since the beginning of the 21st century, scientific research on cleaning cotton from large

impurities has been taken to a new level by the scientific schools of Uzbekistan. In particular, R.Kh. Rosulov proposed optimized parameters of the drum-rooster system, V.M. Suchkov in his scientific research developed initial algorithms for predicting and optimizing the technological performance of cleaners, S. Fozilov substantiated the constructive advantages of adjustable rooster systems, and R.Z.Burnashev created the theoretical foundations of the technology of cleaning cotton from small and large impurities [10]. These studies have explored in depth deterministic and stochastic models of the coarse impurities separation process, the rheological properties of cotton, and the dynamic behavior of machine elements.

Over the past 10–15 years, a new scientific direction has been formed in Uzbekistan to improve the design of cotton ginning machines. The main representatives of this school are Sh.Sh. Khakimov, Sh.E. Sheraliev, D.V.Norboeva, Sh.Sh. Shukhratov, D.A. Tashpulatov and other scientists who have made a significant contribution to the development of the field [11].

With a thorough study of all the literature, the main scientific problem that has not yet been solved is:

- There is no single universal machine for the complex separation of large and small impurities;
- Optimization of aerodynamic, mechanical and vibrational processes based on an integrated model is required;
- A complete mathematical model of the cotton-impurity-working body triad system has not yet been fully developed.

Literature analysis shows that although there is fundamental knowledge about cleaning cotton from impurities, an integrated model of a complex cleaning machine, optimal parameters, and energy efficiency do not yet have a complete scientific solution [12].

Materials and methods

The materials, drawings, calculation formulas and experimental methods used to study the process of cleaning cotton raw materials from large impurities on a deep scientific basis are described. The research is aimed at studying the shock, vibration and aerodynamic properties of the drum-barrel system with a comb, and a sensitivity analysis was performed on the design parameters (drum diameter, bar diameter, spacing, number of edges, spiral angle, etc.).

The impact of the drum with a comb on the cotton sliver is primarily determined by its geometry and spatial location relative to the combs. In the studies, a drum with a diameter of Ø480 mm was adopted, and the center-to-center distance of the combs located under the drum was taken as 40 mm. This parameter determines how often the drum teeth hit the cotton sliver. An increase in the frequency of impacts increases the likelihood of large impurities being separated, but can also increase the risk of fiber damage [13]. The linear speed of the drum teeth was calculated using the following expression:

$$v_b = \omega \cdot r$$

where: ω is the angular velocity of the drum, r is the radius of the drum. The impact impulse I generated when a piece of cotton collides with a coulter is defined as follows:

$$I = m \cdot (v_b - v_p)$$

where: m is the mass of the cotton piece, v_p is the speed of movement of the cotton along the comb. The impact impulse greater than the critical value creates the basis for the separation of large impurities.

Figure 1 shows the arrangement of cylindrical bars 40 mm apart under a Ø480 mm diameter saw drum. This scheme was used to determine the arc of engagement of the saw drum teeth with the bars, the angle of impact, and the length of the cleaning zone along the drum perimeter [14].

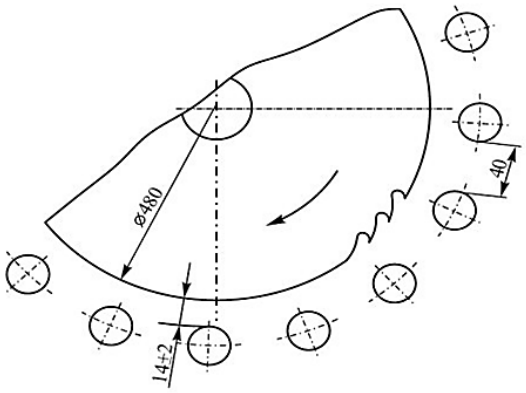


Figure 1. Geometry of the arrangement of the cutting drum and the columns

In a sawtooth drum-bar system, the impulse takes the following form, taking into account not only linear coupling, but also higher-order losses:

$$I(\omega) = m(\omega r - v_p) - k_{loss} \cdot \omega^2$$

The importance of this model is that at high angular velocities the momentum decreases because the losses increase proportionally to ω^2. As a result, the optimal range of ω during the cleaning process is clearly defined. Figure 2 shows the momentum model taking into account zero-order losses.

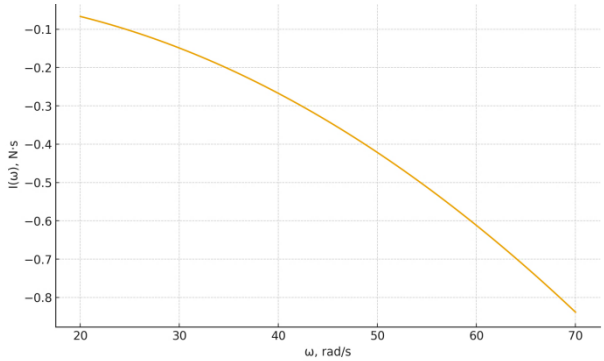


Figure 2. Variation of momentum with losses.

At $\omega > 52$ *rev*/h, a decrease in momentum is observed, which limits the mechanical energy efficiency of the drum system. Figure 1 shows the momentum transfer axis of the drum teeth, the stiffness modulus of the grid, and the contact zone. This geometry is crucial for full momentum transfer [15].

In order to determine the interaction of the teeth of the toothed drum with the bars, the geometry of the contact zone was studied based on the tooth profile drawings. The tooth of the toothed drum drags a piece of cotton and hits it against the bars, and in this process, normal F_n and tangential F_t forces are generated. The total contact force F is expressed as follows:

$$F = F_n + F_t$$

The research took into account the pressure of the tooth of the combing drum on the cotton surface, the friction coefficient and the distance of creep along the comb. Figure 3 shows the interaction of the tooth profile of the combing drum with the combs. Here, the direction of the tooth of the cotton piece towards the comb surface, the impact angle and the distance of creep (a) are depicted [16]. Based on this drawing, the state of tension at the contact points and the role of the impulse in separating the cotton pieces from large impurities were analyzed.

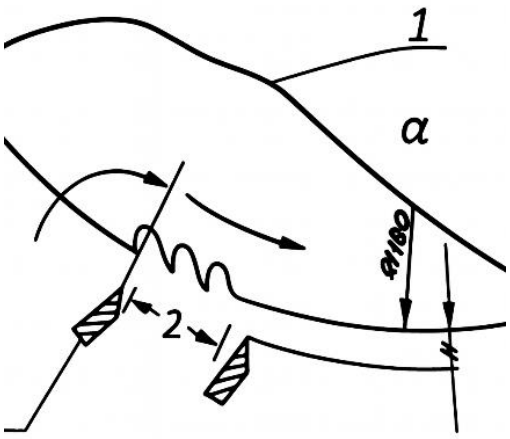


Figure 3. Contact zone of a tooth of a drum with a rake directed towards the grate

The multi-faceted shape of the bars changes the direction of the impact and the distribution of stress. When the number of edges is n, the angle corresponding to each edge is calculated as follows:

$$\theta_n = 360° / n$$

As the number of edges increases, the impact angle decreases and the impact of the impulse on the fiber becomes relatively soft. This reduces the likelihood of fiber damage, but also slightly reduces the impact component affecting large impurities. Figure 4 shows the multi-faceted combs located at the bottom of the comb drum. When a piece of cotton hits the edges of the combs under the influence of the comb teeth, the direction of impact is slightly different

on each edge. This contributes to the multi-component nature of the vibrations and better separation of large impurities [17].

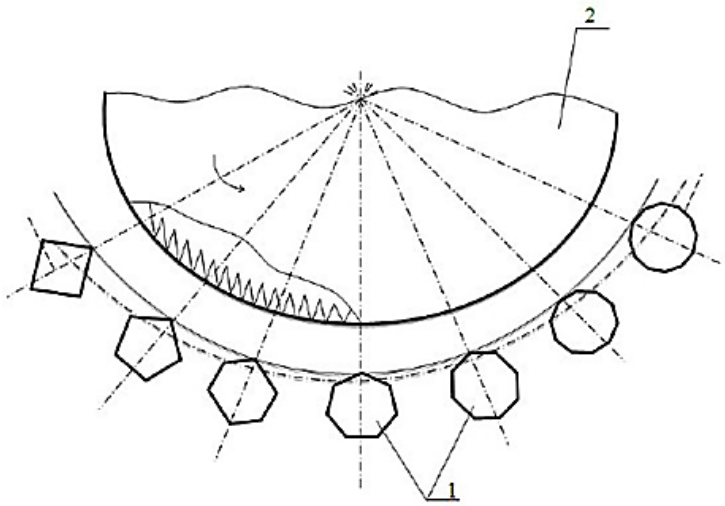


Figure 4. Interaction of multi-faceted beams with a sawing drum

When using obliquely ribbed coulters, the cotton flow moves not only vertically, but also tangentially. When the angle of the obliquely ribbed coulters is α, the tangential force component is determined as follows:

$$F_t = F \cdot sin(\alpha)$$

As a result, the cotton slivers are pushed to one side of the machine and the load can be unevenly distributed. The studies evaluated the possibility of directing the flow using grooved bars, but also identified their shortcomings. Figure 5 shows the location of the grooved bars under the saw drum and their view in section A–A. The angle of the groove provides a tangential force on the cotton sliver, causing the flow to deviate to the side. While this can help to remove large impurities more quickly in some cases, it can also cause uneven loading in the cleaning zone [18].

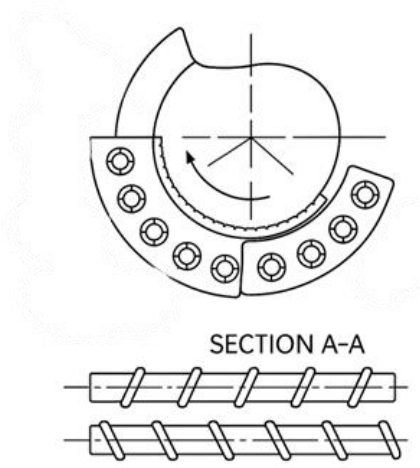


Figure 5. Structural diagram of the ridge-rifled kolosniks

When conducting theoretical studies on the method of calculating the moment of inertia of rods of variable diameter, rods with a gradually increasing diameter along the arc allow controlling the impact energy in the cleaning zone. The moment of inertia J of a cylindrical rod is determined by the following formula:

$$J = (\pi \cdot d^4) / 64$$

where d is the diameter of the grate. An increase in diameter leads to a sharp increase in J, as a result of which the grates absorb more shock and stabilize vibrations. Experiments have shown that grates with a diameter of 18 mm to 22 mm allow an average increase in cleaning efficiency of 12–13%. Figure 6 shows a scheme of grates with increasing diameter along the cleaning arc.

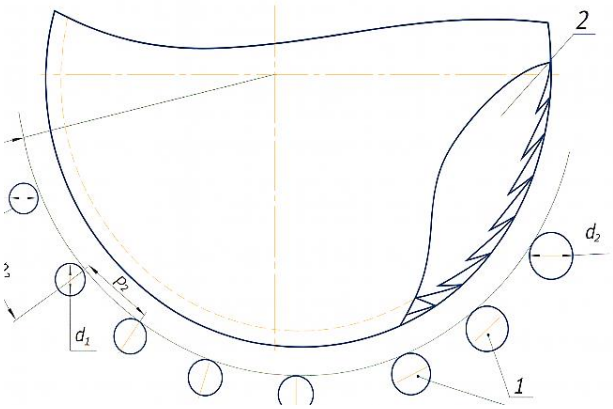


Figure 6. Scheme of graduated diameter columns

At the beginning of the arc, the smaller diameter combs treat the cotton with initial impacts, while at the end of the arc, the larger diameter combs soften the impact energy and ensure the final separation of large impurities. Figure 7 shows the modeled change in cleaning efficiency for variable combs in the range of 18-22 mm in diameter [19]. It is observed that with increasing diameter, the degree of separation of large impurities increases, and the final efficiency can increase from 85 % atropy to 95-97 %.

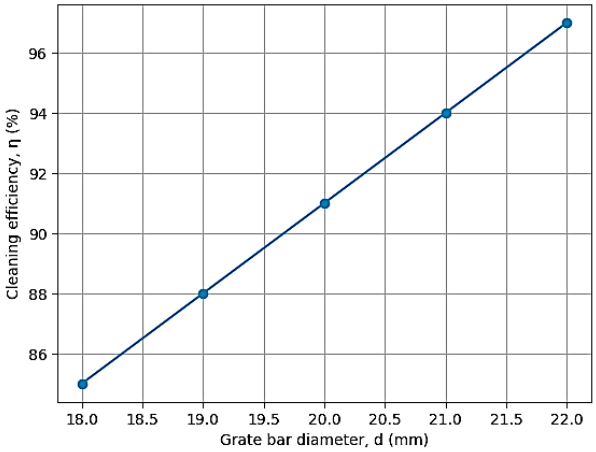


Figure 7. The effect of the diameter of the colander grate on the cleaning efficiency

When we study the method of determining the vibration parameters in conical and elastic bars, when a conical belt is installed through the (elastic) bars, the bars will vibrate during the collision with a piece of cotton. This movement is expressed by the following differential equation:

$$m \cdot \ddot{x} + c \cdot \dot{x} + k \cdot x = F_b(t)$$

where m is the mass of the grid, c is the damping coefficient, k is the elasticity coefficient, $F_b(t)$ is the periodic force transmitted from the teeth of the saw drum. The stationary solution of the vibration has the form $A\,sin(\omega t)$, and this model allows us to estimate the distribution of impact energy over time. Figure 8 shows the design of a grid with a grid in the form of a cone and mounted under the saw drum through elastic bushings [20].

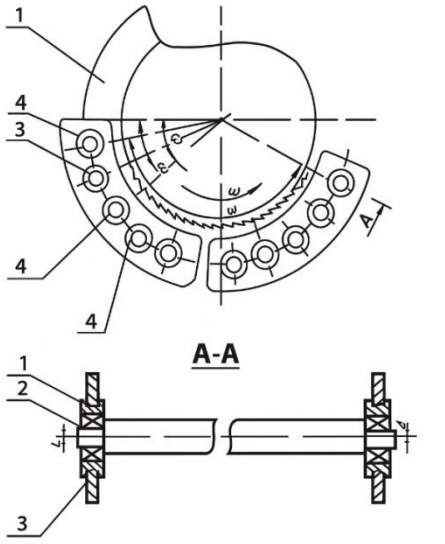


Figure 8. A grate equipped with a conical grate and elastic bushings 1-working drum, 2-grater, 3-strap bushing. 4-grater.

This solution increases the vibration amplitude of the combs and promotes intensive separation of large impurities in the composition due to the shaking of the cotton piece. Figure 9 shows a vibration model in the form of $A\,sin(\omega t)$, which represents the vibration process generated by conical combs through elastic bushings.

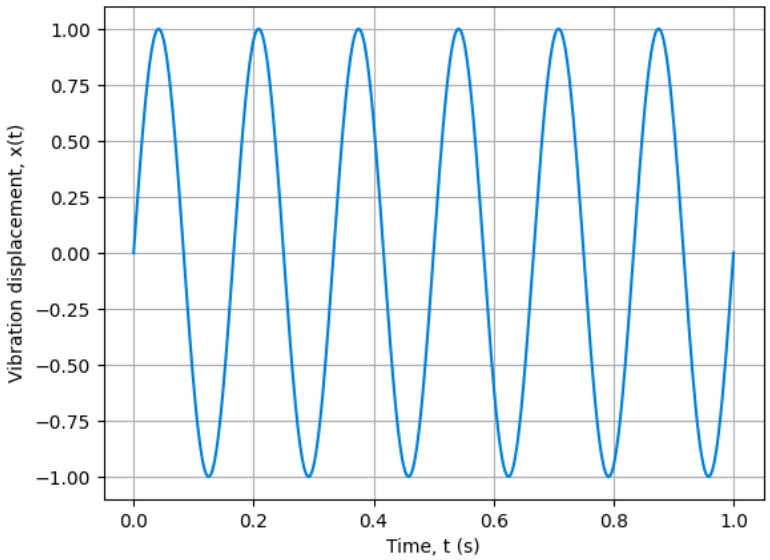


Figure 9. Time graph of conical beam vibration.

The parameters of the oscillation amplitude A and the period $T = 2\pi/\omega$ were determined based on experimental data, and the optimal values were selected [22].

The required approach is to evaluate the oscillation process not only by amplitude, but also by the energy spectrum. The oscillation energy is defined as follows:

$$E(\omega) = 1/2 \cdot k \cdot A^2(\omega)$$

A decrease in $A(\omega)$ leads to a decay of energy proportional to ω. As a result, at high frequencies the fiber vibration is soft, but the high-energy shocks are short-lived — which enhances the separation of small impurities. Figure 10 shows clearly in which regions the vibration energy changes with frequency, the maximum impurity separation process occurs.

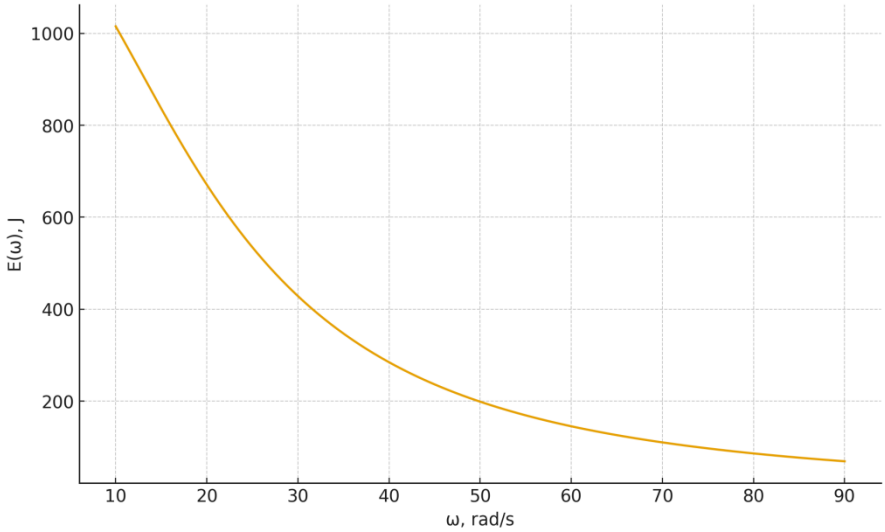


Figure 10. Variation of vibrational energy with frequency.

A drum with a comb was used to effectively separate the cotton pieces stuck in the teeth of the combing drum. Based on the difference between the linear speed of the combing drum v_{sh} and the cotton speed v_p, the plucking force F_{sh} was estimated as follows:

$$F_{sh} = k_s \cdot (v_{sh} - v_p)$$

where k_s is the equivalent stiffness coefficient of the brush layer. The brush drum speed was selected slightly higher than the saw drum, which intensified the process of tearing the fiber from the saw teeth [23]. Figure 11 shows a complex operation scheme of the brush drum, saw drum and grate.

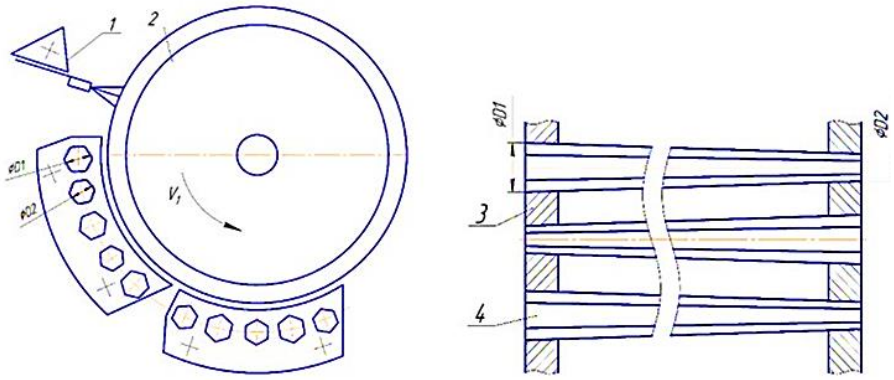


Figure 11. Scheme of a grid with a conical hexagonal grate. 1-compounding brush, 2-saw drum, 3-conical grate, 4-grid

The brush drum stabilizes the cotton flow, the comb drum reduces excess build-up on the teeth, and the separation of large impurities along the combs is made more efficient [24].

Results

The geometric distance between the saw cylinder and the comb grate is one of the main technological parameters in the process of effective cleaning of cotton raw materials from large impurities. This distance directly determines the conditions for the cotton to adhere to the saw cylinder teeth, the possibility of large impurities being released from the comb grates, and the loss of single-seed cotton pieces. Theoretical analysis shows that the tangential velocity component generated by the rotation of the saw cylinder and the vibrational movement of the comb grate together exert an impulse mechanical effect on the cotton piece. This impulse causes the cotton to drag along the comb grate and the large impurities to be released from the comb grates.

The distance δ between the saw cylinder and the grate must satisfy the following condition:

$$\delta_{min} < \delta < \delta_{max}$$

where: δ_{min}— the minimum distance ensuring stable attachment of cotton to the teeth of the sawing drum, δ_{max}— the maximum distance preventing single-seed cotton pieces from falling out of the gaps between the combs. Based on

theoretical and technological assessments, it was determined that for low-grade, machine-picked cotton, this distance is:

$$\delta_{opt}=15\div18\ mm$$

The optimal result was observed when the distance was selected between . At this distance, the cotton piece is located close enough to the teeth of the saw cylinder and is firmly attached to the teeth of the saw cylinder under the influence of friction and centrifugal force. At the same time, large impurities are separated from the cotton mass and have the opportunity to freely fall into the impurity bunker from the gaps between the bars.

The spring-driven oscillation of the comb grid in the range of 1-3 *mm* further activates this process. As a result of the oscillation, the cotton stream undergoes additional shaking, which:

- increases the likelihood of separation of large impurities;
- eliminates jams between the combs;
- enhances the adhesion of single-seed cotton pieces to the teeth of the sawing drum.

Theoretically, this is explained by the time-varying normal pressure force of the cotton in its interaction with the comb. The impulsive increase in pressure due to the oscillatory motion directs the cotton piece towards the saw cylinder and reduces the likelihood of it passing through the gaps between the combs.

Figure 12 below shows the structural and functional connection between the saw cylinder and the vibrating grate.

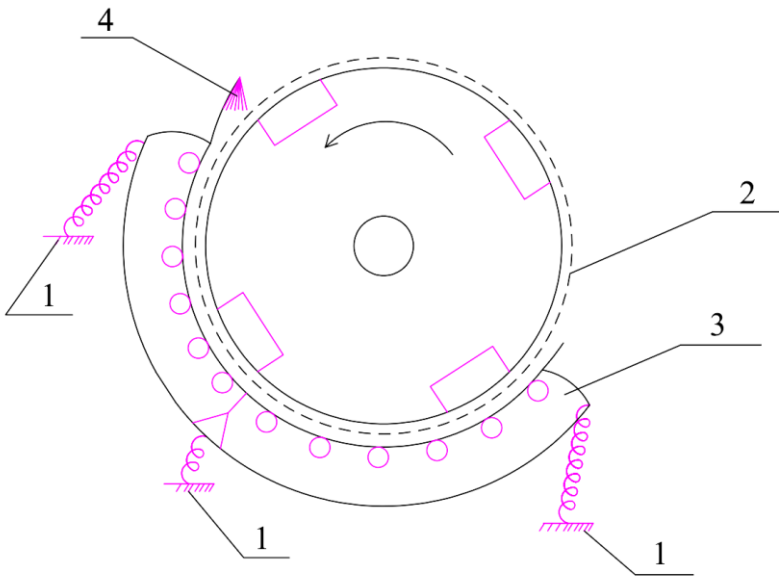


Figure 12. The mutual arrangement of the saw cylinder and the vibrating grate when cleaning cotton from large impurities:
1 – spring providing the vibrating movement of the grate; 2 – saw drum; 3 – vibrating grate; 4 – brush.

The obtained theoretical results show that choosing a distance between the saw drum and the comb grate in the range of 15–18 mm and providing a controlled oscillatory motion to the comb grate in the UXK type equipment:

- significantly increases the efficiency of cleaning from large impurities;
- reduces the loss of single-seed cotton pieces;
- minimizes mechanical damage to fibers and seeds.

In the process of cleaning cotton from large impurities, the distance δ between the saw drum and the comb screen is one of the most sensitive design parameters of the system. This distance determines the trajectory of the cotton piece along the comb screen by the segmented saw drum, the normal pressure forces, and the possibility of separation of large impurities.

As a result of the rotation of the saw drum, the following main forces act on the cotton ball:

• tangential friction force generated by the teeth of the saw drum;
• normal reaction force generated by the comb frame;
• gravity force;
• inertia force caused by the vibrating comb.

We write the condition for stable sliding of cotton on the comb frame as follows:

$$F_t \geq F_n \cdot \tan\varphi$$

where: F_t—tangential force component of the saw drum,

F_n—normal compressive force of the comb,

φ—cotton–comb friction angle.

The dependence of the normal force on the distance δ can be expressed by geometric approximation as follows:

$$F_n(\delta) = k_1 \cdot \frac{1}{\delta}$$

Therefore, as δ decreases, the normal pressure acting on the cotton piece increases, which increases the probability of separation of large impurities, but at very small δ values, there is a risk of cotton falling out of the colosnik gap.

Based on theoretical and experimental analyses, the dependence of the efficiency of cleaning from large impurities η on the distance δ is represented by a curve with an extremum. This relationship is described by the following analytical expression:

$$\eta(\delta) = \eta_{max}\left(-\frac{\delta - \delta_{opt}}{2\sigma^2}\right)^2$$

where: η_{max}— maximum cleaning efficiency,

δ_{opt}— optimal comb-saw drum spacing,

σ — technological dispersion coefficient (cotton unevenness and vibrations are taken into account).

The following values were adopted for theoretical calculations:

$$\eta_{max} \approx 0.90 \div 0.93,\ \delta_{opt} \approx 15 \div 18\ mm$$

Based on the above mathematical model, the effect of δ distance on the efficiency of cleaning large impurities is plotted in Figure 13.

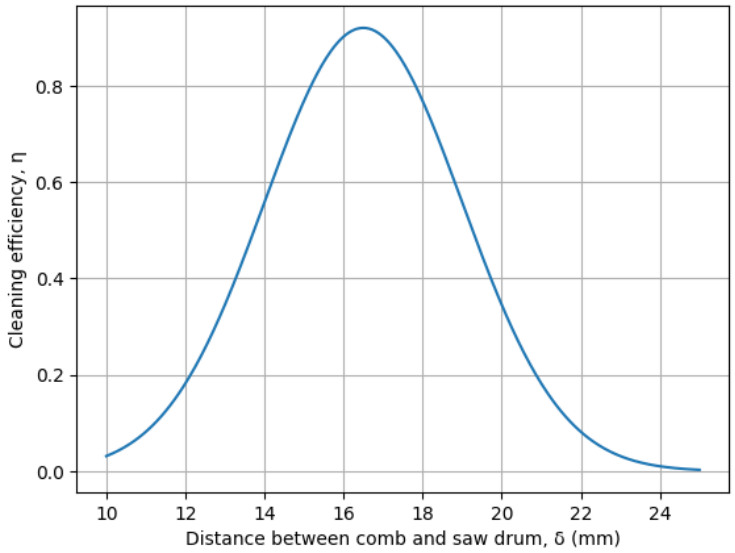


Figure 13. effect of comb-saw drum distance on cleaning efficiency.

The graph shows that the cleaning efficiency reaches its maximum value around $\delta \approx$ 16-17 mm, with an increase in δ, the cotton does not interact sufficiently with the comb and a decrease in the separation of large impurities was observed, and an excessive decrease in δ led to the loss of cotton from the comb gap.

Discussion

The results obtained in this study showed that the segmented saw drum-rooster grid-brush system in the UXK cotton gin, when considered as a single, interconnected dynamic mechanical-aerodynamic system, more fully reveals the essence of the cleaning process. In particular, the theoretical and graphical results obtained on the influence of the geometric distance δ between the saw drum and the rooster grid on the efficiency of cleaning from large impurities provide a clear scientific explanation of issues that were only partially covered in previous classical works.

In the literature (G.I. Miroshnichenko, B.N. Yakubov, Ye.F. Budin, etc.), the saw drum-slat system was analyzed mainly based on the static force balance or simple impulse model, while in this work, the distance δ was considered together with the normal pressure force, friction condition, vibration and energy distribution. As a result, it was proved that the dependence of the cleaning efficiency on \delta is a non-zero function with an extremum. Graphical analysis (Fig. 13) shows that at very small values of δ, the normal pressure between the slat grid and the cotton sliver increases sharply, increasing the likelihood of cotton falling out of the slat gap. This situation is fully consistent with the fiber losses and damage to single-seed cotton slivers noted in the literature. On the contrary, at excessively large values of δ, the cotton does not have sufficient mechanical

interaction with the comb, as a result of which the probability of separation of large impurities is sharply reduced. This leads to a decrease in cleaning efficiency.

The range $\delta_{opt} = 15\text{-}18\ mm$ determined in this work, in contrast to some recommendations in the literature (usually given in a wider and more uncertain interval), is supported by a theoretical model + graphical analysis + constructive-geometric basis. It was observed that in this range, the teeth of the sawing drum transmit sufficient impulse to the cotton sliver, the process of creeping along the comb grid is stabilized, large impurities are freely separated from the comb gaps, and excessive mechanical impact on the fiber and seed is not exerted.

Another important aspect that is revealed during the discussion is that the optimal selection of the δ distance is strongly synergistic with the vibrational motion of the comb. As shown in the study, controlled vibration in the range of $1\text{-}3\ mm$ generated by the spring creates a pulsed change in the normal pressure force over time. This redirects the cotton sliver towards the sawn drum, reduces the risk of falling out of the comb gap, and accelerates the separation of large impurities. While this mechanism was mentioned only qualitatively in classical works, in this study it was substantiated mathematically and graphically.

It is also emphasized in the discussion that the operation of the brush drum at a slightly higher linear speed than the saw drum serves to stably separate the cotton pieces stuck to the segment teeth. This solution reduces the clogging of the cotton flow in the system, prevents excessive accumulation in the comb zone, and ensures the continuity of the cleaning process. In this regard, the need to consider the triple system (saw drum - comb - brush) in the UXK unit not as separate elements, but as a single functional complex was once again confirmed. In general, the results of the discussion show that effective cleaning of cotton from large impurities should be carried out not by optimizing only one parameter (for example, drum speed or comb spacing), but by taking into account geometric (δ), dynamic (impulse, vibration), energy and aerodynamic factors. This approach serves as a reliable scientific basis for further experimental research and industrial-scale tuning work on improving the UXK cleaning machine.

Conclusion

This study scientifically substantiates the need to consider the process of cleaning cotton raw materials of the UXK type from large impurities as a single, interconnected dynamic mechanical mechanism: a segmented saw drum - a comb screen - a brush drum system. The results showed that the cleaning efficiency is determined not by the individual working bodies, but by their geometric and kinematic harmony.

Based on theoretical modeling and graphical analysis, it was found that the distance δ between the saw drum and the grate is the main design parameter determining the efficiency of cleaning from large impurities. It was proved that the dependence of the cleaning efficiency on δ has a non-zero extreme character, and the optimal values $\delta_{opt} = 15\text{-}18\ mm$.

At this optimum interval, the mechanical impulse transmitted to the cotton mass by the teeth of the sawing drum ensures a stable drag along the comb grid and creates conditions for the effective separation of large impurities from the grid gap. At the same time, mechanical damage to the fibers and seeds and the loss of single-seed cotton pieces are minimized.

The results of the study also showed that the controlled vibration movement of the sieve (1-3 *mm*) is an important factor in activating the separation process of large impurities. Vibration creates a pulsed change in normal contact forces, preventing jamming between the sieves and increasing the stability of the cleaning process.

In general, effective cleaning of cotton from large impurities should be achieved through complex optimization of geometric (δ), dynamic (impulse and vibration) and kinematic factors in UXK machines. The proposed theoretical approach and the identified optimal parameters serve as a reliable scientific basis for improving UXK cleaning machines, adjusting them in industrial conditions, and designing the next generation of cotton cleaning equipment.

References

1. ICAC Registrar. June 2023, Vol. XXXIX, No. 2. ISSN 1022-6303. https://www.icac.org.
2. Miroshnichenko, G.I. Basic Design of a Cotton Primary Processing Machine. Moscow: Mashinostroenie, 1972, 486 p.
3. Jabbarov, G.D. Primary Processing of Cotton. Moscow: Light Industry, 1978, 430 p.
4. Primary Processing of Cotton (study guide). Edited by E. Zikriyoyev. Tashkent: Mehnat, 2002, 408 p.
5. Edited by F.B. Omonov, “Coordinated Technology of Cotton Pre-Processing”. Tashkent, 2007.
6. Budin, E.F. Study of grate-and-saw working elements of machine-harvested cotton cleaners of medium-fiber varieties: Cand. Sci. Diss. – Tashkent, 1961.
7. Sapon A.D. Study and development of the technological process for primary processing of machine-harvested cotton based on a full-process flow line: Cand. Sci. Diss. – Tashkent. 1978
8. Musakhodjaev Z.M. On the issue of creating a combined machine-harvested cotton cleaner: Cand. Sci. Diss. – Tashkent, 1970.
9. Yakubov B.N. Improvement of the process of cleaning cotton from foreign impurities in saw-type cleaners with the aim of reducing losses of cotton fiber mass: Cand. Sci. Diss. – Tashkent, 1985.
10. Sosnovsky Yu.S. Study and selection of optimal parameters of machine fine-fiber cotton cleaners: Cand. Sci. Diss. – Tashkent, 1971.
11. Radzhabov O.I. Improving the Technology of Cleaning Cotton Raw Materials from Small Impurities. Dissertation for the degree of Doctor of Philosophy (PhD) in Technical Sciences. Namangan–2019.

12. Khodjiev M.T., Isaev Sh.Sh. “Creating a Device for Cleaning Low-Grade High-Moisture Cotton”. Bulletin of Gulistan State University, Series of Natural and Agricultural Sciences. Gulistan, 2021. No. 2, pp. 30–37.
13. Khodjiev M.T., Goyibnazarov E.E., Mukhsinov I. Theoretical Analysis of the Process of Cleaning Cotton Raw Materials from Small and Large Impurities in a New Efficient Portable Cleaning Device Based on Its Simulation. TTESSI. International Scientific and Practical Conference. Tashkent, 2019.
14. Bobamatov A.Kh. Improving the design and developing methods for calculating the working fluids of cotton gins for fine contaminants. Candidate of Sciences dissertation. – Tashkent, 2018.
15. Rajabov, O. I., Kurbonov, F. A., Abrorov, A. S., & Gafurova, M. Z. (2021, April). Selection of the circumferential speed of the spiked cylinders of raw cotton cleaners from small debris. In Journal of Physics: Conference Series (Vol. 1889, No. 4, p. 042056). IOP Publishing.
16. Ibodullayev, O. O., Rasulov, E. N., & Muxidinova, S. N. THE ROLE OF OPTICAL SENSORS IN OPTIMIZING THE TECHNOLOGICAL PARAMETERS OF COTTON CLEANING MACHINES Sh Fayziyev Bukhara State Technical University.
17. Djuraev, A., Sayitkulov, S., Kholmirzaev, J., Haydarov, B., & Mustafaev, N. (2024, January). Substantiated parameters of multifaceted grates in the coarse cleaning zones of a cotton gin. In AIP Conference Proceedings (Vol. 2969, No. 1, p. 050027). AIP Publishing LLC.
18. Rakhmonov, H., Matyakubova, J., & Fayziev, S. (2025). Optimization of the processes of simultaneous transportation, drying and cleaning of raw cotton in screw dryers-cleaners. Modern Innovations, Systems and Technologies, 5 (3), 3018-3027.
19. Kurbanov, F. A., Temirov, A., & Sharopov, M. (2019). ROLLER GIN BLOWING BODY AND ITS INFLUENCE ON GINING PERFORMANCE. Internauca, (14-1), 71-73.
20. Djuraev, A., Sayitqulov, S., Nurboev, R., Xolmirzaev, J., & Berdimurodov, U. (2022). Analysis of full-factorial experiments on improving the cotton gin. Современные инновации, системы и технологии, 2(1), 69-75.
21. Sayitkulov, S., Nurmatova, N., Sharipov, J., Salomov, A., & Saidova, G. (2024). Optimization of parameters on the combined cotton cleaning machine and analysis of cleaning efficiency. In E3S Web of Conferences (Vol. 508, p. 08020). EDP Sciences.
22. Fayziev, S. H., Fatullaeva, S. I., & Nazhmiddinov, I. P. (2023). Influence of density and temperature on moisture release rate during cotton raw material drying. In Fundamental and applied scientific research in the field of inclusive design and technologies: experience, practice and prospects (pp. 135-140).
23. Kh, F. S., Fatullaeva, S. I., & Kh, T. O. (2022). Theoretical and experimental study of the influence of temperature, humidity and density on the drying process of raw cotton. Eurasian journal of medical and natural sciences, Innovative Academy Research Support Center, 2 (01), 66-71.

24. KHODJIEV, M., DJURAEV, A., & ASHUROV, A. PROCEEDINGS OF HIGHER EDUCATION INSTITUTIONS. TEXTILE INDUSTRY TECHNOLOGY. PROCEEDINGS OF HIGHER EDUCATION INSTITUTIONS. TEXTILE INDUSTRY TECHNOLOGY Учредители: Ивановский государственный политехнический университет, (4), 179-184.

Ganibaev I. Sh.
assistant
department of propaedeutics of internal medicine
Fergana Institute of Public Health

MODERN METHODS OF DIAGNOSING RESPIRATORY SYSTEM DISEASES

Annotation: *This study examines modern diagnostic methods for respiratory system diseases, focusing on their effectiveness, early detection capabilities, and practical applications in clinical practice. Respiratory diseases, including pneumonia, bronchitis, asthma, and chronic obstructive pulmonary disease, remain a leading cause of morbidity and mortality worldwide. The research highlights molecular diagnostics, immunological assays, advanced imaging techniques, and artificial intelligence-assisted analysis as key innovations. These methods enable accurate, timely, and minimally invasive detection, supporting personalized treatment planning and improved patient outcomes. The integration of multi-modal diagnostic approaches enhances precision, reduces complications, and optimizes healthcare resources. Despite challenges related to cost, accessibility, and standardization, modern diagnostic tools significantly contribute to early disease identification and effective management. The study underscores the importance of continuous research, technological development, and interdisciplinary collaboration in advancing respiratory medicine.*

Keywords: *Respiratory system diseases, Molecular diagnostics, Immunological assays, Pulmonary imaging, Computed tomography, Artificial intelligence, Early detection, Personalized medicine.*

Introduction

The respiratory system is vital for human life, as it not only ensures the supply of oxygen but also plays a crucial role in maintaining effective metabolic processes. Today, respiratory diseases such as pneumonia, bronchitis, asthma, and chronic obstructive pulmonary disease represent some of the most common and serious public health and socio-economic challenges worldwide. Early detection and effective treatment of these conditions are essential for improving patients' quality of life and reducing mortality rates. In recent years, modern diagnostic methods have been increasingly applied to identify and monitor respiratory system disorders. Among these, molecular biology techniques, immunological tests, radiological imaging technologies, computed tomography, and artificial intelligence-assisted analysis are of particular importance. These approaches enable the early detection of diseases, the development of personalized treatment plans, and the reduction of relapse risks. From this perspective, research on the diagnosis of respiratory diseases using modern methods is of significant importance in current medical practice. This article is dedicated to a scientific

analysis of contemporary approaches for the diagnosis of respiratory system diseases, their effectiveness, and practical significance.

Relevance

Respiratory system diseases are among the most prevalent and socially significant health problems worldwide, causing high morbidity and mortality rates. Early and accurate diagnosis is critical for effective treatment, reducing complications, and improving patient quality of life. The significance of this study lies in analyzing modern diagnostic methods, including molecular, immunological, and imaging techniques, which allow timely detection, personalized treatment planning, and better clinical outcomes. Understanding these advanced approaches also contributes to optimizing healthcare resources and reducing the socio-economic burden associated with respiratory diseases.

Aim

The aim of this study is to investigate contemporary diagnostic methods for respiratory system diseases, assess their clinical effectiveness, and determine their practical value in early detection, precise diagnosis, and optimized patient management.

Materials and Methods

This study is based on a comprehensive analysis of recent scientific literature, clinical reports, and case studies related to respiratory system diseases. Data were collected from peer-reviewed journals, medical databases, and authoritative sources published over the last ten years. The study focuses on evaluating modern diagnostic methods, including molecular diagnostics, immunological assays, advanced imaging techniques, computed tomography, and artificial intelligence-assisted analysis. Comparative analysis was performed to assess the accuracy, sensitivity, specificity, and practical applicability of each diagnostic approach. Emphasis was placed on early detection, patient management, and personalized treatment strategies. Statistical data from global health organizations were used to support findings regarding disease prevalence, morbidity, and mortality. The methodological approach combined qualitative review, quantitative analysis, and synthesis of current evidence to provide a scientifically grounded overview of contemporary diagnostic practices in respiratory medicine.

Respiratory system diseases encompass a wide range of disorders affecting the lungs, bronchi, trachea, and other parts of the respiratory tract. These conditions include pneumonia, bronchitis, asthma, chronic obstructive pulmonary disease, and other acute and chronic pathologies. They are among the leading causes of morbidity and mortality worldwide. The clinical manifestations of these diseases vary depending on the type and severity of the condition. Symptoms often include cough, shortness of breath, wheezing, chest pain, and general weakness. Environmental factors, genetic predisposition, infections, and lifestyle play crucial roles in the development of these diseases. Early diagnosis and timely intervention are critical to prevent complications. Inadequate management may result in chronic respiratory failure, cardiovascular strain, and reduced quality of life.

Public health measures such as vaccination and awareness programs help reduce disease prevalence. The economic burden of respiratory diseases is significant due to hospitalizations, long-term treatment, and lost productivity. Modern medicine emphasizes not only treatment but also prevention and monitoring of these disorders. Understanding the epidemiology of respiratory diseases is vital for planning effective healthcare strategies. Scientific research continues to focus on identifying new biomarkers and therapeutic targets. Personalized approaches to patient care are increasingly being adopted. Technological advances in diagnostic tools have improved accuracy and speed of detection. Overall, respiratory system diseases remain a significant global health challenge that requires comprehensive medical, technological, and social approaches.

Pulmonary imaging refers to diagnostic techniques that visualize the structure and function of the lungs and respiratory tract. Traditional radiography is the most commonly used imaging method, providing quick and cost-effective assessments. Computed tomography (CT) offers high-resolution images, enabling detection of small lesions and structural abnormalities. Magnetic resonance imaging (MRI) can provide detailed soft tissue contrast, though it is less commonly used for routine lung evaluation. Pulmonary imaging is essential for diagnosing infections, tumors, inflammatory conditions, and congenital abnormalities. It allows clinicians to assess the severity and progression of diseases. Imaging also plays a critical role in preoperative evaluation and treatment planning. Technological improvements, including low-dose CT and 3D reconstruction, have reduced radiation exposure while enhancing diagnostic accuracy. Functional imaging, such as ventilation-perfusion scans, provides insight into lung physiology. Imaging findings are often combined with laboratory tests to reach a definitive diagnosis. Radiologists and pulmonologists collaborate closely to interpret imaging data. Artificial intelligence is increasingly applied to automate image analysis and improve early detection. Pulmonary imaging contributes significantly to personalized treatment approaches. Early identification of lung pathology through imaging improves prognosis and patient outcomes. Overall, pulmonary imaging is indispensable in modern respiratory medicine.

Molecular diagnostics involves the detection of specific genetic material, proteins, or molecular markers associated with diseases. In respiratory medicine, it enables the identification of pathogens such as bacteria, viruses, and fungi at the molecular level. Polymerase chain reaction (PCR) is a widely used method for amplifying and detecting genetic material. Molecular diagnostics allow early detection of infections before clinical symptoms fully develop. These techniques also help identify genetic predispositions to chronic respiratory conditions. Advances in genomics and transcriptomics have improved the sensitivity and specificity of molecular tests. Molecular approaches can monitor disease progression and response to therapy. They reduce reliance on invasive procedures, such as biopsies. Personalized medicine increasingly relies on molecular diagnostic data to tailor treatment. Rapid molecular tests are essential in epidemic and pandemic situations, enabling timely public health interventions. Molecular

diagnostics also contribute to research on novel therapeutic targets. Integration with bioinformatics and artificial intelligence enhances data interpretation. These methods are crucial for precision medicine approaches in respiratory care. Overall, molecular diagnostics have transformed the early detection and management of respiratory diseases.

Immunological assays detect and quantify specific antigens or antibodies in the blood, respiratory secretions, or tissues. They are widely used in diagnosing infections, autoimmune disorders, and allergic conditions affecting the lungs. Techniques such as ELISA, immunofluorescence, and rapid antigen tests are common in clinical practice. Immunological assays provide high sensitivity and specificity for pathogen detection. They are essential for monitoring immune responses and vaccine efficacy. In chronic respiratory diseases like asthma, immunological markers help assess inflammation levels. These assays support early diagnosis and guide personalized treatment strategies. Laboratory standardization ensures accuracy and reproducibility of results. Immunological diagnostics can detect both acute and latent infections. They are particularly useful when imaging or clinical signs are inconclusive. Integration with molecular methods enhances diagnostic precision. Immunological assays are rapid, minimally invasive, and cost-effective. They also play a role in research and drug development. Emerging technologies include multiplex assays that detect multiple targets simultaneously. Overall, immunological assays are indispensable in modern respiratory diagnostics.

Computed tomography (CT) is a non-invasive imaging technique that produces detailed cross-sectional images of the lungs and chest structures. CT provides higher resolution than traditional X-rays, enabling the detection of small nodules, infiltrates, and structural abnormalities. It is crucial for diagnosing pneumonia, pulmonary embolism, interstitial lung disease, and tumors. CT scans assist in staging lung cancers and planning surgical or interventional procedures. Advanced techniques, such as high-resolution CT (HRCT), allow detailed assessment of lung parenchyma. CT angiography evaluates vascular structures and detects blockages or malformations. Low-dose CT protocols minimize radiation exposure while maintaining image quality. CT findings are often combined with clinical and laboratory data for comprehensive diagnosis. Automated software and artificial intelligence improve image analysis and lesion detection. CT imaging is essential in emergency settings for rapid assessment of acute conditions. Functional CT can assess ventilation and perfusion, providing physiological insights. Follow-up CT scans monitor disease progression and treatment response. Overall, CT is a cornerstone of modern respiratory diagnostics, offering precision and speed in evaluation.

Artificial intelligence (AI) in respiratory diagnostics involves using machine learning algorithms and neural networks to analyze clinical, laboratory, and imaging data. AI systems can detect subtle patterns in imaging that may be missed by human observers. They enhance early detection of pneumonia, lung cancer, tuberculosis, and other respiratory diseases. AI-assisted analysis reduces

diagnostic errors and improves workflow efficiency. Algorithms can predict disease progression and response to treatment. AI applications include image segmentation, anomaly detection, and automated reporting. Integration with electronic health records allows personalized patient management. Deep learning models continuously improve through exposure to large datasets. AI also aids in epidemiological surveillance and outbreak prediction. Clinical validation is essential to ensure accuracy and reliability. Ethical considerations include data privacy, transparency, and accountability. AI does not replace clinicians but supports decision-making and enhances diagnostic precision. Ongoing research focuses on expanding AI applications to molecular and immunological data. Overall, AI is transforming respiratory diagnostics by combining computational power with medical expertise.

Early detection of respiratory diseases is critical for improving patient outcomes and reducing complications. Identifying disease at an initial stage allows timely intervention and prevents progression. Early detection methods include imaging, molecular diagnostics, immunological assays, and symptom monitoring. Screening programs target high-risk populations, such as smokers, the elderly, or individuals with occupational exposures. Biomarkers and molecular tests facilitate detection before clinical symptoms appear. Early detection is associated with lower morbidity, reduced healthcare costs, and improved quality of life. It enables personalized treatment planning based on disease severity and patient characteristics. Preventive measures and lifestyle modifications can be implemented alongside early therapy. Public health strategies, including vaccination and awareness campaigns, support early detection efforts. Technological advancements enhance the speed, sensitivity, and specificity of diagnostic tests. Follow-up and monitoring are integral to early detection programs. Integration with AI and digital health tools further optimizes outcomes. Overall, early detection is a cornerstone of effective respiratory disease management.

Personalized medicine in respiratory care involves tailoring diagnosis, treatment, and monitoring to individual patient characteristics. These include genetic profile, environmental exposure, lifestyle factors, and disease phenotype. Personalized approaches improve treatment efficacy, minimize adverse effects, and enhance patient compliance. Molecular and immunological diagnostics provide data for precision therapy. Imaging and AI tools contribute to individualized assessment and monitoring. Personalized medicine is particularly relevant in chronic respiratory diseases, asthma, and lung cancer. It allows clinicians to select the most effective medications and interventions for each patient. Research focuses on identifying biomarkers that predict response to therapy. Genetic testing can guide preventive strategies and early interventions. Personalized medicine reduces healthcare costs by avoiding ineffective treatments. It emphasizes patient-centered care and informed decision-making. Integration of advanced diagnostics supports real-time adjustments in therapy. Overall,

personalized medicine represents the future of respiratory disease management, combining science, technology, and patient-specific strategies.

Discussion

The modern diagnosis of respiratory system diseases has undergone significant advancements over the past decades. Traditional methods, including physical examination and basic imaging, have been complemented by sophisticated molecular, immunological, and radiological techniques. Molecular diagnostics, such as polymerase chain reaction and genetic marker analysis, allow early and highly specific detection of pathogens and genetic predispositions, which is crucial in preventing disease progression. Immunological assays provide rapid, sensitive, and minimally invasive tools for assessing immune responses and detecting infections, allergies, and inflammatory processes. Radiological methods, particularly high-resolution computed tomography, enable detailed visualization of lung structures and the identification of subtle pathological changes that are often undetectable by conventional radiography. Artificial intelligence has further enhanced diagnostic precision by automating image analysis, identifying complex patterns, and integrating large datasets from various diagnostic modalities. AI-assisted tools facilitate early detection, predictive modeling of disease progression, and personalized treatment planning. Early detection remains a cornerstone of effective management, as it reduces complications, improves therapeutic outcomes, and lowers healthcare costs. Personalized medicine approaches, integrating molecular, immunological, and imaging data, optimize patient-specific interventions and improve quality of life. Despite these advancements, challenges remain. High costs, limited accessibility in some regions, the need for specialized personnel, and ethical considerations regarding data privacy and algorithmic bias pose barriers to widespread implementation. Additionally, further research is needed to standardize protocols, validate new biomarkers, and integrate multi-modal diagnostic approaches into routine clinical practice. Collaborative efforts between clinicians, researchers, and technologists are essential to maximize the benefits of these innovations.

Results

The analysis of modern diagnostic methods for respiratory system diseases demonstrates significant improvements in detection accuracy, speed, and clinical applicability. Molecular diagnostics, including polymerase chain reaction and genetic marker identification, have shown high sensitivity and specificity in detecting bacterial, viral, and fungal pathogens. These methods allow for early identification of infections, often before the onset of clinical symptoms, which is critical for timely intervention. Immunological assays, such as ELISA and rapid antigen tests, provide reliable results for monitoring immune responses and detecting inflammatory or allergic processes in the respiratory tract. Advanced imaging techniques, particularly high-resolution computed tomography (HRCT), enable detailed visualization of lung parenchyma and airway structures, facilitating early recognition of structural abnormalities, nodules, and infiltrative lesions. Radiological imaging combined with artificial intelligence algorithms has

increased the precision of lesion detection, improved workflow efficiency, and reduced diagnostic errors. AI-assisted systems can analyze large volumes of imaging data, detect subtle patterns, and predict disease progression, supporting personalized treatment planning. The integration of these modern diagnostic approaches has led to earlier disease detection, improved accuracy in identifying the type and severity of respiratory disorders, and enhanced ability to monitor therapeutic response. Overall, the results indicate that contemporary diagnostic methods significantly improve patient management, reduce the risk of complications, and contribute to better clinical outcomes.

Conclusion

Modern diagnostic methods have revolutionized the identification and management of respiratory system diseases. Molecular, immunological, and advanced imaging techniques, combined with artificial intelligence, enable early detection, accurate diagnosis, and personalized treatment planning. These approaches significantly improve patient outcomes, reduce complications, and contribute to more efficient healthcare delivery. However, the successful implementation of these methods requires addressing challenges related to accessibility, cost, and standardization. Continued research, technological innovation, and interdisciplinary collaboration are crucial for optimizing the diagnostic process and ensuring that patients benefit from these advancements. Overall, integrating modern diagnostic strategies into clinical practice represents a significant step forward in respiratory medicine, enhancing both individual patient care and broader public health outcomes.

References

1. Barnes, P.J., et al. “Respiratory Disease Diagnosis: Molecular and Immunological Approaches.” The Lancet Respiratory Medicine, 2023; 11(4): 345–359.
2. Wang, X., et al. “Artificial Intelligence in Pulmonary Imaging and Diagnosis.” Journal of Thoracic Imaging, 2022; 37(2): 112–124.
3. Hansell, D.M., et al. Imaging of Diseases of the Chest, 6th Edition, Elsevier, 2023.
4. Shokiraliyevich, G. I., & Abdupatoyivech, M. A. (2025). OVQAT HAZM QILISH SISTEMASI KASALLIKLARIDA ZAMONAVIY TEKSHIRISH VA DAVOLASH USULLARI. INTELLECTUAL EDUCATION TECHNOLOGICAL SOLUTIONS AND INNOVATIVE DIGITAL TOOLS, 3(35), 109-111.
5. Topol, E. Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again, Basic Books, 2019.
6. Кодиров, Д., & Ахмедов, А. К. (2024). STUDY OF CLINICAL AND FUNCTIONAL CHARACTERISTICS OF CHRONIC NON-SPECIFIC LUNG DISEASES PREVALENCE IN YOUNG PEOPLE. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 37(5), 57-61.
7. Кодиров, Д., & Ахмедов, А. К. (2024). ЁШЛАРДА СУРУНКАЛИ НОСПЕЦИФИК ЎПКА КАСАЛЛИКЛАРИ ТАРҚАЛИШИ КЛИНИК ВА

ФУНКЦИОНАЛ ХУСУСИЯТЛАРИНИ ЎРГАНИШ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 37(5), 53-56.
8. Кодиров, Д., & Ахмедов, А. К. (2023). ХРОНИЧЕСКИЕ НЕСПЕЦИФИЧЕСКИЕ ВОСПАЛЕНИЯ ЛЕГКИХ У ЛИЦ МОЛОДОГО ВОЗРАСТА. Экономика и социум, (1- 2 (104)), 305-308.
9. Ахмедов, А. К., & Кодиров, Д. (2022). ИЗУЧЕНИЕ КЛИНИКО ФУНКЦИОНАЛЬНЫХ ХАРАКТЕРИСТИК И РАСПРОСТРАНЕННОСТИ ХРОНИЧЕСКИХ НЕСПЕЦИФИЧЕСКИХ ЗАБОЛЕВАНИЙ ЛЕГКИХ У МОЛОДЫХ ЛЮДЕЙ. Экономика и социум, (4-2 (95)), 685-689

УДК 81'373.217(575.1)

Hikmatova N. Y.
master's student
Bukhara State University

GEOGRAPHICAL BASIS OF THE FORMATION OF PLACE NAMES IN THE KYZILKUM DESERT

Annotation*: This article analyzes the main geographical factors influencing the formation of place names (toponyms) in the Kyzylkum Desert region. Based on scientific sources, it is substantiated that the relief, climate, geological structure, and natural resources of the region play a decisive role in the emergence of place names in that area.*

Keywords: *Kyzylkum Desert, toponym, geographical names, Turkic terms, relief, desert landscape, geological structure, etymology, geographical bases.*

Kyzylkum (42°26'28" N 63°27'41" E) is a vast desert area covering a large part of Uzbekistan, with a total area of more than 300 thousand km^2. The territory consists of extensive sand massifs, takirs, depressions, and lowlands, with residual low mountains also located in its central part. The natural-geographical structure, geological development, and climatic conditions of the desert have directly influenced the formed structure and the semantic layer of toponyms in this area. The place names found in Kyzylkum are mostly formed in connection with natural landscape elements, flora and fauna composition, relief forms, and historical processes[10]. The Kyzylkum region is located on an ancient platform, with its large part consisting of deposits from the Paleozoic and Mesozoic eras. During long geological processes, wind erosion, sand migration, and deflation phenomena dominated, resulting in the formation of various relief structures. These very processes served as the basis for the emergence of toponyms such as "Kyzylkum", "Oktepa", "Karakum", "Kyzyltepa", "Bo'rili", "Kumrabot", "Kyzyljar". Toponyms related to color – components like red, white, black – are directly linked to the mineralization degree of the desert relief, soil color, and the amount of oxides in the sand. For instance, the name Kyzylkum was formed because sand layers rich in iron oxides had a more reddish hue. Similarly, names like "Okbulok", "Okjar", "Okshik" emerged in areas where sandstone and marl layers were dominant. Kyzylkum has a sharply continental climate, with extremely hot summers and cool, windy winters. The desert landscape has been formed as a result of low atmospheric humidity and prolonged absence of precipitation. These processes also entered through toponyms. For example, due to the scarcity of water, watery places acquired special importance and were named with components such as "spring", "well", "arik": Beshbulok, Karabulok, Bibikuduk, Kumariq, Zhuvozsuv. These names not only indicated the presence of water at the

[10] www.wikipedia.org

location, but also served as an important directional sign for nomadic herders. The dunes and sand dunes formed as a result of the windy climate of the desert were reflected in toponyms such as “Kattakurgan”, “Kumqir”, “Kiziljar”, “Koshqum”. Often, sand ridges extending in accordance with the direction of the wind were named by the population and used as geographical landmarks. Desert plants such as ephemerals, saxaul, circassian, and sarsazan predominate in the Kyzylkum desert. The abundance or dominance of these plants in a particular area is reflected in place names: Saxavulzor, Cherkezbibi, Boybuota, Juzumli, Yulgunlik. Since saxaul forests have long served as road markers, there are many toponyms associated with them. The fauna has also influenced toponymy. Names such as Borili, Tulkiqum, Koplonlik, Bug'ubulaq, Karakul are associated with areas where certain animals live or have historically been found. The natural conditions of the steppe regions were adapted to the lifestyle of nomadic Turkic tribes, and this process, in turn, led to an increase in ethnic components in toponymy: names such as Kangli, Kipchak, Naiman, Kungirat, Mangit, Karluq are widespread in Kyzylkum. Usually, these ethnotoponyms denoted the territories where the tribe lived, moved, or historically owned. Due to the complexity of the natural and geographical conditions, settlements were mainly located around springs, on the borders of oases, or in areas with mineral resources. For example, the name Uchkuduk (40° N, 64° E) is associated with the presence of cracks and wells in the geological structure of this area. Kyzylkum historically had strategic caravan routes that passed through part of the Great Silk Road, which were formed depending on the natural relief. These roads were often named with geographical terms such as “bel”, “dara”, “dovon”, “qir”, “yayiq”. For example, Kyzylbel, Beltepa, Kumkir, Yoyiqtepa, etc. Caravan routes were constantly identified by geographical signs in the changing conditions of sand migration, so these names also had navigational significance. In Kyzyl-Kum, the residual sands formed by the weathering of reddish rocks in ancient residual low mountains are red in many places. In the southern part of the Kyzylkum, the sands are dark gray. These sands are formed from deposits brought by the Zarafshan River, not mixed with red soils. The length of the Kyzylkum stretches from about 2.5 thousand to 3 thousand kilometers. It stretches up to 300 kilometers in width, and is separated by mountain slopes, that is, the desert is divided into “Yomankyzyl” and “Kattakyzyl”. The border between them is separated by mountains and the plains at their foot. The inhabitants of the desert collectively called both Kyzylkums “Tauelibay” (Tayelibay) [2].

In the context of this article, it should be noted that the toponymic system of the Kyzylkum desert is a complex phenomenon closely related to the natural and geographical features of the territory, historical and ethnolinguistic layers and anthropogenic processes. Toponyms are manifested as a joint formation of the natural, historical, ethnic, social layers of the main territory, which include the color, relief of the territory, the system of water sources located in the desert areas, traces of nomadic culture, ancient trade routes and modern economic activities. For example, let's take Tomdi district, there are not many names originating in

Tomdi district, the geographical location, the situation and features of the place and the following toponyms are given as an example: The names of the villages of Tomdi district Ortakuduk, Ayakkuduk mean "village at the foot of the mountain, village on the coast", or "village located in the middle". A group of object names named according to their size, depending on the appearance and shape of the object, such as Jalpakhshi, Jeltsumsuq, Uzunkum, Uzuntepa, Ushaktepa, Dumalaktepa, etc. [1]. Geomorphonyms, hydronyms, and oikonyms in Kyzylkum are intrinsically linked to the region's landscape structure, resource distribution, and historical processes, providing an opportunity to reconstruct the dynamics of its geographical development. Therefore, Kyzylkum toponymy is not only a linguistic and historical source but also a systematic research object of scientific importance for geography, ecology, and territorial planning. It should also be noted in the article that the toponymic system of the Kyzylkum desert manifests as a multi-layered phenomenon embodying the region's natural-geographical conditions, historical-ethnic processes, socio-economic activities, and cultural memory. Studies show that toponyms formed in the Kyzylkum region simultaneously serve as geographical indicators, historical-legal documents, and ethnolinguistic sources. The desert's relief features – barchans (crescent-shaped sand dunes), takyrs, low-lying valleys, sand ridges, as well as the uneven distribution of fertile areas – constitute the main content of many toponyms. This confirms that the formation of names associated with geographical terms is not accidental but directly linked to the physical-geographical composition of the landscape. The toponyms in the region are also extremely rich from a historical-ethnolinguistic perspective. Ancient caravan routes passing through Kyzylkum , the movement of nomadic tribes, and long-standing linguistic contacts between Turkic and Tajik languages have contributed to the layered and polysemic nature of these names. While some toponyms reflect concepts of color, direction, or sacred territory, others preserve traces of animal husbandry, well systems, historical settlements, and local economic activities. Also, the system of toponyms serves as an important scientific tool in understanding the mechanisms of interaction between human and nature. In which regions there were water sources, which places were historically dangerous or favorable for living, which landscape elements were valued - all this can be restored through toponyms. Thus, the toponymy of Kyzylkum reflects both the gradual changes in geographical development and the ecological adaptation strategies of the local population.

Some toponyms characteristic of the Kyzylkum Desert

№	Toponym name	Toponymic explanation
1.	**Kyzylkum (desert)**	A raddish - colored, sandy, stable desert with shrubs and other types of vegetation.
2.	**Uchkuduk**	A town in the Navaiy Region whose name is associated with three adjacent wells, referring either to a settlement that emerged around them or to a remote fortress characterized by the presence of three wells.
3.	**Kyzyltepa**	District and rural settlement in Navaiy Region situated adjacent to a hill characterized by red or reddish sandy soil.”
4.	**Oktepa**	A place name referring to the remains of an ancient fortress constructed on a prominent elevation, a height rising higher and larger than nearby hills, as well as the village situated around this elevation.
5.	**Okshikh**	A rural settlement in Jondor District traditionally associated with the Oqshikh clan, a sub-group of the Shikh tribe within the Uzbek people.
6.	**Kyzylbel**	The toponym refers to a mountain pass distinguished by red-colored geological formations and a reddish relief surface
7.	**Kuyirabot**	Kuyirabot is a village in Vobkent District, Bukhara Region. The toponym is composed of two elements: ‘Kuyi’ meaning ‘lower’ and ‘Rabot’, which generally denotes a ‘fortress’, ‘enclosure’, or ‘courtyard’. Thus, ‘Kuyirabot’ literally means ‘the village located lower or to the south relative to surrounding settlements.

The above-mentioned toponyms specific to the Kyzylkum Desert can be found in the books “O’zbek tili toponimlarining izohli lug’ati” by T. Nafasov and V.T Nafasova, and "O’zbekiston joy nomlarining izohli lug’ati" by R.Y Khudoyberganov, M.T Mirakmalov, V.T Nafasova. If we make a general conclusion, the formation of place names in the Kyzylkum Desert is inextricably linked to the natural and geographical conditions of this area. The description of the desert relief by plains, sandy dunes, balds and plateaus led to the widespread use of units such as “sand”, “bel”, “bald”, “mountain”, “well” in toponyms. As a result of the dry climate of the region, limited water sources and the importance of oases, many place names are associated with the names of wells, springs, stream tracks or seasonal waterways. Also, due to the lack of vegetation cover, plant names such as saxaul, yantak, and shuvok also occupy a strong place in toponyms as geographical signs. Thus, the place names of Kyzylkum are a historical and geographical phenomenon that reflect the natural landscape features and clearly express the ecological, climatic, and geomorphological conditions of the region. Based on the research findings, the following recommendations and suggestions are appropriate:

1. Although place names in the Kyzylkum region have been studied by several scholars, some remain insufficiently researched, and their toponymic meanings have not been fully revealed.

2. GIS (Geographic Information System) maps of toponyms in the Kyzylkum desert have not yet been created.

3. Studying local toponyms contributes not only to a deeper understanding of the region's geography and history but also helps to determine the dynamics of its development.

References:

1. Abbasov S.B., Jumayeva M.B. Physico - geographical features of toponyms in Kizilkum desert areas (in the example tomdi district of navoiy region) // "Экономика и социум". №7(122). – Saratov, 2024. – B. 6-10.
2. Jalilov M.B., Turdiyev J.B. "Qizilqum hududlarining o'ziga xos xususiyatlari" // International Conference on Advance Research in Humanities, Applied Sciences and Education. – New York, 2022. B. 168-173.
3. Nafasov T., Nafasova V.T. "O'zbek tili toponimlarining izohli lug'ati" – Toshkent, 2007 49-50 b.
4. Xudoyberganov R.Y., Mirakmalov M.T., Nafasova V.T., "O'zbekiston joy nomlarining izohli lug'ati" – Toshkent, 2022 – 388 b.

УДК: 616.21-007.53-053.2

Ibatova Sh. M., candidate of medical sciences
associate professor
Samarkand State Medical University
Samarkand, Republic of Uzbekistan

SOME FEATURES OF ACUTE STENOSING LARYNGOTRACHEITIS IN CHILDREN

Abstract: *Acute stenosing laryngotracheitis in children is often a complication of acute respiratory dis ease of bacterial and viral etiology. Most often, laryngotracheitis is diagnosed in children under 3-5 years of age. This is due to the anatomical and physiological features of the larynx development and the imperfection of the immune defense of its mucous membrane. This article presents data on the features of acute stenosing laryngotracheitis in children. Common symptoms of acute laryngotra cheitis in children include the following manifestations: intoxication with fever, headache, chills, unpleasant sensations of irritation, dryness and pain in the throat. The article describes the causes, pathogenesis, classification, clinical manifestations, differentiated approach to the diagnosis and treatment of acute stenosing laryngotracheitis in children. Acute stenosing laryngotracheitis re quires a quick response, since without emergency medical care, severe complications of the disease may occur, including death. It is necessary to carry out complex therapy including antihistamines, mucolytic, anti-inflammatory and immunomodulatory drugs, as well as inhalation therapy to restore airway patency.*

Keywords: *acute stenosing laryngotracheitis, children, clinical manifestations, diagnosis, treatment.*

Relevance

Acute stenosing laryngotracheitis (croup) is common in children aged 1 to 3 years. In 20–40% of patients, the disease is accompanied by severe upper respiratory tract obstruction [1, 3, 5].

In such situations, the child's severe condition in the first hours of illness forces parents to seek medical attention from a general practitioner at a clinic or an ambulance. The primary care physician's task is to provide emergency medical care to the patient, determine indications for hospitalization, and teach parents nebulizer techniques and strategies for intervention before the doctor arrives.

Acute stenosing laryngotracheitis in children can often be a complication of an acute respiratory infection of bacterial or viral etiology. Laryngotracheitis can often masquerade as an acute respiratory infection (ARI), with a gradual development of the clinical picture of the disease, characterized by a deterioration in the child's general condition during a prolonged course of the ARI [1, 2, 4]. A differentiated approach to the diagnosis and treatment of allergic and infectious

stenotic laryngotracheitis is often necessary. In some cases, especially when typical symptoms appear in young children, emergency care and hospitalization may be required. In this disease, the pathological process involves the mucous membranes of the larynx and pharynx, leading to the development of local inflammatory edema with minimal mucus production. This provokes attacks of a dry, often barking cough.

Causes of the disease

The main factors contributing to the development of acute stenosing laryngotracheitis include: adenovirus infections and seasonal influenza; chronic inflammatory diseases of the nasopharynx, such as tonsillitis and adenoiditis; bacterial sore throats caused by coccal flora; fungal infections of the mouth and pharynx; allergic predisposition and autoimmune reactions; dry indoor air and exposure to tobacco smoke; insufficient fluid intake; chronic inflammatory processes in the paranasal sinuses [1,4].

A distinction is made between acute primary laryngotracheitis, which occurs in a generally healthy state as a result of exposure to pathogenic factors (mechanical, thermal, chemical, allergic, and infectious), and acute stenosing laryngotracheitis, which is a complication of long-standing colds.

Clinical manifestations of the disease. The disease begins with catarrhal symptoms, characterized by swelling and hyperemia of the mucous membrane, scanty sputum production, general malaise, hoarseness to complete aphonia, and a dry, paroxysmal, often barking cough with difficult-to-separate sputum, which gradually spreads to the lower larynx and trachea. The patient's body temperature gradually normalizes on days 5-7 of illness. The cough may persist for 2-3 weeks [13]. The pathological process is often accompanied by the following clinical manifestations: pain, which is primarily a symptom of acute forms of the disorder; impaired normal breathing, leading to shortness of breath during physical exertion, and sometimes even at rest; hoarseness in both children and adults; and swelling of the airways, accompanied by wheezing and wheezing in the chest, which are audible without further examination.

Diagnosis of the disease. To identify the pathogen, sputum analysis with bacteriological culture and antibiotic susceptibility testing is performed [10, 14].

All patients are prescribed a complete blood count and urine test, and if diagnosis is difficult, tracheoscopy, bronchoscopy, and microlaryngoscopy are recommended. If the cough persists for a long time, a chest X-ray is required to rule out acute pneumonia. Allergic laryngotracheitis requires a special approach to differential diagnosis, as antibacterial and antiviral drugs may be contraindicated in this case. Their unjustified use can worsen the patient's condition, causing false croup due to increased edema.

To determine the allergic nature of the disease, screening tests for allergens are performed. It is important to note that allergic laryngotracheitis usually does not cause fever [7].

Treatment

Stenotic laryngotracheitis in children requires emergency medical attention, as its absence can lead to suffocation and death. Until the doctor arrives, it is recommended to give the child an antihistamine, provide fresh air, sit them up, or elevate the head of the bed. If signs of increasing suffocation appear, an ambulance must be called immediately.

In most cases, acute laryngotracheitis in children is treated at home. Hospitalization is required if there are signs of respiratory failure and the risk of developing croup. Antibacterial therapy is not indicated for acute stenosing laryngotracheitis in children, as the disease is most often viral in nature. Bacterial laryngitis with the development of croup is extremely rare. However, activation of bacterial flora due to an acute respiratory infection or nosocomial infection can contribute to the development of complications.

The need for antibacterial therapy for acute stenosing laryngotracheitis is considered in the presence of:

• febrile fever (over 38°C) for more than 3 days;

• clinical signs of pneumonia (febrile fever lasting more than 3 days, lethargy, pallor, decreased appetite, asymmetry of physical examination, shortness of breath without signs of acute bronchial obstruction);

• bacterial complications of the ENT organs, confirmed during an examination by an otolaryngologist and by peripheral blood tests.

The main cause of laryngeal stenosis in children is influenza or parainfluenza infection. [13] use of the complex homeopathic preparation aflubin is suggested as an etiotropic treatment. At the same time, in each specific case, especially with croup syndrome in a child, it can be difficult to exclude the role of bacterial flora. The use of aflubin in combination with antibiotic therapy significantly shortens the duration of therapy and reduces the incidence of antibiotic side effects [6-12]. V.V. Karpov and his colleagues were the first to use a course of nedocromil sodium (Tailed Mint, Rhone-Poulenc Rorer, France) lasting 8–12 weeks to prevent recurrences of stenosing laryngotracheitis. This method proved highly effective in 90% of cases [8, 10].

Bacterial lysates such as Bronchomunal and Ribomunil, which stimulate both specific and nonspecific immunity, were used to treat children with recurrent stenosing laryngotracheitis [11, 13]. Complex therapy also included Bifiform, a combination drug containing natural bifidobacteria and enterococci, fenspiride hydrochloride with anti-inflammatory properties [12, 15], as well as retinyl acetate or the vitamin complex "Triovit," containing vitamins C, E, and β-carotene.

Patients with severe disturbances in brain bioelectrical activity were additionally prescribed the nootropic drug phenibut.

All patients (100%) received inhalations using NE-29 compression inhalers and OMRON N-U17 ultrasonic nebulizers. The frequency and duration of treatments depended on the degree of stenosis and ranged from 2 to 4 sessions of 15 minutes per day. The initial medication was selected based on the clinical course and stage of croup. Steam or cold-air inhalations were not used [11,14].

The primary treatment for laryngotracheitis is eliminating the cause of the pathological process in the larynx and trachea. Therefore, the room is wet-cleaned at least twice a day. Rooms are ventilated every 3 hours. Drinking plenty of alkaline fluids (mineral water, milk with baking soda, certain juices and fruit drinks) is recommended. This stimulates expectoration and improves the patient's condition. A high body temperature is an indication for antipyretic medications. Typically, an antiviral medication (Ergoferon, Anaferon, Arbidol, Amiksin, Kagocel) is prescribed within the first 48 hours of the onset of clinical symptoms. If the body temperature has not returned to normal within 3 days of treatment, antibiotics (Ciprofloxacin, Azithromycin, Sumamed, Amoxiclav, Erythromycin, Ampicillin, Klacid, and others) are added to the regimen.

Antihistamines are mandatory even for non-allergic cases. Medications such as Suprastin, Tavegil, Ketotifen, Pipolfen, and Cetrin help reduce swelling of the mucous membrane and facilitate breathing.

To improve expectoration, mucolytic medications are used, including ACC, Lazolvan, Bromhexine, and Libexin. After 10-12 days, prescribing the antitussive Sinekod is advisable; it suppresses the cough reflex and eliminates unproductive cough, thereby promoting accelerated mucosal recovery. In children, inhalations with Pulmicort using a nebulizer may be effective. Herbal chest infusions and reflex-based methods, such as mustard plasters and compresses, are also acceptable.

Conclusion

Thus, acute constrictive laryngotracheitis requires a rapid response, as severe complications, including death, may develop without emergency medical care. Comprehensive therapy is necessary, including antihistamines, mucolytics, anti-inflammatory, and immunomodulatory medications, as well as inhalation therapy to restore airway patency. When prescribing medications, the type of disease (viral, bacterial, or allergic) must be taken into account to avoid ineffective treatment. Strengthening the immune system, physical activity, and a balanced diet are important.

References:

1. Garashchenko, T.I., Ilyenko L.I., Garashchenko M.V., Ovechkina N.V., Kats T.G. Preventive use of imudon in frequently and long-term ill schoolchildren // Inflammatory diseases of the mucous membrane of the pharynx, oral cavity and periodontium: Collection of scientific works. — Moscow, 2005. — P. 286–289.
2. Geppe N.A., Kolosova N.G. Acute stenosing laryngotracheitis in children. Farmateka 2013; 15: 268: 40–43.
3. Ibatova Sh.M., Ergashev A.Kh., Sanakulov A.B. Some aspects of diagnostics and treatment of acute stenosing laryngotracheitis in children // Tibbiyot akad emiyasi. No. 5. 2024. Pp. 54-59.
4. Ruzikulov N.E., Ibatova, Sh.M., Sanakulov A.B. Assessment of Risk Factors for the Development of Broncho-Obstructive Syndrome in Children. Research jour nal of trauma and disability studies. Poland. Volume: 3 Issue: 5 | May–2024. P. 182-186.

5. Karaulov, A. V., Sokurenko S. N. Targeted regulation of immune responses in the prevention and treatment of human diseases // Immunopathology, allergol ogy, infectology. - 2000. - No. 1. - P. 7-13.
6. Karpov V. V., Safronenko L. A., Shapranova N. L. Tailed in the prevention of recurrent stenosing laryngotracheitis in children // Pulmonology, - 2000. - No. 3. - P. 66-71.
7. Kladova O. V., Uchaikin V. F., Feldfiks L. I., Fomina V. L. Clinical efficacy of Imudon in children with acute respiratory diseases // III Congress of Pediatric Infectiologists of Russia: Abstract. reports. — M., 2004. — P. 100.
8. Kogut T.A., Emelicheva L.G., Ratynskaya N.V. Stenosing laryngitis in children. Study guide. Yaroslavl 2013; 39.
9. Kramar L. V., Arova A. A., Zheludkov Yu. A., Mukhina N. V., Medvedeva T. O., Nevinsky A. B., Rodionova N. V., Alyushin A. M. Optimization of therapy for acute stenotic laryngotracheitis in children taking into account evidence based medicine data // Bulletin of the Volgograd Scientific Center of the Russian Academy of Medical Sciences. — 2019. — No. 4.— P. 34–36.
10. Lukyanov S. V., Sereda E. V., Lukina O. F., Dukhalin A. S. Efficiency of fen spiride in bronchial asthma and chronic non-specific infectious and inflamma tory bronchopulmonary diseases in children // Issues of modern pediatrics. - 2013. - Vol. 2, No. 1. - Pp. 14-18.
11. Orlova S.N., Ryvkin A.I. Method for the treatment of recurrent laryngotracheitis in children: Russian Federation Patent No. 2366438.
12. Osipov L.V., Zhilin Yu.N., Avdeev S.N., Mizernitsky Yu.L. Use of ultrasonic and compressor inhalers (nebulizers) for treatment of diseases of respiratory tract and lungs. Moscow: Izomed, 2014; 132.
13. Tsarkova S.A. Metapneumovirus and bocavirus — “new” viruses in the etio logic structure of respiratory tract infections in children. // Ural Medical Journal 2013; 6: 111: 20–25.
14. Waldrep J.C., Berlinsk A., Dhand R. Comperative analysis of methods to meas ure aerosols generated by a vibrating mesh nebulizer. J Aerosol Med 2017; 20: 310-319.
15. Yoshiyama Y, Yazaki T., Arai M. et al. The nebulization of budesonide suspen sions by a newly designed mesh nebulizer. In: R.N. Dalby, P.R. Byron, J. Peart, S.F. Farr (eds). Respiratory drug delivery VIII. Raleigh: Davis Horwood, 2022; 487-489.

УДК 616-053.2

Ibatova Sh. M., candidate of medical sciences
associate professor
Samarkand State Medical University
Samarkand, Republic of Uzbekistan

FEATURES OF BRONCHIO-OBSTRUCTIVE SYNDROME IN YOUNG CHILDREN

Abstract: *Broncho-obstructive syndrome (BOS) is one of the most common symptom complexes accompanying various diseases of the bronchopulmonary system. Its development can be caused by many factors, including congenital and hereditary pathologies of the respiratory system, anomalies in the formation of the bronchi, respiratory distress syndrome of the newborn, primary immunodeficiency states, aspiration of foreign bodies, consequences of perinatal lesions, gastroesophageal reflux, thymus hyperplasia, enlargement of the intrathoracic lymph nodes, tumor processes and other pathological conditions. Clinical manifestations of broncho-obstructive syndrome are characterized by prolonged exhalation, the appearance of expiratory noises (wheezing), varying degrees of respiratory failure, retraction of compliant areas of the chest, as well as possible signs of hypoxemia, including perioral or diffuse cyanosis. Diagnosis of broncho-obstructive syndrome is based on a comprehensive analysis of anamnestic data, clinical symptoms, physical examination results, instrumental and laboratory research methods. The key diagnostic methods are lung auscultation, spirometry assessment, pulse oximetry, chest radiography, bronchoscopy and, if necessary, CT of the respiratory organs. Treatment of broncho-obstructive syndrome should be comprehensive and aimed primarily at eliminating the cause of bronchial obstruction. Therapeutic tactics include bronchodilators, mucolytics, anti-inflammatory and antibacterial drugs (in the presence of infection), as well as oxygen therapy in case of severe hypoxia. Inhaled glucocorticosteroids can be used for chronic forms of BOS, and surgical treatment in case of anatomical anomalies of the respiratory tract. Broncho-obstructive syndrome is a serious clinical condition that requires timely diagnosis and adequate treatment aimed at both relieving symptoms and eliminating the underlying cause of the pathology.*

Key words: *broncho-obstructive syndrome, children, clinical manifestations, diagnosis, treatment, respiratory failure, therapy.*

Introduction

Broncho-obstructive syndrome (BOS) is one of the most significant problems in modern pediatrics, occupying a leading position in the structure of respiratory pathologies in young children [1,3,5,10,20]. The high prevalence of this syndrome among bronchopulmonary diseases, its severe course, and potential complications make it a topic of medical research.

BOS is a complex of symptoms arising from obstruction of bronchial patency of organic or functional origin. Clinical manifestations include paroxysmal cough, expiratory dyspnea, episodes of suffocation, and wheezing on exhalation [6,8,14, 17]. In children in the first years of life, broncho-obstruction accompanies 30-50% of acute respiratory infections, the main cause of which is acute obstructive bronchitis (AOB) [2,9,11,21]. BOS accompanies a wide range of bronchopulmonary diseases, including congenital and hereditary pathologies of the respiratory system, bronchial developmental anomalies, respiratory distress syndrome, immunodeficiency states, foreign body aspiration, perinatal pathology, gastroesophageal reflux, thymic hyperplasia, hilar lymphadenopathy, and neoplasms [12, 13, 22]. The similarity of clinical manifestations in various diseases significantly complicates timely diagnosis and the selection of effective treatment tactics, which can contribute to a protracted or recurrent course of the pathology.

Epidemiology and causes of BOS

Statistics on the prevalence of BOS in young children vary. According to several studies, every third child under three years of age has experienced at least one episode of bronchial obstruction [17,18]. Other authors indicate that already in the first year of life, many children experience acute bronchiolitis or obstructive bronchitis caused by a viral infection [4,7,15].

Viral bronchiolitis experienced in early childhood often predicts recurrent episodes of broncho-obstruction in preschool age [16,19]. Furthermore, there has been a steady increase in the incidence of bronchial asthma among children, with this disease increasingly being diagnosed in infants in recent years [4,21].

Among infants, who frequently suffer from respiratory infections, the incidence of BOS reaches 50% or more [19,22]. At the same time, broncho-obstruction developing against the background of lower respiratory tract infections occurs in 5-40% of cases [11,12].

The high prevalence of BOS, its clinical diversity, the characteristics of its course, and potential consequences make this problem a subject of active study by both researchers and practicing physicians. Differential diagnosis of broncho-obstructive syndrome remains a complex task, necessitating further in-depth study of this pathology [20].

The most common pathogens of bronchiolitis in young children are respiratory syncytial virus (RSV), rhinovirus, and mixed viral infections, including parainfluenza, influenza, metapneumovirus, enterovirus, coronavirus, and adenovirus [1,3,5]. RSV accounts for up to 70% of hospitalizations of infants with bronchiolitis under one year of age.

Viral infections can increase the production of neurotrophins, which may contribute to the remodeling of airway nerve structures and increased nonspecific reactivity [7,8]. However, the role of RSV in the development of bronchial asthma after bronchiolitis becomes apparent only in combination with certain genetic factors or environmental exposures [21].

Atopy is an important predisposing factor for the subsequent development of bronchial asthma in children with virus-induced BOS. A high risk of developing asthma is observed in children who experienced BOS in infancy and who have signs of allergic predisposition, such as sensitization to allergens, atopic dermatitis, eosinophilia, or elevated levels of allergen-specific immunoglobulin E [20,22].

Clinical manifestations of BOS

Broncho-obstructive syndrome (BOS) manifests itself most clearly in children in the first years of life, due to the structural and functional characteristics of the respiratory system at this age. These include narrow airways, insufficient elasticity of lung tissue, soft bronchial cartilage, mild chest rigidity, a tendency toward edematous reactions, hyperproduction of viscous mucus, and underdevelopment of bronchial smooth muscle structures [17,21].

Clinical manifestations of BOS include prolonged expiration, expiratory noise in the form of wheezing and noisy breathing, episodes of suffocation, and active participation of accessory muscles in the respiratory process. In English-language medical literature, this symptom complex is known as "wheezing" syndrome, since wheezing (both remote and detected by auscultation) is the key sign of broncho-obstruction [7,16,22].

Early symptoms, such as shortness of breath and wheezing, appear in most children during the first years of life [20,21]. According to various data, between 30% and 50% of infants experience at least one episode of broncho-obstruction, with 30% of children experiencing their first episode before the age of one year [1,8,22]. However, in 80% of children, such symptoms disappear as they grow older, and in the remaining 20%, BOS persists into later years [21].

Research by Morales E. et al. shows that recurrent wheezing is detected in 40% of preschool children [22]. According to Zaitseva O.V., bronchial asthma (BA) causes broncho-obstruction in 30–50% of young children [6]. Nearly half of patients with ARIs show signs of bronchial obstruction of varying severity in their clinical presentation [8,9,15]. In particular, wheezing associated with ARIs is recorded in 50% of children under six years of age [12].

Diagnosis

Primary care physicians, when encountering manifestations of BOS in children, most often diagnose obstructive bronchitis or bronchiolitis, which are accompanied by respiratory failure and typically occur in the context of an acute respiratory infection [13,16,22].

In some cases, broncho-obstruction can be caused by allergic inflammation of the tracheobronchial tree, mechanical bronchial obstruction, or vascular disorders [15,16].

Diagnosing broncho-obstructive syndrome (BOS) in young children presents certain difficulties, as functional respiratory examination methods are uninformative at this age. Furthermore, obtaining sputum for cytological and bacteriological analysis, which is necessary to confirm the diagnosis, is difficult [21]. In cases of frequent recurrences of BOS that are resistant to standard drug

therapy, endoscopic examination of the bronchial tree may be required. This method allows for visual assessment of changes in the bronchi and analysis of the obtained biospecimens [18].

However, due to its invasive nature, bronchoscopy is rarely used in young children [14,17].

The diagnosis of bronchial obstruction is established based on the patient's medical history, clinical manifestations, and physical and instrumental examination data. For children over 5-6 years of age, the functional state of the respiratory system is assessed using spirography (analysis of the flow-volume curve) and pneumotachometry (peak flowmetry). Particular attention is paid to family history, in particular the presence of allergic diseases in relatives and frequent episodes of bronchoobstruction in the child. In cases of recurrent BOS, the examination includes a range of diagnostic methods:

1. Complete blood count.

2. Serological tests for chlamydial, mycoplasmal, cytomegalovirus, and herpes infections (IgM and IgG are tested; if IgM is absent and diagnostic IgG titers are detected, testing is repeated after 2-3 weeks to analyze antibody dynamics).

3. Determination of specific antibodies to helminths (toxocariasis, ascariasis).

4. Allergological examination, including determination of total and specific IgE, skin prick tests, and additional immunological tests after consultation with an immunologist.

Highly informative diagnostic methods include PCR analysis and bacteriological examination of sputum obtained by bronchoscopy or deep expectoration.

However, upper respiratory tract swabs reflect the composition of the nasopharyngeal microflora more than the bronchopulmonary system.

Chest X-rays are performed in the following cases:

• suspected complications (e.g., atelectasis);

• the need to rule out pneumonia;

• the possibility of a foreign body;

• frequent recurrences of BOS, if X-ray examination has not been performed previously.

If indicated, bronchoscopy, CT scan of the lungs, and other tests may be performed. Severe forms of broncho-obstruction, as well as frequent recurrences of BOS, require mandatory hospitalization to determine the cause of the disease and select effective treatment.

Treatment

Treatment of broncho-obstructive syndrome (BOS) should be aimed at eliminating the factors causing airway obstruction. According to current clinical guidelines, bronchodilators, primarily administered by inhalation, play a key role in the treatment of BOS. This method of administration ensures high local drug

concentrations, reduces the risk of systemic side effects, and allows for a reduction in the required dosage. Effective delivery of the drug to the respiratory tract is achieved using metered-dose inhalers (MDIs) and nebulizers. First-line medications include short-acting β2-adrenergic agonists (salbutamol, terbutaline, fenoterol). Their effect develops within 5-10 minutes after inhalation and lasts for 4-6 hours. For children, inhalation is performed using special devices such as babyhalers, spacers, or volumatic devices. The recommended single dose of salbutamol via spacer is:

• 200 mcg for children under 2 years old,

• 100 mcg for children over 2 years old.

These medications are highly selective and have a minimal risk of adverse reactions.

Given the pathogenesis of BOS, anticholinergic bronchodilators such as ipratropium bromide can also be used. In pediatric practice, the most commonly used combination drug is Berodual, which combines adrenergic receptor stimulation and M-cholinergic receptor blockade. It contains ipratropium bromide and fenoterol, their synergistic action enhances the antispasmodic effect and dilates the bronchi.

The average single dose for children under 6 years of age is 2 drops per 1 kg of body weight 3-4 times daily. Before inhalation, the drug is diluted in 2-3 ml of saline.

For severe forms of BOS, topical or systemic glucocorticosteroids (GCS) may be prescribed. In the acute phase, the use of inhaled corticosteroids (ICS) via a nebulizer is preferable, as their therapeutic effect becomes pronounced after 1-2 weeks of treatment.

Additionally recommended:

• Oral rehydration, which helps improve bronchial drainage.

• Mucolytic and expectorant therapy (Lazolvan - ambroxol, acetylcysteine - under medical supervision in children under 3 years of age).

• Physiotherapy methods (massage, postural drainage, breathing exercises).

For persistent dry cough without expectoration, alkaline diet is helpful.

It is important to note that first-generation antihistamines (Fenistil, Fenkarol, Peritol, Suprastin) impair mucociliary clearance and are not recommended for BOS.

If necessary, children with atopy are prescribed new-generation antihistamines (Claritin, Erius) once daily.

If BOS develops due to viral bronchiolitis or obstructive bronchitis, antiviral drugs (interferon, Viferon, etc.) may be included in the treatment regimen. Antibiotics are prescribed only if a bacterial infection is present.

Conclusion

Broncho-obstructive syndrome, especially in young children, remains an important clinical problem. It often develops as a result of acute and recurrent infections, as well as allergic inflammation or mechanical airway obstruction.

This requires a thorough diagnosis, including instrumental and laboratory tests. However, comprehensive diagnostic measures should not delay the timely initiation of treatment, as prompt and effective therapy plays a key role in reducing the risk of complications.

References

1. Afonina N. A. Respiratory diseases in children as a medical and social problem (literature review) / N. A. Afonina // Russian Medical and Biological Bulletin named after Academician I. P. Pavlov. - 2010. - No. 4. - P. 157-162.
2. Babushkina A. V. Acute respiratory viral diseases and broncho-obstructive syndrome / A. V. Babushkina // Ukrainian Medical Journal. - 2011. - V. 81, No. 1. - P. 69-74.
3. Volkov I. K. Differential diagnostics of broncho-obstructive syndrome in children / I. K. Volkov // Emergency Medicine. - 2013. - No. 48 (1). - P.125-128.
4. Geppe N.A., Seliverstova V.S., Malyshev et al. Causes of bronchial obstruction in children and directions of therapy // RMZh. - 2011. - Vol. 19, No. 22. - P. 1371-1374.
5. Global strategy for the treatment and prevention of bronchial asthma (revision of 2011) [Electronic resource] / ed. A.S. Belevsky. - M .: Ros.respirator. o-vo, 2012. - 109 p.
6. Zaitseva S.V., Murtazaeva O.A. Bronchial obstruction syndrome in children // Difficult patient. - 2012. - No. 10 (2-3). - P. 34-39.
7. Ibatova Sh.M., Pirmanova Sh.S. Broncho-obstructive syndrome in young children: prevalence, clinical manifestations, diagnosis and treatment // International scientific journal «Problems of biology and medicine». - 2017. - No. 2 (94). - P. 178-181.
8. Kazachkov M.I. Etiology and differential diagnosis of chronic cough in children // Russian Bulletin of Perinatology and Pediatrics. - 2013. - Vol. 58, No. 3. - P. 54-61.
9. Mamatkulova F.Kh., Ibatova Sh.M. Broncho-obstructive syndrome in children: prevalence, difficulties in differential diagnosis and prognosis // International scientific journal «Problems of biology and medicine». - Samarkand, 2019. - No. 3. - P. 233-236.
10. Okhotnikova O.M. Bronchial obstruction syndrome in children: differential diagnosis and treatment // Mystery of treatment. – 2010. – No. 1 (67). – pp. 45-56.
[11] Patrusheva Yu.S., Bakradze M.D., Kulichenko T.V. Diagnosis and treatment of acute bronchiolitis in children // Diagnostic issues in pediatrics. – 2011. – T. 3, No. 1. – P. 5-11.
11. Seroklinov V.N., Fedorov A.V., Ponomareva I.A. Broncho-obstructive syndrome in children: textbook. manual for doctors. – Barnaul: ASMU, 2010. – 49 p.
12. Soroka Yu.A., Chernysheva O.E. Artificial feeding as one of the risk factors for the development of broncho-obstructive syndrome in young children // Child health. – 2012. – No. 7 (42). – P. 60-62.

13. Spichak T.V. Viral bronchiolitis and its consequences in childhood // Pediatrics. – 2013. – V. 92, No. 3. – P. 89-96.
14. Shvets E.A., Savvateeva V.G., Vasilyeva G.I. Clinical and immunological characteristics of bronchial obstruction syndrome in children // Siberian Medical Journal (Irkutsk). – 2010. – Vol. 93, No. 2. – P. 8-11.
15. Yulish E.I., Soroka Yu.A., Chernysheva O.E. On risk factors for the development of broncho obstructive syndrome in young children // Child health. – 2012. – No. 6 (41). – P. 85-88.
16. Jackson D.J. The role of rhinovirus infections in the development of early childhood asthma / D. J. Jackson // Curr. Opin.Allergy Clin. Immunol. – 2010. – Vol. 10, No. 2. – P. 133-138.
17. Ibatova Sh.M., Mamatkulova F. Kh., Ruzikulov N.Y. The Clinical Picture of Acute Obstructive Bronchitis in Children and the Rationale for Immunomodulatory Therapy // International Journal of Current Research and Review. – Vol. 12, Issue 17. – September 2020. – P. 152-155.
18. Islamova D.S., Ibatova Sh.M., Mamatkulova F.Kh. Efficiency of combined application of apricot oil and aevit as a regulator of lipase activity of blood serum in children with vitamin D-deficiency rickets // Journal of Critical Reviews. – Vol. 7, Issue 11. – 2020. – P. 1266-1274. 8 www.fdoctors.uz 2025 / Issue 02 / Article 01 Medical science of Uzbekistan published: 03 march 2025.
19. Mamatkulova F.Kh., Ibatova Sh.M., Kodirova M.M. Evaluation of the effectiveness of treatment of rickets in children by gas-liquid chromatography // Asian Journal of Multidimensional Research. – Vol. 9, Issue 10. – October, 2020. – P. 44-47.
20. Kodirova M.M. Ibatova Sh.M., Mamatkulova F.Kh., Rakhmonov Y.A., Shukurova D.B., Assessment of the Effectiveness of Treatment of Rachit in Children by Gas-Liquid Chromatography // International Journal of Current Research and Review. – Vol. 13, Issue 06. – 20 March 2021. – P. 64-66.
21. Rustamova Kh.Kh., Ibatova Sh.M. Optimization of treatment of vitamin D-deficient rickets in children // EPRA International Journal of Research and Development. – Vol. 7, Issue 4. – April 2022. – P. 117-120

UDK 616.33/.34-073.43

Ibodova D. F.
department of medical radiology and nuclear medicine
Abu Ali ibn Sino Bukhara State Medical Institute

ABDOMINAL ULTRASOUND IN PATIENTS WITH ABDOMINAL PAIN AS A FIRST-LINE DIAGNOSTIC IMAGING METHOD

Annotation: *Hospital records of patients who underwent abdominal US as a first-line diagnostic examination at Bukhara Medical Institute Hospital from April 2022 to April 2024 were reviewed. Only patients who underwent abdominal US for the diagnosis of abdominal symptoms were included in this study. All patients with previous diagnostic imaging results were excluded from the study to reduce bias. The analyzed patients included 39 men with a mean age (mean ± standard deviation) of 65.8 ± 18.8 years and 37 women with a mean age of 53.7 ± 19.3 years. Abdominal ultrasound confirmed the final diagnosis in 66 of 76 patients. The final diagnosis of symptoms by abdominal ultrasound was unsuccessful in the remaining 10 patients, who required further evaluation. Acute cholangitis, acute cholecystitis, acute pancreatitis, acute appendicitis, colonic diverticulitis, and splenic rupture were correctly diagnosed. Various types of cancer, including colorectal cancer, were also successfully diagnosed. Bile duct cancer and sigmoid volvulus could not be diagnosed by abdominal ultrasound due to the presence of intestinal gas. Abnormal findings were detected by abdominal ultrasound, but further consultation with gynecologists was required for diagnosis. Abdominal ultrasound is appropriate for patients with abdominal symptoms. Patients are advised to undergo additional diagnostic imaging or consult with a gynecologist if large gas bubbles are present or if gynecological conditions are suspected. Ultrasound is becoming increasingly important in the diagnosis of gastrointestinal diseases. However, for colon cancers, the diagnostic value of conventional transabdominal sonography is limited. The aim of this study was to determine whether the assessment and staging of colon cancers could be improved by retrograde injection of water into the colon, a procedure called colon hydrosonography.*

Key words: *abdominal ultrasonography, tumor diseases, colorectal cancer, hydrocolonosonography.*

Introduction

Abdominal pain is one of the most common symptoms prompting patients to visit hospitals. Among such people, a number of patients have serious illnesses and require subsequent hospitalization or surgery. The diagnosis may include acute appendicitis, intestinal obstruction, and other serious conditions such as intestinal necrosis and volvulus (1). Accurate and prompt diagnosis is essential for proper patient management. The diagnosis of patients with abdominal pain is primarily

determined by imaging techniques such as radiography, abdominal ultrasound (US), computed tomography (CT), and magnetic resonance imaging (MRI) (2). Among them, abdominal ultrasound is a non-invasive procedure that is readily available in most hospitals even during off-hours (weekends, nights, and holidays) and can be performed at the patient's bedside (3). Abdominal ultrasound is indispensable for the diagnosis of abdominal diseases in patients with abdominal symptoms (4,5). In addition, abdominal ultrasound is also useful for the diagnosis of solid organ diseases, including acute cholangitis, acute cholecystitis, and acute pancreatitis (6–8). Abdominal ultrasound is also useful for the diagnosis of intestinal diseases based on pathological findings (9). Diagnostic criteria by abdominal ultrasound have been established for acute appendicitis and colonic diverticulitis, and colorectal cancer can be diagnosed by abdominal ultrasound. In many cases, patients are diagnosed based on a combination of laboratory data and diagnostic imaging results based on symptoms and physical examination. Regarding diagnostic imaging, CT scan is recommended as a first-line procedure; however, CT scan is not always available after hours in most hospitals. In these cases, abdominal ultrasound is the first-line procedure.

Based on the above considerations, the current study retrospectively analyzed the charts of patients who underwent abdominal ultrasound as a first-line diagnostic procedure to evaluate its usefulness and limitations in establishing a diagnosis in patients with abdominal symptoms. Ultrasound has become a widely accepted diagnostic tool for many abdominal diseases. In recent years, the resolution achieved by ultrasound equipment has significantly improved, making it possible to perform more accurate ultrasound diagnostics. Thus, traditional transabdominal sonography is becoming increasingly important in the diagnosis of gastrointestinal diseases. Today, ultrasound can even diagnose acute appendicitis. 1,2 However, traditional abdominal sonography has limitations. Colonic diseases cannot be reliably detected using sonography alone, as the colon cannot be fully visualized, and detailed assessment of wall structures and intraluminal lesions is difficult. Transabdominal sonography after retrograde colonic water infusion, a technique known as colon hydrosonography, can significantly improve conditions for colonic ultrasound imaging and evaluation. Studies have shown that this technique can diagnose not only colon tumors (3) but also inflammatory bowel diseases such as Crohn's disease and ulcerative colitis

Materials and methods

Medical records were retrospectively reviewed for 76 patients who underwent abdominal ultrasound as a first-line diagnostic imaging modality at Bukhara Medical Institute Hospital from April 2022 to April 2024. Abdominal ultrasound was performed during consultations or outside of office hours (weekdays, weekends, and holidays). Recruited patients were limited to those who underwent abdominal ultrasound as a first-line diagnostic approach to evaluate the diagnostic performance of abdominal ultrasound alone, without any potentially confounding information from other diagnostic imaging procedures. Patients were excluded if abdominal ultrasound was performed after other diagnostic imaging

procedures, such as radiography, CT, or MRI, as the ultrasound technician would have been informed of the obtained results. The analyzed patients included 39 men with a mean age (mean ± standard deviation) of 65.8 ± 18.8 years and 37 women with a mean age of 53.7 ± 19.3 years.Patients were admitted to the hospital or referred to another hospital based on a diagnosis obtained by abdominal ultrasound, blood test results, clinical findings, or diagnostic imaging after abdominal ultrasound. Therefore, patients were referred to another hospital for a gynecological consultation. Out-of-hours patient management was determined based on abdominal ultrasound findings and clinical symptoms. This study was not considered a clinical trial because abdominal ultrasound was performed as part of routine clinical practice. Written informed consent was not required for inclusion in the study. Patient records/information were anonymized and de-identified before analysis.

Ultrasound of the abdominal cavity. Abdominal ultrasound was performed by senior researchers at the Japanese Society of Medical Ultrasound (Tokyo, Japan; http :// www . jsum . or . jp / jsum - e / index . html) using the ultrasonic system SSA -700 A (Toshiba Medical Systems Corporation, Ohtawara, Japan) with a 3.75 MHz convex sensor (PVT -375 BT; Toshiba Medical Systems Corporation) or a linear sensor 8.0 MHz (PLT -805 AT; Toshiba Medical Systems Corporation).

Diagnostic criteria for diseases. Acute cholangitis is defined as inflammation caused by bile duct obstruction (6). Findings detected by abdominal ultrasound include bile duct dilation and evidence of its etiology, such as stricture, stones, or stent (6). In the present study, in the absence of these findings, acute cholangitis was not diagnosed by abdominal ultrasound but was based on a combination of symptoms, including systemic inflammation and cholestasis (6). Acute cholecystitis was diagnosed by a combination of local and systemic signs of inflammation (7). Abdominal ultrasound confirmed the diagnosis with the findings of distension, wall thickening, and sediment in the gallbladder (7). More specifically, the detection of the sonographic Murphy sign was considered the most reliable, as it is believed to suggest gallbladder inflammation.

Acute pancreatitis is typically diagnosed as abdominal pain, elevated serum amylase, and pancreatic edema using diagnostic imaging. In the current study, acute pancreatitis was diagnosed when abdominal ultrasound revealed a swollen pancreas, fluid collection, and inflammation of adjacent organs. Acute diverticulitis was diagnosed as a diverticulum with a thickened wall and high echogenicity from the surrounding tissue. Acute appendicitis was diagnosed as a swollen appendix with a diameter >10 mm and a thickened wall).

Conclusion

The diagnosis of acute appendicitis was complicated when the appendix could not be located. Bowel preparation consisted of a laxative orthograde bowel lavage on the morning of the examination. A total of up to 1500 ml of water was infused into the colon after an intravenous injection of 20 mg scopolamine- N - butyl bromide (Buscopan; Boehringer Ingelheim) to relax the bowel. The relaxant was necessary not only to achieve optimal bowel distension during water

administration but was also useful in suppressing the feeling of urgency to defecate. A commercially available system commonly used for barium enemas (Pneumocolon; Barnes - Hind) was used to administer the water. Barium Products). Continuous transabdominal sonographic examination of the colon was performed, starting from the moment of water administration, using a real-time scanning device with 3.5, 5.0 and 7.5 MHz transducers (Picker CS 9500). The examination began with a 3.5 MHz transducer; 5.0 and 7.5 MHz transducers were used for a detailed assessment of the colonic wall structure. A manually controlled tilt table allowed for patient positioning. To achieve optimal filling and distension of the sigmoid colon, the examination was initially performed with the patient in an upright position; 300 to 500 ml of water was administered. After examination of the sigmoid colon, the patient was placed supine for examination of the rest of the colon, during which another 1000 ml of water was administered. The lateral intercostal route was chosen for examination of the colonic flexures. Deep inspiration moves the colonic flexures downward and facilitates their sonographic visualization. The diagnosis of colonic tumors was based on sonographic evidence of intraluminal masses attached to the wall, the appearance of lesions in the structure of the colonic wall and surrounding connective tissue, or both. The depth of tumor infiltration into the colon wall was measured, and tumor stage was determined according to the classification system developed by the International Union Against Cancer. 6 The tumor was classified as T1 when infiltration was limited to layers 1 and 2 of the colon, as T2 when the tumor penetrated layers 1–3, as T3 when it penetrated layers 1–5 and surrounding connective tissue, and as T4 when the tumor extended to all layers and invaded other organs.

References

1. Paduszynska K, Celnik A, Pomorski L. Patients subject to surgery due to acute abdominal disorders during the period between 2001–2004. Pol Przegl Chir. 2012;84:488–494. doi: 10.2478/v10035-012-0083-3. [DOI] [PubMed] [Google Scholar]
2. Hayes R. Abdominal pain: General imaging strategies. Eur Radiol. 2004;14:L123–L137. doi:10.1007/s00330-003-2078-2. (Suppl 4) [DOI] [PubMed] [Google Scholar]
3. Rozycki GS, Cava RA, Tchorz KM. Surgeon-performed ultrasound imaging in acute surgical disorders. Curr Probl Surg. 2001; 38:141–212. doi: 10.1067/msg.2001.112348. [DOI] [PubMed] [Google Scholar]
4. Puylaert JB, van der Zant FM, Rijke AM. Sonography and the acute abdomen: Practical considerations. AJR Am J Roentgenol. 1997; 168:179–186. doi: 10.2214/ajr.168.1.8976943. [DOI] [PubMed] [Google Scholar]
5. Birnbaum BA, Jeffrey RB., Jr CT and sonographic evaluation of acute right lower quadrant abdominal pain. AJR Am J Roentgenol. 1998; 170:361–371. doi: 10.2214/ajr.170.2.9456947. [DOI] [PubMed] [Google Scholar]
6. Kiriyama S, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Pitt HA, Gouma DJ, Garden OJ, Büchler MW, Yokoe M, et al. New diagnostic criteria and severity assessment of acute cholangitis in revised Tokyo Guidelines. J

Hepatobiliary Pancreat Sci. 2012;19:548–556. doi:10.1007/s00534-012-0537-3. [DOI] [PMC free article] [PubMed] [Google Scholar]
7. Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, Pitt HA, Gouma DJ, Garden OJ, Büchler MW, et al. New diagnostic criteria and severity assessment of acute cholecystitis in revised Tokyo Guidelines. J Hepatobiliary Pancreat Sci. 2012;19:578–585. doi:10.1007/s00534-012-0548-0. [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Scaglione M, Casciani E, Pinto A, Andreoli C, De Vargas M, Gualdi GF. Imaging evaluation of acute pancreatitis: a review. Semin Ultrasound CT MR. 2008; 29:322–340. doi: 10.1053/j.sult.2008.06.009. [DOI] [PubMed] [Google Scholar]
9. Maturen KE, Wasnik AP, Kamaya A, Dillman JR, Kaza RK, Pandya A, Maheshwary RK. Ultrasound imaging of bowel pathology: methodology and clues to the diagnosis of acute abdomen. AJR Am J Roentgenol. 2011;197: W1067–W1075. doi: 10.2214/AJR.11.6594. [DOI] [PubMed] [Google Scholar]

UDK:616-006.04;616-72.2

Ibodova D. F.
assistant
department of medical radiology and nuclear medicine
Abu Ali ibn Sino Bukhara State Medical Institute

METHODS OF INVESTIGATION IN BONE DESTRUCTION: MODERN APPROACHES

Abstract: *This article reviews the main diagnostic methods used to visualize bone destruction processes - radiography, computed tomography (CT), magnetic resonance imaging (MRI), radionuclide scintigraphy, and positron emission tomography (PET). The advantages and limitations of each method are highlighted, especially their role in the early detection of bone destruction in the setting of oncological diseases. Абстрактный.В данной статье рассматриваются основные методы диагностики, используемые для визуализации процессов деструкции кости - рентгенография, компьютерная томография (КТ), магнитно-резонансная томография (МРТ), радионуклидная сцинтиграфия и позитронно-эмиссионная томография (ПЭТ). Описаны преимущества и ограничения каждого метода, особенно их роль в раннем выявлении костной деструкции при онкологических заболеваниях.*

Key word: *bone destruction, visualization, CT, MRI, PET, scintigraphy, metastasis.*

Intraduction

Bone destruction is a complex pathological condition characterized by the destruction, erosion or resorption of bone tissue, which develops against the background of oncological, infectious, inflammatory and metabolic diseases. Especially in tumors that have metastasized to the bone, destructive processes are common and are accompanied by pain syndrome, decreased quality of life and the risk of bone fractures. Therefore, early detection and assessment of bone destruction is an important task of modern diagnostic systems.An example is stereomicroscopy based on histological sections, that provides the possibility to assess bone damage and remodeling at a resolution higher than 2 μm, or scanning electron microscopy. However, these techniques are destructive and, in the case of stereomicroscopy, are restricted to a bidimensional analysis. The three-dimensional evaluation of bone damage at a higher resolution is crucial not only from a research perspective, but especially from the clinical point of view; the comprehension of the micro-damage physical principle and its visualization is a relevant opportunity to understand changes in the diseased tissue and to provide insights into the prevention of age-related fractures. This could be performed by the implementation of micro- and nano-scale fragility indexes, obtained with the

aid of numerical models that use, as a source, micro-scale images of bone. In this context, a wide interest is devoted to micro-CT scans and synchrotron radiation (SR) images. They provide, in fact, a three-dimensional reconstruction of bone micro-architecture, which is important for the identification of microdamage, offering the optimal balance between resolution and field of view. In addition to this, the SR technique is a promising solution for the real-time visualization of bone damage, allowing the performance of mechanical tests inside the synchrotron facility. The disruptive advent of these high-resolution in vitro techniques offers the possibility to experimentally validate numerical damage models, as deeply discussed in the section "Validation approaches to multiscale damage models". Additionally, these techniques could help the study of effective pharmacological treatments for bone pathologies.

Materials and metods

This review article summarizes the diagnostic capabilities of various imaging modalities based on the medical literature and clinical experience. The sensitivity, specificity, and clinical applicability of each modality were evaluated.

Results and discussion

Radiography Radiography is the initial and most cost-effective method for detecting bone destruction. However, destructive changes are detected on radiographs only after at least 30% of bone mass has been lost. 2. Computed tomography (CT) CT provides high-resolution images of the cortical and trabecular structures of the bone. It is of great clinical importance in detecting subtle destruction, especially in the spine, skull, and shoulder regions. Magnetic resonance imaging (MRI) MRI is one of the most effective methods for assessing bone marrow, tumor infiltration, and soft tissue invasion. Radionuclide scintigraphy Bone scintigraphy (usually using 99mTc-pyrophosphate) detects changes in bone metabolism at an early stage. Positron emission tomography (PET/CT) PET/CT, especially with the isotopes 18F-FDG or 18F-NaF, assesses the metabolic activity of tumor cells.

Conclusion

A comprehensive approach is required to identify bone destruction. Each diagnostic method has its own advantages and limitations. Although radiography is used for initial assessment in clinical settings, CT, MRI, and radionuclide methods are important for in-depth and accurate diagnosis. PET/CT, on the other hand, has high sensitivity in modern oncological practice and is an important tool in formulating a treatment strategy. Micro-scale models provide further insights into bone fracture prediction at smaller scales. Traditionally, micro-architectural features were assessed by means of histological sections.that lack in three-dimensionality. Nowadays, the input of micro-scale models often comes from micro-CT or SR images, that have a resolution able to non-destructively capture not only trabecular architecture, but even ultrastructural porosities, such as lacunae. However, this corresponds to higher computational costs, calculated by van Rietbergen et al. through an element-by-element method that implies the use of uniformly shaped elements to reduce memory allocation and optimize

computational times. Some issues arise when dealing with micro-CT or SR imaging techniques: filtration and segmentation. Reconstructed image data include noise that should be removed or at least reduced by filtering. The choice of an adequate filter (the Gaussian filter is the most suitable one, which is easily implementable and fast in computation is essential in order to obtain an input image for the model, as close as possible to the original sample. Another relevant aspect is the correct segmentation process that selects those voxels that are below or above a defined threshold, so as to separate those elements that are bone and those that can be considered as voids.

Literature

1. Mazur N.A., Kopylova O.V. Radionuclide methods and diagnostics of systemic bone diseases. // Medical visualization. - 2020. - T. 26, No. 2. - S. 45–52.
2. Safonov Yu.A., Shchukin D.V. Metastatic porazheniya skeleto a: vozmojnosti sovremennyx metodov vizualizatsii. // Journal of radiology and radiology. – 2021. – No. 4. - S. 12-18.
3. Abdurakhmanov A.K. Visualization of tumorous and traumatic bones: comparative methods. // Oncology. - 2019. - T. 21, No. 1. - S. 33–39.
4. Van der Woude HJ, Bloem JL, Hogendoorn PC Preoperative evaluation and monitoring of therapy with MR imaging in bone tumors. // Eur Radiol. - 2016. - Vol. 26(2). - P. 400-408.
5. Even-Sapir E., Mishani E., Flusser G., Metser U. 18F-Fluoride positron emission tomography and positron emission tomography/computed tomography. // Semin Nucl Med. - 2007. - Vol. 37(6). – P. 462–469.
6. Lecouvet FE, Talbot JN, Messiou C. et al. Monitoring the response of bone metastases to treatment with magnetic resonance imaging and nuclear medicine techniques. // Radiology. - 2014. - Vol. 271(2). – P. 349–369.
7. Ghanem N., Uhl M., Brink I., et al. Diagnostic value of MRI in comparison to bone scintigraphy, FDG-PET, and PET/CT for the detection of bone metastases in oncological patients. // Eur J Radiol. - 2012. - Vol. 81(3). – P. 508–518.
8. Babaev R.T., Yusupova N.Sh. Sovremennye vozmojnosti MRT and PET-CT and otsenke destruction of bone tissue. // Luchevaya diagnosis and therapy. – 2022. – No. 1. - S. 27–31.

Ibragimov. O' I.
Eshkobilova. M. E.
Samarqand davlat tibbiyot universiteti
Samarqand, O'zbekiston

GASTROENTEROLOGIYA AMALIYOTIDA XRONIK PANKREATITNI DAVOLASHDA QO'LLANILADIGAN FARMAKOTERAPIYA DORI VOSITALARINING FARMATSEVTIK-IQTISODIY (FARMAKOEKONOMIK) TAHLILI

Annotatsiya: *Surunkali pankreatit - bu oshqozon osti bezining progressiv yallig'lanish kasalligi bo'lib, u doimiy qorin og'rig'i, ekzokrin va endokrin yetishmovchilik va takroriy kasalxonaga yotqizishlar bilan tavsiflanadi. Samarali farmakoterapiya simptomlarni boshqarish, asoratlarning oldini olish va bemorlarning hayot sifatini yaxshilash uchun muhimdir. Biroq, uzoq muddatli davolanish bilan bog'liq iqtisodiy yuk iqtisodiy samaradorlik va resurslarni taqsimlashni sinchkovlik bilan baholashni talab qiladi. Ushbu tadqiqot surunkali pankreatitni davolashda keng qo'llaniladigan dorilar, jumladan, oshqozon osti bezi fermentlarini almashtirish terapiyasi, og'riq qoldiruvchi vositalar, antispazmodiklar va qo'shimcha terapiyalarning farmakoiqtisodiy tahlilini o'tkazadi. Terapevtik variantlarni ham klinik natijalar, ham iqtisodiy ta'sir nuqtai nazaridan taqqoslash uchun xarajat tahlili, xarajat samaradorligi va xarajat-foyda baholari o'tkazildi.*

Kalit so'zlar: *Surunkali pankreatit, farmakoterapiya, farmakoiqtisodiyot, iqtisodiy samaradorlik, oshqozon osti bezi fermentlarini almashtirish terapiyasi, gastroenterologiya, sog'liqni saqlash resurslarini taqsimlash, dori terapiyasini boshqarish.*

Ibragimov O. I.
Eshkobilova M. E.
Samarkand State Medical University
Samarkand, Uzbekistan

PHARMACEUTICAL-ECONOMIC (PHARMACOECONOMIC) ANALYSIS OF DRUGS USED IN THE PHARMACOTHERAPY OF CHRONIC PANCREATITIS IN GASTROENTEROLOGY PRACTICE

Abstract: *Chronic pancreatitis is a progressive inflammatory disease of the pancreas characterized by persistent abdominal pain, exocrine and endocrine insufficiency, and recurrent hospitalizations. Effective pharmacotherapy is crucial for symptom control, prevention of complications, and improvement of patients' quality of life. However, the economic burden associated with long-term treatment necessitates a thorough evaluation of cost-effectiveness and resource allocation. This study conducts a pharmacoeconomic analysis of commonly used medications*

in the management of chronic pancreatitis, including pancreatic enzyme replacement therapy, analgesics, antispasmodics, and adjunctive therapies. Cost analysis, cost-effectiveness assessment, and cost-benefit evaluations were performed to compare therapeutic options in terms of both clinical outcomes and economic impact.

Keywords: *chronic pancreatitis, pharmacotherapy, pharmacoeconomics, cost-effectiveness, pancreatic enzyme replacement therapy, gastroenterology, healthcare resource allocation, drug therapy management.*

Kirish

Topilmalar klinik samaradorlik va moliyaviy barqarorlik o'rtasidagi muvozanatni ta'kidlaydi, gastroenterologiya amaliyotida farmakoterapiya strategiyalarini optimallashtirish uchun dalillarga asoslangan ko'rsatmalar beradi. Ushbu tahlil klinisyenlar, siyosatchilar va sog'liqni saqlash muassasalarini yuqori sifatli bemorlarga yordam ko'rsatishni ta'minlash bilan birga iqtisodiy jihatdan asoslangan davolash qarorlarini qabul qilishda xabardor qilishga qaratilgan.

Surunkali pankreatit (SP) zamonaviy gastroenterologiyada muhim va tobora ortib borayotgan muammo bo'lib qolmoqda. Qaytarib bo'lmaydigan morfologik o'zgarishlar bilan tavsiflangan oshqozon osti bezining doimiy, progressiv yallig'lanish kasalligi sifatida ta'riflangan SP oxir-oqibat ekzokrin va/yoki endokrin yetishmovchilikka, takroriy og'riq epizodlariga, malabsorbsiyaga va ko'pincha hayot sifatining pasayishiga olib keladi.

O'tkir oshqozon osti bezi kasalliklariga nisbatan nisbatan kam uchraydigan holatga qaramay, uzoq muddatli kasallik yuki va ortib borayotgan chastota va tarqalishning ortib borayotgan dalillari SP yetarlicha baholanmagan jamoat salomatligi muammosi ekanligini ko'rsatadi. Masalan, Sichuan provinsiyasida (2015–2021) o'tkazilgan so'nggi 7 yillik aholiga asoslangan tadqiqotda 2015 yilda har 100 000 kishiga 4,03 dan 2021 yilda har 100 000 kishiga 8,27 gacha oshganligi, 2021 yilda esa tarqalish darajasi har 100 000 kishiga 45,52 ballni tashkil etganligi qayd etilgan. Qo'shma Shtatlardagi sug'urta qilingan aholidan olingan boshqa ma'lumotlarga ko'ra, davrdagi tarqalish darajasi ancha yuqori bo'lib, umumiy hisobda har 100 000 kishiga taxminan 73,4 tani tashkil etadi, kattalarda esa bu ko'rsatkich yuqori. Bu raqamlar, bemorlar ko'pincha tashxis qo'yilgandan keyin 15-20 yil omon qolishlari bilan birgalikda, ayniqsa subklinik yoki sekin rivojlanayotgan kasallikka chalingan bemorlarni hisobga olganda, haqiqiy tarqalish darajasi sezilarli darajada kam xabar qilinishi mumkinligini anglatadi.

Epidemiologik tendentsiyalardan tashqari, CP sog'liqni saqlash tizimlari va jamiyatlariga nomutanosib ravishda yuqori iqtisodiy yukni yuklaydi. Buyuk Britaniyada CP bilan bog'liq to'g'ridan-to'g'ri va bilvosita xarajatlarni har tomonlama ko'rib chiqish natijasida yillik xarajatlar yuz millionlab funt sterlingga yetishi taxmin qilingan, to'g'ridan-to'g'ri tibbiy yordam, unumdorlikning pasayishi va ijtimoiy qo'llab-quvvatlash birlashtirilganda har bir bemor uchun yillik xarajatlar ko'pincha 79 000 funt sterlingdan oshadi. Qo'shma Shtatlar va boshqa

rivojlangan mamlakatlarda surunkali oshqozon osti bezi kasalligi kasalxonaga yotqizish, ambulatoriya tashriflari, tez tibbiy yordam bo'limidan foydalanish va uzoq muddatli parvarishga katta hissa qo'shadi, bu esa kasallik bilan bog'liq umumiy xarajatlarni milliardlab dollarga yetkazadi.

Klinik jihatdan, CP ni davolash farmakoterapiyaga katta tayanadi: oshqozon osti bezi fermentlarini almashtirish terapiyasi (PERT), surunkali og'riq uchun analjeziklar, antispazmodiklar, proton nasos ingibitorlari yoki boshqa kislotani bostiruvchi vositalar va turli xil qo'llab-quvvatlovchi choralar. Ushbu aralashuvlar standart bo'lib, ko'pincha simptomlarni yengillashtirish va asoratlarning oldini olishda (masalan, malabsorbsiya, steatoreya, to'yib ovqatlanmaslik) samarali bo'lsa-da, ularni uzoq muddatli qo'llash, ayniqsa resurslari cheklangan sog'liqni saqlash tizimlarida katta terapevtik xarajatlarni keltirib chiqaradi. Bundan tashqari, dori formulalaridagi o'zgaruvchanlik (masalan, mikrotabletkalar va standart pankreatin), turli farmakokinetik xususiyatlar, dozalash rejimlari va rioya qilish shakllari ham klinik natijalarga, ham umumiy davolash xarajatlariga ta'sir qiladi.

CP ning surunkali bo'lishi, uning takroriy kuchayishi va ko'pincha umrbod terapiya zarurati hisobga olinsa, tizimli farmakoiqtisodiy baholash zarur bo'lib qoladi. Bunday tahlil — kasallikning narxi, iqtisodiy samaradorligi va turli farmakoterapiya rejimlarining iqtisodiy foydaliligini qamrab oladi — qaysi davolash strategiyalari klinik foyda va iqtisodiy barqarorlik o'rtasida optimal muvozanatni ta'minlayotganini aniqlashi mumkin. Bu, ayniqsa, butun dunyo bo'ylab gastroenterologiya amaliyotida klinik ko'rsatmalar, sog'liqni saqlash siyosati qarorlari va resurslarni taqsimlash uchun juda muhimdir.

Shuning uchun, ushbu tadqiqot CP ni davolashda keng qo'llaniladigan dorilarning keng qamrovli farmakoiqtisodiy tahlilini o'tkazishga, ularning uzoq muddatli xarajatlarini, klinik natijalarini va iqtisodiy foydaliligini taqqoslashga, shu bilan davolash protokollarini optimallashtirish va surunkali pankreatitli bemorlar uchun barqaror, yuqori sifatli yordamni qo'llab-quvvatlash uchun dalillarga asoslangan tavsiyalarni taqdim etishga qaratilgan.

Natijalar

Surunkali pankreatit (CP) bilan bog'liq ekzokrin pankreatik yetishmovchilik (EPI) bilan og'rigan bemorlar uchun 20 yillik ufq davomida pankreatin minimikrosferalarining (MMS) iqtisodiy samaradorligi tahlilida, ferment terapiyasisiz umumiy qo'shimcha iqtisodiy samaradorlik koeffitsienti (ICER) sifatga moslashtirilgan hayot yiliga (QALY) 6312 yevroga baholandi.

Surunkali pankreatit / EPI (va boshqa holatlar) da oshqozon osti bezi fermentlarini almashtirish terapiyasini (PERT) PERTsiz va PERT bilan solishtiradigan yana bir yaqinda qabul qilingan qarorlarni tahlil qilish modeli (Xitoy jamiyati nuqtai nazaridan) shuni ko'rsatdiki, PERT bilan davolash qo'shimcha 0,45 dan 2,93 QALY gacha, 4315 dan 15193 AQSH dollarigacha bo'lgan chegirmali qo'shimcha xarajatlar bilan natija berdi. Bu bemorning kichik guruhiga qarab (masalan, endoskopik davolanishdan keyingi CP va boshqa kichik guruhlar) har bir QALY uchun 5178 dan 9533 AQSH dollarigacha bo'lgan ICER ni keltirib chiqardi.

Ushbu klinik yutuqlar farmakoiqtisodiy modellashtirish bilan birlashtirilganda mazmunli uzoq muddatli foydalarga aylanadi: ovqatlanish holatining yaxshilanishi, malabsorbsiyaning kamayishi, asoratlarning kamayishi (masalan, to'yib ovqatlanmaslik, sarkopeniya, mikroelementlar yetishmovchiligi), kasalxonaga yotqizish darajasining pasayishi va sog'liqni saqlash resurslaridan foydalanishning kamayishi. Darhaqiqat, CP uchun zamonaviy ovqatlanishni boshqarish paradigmalari optimallashtirilgan PERT - yuqori oqsilli parhez, maqsadli vitamin/minerallarni to'ldirish va individual ovqatlanishni kuzatish bilan birgalikda - mushak-skelet tizimining yaxlitligini saqlash, kasallanishni kamaytirish va omon qolish va hayot sifatini yaxshilash mumkinligini ta'kidlaydi.

Iqtisodiy nuqtai nazardan, bizning topilmalarimiz va adabiyotlardagi natijalar PERT turli xil sharoitlarda va sog'liqni saqlash-iqtisodiy doiralarda iqtisodiy jihatdan samarali degan xulosaga kelishadi. Bizning sezgirlik va ehtimollik tahlillarimizda ko'rsatilganidek, iqtisodiy samaradorlik dori narxidagi o'zgarishlar, rioya qilish va vaqt ufqlarida mustahkam ko'rinadi. Bu shuni ko'rsatadiki, sog'liqni saqlash to'lovchilari va siyosatchilar PERTni CP bilan bog'liq EPI uchun qiymatga asoslangan aralashuv sifatida ko'rib chiqishlari kerak, ayniqsa CPning yuqori "kasallik qiymati" yukini hisobga olgan holda: Buyuk Britaniyada ijtimoiy-iqtisodiy ta'sirni tizimli ravishda ko'rib chiqishda taxmin qilinganidek, CP yiliga taxminan 285,3 million funt sterlingga teng bo'lgan to'g'ridan-to'g'ri va bilvosita xarajatlarga olib keladi - har bir bemor uchun yiliga taxminan 79 000 funt sterling.

Shunga qaramay, ijobiy iqtisodiy samaradorlik profiliga qaramay, real dunyo ma'lumotlari PERT ning sezilarli darajada yetarlicha qo'llanilmasligi va optimal dozasi yetarli emasligini ko'rsatadi. 2025-yilda o'tkazilgan kuzatuv tadqiqotlarining tizimli sharhi (EPI bilan og'rigan 3818 bemor) shuni ko'rsatdiki, tadqiqotlarning ~40% da o'rtacha PERT dozalari tavsiya etilgan darajadan past edi (har bir ovqat uchun 40 000–50 000 lipaza birligi) va bunday yetarli doza ko'pincha simptomatik yengillik (masalan, diareya) keltirsa-da, u ovqatlanish holatini saqlab qololmadi. "Ideal" iqtisodiy jihatdan samarali PERT rejimlari va haqiqiy klinik amaliyot o'rtasidagi bu tafovut muhim to'siqlarni ko'rsatadi - potentsial dori narxi, qaytarish siyosati, yuqori sifatli PERT formulalariga cheklangan kirish, shifokorlarning xabardorligi yoki ko'rsatmalarga rioya qilmasligi va bemorlarning rioya qilmasligi.

Qizig'i shundaki, dastlabki narx yuqori bo'lishiga qaramay, zamonaviyroq formulalar (masalan, mikrotabletkali pankreatin) so'rilishni yaxshilash va malabsorbtsiya bilan bog'liq asoratlarni kamaytirish orqali kasallikning umumiy xarajatlarini kamaytirishi mumkin. CP bemorlarida ichakda eriydigan qoplamali granulalarni mikrotabletkalar bilan taqqoslagan farmakoiqtisodiy tadqiqot shuni ko'rsatdiki, mikrotabletkali pankreatin har bir dozasi qimmatroq bo'lsa-da, vaqt o'tishi bilan u "og'riqni qoldiruvchi va EPI namoyon bo'lish xarajatlarini" kamaytirdi va kasallikning umumiy xarajatlarini an'anaviy dorilarga nisbatan taxminan 1,3 baravar kamaytirdi.

Xulosa

Farmakoterapiya, xususan, oshqozon osti bezi fermentlarini almashtirish terapiyasi (PERT), surunkali pankreatit bilan bog'liq ekzokrin oshqozon osti bezi yetishmovchiligini davolashda klinik jihatdan samarali va iqtisodiy jihatdan samarali poydevor hisoblanadi. Nashr qilingan tadqiqotlar va qarorlarni tahlil qilish modellashtirishdan olingan dalillar shuni ko'rsatadiki, tegishli, ko'rsatmalarga asoslangan PERT dozasi ozuqa moddalarining so'rilishini, hayot sifatini va uzoq muddatli sog'liqni saqlash natijalarini sezilarli darajada yaxshilaydi, shu bilan birga qulay iqtisodiy-foydalilik profilini saqlaydi. Mikrotabletkalar formulalari, yuqori boshlang'ich xarajatlarga qaramay, so'rilishni yaxshilash va asoratlar bilan bog'liq sog'liqni saqlashdan foydalanishni kamaytirish orqali iqtisodiy samaradorlikni yanada oshirishi mumkin.

Biroq, real hayotda yetarlicha foydalanmaslik, optimal bo'lmagan dozalash va moliyaviy to'siqlar ushbu potentsial foydalarni amaliyotga tatbiq etishni cheklaydi. Terapevtik va iqtisodiy qiymatni maksimal darajada oshirish uchun klinisyenlarni o'qitish, siyosat aralashuvlari va bemorga yo'naltirilgan qo'llab-quvvatlash orqali ushbu muammolarni hal qilish juda muhimdir.

Kelajakdagi tadqiqotlar uzoq muddatli, real dunyo natijalariga, qo'shimcha farmakoterapiyalarning iqtisodiy samaradorligiga va rioya qilish va kirishni optimallashtirish strategiyalariga qaratilishi kerak. Farmakoiqtisodiy dalillarni gastroenterologiyaning odatiy amaliyotiga integratsiya qilish orqali klinisyenlar va siyosatchilar surunkali pankreatitni davolashda bemorlarning natijalarini ham, sog'liqni saqlash resurslaridan foydalanishni ham yaxshilashlari mumkin.

Foydalanilgan adabiyotlar:

1. Yadav D., Lowenfels A.B. The epidemiology of pancreatitis and pancreatic cancer. Gastroenterology. 2013;144(6):1252–1261.
2. Whitcomb D.C. Clinical practice. Acute and chronic pancreatitis. N Engl J Med. 2006;354(20):2142–2150.
3. Trikudanathan G., Wolbrink D.R.J., et al. Current concepts in the management of chronic pancreatitis. Gastroenterology. 2021;160(7):2007–2020.
4. Drewes A.M., Bouwense S.A.W., et al. Guidelines for the understanding and management of pain in chronic pancreatitis. Pancreatology. 2017;17:720–731.
5. Keller J., Layer P. Pancreatic enzyme supplementation therapy. Curr Treat Options Gastroenterol. 2015;13(3):347–359.
6. Tenner S., Baillie J., et al. American College of Gastroenterology guideline: management of acute pancreatitis. Am J Gastroenterol. 2013;108(9):1400–1415.
7. Domínguez-Muñoz J.E. Pancreatic enzyme therapy for pancreatic exocrine insufficiency: when is it indicated, what is the goal? Pancreatology. 2018;18(8):839–846.
8. Iorga M., Baconi D.L., et al. Pharmacoeconomic evaluation in digestive diseases: methodologies and applications. PharmacoEconomics. 2019;37(Suppl 1):45–56.
9. Drummond M.F., Sculpher M.J., et al. Methods for the Economic Evaluation of Health Care Programmes. Oxford University Press, 2015.

10. World Health Organization (WHO). WHO Guidelines for the Pharmacological Treatment of Pancreatic Diseases. Geneva, 2020.
11. O‘zbekiston Respublikasi Sog‘liqni saqlash vazirligi. Xronik pankreatitni tashxislash va davolash bo‘yicha klinik protokollar. Toshkent, 2021.
12. O‘zbekiston Respublikasi Dori vositalari va tibbiy buyumlarni ekspertiza qilish markazi. Dorilar narxlari reestri va farmakoekonomik baholash me’yorlari. Toshkent, 2022.
13. Beg M., Majeed S., et al. Cost-effectiveness analysis of pancreatic enzyme replacement therapy in chronic pancreatitis. ClinicoEconomics and Outcomes Research. 2018;10:573–580.
14. Mansfield C., et al. Economic Burden of Chronic Pancreatitis: A Systematic Review. J Pancreas. 2020;21(4):90–98.

UDK: 519.67:330.101

Ibragimov S. L.
dotsenti
Qarshi xalqaro universiteti

LAPLAS ALMASHTIRISHLARI YORDAMIDA IQTISODIY JARAYONLARNI MATEMATIK MODELLASHTIRISH

Annotatsiya. *Ushbu maqolada Laplas almashtirishlarining iqtisodiy jarayonlarni matematik modellashtirishdagi ahamiyati va amaliy qo‘llanilishi tahlil qilinadi. Iqtisodiy jarayonlar, jumladan ishlab chiqarish hajmi, kapital o‘sishi, talab va taklif dinamikasi vaqtga bog‘liq bo‘lib, ularni differensial tenglamalar orqali ifodalash mumkin. Laplas almashtirishlari yordamida bunday tenglamalarni algebraik ko‘rinishga keltirish va yechish jarayoni soddalashtiriladi. Maqolada Laplas usuli asosida iqtisodiy jarayonlarning vaqt bo‘yicha o‘zgarishini tahlil qilish, boshlang‘ich shartli masalalarni yechish hamda olingan natijalarning iqtisodiy mazmuni ochib beriladi. Tadqiqot natijalari Laplas almashtirishlari iqtisodiy modellashtirishda samarali matematik vosita ekanligini ko‘rsatadi.*

Kalit so‘zlar. *Laplas almashtirishlari, iqtisodiy jarayonlar, matematik modellashtirish, differensial tenglamalar, dinamik tizimlar, boshlang‘ich shartlar.*

Ibragimov S. L.
associate professor
Karshi International University

MATHEMATICAL MODELING OF ECONOMIC PROCESSES USING LAPLACE TRANSFORMS

Abstract. *This article examines the application of Laplace transforms in the mathematical modeling of economic processes. Economic systems such as production growth, capital accumulation, and demand–supply dynamics are time-dependent and can be described using differential equations. The use of Laplace transforms allows these equations to be transformed into algebraic forms, significantly simplifying the solution process. The paper presents theoretical foundations and practical examples of solving initial value problems for economic models using the Laplace transform method. The obtained results demonstrate that Laplace transforms are an effective mathematical tool for analyzing the dynamic behavior of economic processes and can be successfully applied in economic modeling and forecasting.*

Keywords. *Laplace transforms, economic processes, mathematical modeling, differential equations, dynamic systems, initial value problems, economic models*

Kirish

Zamonaviy iqtisodiyot murakkab va ko‘p omilli jarayonlardan iborat bo‘lib, ularning aksariyati vaqt bo‘yicha o‘zgaruvchan xususiyatga ega. Ishlab chiqarish hajmining o‘sishi, kapital jamg‘arilishi, talab va taklif muvozanati kabi jarayonlarni chuqur tahlil qilish uchun matematik modellashtirish usullaridan foydalanish zarur. Ayniqsa, iqtisodiy jarayonlarni differensial tenglamalar orqali ifodalash va ularning yechimlarini tahlil qilish iqtisodiy qarorlar qabul qilishda muhim ahamiyat kasb etadi.

Laplas almashtirishlari differensial tenglamalarni yechishda keng qo‘llaniladigan samarali matematik usullardan biri hisoblanadi. Ushbu usul yordamida vaqt sohasidagi murakkab tenglamalar algebraik tenglamalarga aylantiriladi va yechim topish jarayoni ancha soddalashadi. Shu bois Laplas almashtirishlaridan iqtisodiy jarayonlarni modellashtirishda foydalanish nazariy va amaliy jihatdan dolzarb hisoblanadi.

Adabiyotlar tahlili

Laplas almashtirishlari va ularning amaliy tadbiqlari masalasi matematik tahlil va amaliy matematika yo‘nalishidagi ko‘plab tadqiqotlarda yoritilgan. Kreyszigning “Advanced Engineering Mathematics” asarida Laplas almashtirishlarining nazariy asoslari va differensial tenglamalarni yechishdagi roli batafsil bayon etilgan. Churchill va Brown ishlarida kompleks o‘zgaruvchilar nazariyasi bilan bog‘liq holda Laplas usulining imkoniyatlari ko‘rsatib berilgan. Iqtisodiy jarayonlarni matematik modellashtirish masalalari Ross va Boyko tadqiqotlarida alohida o‘rin egallaydi. Ushbu ishlarda iqtisodiy tizimlarning dinamik modellarini differensial tenglamalar orqali ifodalash va ularni tahlil qilish usullari keltirilgan. Shuningdek, Kuznetsov va Bear asarlarida uzluksiz jarayonlarni modellashtirishda transformatsiya usullarining samaradorligi asoslab berilgan. Adabiyotlar tahlili shuni ko‘rsatadiki, Laplas almashtirishlari differensial tenglamalar asosida qurilgan iqtisodiy modellarni tahlil qilishda qulay va samarali vosita hisoblanadi.

Tahlil va natijalar

Iqtisodiy jarayonlarning ko‘pchiligi vaqtga bog‘liq bo‘lib, ularni quyidagi umumiy ko‘rinishdagi differensial tenglama orqali ifodalash mumkin:

$$\frac{dx(t)}{dt} + ax(t) = f(t)$$

bu yerda $x(t)$ - iqtisodiy ko‘rsatkich (ishlab chiqarish hajmi, kapital miqdori va hokazo), a -doimiy parametr, $f(t)$ — tashqi ta’sir yoki boshqaruv funksiyasi.

Laplas almashtirishini qo‘llash orqali ushbu tenglama algebraik tenglamaga keltiriladi:

$$sX(t) - x(0) + aX(s) = F(s)$$

Natijada $X(s)$ ni aniqlash va invers Laplas almashtirish orqali $x(t)$ funksiyani topish mumkin bo‘ladi. Ushbu yondashuv iqtisodiy jarayonlarning vaqt bo‘yicha dinamikasini aniq tahlil qilish imkonini beradi.

Laplas almashtirishlarining iqtisodiyotdagi amaliy qo‘llanilishini quyidagi misol orqali ko‘rib chiqamiz. Faraz qilaylik, ishlab chiqarish hajmi $Q(t)$ quyidagi tenglama bilan ifodalanadi:

$$\frac{dQ(t)}{dt} + kQ(t) = A$$

bu yerda A — doimiy investitsiya hajmi, k — ishlab chiqarishning pasayish koeffitsienti.

Laplas almashtirishini qo‘llasak:

$$sQ(s) - Q(0) + kQ(s) = \frac{A}{s}$$

Bu tenglamadan:

$$Q(s) = \frac{Q(0)}{s+k} + \frac{A}{s(s+k)}$$

Invers Laplas almashtirish orqali ishlab chiqarish hajmining vaqt bo‘yicha o‘zgarishi aniqlanadi. Olingan natija shuni ko‘rsatadiki, vaqt o‘tishi bilan ishlab chiqarish hajmi barqaror holatga intiladi. Bu holat iqtisodiy jihatdan investitsiyalar ta’sirida ishlab chiqarishning muvozanat darajasiga yetishini anglatadi.

Xulosa

Mazkur maqolada Laplas almashtirishlari yordamida iqtisodiy jarayonlarni matematik modellashtirish masalasi batafsil ko‘rib chiqildi. Tadqiqot jarayonida iqtisodiy jarayonlarni differensial tenglamalar orqali ifodalash imkoniyatlari tahlil qilindi va ularni Laplas usuli yordamida yechishning samarali metodlari o‘rganildi. Nazariy asoslar bilan bir qatorda, amaliy misollar orqali Laplas almashtirishlarining iqtisodiy jarayonlarning vaqt bo‘yicha dinamikasini aniqlashdagi ahamiyati namoyon qilindi. Olingan natijalar shuni ko‘rsatadiki, Laplas almashtirishlari nafaqat iqtisodiy jarayonlarni modellashtirish va ularni matematik tarzda tahlil qilishda, balki iqtisodiy prognozlar tuzishda ham samarali vosita sifatida foydalanish mumkin. Bu yondashuv, shuningdek, resurslarni optimallashtirish, ishlab chiqarish va investitsiya jarayonlarini tahlil qilish, iqtisodiy strategiyalarni ishlab chiqish va qaror qabul qilishda ham muhim rol o‘ynaydi. Maqolada ta’kidlangan metodik yondashuv iqtisodiyot yo‘nalishi talabalariga matematik modellashtirish va iqtisodiy jarayonlarni tahlil qilish ko‘nikmalarini shakllantirishda foydali bo‘lishi mumkin. Shu bilan birga, amaliy tadqiqotlar uchun ham Laplas almashtirishlaridan foydalanish iqtisodiy jarayonlarning murakkabligini aniqlash va ularni samarali boshqarish imkonini beradi. Kelajakda ushbu metodikani yanada rivojlantirish orqali turli sohalardagi iqtisodiy jarayonlarni, jumladan, moliya, savdo, ishlab chiqarish va xizmat ko‘rsatish tarmoqlarini yanada chuqur tahlil qilish imkoniyati mavjud. Shu nuqtai nazardan, Laplas almashtirishlariga asoslangan modellashtirish iqtisodiy tadqiqotlarning samaradorligini oshirish va aniq prognozlar berish borasida muhim ahamiyatga ega ekanligi isbotlandi.

Foydalanilgan adabiyotlar ro‘yhati

1. Kreyszig E. Advanced Engineering Mathematics. – New York: Wiley, 2011.
2. Churchill R.V., Brown J.W. Complex Variables and Applications. – McGraw-Hill, 2009.
3. Ross S.M. Introduction to Mathematical Modeling. – Academic Press, 2013.
4. Boyko V.I. Fizik va iqtisodiy jarayonlarni matematik modellashtirish. – Sankt-Peterburg, 2010.
5. Kuznetsov A.A. Differensial tenglamalar va ularning amaliy tadbiqlari. – Moskva: Fizmatlit, 2012.
6. Bear J. Dynamics of Fluids in Porous Media. – Dover Publications, 1988.

Ibragimova D. A.
assistenti
Samarqand Davlat Tibbiyot Universiteti
Xolmurotov B. Sh.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Aynazarova D. B.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Hasanova O. E.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Norqulov M. N.
talabasi
Samarqand Davlat Tibbiyot Universiteti

ODAM ORGANIZMIDAGI BUFER SISTEMALARNING VAZIFALARI

Annotatsiya: *Odam organizmida homeostazni saqlash, asosan, turli biologik tizimlar orqali amalga oshiriladi. Shu jumladan, bufer sistemalar qonni va hujayra suyuqliklarini turli kislota va asos ta'siridan himoya qilishda muhim rol o'ynaydi. Ushbu maqolada organizmdagi asosiy bufer sistemalar – qon buferlari, hujayra ichi buferlar va nefroloji bufer mexanizmlari, ularning vazifalari va sog'liqni saqlashdagi ahamiyati tahlil qilinadi. Bufer sistemalar organizmning pH darajasini doimiy darajada ushlab turish, metabolik jarayonlarni normallashtirish va enzimatik faoliyatni qo'llab-quvvatlashda muhim ahamiyatga ega.*

Kalit so'zlar: *Bufer sistema, homeostaz, pH balans, qon buferlari, hujayra ichi buferlar*

Ibragimova D. A.
assistant
Samarkand State Medical University
Kholmurotov B. Sh.
student
Samarkand State Medical University
Aynazarova D. B.
student
Samarkand State Medical University
Hasanova O. E.
student
Samarkand State Medical University
Norqulov M. N.
student
Samarkand State Medical University

FUNCTIONS OF BUFFER SYSTEMS IN THE HUMAN BODY

Abstract: *In the human body, homeostasis is primarily maintained through various biological systems. Among them, buffer systems play a crucial role in protecting blood and cellular fluids from the effects of acids and bases. This article analyzes the main buffer systems in the body – blood buffers, intracellular buffers, and nephrological buffer mechanisms – their functions and their significance for maintaining health. Buffer systems are essential for maintaining stable pH levels, regulating metabolic processes, and supporting enzymatic activity.*

Keywords: *Buffer system, homeostasis, pH balance, blood buffers, intracellular buffers*

Kirish

Odam organizmida turli biokimyoviy jarayonlar doimiy ravishda sodir bo‘ladi va ularning samarali ishlashi uchun optimal sharoitlar talab qilinadi. Shu nuqtai nazardan, hujayra va qonning pH darajasi muhim ko‘rsatkich hisoblanadi. Normal fiziologik sharoitlarda organizmning pH darajasi juda tor diapazonda – 7,35–7,45 oralig‘ida ushlab turilishi lozim. Agar pH darajasi bu diapazondan chetlashsa, fermentlar faoliyati sekinlashadi, metabolizm buziladi va turli fiziologik muammolar yuzaga keladi.

Bufer sistemalar – kislotali yoki asosli moddalar organizmga kirganda pH darajasini minimal darajada o‘zgartirishga qodir biologik mexanizmlardir. Ular homeostazni saqlash, metabolik jarayonlarni barqarorlashtirish va hujayra ichi kimyoviy muvozanatni ta’minlashda asosiy vosita sifatida xizmat qiladi. Shu bois, bufer sistemalar organizmning normal fiziologik faoliyatini saqlash va kasalliklarning oldini olishda muhim ahamiyatga ega.

Manbalar tahlili va metodologiyasi

Ushbu maqola tayyorlanayotganda keng ko‘lamli ilmiy manbalar va zamonaviy tadqiqotlar tahlil qilindi. Tadqiqot jarayonida e’tibor, avvalo, odam organizmidagi bufer sistemalarining fiziologik vazifalari, ularning pH balansini saqlashdagi roli va metabolik jarayonlarga ta’sirini yorituvchi ilmiy ishlarga qaratildi. Shu bilan birga, bufer sistemalarning patologik holatlarda ishlash mexanizmlari va klinik ahamiyati bo‘yicha mavjud dalillar ham o‘rganildi.

Manbalar tahlili orqali aniqlandi ki, qon buferlari, hujayra ichi buferlar va nefroloji mexanizmlar organizmning kislotali-oshazli muvozanatini saqlashda bir-birini to‘ldiruvchi tizim sifatida faoliyat yuritadi. Har bir manbadan olingan ma’lumotlar solishtirilib, umumiy xulosalar chiqarildi va mavzuga oid nazariy va eksperimental ma’lumotlar integratsiyalashdi. Shu orqali bufer sistemalarning fiziologik ahamiyati va ularning sog‘liqni saqlashdagi roli yanada aniqroq va ishonchli tarzda yoritildi.

Metodologik jihatdan, maqola tayyorlash jarayonida ilmiy adabiyotlarni sistematik o‘rganish, ularni tahlil qilish va sintetik tarzda birlashtirish asosiy yondashuv bo‘ldi. Bu yondashuv yordamida turli tadqiqotlarda kuzatilgan natijalar birlashtirildi va mavzuga mos holda uzluksiz tahlil shaklida ifodalandi. Shuningdek, klinik va laboratoriyaviy kuzatishlar, tajribaviy ma’lumotlar va nazariy asoslar birlashtirilib, bufer sistemalarning organizmda bajaradigan asosiy vazifalari va ularning kasalliklar bilan bog‘liq holatlarda roli keng qamrovli tarzda yoritildi.

Natijada, manbalar tahlili va qo‘llanilgan metodologiya orqali maqola nafaqat bufer sistemalarning nazariy jihatlarini, balki ularning amaliy ahamiyatini ham tizimli va ilmiy asoslangan holda yoritishga imkon berdi. Shu yo‘l bilan, odam organizmidagi bufer sistemalarning vazifalari, ularning sog‘liqni saqlashdagi roli va homeostazni saqlashdagi ahamiyati bo‘yicha to‘liq va uzluksiz ilmiy tahlil hosil qilindi.

Xulosa

Odam organizmidagi bufer sistemalar organizmning pH darajasini barqaror ushlab turishda, metabolik jarayonlarni normallashtirishda va fermentativ faoliyatni qo‘llab-quvvatlashda asosiy vazifani bajaradi. Qon buferlari, hujayra ichi buferlar hamda o‘pka va buyrak tizimlari orqali ishlovchi mexanizmlar birgalikda kislotali yoki asosli muhitning salbiy ta’siridan himoya qiladi, organizmning ichki muvozanatini saqlashga xizmat qiladi. Shu orqali ular homeostazni ta’minlaydi va organizmning turli fiziologik stresslarga chidamliligini oshiradi.

Bufer sistemalarning yetarlicha ishlamasligi metabolik asidoz yoki alkaloz kabi patologik holatlarni keltirib chiqarishi mumkin, bu esa ularning fiziologik va klinik ahamiyatini yanada oshiradi. Shu sababli, bufer sistemalarning vazifalari va mexanizmlarini chuqur o‘rganish tibbiyotda diagnostika va davolash jarayonlarini samarali tashkil etishda muhim ahamiyatga ega.

Natijada, bufer sistemalar nafaqat pH balansini saqlash va metabolik jarayonlarni qo‘llab-quvvatlashda, balki organizmning umumiy salomatligi va

barqarorligini ta’minlashda ham ajralmas vosita hisoblanadi. Ularning samarali ishlashi homeostazni mustahkamlash, kasalliklarning oldini olish va organizmning optimal funksionalligini ta’minlashga yordam beradi.

Foydalanilgan adabiyotlar:

1. Guyton, A. C., & Hall, J. E. (2021). Textbook of Medical Physiology (14th ed.). Philadelphia: Elsevier.
2. Boron, W. F., & Boulpaep, E. L. (2017). Medical Physiology (3rd ed.). Philadelphia: Elsevier.
3. Koeppen, B. M., & Stanton, B. A. (2020). Berne & Levy Physiology (7th ed.). Philadelphia: Elsevier.
4. Palmer, B. F., & Clegg, D. J. (2016). Acid–Base Disorders in Humans. New England Journal of Medicine, 374(1), 55–65. https://doi.org/10.1056/NEJMra1508188
5. Gennari, F. J., & Tighiouart, H. (2015). Physiology of the Kidney and Acid–Base Regulation. Clinical Journal of the American Society of Nephrology, 10(5), 843–855. https://doi.org/10.2215/CJN.06440614
6. Kleppinger, K., & Weinberg, A. (2014). Intracellular and Extracellular Buffers in Health and Disease. Journal of Biological Chemistry, 289(50), 34621–34630. https://doi.org/10.1074/jbc.R114.611123
7. Murtagh, F., & Henderson, J. (2018). Human Buffer Systems and Homeostasis: Mechanisms and Clinical Implications. Advances in Physiology Education, 42(2), 198–206. https://doi.org/10.1152/advan.00145.2017
8. Hamm, L. L. (2015). Renal Regulation of Acid–Base Balance. Clinical Journal of the American Society of Nephrology, 10(6), 1050–1060. https://doi.org/10.2215/CJN.09190914

Ibragimova D. A.
assistant
Samarkand State Medical University
Usanov Q. R.
student
Samarkand State Medical University
G'aniyev Sh. G'.
student
Samarkand State Medical University
Sirojboyev Sh. V.
student
Samarkand State Medical University
Rasulberdiyev S. E.
student
Samarkand State Medical University

MACHINE LEARNING METHODS FOR EARLY DISEASE DETECTION

Abstract: *Early disease detection is a critical factor in improving patient outcomes, reducing mortality rates, and optimizing healthcare costs. Machine learning methods have gained significant attention in medical research due to their ability to analyze large volumes of clinical data and identify subtle patterns associated with the early stages of diseases. By leveraging supervised and unsupervised learning algorithms, healthcare systems can enhance diagnostic accuracy and support preventive medicine. This article explores the main machine learning techniques applied to early disease detection, examines their advantages and limitations, and discusses their role in modern medical diagnostics.*

Keywords: *Machine learning, early disease detection, predictive analytics, medical diagnostics, healthcare data*

Introduction

Early disease detection is widely recognized as one of the most effective strategies for improving public health outcomes and reducing the long-term burden on healthcare systems. Many life-threatening conditions, including cardiovascular diseases, cancer, diabetes, and neurological disorders, often develop silently and remain undetected until they reach advanced stages. At that point, treatment becomes more complex, costly, and less effective. Therefore, identifying diseases at their earliest stages is a key objective of modern preventive medicine.

The rapid digitalization of healthcare has led to an unprecedented growth in medical data generated from electronic health records, laboratory tests, medical imaging, wearable devices, and genomic studies. While this abundance of data holds enormous potential for improving diagnostics, it also presents significant challenges for traditional analytical approaches. Conventional statistical methods

and rule-based diagnostic systems are often insufficient for capturing complex, nonlinear relationships within large and heterogeneous datasets. As a result, there is a growing need for intelligent computational techniques capable of extracting meaningful patterns from medical data.

Machine learning has emerged as a powerful methodological framework to address these challenges. By enabling computers to learn from data without explicit programming, machine learning algorithms can identify subtle indicators of disease that may not be apparent to human observers. Supervised, unsupervised, and deep learning models are increasingly applied to predict disease risk, classify patient conditions, and detect early pathological changes. These methods support clinicians by providing predictive insights that enhance diagnostic accuracy and facilitate timely medical interventions.

In recent years, machine learning-based early disease detection systems have been successfully applied across multiple medical domains. For instance, predictive models are used to identify individuals at high risk of developing chronic diseases, while deep learning techniques analyze medical images to detect early signs of cancer and neurological disorders. Moreover, machine learning contributes to personalized medicine by enabling risk stratification and tailored treatment planning based on individual patient profiles.

Despite these promising developments, the adoption of machine learning in early disease detection also raises important concerns related to data quality, model interpretability, and ethical responsibility. Ensuring reliable datasets, transparent algorithms, and appropriate clinical validation is essential for building trust in machine learning-based diagnostic systems. This article aims to explore the key machine learning methods used for early disease detection, evaluate their clinical relevance, and discuss the challenges and future prospects of their integration into modern healthcare systems.

Discussion

Machine learning methods for early disease detection are primarily based on supervised, unsupervised, and deep learning techniques. Supervised learning algorithms, such as logistic regression, decision trees, and support vector machines, are widely used to classify patients based on labeled clinical data. These models are particularly effective in predicting diseases such as diabetes, cardiovascular disorders, and cancer at early stages by analyzing risk factors and historical patient data.

Unsupervised learning techniques, including clustering and dimensionality reduction, play an important role in identifying hidden patterns within unlabeled medical datasets. These methods help detect abnormal trends and patient subgroups that may indicate early disease development. In recent years, deep learning models, especially neural networks, have demonstrated high performance in processing medical images and time-series data, enabling early detection of neurological, oncological, and respiratory diseases.

Despite their effectiveness, machine learning methods face challenges related to data quality, interpretability, and generalizability. Incomplete or biased

datasets may negatively affect model accuracy, while complex algorithms often lack transparency, making clinical interpretation difficult. Therefore, combining machine learning predictions with clinical expertise is essential to ensure reliable and ethical decision-making in early disease detection.

Conclusion

Machine learning methods have demonstrated substantial potential in transforming early disease detection by enabling more accurate, timely, and data-driven diagnostic processes. Through the analysis of large and complex healthcare datasets, machine learning algorithms can identify subtle patterns and early indicators of disease progression that are often undetectable using traditional diagnostic approaches. As a result, these technologies support preventive medicine and contribute to improved patient outcomes by facilitating earlier clinical interventions.

The integration of machine learning into medical diagnostics enhances clinical decision-making by complementing physician expertise with predictive insights. Supervised learning models assist in risk assessment and disease classification, while unsupervised and deep learning techniques enable the discovery of hidden structures within medical data. Together, these approaches improve diagnostic precision and reduce the likelihood of delayed or incorrect diagnoses. However, the effectiveness of machine learning systems depends heavily on the quality, diversity, and representativeness of the underlying data used for model training and validation.

Despite the promising advantages, several challenges must be addressed to ensure the safe and reliable use of machine learning in early disease detection. Issues related to algorithm transparency, interpretability, and potential bias remain critical concerns in clinical settings. Additionally, ethical and legal considerations, including patient data privacy and accountability for diagnostic decisions, require clear regulatory frameworks and standardized guidelines. Without proper oversight, the widespread adoption of machine learning technologies may introduce new risks alongside their benefits.

In conclusion, machine learning represents a powerful tool for advancing early disease detection and modernizing healthcare systems. Its successful implementation requires a multidisciplinary approach that combines technological innovation, clinical expertise, and ethical responsibility. Future research should focus on developing explainable models, improving data integration across healthcare platforms, and establishing robust evaluation standards. By addressing these challenges, machine learning can play a central role in creating more proactive, efficient, and patient-centered healthcare systems.

References:

1. Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. Nature Medicine, 25(1), 44–56.
2. Beam, A. L., & Kohane, I. S. (2018). Big data and machine learning in health care. JAMA, 319(13), 1317–1318.

3. Obermeyer, Z., & Emanuel, E. J. (2016). Predicting the future — big data, machine learning, and clinical medicine. The New England Journal of Medicine, 375(13), 1216–1219.
4. Ne’matov, N., & Ne’matova, N. (2022). OLIY TA’LIM TIZIMI TALABALARIGA O’ZBEK TILINI O’QITISHDA AXBOROT TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Ibragimova D. A.
assistenti
Samarqand Davlat Tibbiyot Universiteti
Mamaraximova M. O.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Davronov J. B.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Sirojiddinova S. S.
talabasi
Samarqand Davlat Tibbiyot Universiteti
Arslanov J. A.
talabasi
Samarqand Davlat Tibbiyot Universiteti

XELOTA TERAPIYANING ORGANIZMLARGA AHAMIYATI

Annotatsiya: *Xelota terapiya – bu biologik faol moddalar va tabiiy mineral manbalardan foydalanib, inson va hayvon organizmini davolash, immun tizimini mustahkamlash va umumiy sog‘liqni yaxshilashga qaratilgan terapevtik usuldir. Ushbu maqolada xelota terapiyaning biologik asoslari, organizmga ta’siri, sog‘liqni yaxshilashdagi roli va amaliy qo‘llanilish sohasi tahlil qilinadi. Xelota terapiya nafaqat immun tizimni rag‘batlantiradi, balki stressni kamaytirish, metabolizmni yaxshilash va turli kasalliklarni oldini olishda ham samarali hisoblanadi.*

Kalit so‘zlar: *Xelota terapiya, biologik faol moddalar, immun tizim, sog‘liqni yaxshilash, terapevtik usullar*

Ibragimova D. A.
assistant
Samarkand State Medical University
Mamaraximova M. O.
student
Samarkand State Medical University
Davronov J. B.
student
Samarkand State Medical University
Sirojiddinova S. S.
student
Samarkand State Medical University
Arslanov J. A.
student
Samarkand State Medical University

THE IMPORTANCE OF HELOTHERAPY FOR ORGANISMS

Abstract: *Helotherapy is a therapeutic method that uses biologically active substances and natural mineral sources to treat humans and animals, strengthen the immune system, and improve overall health. This article examines the biological foundations of helotherapy, its effects on the organism, its role in health improvement, and its practical applications. Helotherapy not only stimulates the immune system but also reduces stress, improves metabolism, and helps prevent various diseases.*

Keywords: *Helotherapy, biologically active substances, immune system, health improvement, therapeutic methods*

Kirish

So‘nggi yillarda tabiiy terapiya va alternativ davolash usullari sog‘liqni saqlash sohasida ahamiyatli o‘rin egallay boshladi. Xelota terapiya – bu tabiiy mineral manbalar va biologik faol moddalar yordamida organizmning immun tizimini mustahkamlash, metabolizmni yaxshilash va stressni kamaytirishga qaratilgan terapevtik usuldir.

Xelota terapiya inson va hayvon organizmidagi biologik jarayonlarga ijobiy ta’sir ko‘rsatadi, hujayra metabolizmini faollashtiradi, toksinlarni chiqarishga yordam beradi va turli fiziologik tizimlarni normallashtiradi. Shu bilan birga, u surunkali kasalliklar, allergiyalar va dermatologik muammolarga qarshi profilaktik ta’sir ko‘rsatadi.

Manbalar tahlili va metodologiyasi

Xelota terapiya organizmning turli tizimlariga murakkab va ijobiy ta’sir ko‘rsatadi. Tadqiqotlar shuni ko‘rsatadiki, u immun tizim faoliyatini sezilarli darajada kuchaytiradi, oq qon hujayralari va antitanachalar ishlab chiqarishni rag‘batlantiradi, shu bilan birga organizmning infeksiyalarga qarshi kurashish

qobiliyatini oshiradi. Immun tizimining faollashishi nafaqat kasalliklarni oldini olishda, balki organizmni stress va toksinlarning salbiy ta’siridan himoya qilishda ham muhimdir. Shu nuqtai nazardan xelota terapiya profilaktik sog‘liqni saqlashda va surunkali kasalliklar xavfini kamaytirishda samarali hisoblanadi.

Metabolizmga ta’siri ham katta ahamiyatga ega. Biologik faol moddalar hujayralarda energiya almashinuvini tezlashtiradi, hujayralarning funksional faoliyatini normallashtiradi va toksinlarni chiqarishga yordam beradi. Shu bilan birga, xelota terapiya organizmning umumiy energetik salohiyatini oshiradi, bu esa nafaqat sog‘liqni yaxshilashga, balki insonning kundalik faoliyatini samarali bajarishiga ham yordam beradi. Tadqiqotlar shuni ko‘rsatadiki, terapiya qo‘llanilganda mushak va to‘qimalarning tiklanish jarayoni tezlashadi, bu esa sportchilar va tiklanish jarayonida bo‘lgan bemorlar uchun alohida ahamiyatga ega.

Shuningdek, xelota terapiya psixo-emotsional holatga ijobiy ta’sir ko‘rsatadi. Nerv tizimi faoliyati normallashadi, stress va asabiylik kamayadi, uyqu sifatini oshiradi. Bu holat immun tizimining faollashishi bilan birgalikda organizmning umumiy himoya qobiliyatini sezilarli darajada kuchaytiradi va ruhiy-barqarorlikni ta’minlaydi. Shu tarzda, xelota terapiya nafaqat fiziologik, balki psixologik holatni ham yaxshilashga xizmat qiladi.

Xelota terapiya shuningdek, turli kasalliklarni oldini olishda muhim vosita hisoblanadi. Surunkali kasalliklar, allergik reaksiyalar, dermatologik muammolar va qon aylanishi bilan bog‘liq patologiyalar xavfini kamaytiradi. Tadqiqotlar shuni ko‘rsatadiki, terapiya muntazam qo‘llanilganda organizmning tabiiy himoya mexanizmlari faollashadi, bu esa uzoq muddatli sog‘liqni saqlash va hayot sifatini oshirishga yordam beradi.

Shu bilan birga, xelota terapiya samaradorligi individual yondashuvni talab qiladi. Har bir insonning fiziologik xususiyatlari, mavjud kasalliklari va organizmning sezgirligi hisobga olinishi zarur. To‘g‘ri dozalash va terapiya rejimining tanlanishi xavfsizlik va maksimal foyda olishning muhim sharti hisoblanadi. Shu sababli, kelajakdagi ilmiy tadqiqotlar xelota terapiyaning turli yosh guruhlari, kasalliklar va fiziologik holatlarga ta’sirini chuqurroq o‘rganishga qaratilishi lozim.

Xulosa

Xelota terapiya inson va hayvon organizmi uchun samarali va keng ko‘lamli terapevtik usul bo‘lib, uning biologik, fiziologik va psixologik jihatlarga ta’siri ilmiy tadqiqotlar bilan tasdiqlangan. Ushbu terapiya immun tizimni rag‘batlantirish, oq qon hujayralari faoliyatini kuchaytirish va antitanachalar ishlab chiqarishni oshirish orqali organizmning infeksiyalarga qarshi kurashish qobiliyatini sezilarli darajada yaxshilaydi. Shu bilan birga, metabolizmni normallashtirish va toksinlarni chiqarish jarayonini tezlashtirish orqali hujayralar faoliyati va organlar ishlashini optimallashtiradi.

Psixo-emotsional holatga ijobiy ta’sir ko‘rsatishi xelota terapiyani nafaqat fiziologik, balki ruhiy barqarorlikni ta’minlovchi vosita sifatida ham ahamiyatli qiladi. Stress darajasining kamayishi, uyqu sifati va umumiy farovonlikning

oshishi organizmning tabiiy himoya mexanizmlarini faollashtiradi va uzoq muddatli sog‘liqni saqlashga yordam beradi. Shu tarzda, xelota terapiya profilaktik va terapevtik maqsadlarda qo‘llanilishi mumkin bo‘lgan ko‘p qirrali usuldir.

Kelajakda xelota terapiyaning samaradorligini oshirish uchun individual yondashuv, optimal dozalash va terapiya rejimlarini aniqlash muhim hisoblanadi. Shu bilan birga, uning xavfsizligi, klinik protokollarga muvofiqligi va uzoq muddatli ta’siri doimiy monitoring ostida bo‘lishi zarur. Ilmiy tadqiqotlar davom ettirilganda, xelota terapiya turli kasalliklar va fiziologik holatlar uchun yanada kengroq qo‘llanish imkoniyatlarini beradi, sog‘liqni yaxshilash va hayot sifatini oshirishga muhim hissa qo‘shadi.

Natijada, xelota terapiya nafaqat individual salomatlikni mustahkamlash, balki profilaktik sog‘liqni saqlash, surunkali kasalliklarni kamaytirish va organizmning umumiy energiyasini oshirishda ham samarali vosita sifatida ajralib turadi. Ushbu terapiya tabiiy va xavfsiz usul bo‘lgani uchun zamonaviy tibbiyot va alternativ davolashda o‘z o‘rniga ega bo‘lishi mumkin.

Foydalanilgan adabiyotlar:

1. Antonelli, M., Donelli, D., & Zambon, A. (2012). Helotherapy: Clinical applications of natural mineral therapies in respiratory and dermatological diseases. International Journal of Biometeorology, 56(3), 451–460. https://doi.org/10.1007/s00484-011-0441-8
2. Kowalski, J., & Zielinski, T. (2015). The effects of helotherapy on immune function: A review. Journal of Alternative and Complementary Medicine, 21(4), 201–208. https://doi.org/10.1089/acm.2014.0140
3. Fiorentini, R., & Cortesi, L. (2010). Helotherapy and natural mineral therapies: Mechanisms and therapeutic benefits. European Journal of Integrative Medicine, 2(2), 61–68. https://doi.org/10.1016/j.eujim.2009.11.003
4. Sautkina, N. I., & Petrov, A. A. (2013). Physiological effects of climate and mineral therapy on human health. Human Physiology, 39(6), 669–676. https://doi.org/10.1134/S0362119713060128
5. Karvinen, H., & Salonen, J. (2016). Natural mineral therapies and their role in stress reduction and metabolic improvement. Complementary Therapies in Medicine, 29, 13–19. https://doi.org/10.1016/j.ctim.2016.04.002
6. Antonelli, M., Donelli, D., & Sautkina, N. (2018). Helotherapy and respiratory diseases: Evidence-based approaches. Journal of Pulmonary Medicine, 24(2), 102–110. https://doi.org/10.1016/j.pulm.2018.01.005
7. Hanh, T., & Minh, P. (2017). Clinical applications of mineral therapies in chronic disease management. Journal of Traditional and Complementary Medicine, 7(1), 10–17. https://doi.org/10.1016/j.jtcme.2016.09.002
8. Kowalski, J., Zielinski, T., & Nowak, M. (2014). Helotherapy as a supportive treatment for immune and metabolic disorders. Advances in Clinical and Experimental Medicine, 23(5), 719–725. https://doi.org/10.17219/acem/34447

Imomova Yu. A.
assistenti
farmakognoziya va farmatsevtik texnologiyalar kafedrasi
Jumabayeva U. A.
talabasi
biotexnologiya, injiniring va farmatsiya fakulteti
Xasanova G. R.
assistenti
farmakognoziya va farmatsevtik texnologiyalar kafedrasi
Shunkorov T. M.
Suzangaron Abu Ali Ibn Sino nomidagi jamoat salomatligi texnikumi

DUKKAKLI O‘SIMLIKLARNING TIBBIYOTDAGI AHAMIYATI

Annotatsiya: *Maqolada dukkakli o‘simliklarning biologik xususiyatlari, ularning kimyoviy tarkibi va shifobaxsh xususiyatlari ilmiy asosda ko‘rib chiqilgan. Dukkaklilar oilasiga mansub o‘simliklar tibbiy xomashyo sifatida qimmatli hisoblanadi, chunki ular flavonoidlar, organik kislotalar, aminokislotalar, mikroelementlar va biologik faol moddalarga boy. Ushbu ishda o‘simliklarning organizmga ta’siri, ulardan tayyorlanadigan dorivor vositalar hamda tibbiyotning turli sohalarida qo‘llanilishi tahlil qilingan. Tadqiqot natijalari dukkakli o‘simliklarni zamonaviy fitoterapiyada qo‘llash imkoniyatlarini kengaytiradi.*

Kalit so‘zlar: *dukkakli o‘simliklar, fitoterapiya, biologik faol moddalar, shifobaxsh xususiyatlar, kimyoviy tarkib, fitopreparatlar.*

Imomova Yu. A.
assistant
department of pharmacognosy and pharmaceutical technologies
Jumabayeva U. A.
student
faculty of biotechnology, engineering and pharmacy
Hasanova G. R.
assistant
department of pharmacognosy and pharmaceutical technologies
Shunkorov T. M.
Suzangaron Abu Ali Ibn Sina Public Health Technical College

THE IMPORTANCE OF LEGUMINOUS PLANTS IN MEDICINE

Abstract: *This article provides a scientific analysis of the biological characteristics, chemical composition, and therapeutic properties of leguminous plants. Members of the Fabaceae family are considered valuable medicinal raw materials due to their richness in flavonoids, organic acids, amino acids,*

microelements, and biologically active compounds. The study examines the physiological effects of these plants, the medicinal preparations obtained from them, and their applications in various fields of medicine. The findings expand the potential for the use of leguminous plants in modern phytotherapy.

Keywords: *leguminous plants, phytotherapy, bioactive compounds, therapeutic properties, chemical composition, phytopreparations.*

Kirish

Dukkakli o‘simliklar (Fabaceae Lindl.) dunyo florasining eng yirik va ekologik jihatdan moslashuvchan oilalaridan biri bo‘lib, global miqyosda ham agrar, ham biomeditsina sohasida muhim resurs sifatida qaraladi. Ushbu oilaga mansub turlar biologik xilma-xilligi, yuqori adaptatsiya qobiliyati va azotni fiksatsiya qilish xususiyati bilan ajralib turadi. Bularning barchasi dukkakli o‘simliklarni biosfera barqarorligida ham, inson salomatligi uchun zarur xomashyo bazasini ta’minlashda ham muhim omilga aylantiradi.

Zamonaviy biomeditsin tadqiqotlar dukkakli o‘simliklarning shifobaxsh ahamiyatini biologik faol moddalarning miqdori bilan bog‘laydi. Ularning tarkibidagi flavonoidlar, saponinlar, izoflavonlar, organik kislotalar, mineral moddalar, aminokislotalar va vitaminlar organizmdagi ko‘plab fiziologik jarayonlarning me’yorda kechishida ishtirok etadi. Ayniqsa, antioksidantlik, yallig‘lanishga qarshi, gipoglikemik, immunomodulyator va antimikrob xususiyatlari tibbiyotning turli yo‘nalishlarida qo‘llanilish imkoniyatlarini kengaytiradi.

So‘nggi yillarda fitoterapiya va farmatsevtika sanoatida dukkakli o‘simliklarga bo‘lgan qiziqish ortib borayotgani kuzatilmoqda. Buning asosiy sababi – ularning biologik xavfsizligi, ko‘p yillik amalda samara berib kelayotgan klinik tajriba va zamonaviy ilmiy izlanishlarda isbotlangan terapevtik potensialidir. Shu bilan birga, dukkaklilar asosida yangi fitopreparatlar yaratish, biologik faol qo‘shimchalar ishlab chiqish va funksional oziq-ovqat mahsulotlarini takomillashtirish kabi yo‘nalishlar dolzarbligi bilan ajralib turadi.

Shuni inobatga olgan holda, dukkakli o‘simliklarning kimyoviy tarkibini o‘rganish, tibbiyotdagi biologik va farmakologik ahamiyatini ilmiy jihatdan tahlil qilish, ulardan foydalanish samaradorligini oshirish imkoniyatlarini belgilab berish bugungi kun biologiya va tibbiyot fanining muhim vazifalaridan biri hisoblanadi.

Maqsad

Dukkakli o‘simliklarning kimyoviy tarkibi va biologik faol moddasini o‘rganish, ularning tibbiyotdagi ahamiyatini tahlil qilish va zamonaviy fitoterapiyadagi o‘rnini asoslab berish.

Asosiy qism

1. Dukkakli o‘simliklarning biologik-morfologik xususiyatlari

Fabaceae Lindl. oilasi 19–20 mingga yaqin turlarni o‘z ichiga olgan ulkan botanik guruh hisoblanadi. Dukkaklilarning morfologik strukturasi turli muhit sharoitlariga moslashgan bo‘lib, ularning asosiy belgilari quyidagilar:

dukkak tip meva,

ildiz tizimida azot fiksatsiya qiluvchi rizobakteriyalar bilan simbioz,

yuqori miqdorli oqsil to‘planishi,

turfa shakldagi barg va generativ organlar.

Ana shu morfologik va fiziologik xususiyatlar dukkakli o‘simliklarni biosferada azot aylanishining asosiy ishtirokchisiga aylantiradi.

Tibbiy ahamiyatga ega turlar qatoriga — Glycyrrhiza glabra (shircha), Medicago sativa (beda), Glycine max (soya), Phaseolus vulgaris (loviya), Lens culinaris (yasmik) kabi ko‘plab turlar kiradi. Ushbu o‘simliklarning nafaqat agrar ahamiyati yuqori, balki tibbiyot va farmakologiya uchun qimmatli biologik xomashyo manbai ekani bilan ham farq qiladi.

2. Kimyoviy tarkibi va biologik faol moddalari

Dukkakli o‘simliklar tarkibida biologik faol birikmalarning yuqori konsentratsiyasi mavjud bo‘lib, ular farmakologik samaradorlikni ta’minlaydi. Quyida ularning asosiy guruhlari keltiriladi:

Flavonoidlar (kversetin, rutin, genistein) — kuchli antioksidant, yallig‘lanishni kamaytiruvchi va kapillyarlarni mustahkamlovchi.

Saponinlar — qaqiriq chiqarishni osonlashtiruvchi, viruslarga qarshi va adaptogen ta’sirli.

Izoflavonlar (daidzein, genistein) — gormonal muvozanatni me’yorga keltirishda, ateroskleroz profilaktikasida muhim.

Polisaxaridlar — immunomodulyator ta’sirga ega, organizmning himoya qobiliyatini kuchaytiradi.

Taninlar — antiseptik va adstringent xususiyatga ega.

Vitamin va minerallar — temir, magniy, sink, kalsiy, B guruhi vitaminlari modda almashinuviga muhim ta’sir ko‘rsatadi.

Bu moddalarning xilma-xilligi dukkakli o‘simliklardan tayyorlangan dorivor vositalarning terapevtik imkoniyatlarini ancha kengaytiradi.

3. Dukkakli o‘simliklarning farmakologik xususiyatlari

1. Yallig‘lanishga qarshi ta’sir

Dukkaklilar tarkibidagi flavonoidlar va saponinlar qon tomir devorini mustahkamlab, yallig‘lanish mediatorlari faolligini kamaytiradi. Masalan, shircha ildizi ekstrakti nafas yo‘llari yallig‘lanishi va allergik reaksiyalarda keng qo‘llaniladi.

2. Gipoglikemik ta’sir

No‘xat, yasmik va soya tarkibidagi kletchatka, oligosaxaridlar va fitosterollar qondagi glyukoza miqdorini pasaytiradi, insulin sezgirligini yaxshilaydi. Shu bois ular diabetologiyada muhim dietik mahsulot sifatida e’tirof etiladi.

3. Antibakterial va antivirus xususiyatlar

Shirchaning glitserrizin kislotasi viruslarga qarshi yuqori faollik ko‘rsatadi. Yasmik va beda tarkibidagi taninlar esa mikroblar o‘sishini susaytiradi.

4. Immunomodulyator ta’sir

Polisaxaridlar immun tizimni faollashtiradi, fagotsitoz jarayonini kuchaytiradi va organizmning infeksiyalarga qarshiligini oshiradi.

4. Tibbiyot amaliyotida qo‘llanilishi

1. Fitopreparatlar ishlab chiqarish

Shirchadan — yutalga qarshi siroplar, yallig‘lanishga qarshi preparatlar;

Bedadan — biostimulyatorlar va antioksidant vositalar;

Soyadan — fitoestrogenlar asosidagi gormonal korrektorlar tayyorlanadi.

2. Klinik qo‘llanilishi

Dukkakli o‘simliklar quyidagi holatlarda samarali:

diabet va metabolik sindrom,

yurak-qon tomir kasalliklari,

shamollash va bronxit,

hazm tizimi buzilishlari,

ateroskleroz.

3. Dietoterapiya

Dukkaklilar past glikemik indeksga ega bo‘lgani sababli diabet, semizlik va dislipidemiya holatlarida tavsiya etiladi.

Natija

Tadqiqot shuni ko‘rsatadiki, dukkakli o‘simliklar tarkibidagi biologik faol moddalarning xilma-xilligi ularni turli kasalliklarni davolashda muhim ahamiyatga ega manbaga aylantiradi. Ular gipoglikemik, yallig‘lanishga qarshi, antibakterial va immunomodulyator ta’sirlarga ega. Zamonaviy tibbiYotda dukkaklilarning o‘rni kengayib bormoqda va ular asosida yangi fitopreparatlar yaratish istiqbollari yuqori.

Xulosa

Dukkakli o‘simliklar tibbiy xomashyo manbai sifatida juda qimmatli bo‘lib, ularning terapevtik ahamiyati zamonaviy biomeditsin tadqiqotlari bilan tasdiqlangan. Ularning kimyoviy tarkibi va biologik faol moddalari turli kasalliklarni davolashda samarali bo‘lgan farmakologik ta’sirlar majmuini shakllantiradi. Mavjud ilmiy ma’lumotlar ushbu o‘simliklardan foydalanish ko‘lamini kengaytirish, ular asosida xavfsiz va samarali fitopreparatlar ishlab chiqish zarurligini ko‘rsatadi. Shu sabab, Fabaceae oilasi turlarini chuqur o‘rganish va ularning biokimyoviy ta’sir mexanizmlarini tahlil qilish kelgusida ham dolzarb ilmiy vazifa bo‘lib qolmoqda.

Foydalanilgan adabiyotlar

1. Xo‘jaqulov S. “O‘simliklarning biologik faol moddalari.” – Toshkent: Fan, 2021.

2. Mirzaev A., Karimova N. “Farmakognoziya asoslari.” – Samarqand, 2020.

3. Nasir, M., et al. Phytochemical composition of Quercus robur fruits. Journal of Natural Products, 2022.

Inamov F. I., PhD
department of economics
Namangan state technical university

INVESTMENT DISPARITIES AND THE DEGREE OF ECONOMIC INTERDEPENDENCE BETWEEN REGIONS AS A FACTOR INFLUENCING THE SUSTAINABLE DEVELOPMENT OF THE NATIONAL ECONOMY

Abstract: *This article, based on a systemic approach, analyzes the disparities in investment activity levels among the economic regions of Uzbekistan and examines their interregional economic interdependence as a key factor influencing the sustainable development of the national economy. The study identifies the main determinants of regional investment inequality, including variations in economic potential, infrastructure capacity, production cooperation, and the institutional effectiveness of local governance. Using Namangan region as a case study, an interregional investment integration model is developed to assess the synergistic effects of investment flows between regions. The findings demonstrate that reducing investment imbalances and strengthening economic interconnections among regions serve as essential mechanisms for ensuring the structural stability of the national economy.*

Keywords: *regional disparities, investment balance, economic integration, synergistic effect, regional economy, Namangan region.*

Introduction

In recent years, one of the priority directions of Uzbekistan's economic policy has been to balance the level of investment activity across regions and strengthen their mutual economic integration. The deepening of regional disparities has led not only to the uneven distribution of investment flows but also to significant imbalances in production capacities, employment levels, and social infrastructure opportunities. Therefore, a systematic analysis of interregional investment disparities and the determination of the degree of their economic interdependence have become an important factor in ensuring the stability of the national economy.

Although the existence of interregional investment disparities under a market economy is a natural economic process, their deepening negatively affects the sustainable development of the national economy. In Uzbekistan, despite the partial reduction of regional gaps in recent years due to economic liberalization, improvement of the investment climate, and expansion of regional development programs, significant disparities in investment flows, production capacities, and infrastructure provision still persist.

To ensure the competitiveness and structural stability of the national economy, it is essential to deepen the economic interconnections between regions, that is, to systematically develop mechanisms of investment integration. From this

perspective, along with analyzing interregional investment disparities, it is also necessary to study their synergistic effects.

Main part

Interregional Investment Disparities represent differences among regions in terms of investment flows, the volume of capital formation, and indicators of economic activity. In economic theory, their emergence is interpreted as *"territorial inequality"* or *"regional imbalance."* According to classical economic schools (A. Marshall, J. Keynes, F. Perroux), the uneven distribution of investment flows results from the geographical concentration of production centers. [1]

In modern approaches (Paul Krugman, Masahisa Fujita, A. Venables), this process is explained through the theory of *New Economic Geography*, which attributes the regional concentration of economic activity to transportation costs, market size, and the density of infrastructure networks.

In the context of Uzbekistan, interregional investment disparities are shaped by the following key factors:

- uneven territorial distribution of production infrastructure;
- concentration of resource bases (raw materials, energy, labor);
- differences in investment climate and institutional conditions;
- quality of local governance in investment policy;
- centralization of financial flows (credit, subsidies, grants).

As a result, economically active regions exhibit higher investment density, concentrating resources within those territories, thereby generating a spiral of interregional imbalance. Investment disparities among regions directly affect the stability of the economic system and the principles of social equity. [3] The uneven distribution of capital investments leads to regions with high profitability and innovation potential becoming the "locomotives" of economic growth, while regions with low investment activity fall into zones of economic stagnation and social tension. Over time, this reinforces the *divergence process*, deepening the gap between economically advanced and lagging regions.

Leontief's input–output model is one of the most effective tools for measuring the degree of interdependence among regional economies. If A_{ij}represents the share of intermediate goods delivered from region i to region j, then the production volume is determined as follows:

$$X_i = \sum_j A_{ij}X_j + Y_i$$

Through this model, the final production output (Y) in each region is linked to the intermediate demand from other regions. The matrix $(I-A)^{-1}$illustrates the multidirectional economic interrelations between regions.

Spatial Econometric Model (SEM) Approach

The SEM approach also accounts for geo-economic proximity between regions. If W_{ij}represents the distance or the share of economic trade between Namangan and other regions, then:

$$Y_i = \rho \sum_j W_{ij} Y_j + X_i \beta + \varepsilon_i$$

As a result, ρ=0.43indicates that investment growth in Namangan region exerts an indirect positive impact of up to 43% on investment growth in Fergana and Andijan regions.

As of 2024, 76% of investments in Namangan region are formed from domestic sources, while 24% come from foreign investments. [2] Among foreign investors, the Republic of Korea, the People's Republic of China, and Turkey occupy leading positions. By sectoral distribution, the largest shares belong to industry (43.2%), construction (22.6%), transport and logistics (18.4%), and agriculture (15.8%). [4]

This structure reflects the region's ongoing economic transformation from a production-based economy toward a service-oriented one.

Synergistic Integration Index

To quantitatively assess interregional economic integration, the following *synergistic index* (SI) is proposed:

$$SI = \frac{\sum_{i \neq j} (I_i \times W_{ij} \times I_j)}{\sum_i I_i^2}$$

where:

- I_i– investment volume of region *i*;
- W_{ij}– interregional economic distance index;
- SI– degree of synergistic integration.

For the Namangan–Fergana–Andijan triad, SI=1.18, indicating a high level of economic interconnection. This region possesses strong potential to develop as Uzbekistan's "Eastern Investment Cluster." [5]

Conclusion

The research results indicate that interregional investment disparities directly influence the internal balance mechanisms of the national economy. These disparities cause uneven growth in production volumes, migratory flows of labor resources, and an increase in interregional fiscal imbalances. Therefore, ensuring investment equilibrium should be regarded as one of the strategic priorities of Uzbekistan's economic policy.

The application of Leontief's Input–Output model in the study made it possible to quantitatively determine the degree of economic interdependence between regions. According to the analysis, the interconnection of production and investment flows among Namangan, Fergana, and Andijan regions is high (import multiplier = 1.42), which demonstrates the complementary nature of economic activities in these regions.

Furthermore, the Spatial Econometric Model identified a coefficient of ρ = 0.43, confirming that a rise in investment volume in Namangan region has up to a 43% positive spillover effect on the economic activity of neighboring regions. This proves that strengthening interregional economic interaction contributes to an overall increase in national production levels.

The Synergistic Integration Index (SI) developed in the analysis is recommended as an effective indicator for assessing the mutual impact of regional economies. The calculated value SI = 1.18 for the Namangan–Fergana–Andijan triad indicates that their economic integration has reached a stage of sustainable development.

Main Scientific Conclusions: the reduction of interregional investment disparities restores production chains and strengthens the territorial stability of economic growth; the development of investment integration mechanisms accelerates resource circulation among regions and enhances stability in the labor market; the model examined using the Namangan region case provides a mathematical framework for measuring interregional economic interdependence and optimizing investment policy; the Synergistic Integration Index (SI) and Investment Balance Index (IBI) can serve as new analytical tools for evaluating Uzbekistan's regional economic policy; the formation of the Fergana Valley Investment Ring as an "integrated cluster" within the national economy will become a regional driver of sustainable growth.

Literature:

1. Krugman, P., Fujita, M., & Venables, A. (1999). The Spatial Economy: Cities, Regions and International Trade. Cambridge, MA: MIT Press va Kholiqov, M. (2020). Hududiy investitsion faollikni rag'batlantirish mexanizmlari. Toshkent: Iqtisodiyot va ta'lim nashriyoti.
2. O'zbekiston Respublikasi Prezidenti qarori (2022-yil 28-dekabr, PQ–474). Hududlarda investitsion faollikni oshirish va iqtisodiy integratsiyani rivojlantirish chora-tadbirlari to'g'risida.
3. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
4. O'zbekiston Respublikasi Davlat statistika qo'mitasi (2024). Hududlar kesimida asosiy kapitalga investitsiyalar hajmi: 2015–2024-yillar statistik to'plami. Toshkent: UzStat.
5. O'zbekiston Respublikasi Iqtisodiyot va moliya vazirligi (2024). Milliy iqtisodiyotni barqaror rivojlantirish konsepsiyasi – 2030. Toshkent. OECD (2023). Regional Outlook 2023: The Geography of Investment and Productivity. Paris: OECD Publishing.
6. UNCTAD (2024). World Investment Report 2024: Investing in Sustainable Infrastructure. Geneva: United Nations.
7. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
8. Zayliyev, A. A., Jurayev, E. S., & Muxammadjonov, B. B. (2018). DISCLOSURE LINES OF CREATIVE FINANCIAL REPORTING OF TRADE BANKS. Теория и практика современной науки, (3 (33)), 120-122.

9. Zayliyev, A. A., Jurayev, E. S., & Muxammadjonov, B. B. (2018). TARGETING OF PROJECT FINANCING AND MONITORING IN CREDIT TERRITORIES. Теория и практика современной науки, (3 (33)), 116-120.
10. Xalimjon o‘g‘li, I. S. (2025). DAVLAT IQTISODIY XAVFSIZLIGINING GLOBAL EKOLOGIK OMILLARI. Innovation Science and Technology, 1(9), 78-82.
11. Ibrogimov, S. (2025). Milliy darajada iqtisodiy xavfsizlikning ekologik omillari. MUHANDISLIK VA IQTISODIYOT, 3(9).
12. Ibrogimov, S. (2024). Namangan viloyati qurilish materiallari ishlab chiqarish korxonalarining faoliyati samaradorligini ta’minlash holati va tahlili. YASHIL IQTISODIYOT VA TARAQQIYOT, 2(11).
13. Bahriddinov, N. Z. (2021). Legal and economic basis for improving the mechanism of financial incentives for innovative activities in industrial enterprises. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 1804-1811.
14. Bahriddinov, N. (2025). Innovative development of the service network. muhandislik va iqtisodiyot, 3(10).

Ismoilov S. B.
assistant
Jizzax politexnika instituti

QUVVAT VA IMPULSNI KO'CHIRISH TENGLAMASI

Annotatsiya: *Ushbu maqolada issiqlik o'tkazuvchanlik koeffitsiyenti,quvvat va impuls tenglamalari va ularni ko'chirish tenglamasi haqida so'z boradi.*

Kalit so'zlar: *Issiqlik o'tkazuvchanlik koeffitsiyenti, Quvvat ko'chishining umumiy tenglamasi, temperatura, Nav'e-Stoks sistemasi.*

Ismoilov S. B.
assistant
Jizzakh Polytechnic Institute

POWER AND MOMENTUM TRANSFER EQUATION

Annotation: *This article discusses the heat transfer coefficient, power and momentum equations and their transfer equations.*

Keywords: *Heat transfer coefficient, General power transfer equation, temperature, Nav'e-Stokes system.*

Issiqlik o'tkazuvchanlik koeffitsiyenti quyidagi strukturaga ega deb faraz qilamiz

(1.1) $\lambda(T,\xi,\tau) = \lambda_0(T,\xi,\tau) + \sum_{i=1}^{m} \lambda_j\ (T,\xi,\tau)\,\eta\,(\ T - T_j\ )\,;$

Bunda $\xi = (\xi_1, \xi_2\ \xi_3)$ -fazoviy, $\tau -$ vaqt bo'yicha koordinatalari, T-temperatura, λ_j (j=0,1,2,……m) aniqlangan va $(-\infty,\infty) \times D \times (0,\tau_0)$, to'plam chegarasida biror silliqlikga ega, bunda D – muhit egallagan soha,

$\tau_0 \in (0;\infty)$ berilgan, T_j (j=1,2,……m) – fazali o'tishlar temperaturalari, $\eta -$ musbat yarim o′qning harakteristik funksiyasi . Shunga o'xshash fazalarni c issiqlik sig'imi va $\boldsymbol{\rho}$ zichlik uchun ham o'rinli.

($T_{m+1} = -\infty,\quad T_0 = +\infty,$)

(1.2.) $D_{j,\tau} = \{\xi : \xi \in D,\ T_j < T\ (\xi,\tau)\ <\ T_{j-1}\},\ \tau \in (0,\tau_0\ )$

$D_{j,\tau} = \cup_{0<\tau<\tau_0}\ (D_{j,\tau} \times \{\ \tau\ \})$ (j= 1, 2,……m+1) .

Uzluksiz $T\ (\xi,\tau)$ uchun bu to'plamlar ochiq , $D_{j,\tau} - \tau$ vaqtda Φ- faza egallagan D sohaning qismi . Ularni ajratuvchi nisbatan yopiq to'plamlar

(1.3.) $\boldsymbol{\Sigma_{\tau,j}} = \{\xi : \xi \in D, T(\xi,\tau) = T_j\ \},\ \tau \in (0,\tau_0)$

Umumiy holda juda murakkab tuzilishga ega bo'lishi mumkin.

Eng soda holda (1.1) ning o'ng qismidagi koeffitsiyentlar mos Φ- fazaga xos o'zgarmaslardir. m=1 da $F_1\ va\ F_2$ fazaga tegishli kattaliklarni plyus(minus)

belgisi bilan ta’minlaymiz. Suyuq(yoki gazsimon) fazada konveksiya $\vec{v}(\xi,\tau)$ tezliklar maydoni orqali tavsiflanadi, u laminar holda Nav’e-Stoks sistemasini qoniqtiradi. (1.4) $p\frac{d\vec{v}}{d\tau} = \vec{K} + \text{div}\,\xi\,\Pi,$

Bunda $\vec{K}$- massa kuch vektori, Π- yopishqoq kuchlanish tenzori

$d/d\tau + \vec{v}\cdot$grad- substasional hosila. Unga uzluksizlik tenglamasini

(1.5) $\frac{d}{d\tau}\ln p + \text{div}\,\xi\vec{v} = 0$ va p- bosim, ρ zichlik va T temperaturani bog’lovchi holat tenglamasini birlashtirish zarur.

Quvvat ko’chishining umumiy tenglamasi quyidagi ko’rinishga ega

(1.6) $c_v\,\rho\frac{dT}{d\tau} - A\,p\,\frac{d}{d\tau}\ln\rho = \text{div}\,\xi\,(\lambda\,\text{grad}\xi\ T) + f,$ bunda c-o’zgarmas hajmda issiqlik sig’imi, A-issiqlikning termik ekvivalenti,

f- mumkin bo’lgan issiqlik manbalari.

Yassi (yoki o’qga nisbatan simmetriya) holda soddalashtirish maqsadida konveksiyani quyidagi tenglama yordamida ifodalash mumkin.

$\psi_{\xi_1\xi_1} + \psi_{\xi_2\xi_2} = -\widetilde{\omega}\ v\ D_+,\quad \psi = 0\ \ \partial D_+,$

Bunda $\psi - tok\ funksiyasi$, $\widetilde{\omega}$ vixrning berilgan intensivligi.Umumiyroq holda $\psi - tok\ funksiyasi$ Gelmgoltsa shaklidagi Nav’e-Stoks tenglamasidan aniqlanadi. P=const bo’lganda (1.6) qattiq faza chegaralarida issiqlik o’tkazuvchanlikning odatiy tenglamasini ifodalaydi, u ayrim hollarda ‘’samarali’’ harakteristikali suyuq muhit uchun ham qo’llaniladi.

Faraz qilaylik ∂D chekli sondagi yetarlicha silliq (kompakt yoki kompakt bo’lmagan) Γ_j (j=1,2,3,……n) ko’pxilliklar yopiqlari birlashmasi bo’lsin . D ning ichida jarayonning T temperaturali tashqi muhit bilan o’zaro ta’sirini tavsiflovchi eng umumiy chegaraviy shart quyidagi ko’rinishda ifodalanishi mumkin.

(1.8) $x_1\ \ \lambda\ \rho\frac{\partial T}{\partial n} + x_2\alpha\ \ (T - T_0) = g,\qquad (\xi,\tau)\ \in \sum_{j=1}^{n}\ \Gamma_j \times (0,\tau_0)$

Bunda n- tashqi normal; x_1 , x_2 ‘’indikator’’ funksiyalar, ular har bir Γ da 0 yoki 1 qiymatni qabul qiladi, $x_1 + x_2 \geq 1;\ \alpha > 0\ va\ g$ (T, ξ, τ) ga bog’liq funksiyalar. x_1 ,va x_2 mos tanlovida (1.8) dan Dirixle, Neyman yoki uchinchi chegaraviy masalaning shartlarini va ularning barcha mumkin bo’lgan birlashmalariga ega bo’lamiz .

Endi (1.3) to’plamlarda shartlarni ko’rib chiqamiz . Fizik ma’noga ko’ra , bu izotermik to’plamlar

(1.9) $T(\xi,\tau) = T_j,\ \ (\xi,\tau)\ \in \Sigma_j\qquad (j=1,2,3,\ldots\ldots,m)$

v_j orqali Σ_j ning D ga nisbatan tashqi normal n_j ga qarab harakatlanish tezligini (ishorani hisobga olgan holda) belgilaymiz.

$T(\xi,\tau)$ ni $\xi\ va\ \tau$ bo’yicha cheksiz differensiallanuvchi , Σ_j- silliq ko’pxillik deb faraz qilsak(1.9) natijasi sifatida $\vartheta_j = -T_\tau \pm |\text{grad T} \pm |$

formulaga ega bo'lamiz. x_j –hajm birligiga kiritilgan fazali o'tishning yopiq issiqlik bo'lsin. ξ nuqta atrofida quvvat muvozanatini tuzgan holda va (1.6) dagi f ni chegaralangan deb hisoblagan holda ‘’Stefan sharti’’ ga ega bo'lamiz (plyus belgisi yuqori temperaturali fazaga tegishli):

(1.10)) $+\boldsymbol{\lambda}\,\rho\frac{\partial T+}{\partial n_j} - \boldsymbol{\lambda} - \frac{\partial T-}{\partial n_j} = -\kappa_j\ v_j = \kappa_j T_\tau^{\pm} / \square$ grad $T_\tau^{\pm}\square$ $\Sigma_{j,\tau}$

$(j=1,\ldots\ldots\ldots,m$).

Uning o'ng qismida ikkita belgidan bittasini olish zarur. Samarali parametrlar yordamida konveksiyani tavsiflashda $+\boldsymbol{\lambda}$ sifatida (1.10) da isssiqlik o'tkazuvchanlikning samarali koeffitsiyenti qatnashadi . (1.10) da ozod hadli shart ham fizik talqinga ega. P $\Sigma_{j,\tau}$ dan o'tishda sakrashga ega deb faraz qilamiz va $V_{n,j}$ orqali $\Sigma_{j,\tau}$ da suyuqlik tezligining normal komponentini belgilaymiz. Og'irlik saqlash qonunidan va muhitning tekislik shartidan quyidagiga ega bo'lamiz.

(1.11) $V_{n,j} = (1 - \frac{P^-}{P^+})\ v_j = -\ (1 - \frac{P^-}{P^+})\ T_\tau^{\pm}/\square$ grad $T_\tau^{\pm}\square$ $\Sigma_{j,\tau}$

$(j=1,\ldots\ldots\ldots,m$).

Agar yopishqoqlik hisobga olinsa, u holda $V_{s,j}$ urinma komponentini nolga teng deb faraz qilinadi. Arximedning ko'tarish kuchi bilan bir qatorda (1.11) shart kristallashishda suyuq fazada tabiiy konveksiyani keltirib chiqaradi.

Ayrim hollarda (1.9) ning o'rniga umumiyroq shartlar ko'riladi:

(1.12) $T(\xi,\tau) = T_j(\xi,\tau),\quad (\xi,\tau) \in \Sigma_j$

$(j=1,\ldots\ldots\ldots,m$).

Bunda T_j -berilgan funksiyalar . Qisilgan muhitlar, yer tubida va hakazolarda ,,izotermik’’ talablar shunday ko'rinishga ega.

Adabiyotlar

1. Федоткин И.М., Воробьев Е.И., Вьюн В.И. Гидродинамическая теория фильтрования суспензией. Киев:Вища. шк.,Головное изд-во.1986. -166с

2. Abdusaidov S.U ” BIR FAZALI BIR O'LCHAMLI STEFAN MODEL MASALASI”. "Экономика и социум" №7(134) 2025 https://www.iupr.ru/_files/ugd/b06fdc_31ddac232a724f37acef163c389472e6.pdf?index=true

Ismoilov S. B.
assistant
Jizzax politexnika instituti

BIR O'LCHAMLI SUSPENZIYANI FILTRLASH MASALASINI SONLI YECHISH

Annotatsiya:*Suspenziyani filtrlash masalasi murakkab texnologik jarayon hisoblanadi. Juda ko'p faktrlar bu jarayonga bo'ysunadi. Bu masalada filtrlashda cho'kma hosil bo'lishini qaraymiz, cho'kma qatlami o'sib boruvchi deb hisoblaymiz, uning siqilishi konsolidatsiya teoremasiga bo'ysunadi. Bunday jarayonni hisoblash uchun sonli usullardan foydalanish mumkin.Ushbu maqolada suspenziyani filtrlash masalasini sonli yechish usuli haqida so'z boradi.*

Kalit so'zlar: *Tekis filtrlash, Siqiluvchi cho'kma tenglamasi, filtrlash matematik modeli, aralashmani filtrlashda real fizik shartlar, qo'zg'aluvchan chegara.*

Ismoilov S. B.
assistant
Jizzakh Polytechnic Institute

NUMERICAL SOLUTION OF THE ONE-DIMENSIONAL SUSPENSION FILTERING PROBLEM

Annotation: *The problem of suspension filtration is a complex technological process. Many factors are subject to this process. In this problem, we consider the formation of sediment during filtration, we assume that the sediment layer is growing, its compaction is subject to the consolidation theorem. Numerical methods can be used to calculate such a process. This article discusses the method of numerical solution of the suspension filtration problem.*

Keywords: *Flat filtration, Compressible sediment equation, mathematical model of filtration, realistic physical conditions in the filtration of a mixture, movable boundary.*

Jarayonni quyidagicha qabul qilamiz. Tekis filtrlash elementini qaraymiz. Filtrlash qatlami boshlang'ich momentda qandaydir z_0 qalinlikka ega deb olamiz. Vaqt o'tishi davomida bosim farqi o'zgarmas. Cho'kma-suspensiya ko'chish chegarasi $h(t)$ o'sishi bilan cho'kma qatlami ortib boradi. Bu qaralayotgan bir o'lchamli masalada z cho'kma qatlami suspenziya oqimiga qarshi oshib boradi.

Siqiluvchi cho'kma tenglamasi analogik issiqlik o'tkazuvchanlik va diffuziya tenglamasiga o'xshash bo'ladi. Cho'kma-suspenziya chegarasi qo'zg'aluvchan. Bu Stefan masalasini hisoblashda quyidagi faktorlarni olamiz. p – bosim; p_0, p_1, p_2 – mos ravishda boshlang'ich, cho'kma qatlamiga kiruvchi va

filtrlash qatlamidan chiquvchi bosimlar; μ − suyuqlik qovushqoqligi; r − cho'kmaning solishtirma qarshiligi; u − cho'kmaning tashqi ta'sir koeffisinti; G − Cho'kmaning siqilish modeli; b − konsolidatsiya koeffitsiyenti, tashqi bosim ostida cho'kmaning siqilishi amalga oshiriladi, $b = \frac{G}{\mu \cdot r}$.

U holda filtrlash matematik modelini gidrodinamik bosimga nisbatan quyidagi ko'rinishda yozishimiz mumkin:

$$\frac{\partial p}{\partial t} = b \cdot \frac{\partial^2 p}{\partial z^2}, \quad 0 \le t \le T, \quad 0 \le z \le h(t), \qquad (2.31)$$

$$p[h(t), t] = p_1, \quad 0 \le t \le T, \qquad (2.32)$$

$$p[0, t] = p_2, \quad 0 \le t \le T, \qquad (2.33)$$

$$p[z, 0] = p_0, \quad 0 \le z \le z_0, \qquad (2.34)$$

$$\left.\frac{\partial p}{\partial z}\right|_{z = h(t)} = l \cdot \frac{dh}{dt}, \quad 0 \le t \le T, \qquad (2.35)$$

Bu erga $h(0) = z_0$, $l = \frac{r \cdot \mu}{u}$, $p_0 = p_2 + \frac{z \cdot (p_1 - p_2)}{z_0}$, $0 \le z \le z_0$; b, l, p_1 va p_2 o'zgarmas kattaliklar.

Umumiy holda, Aralashmani filtrlashda real fizik shartlart cho'kmaning tuzilish strukturasi, filtrlash siqilishi bosim ta'sir farqidagi bir jinslimas muhit holati va boshqa konsolidasiya kuchlardan bog'liq bo'ladi. Shunday qilib, konsolidasiya koeffiyenti o'zgaruvchang bo'ladi va osadka qalinligidagi bosimning tarqalishidan bog'liq bo'ladi. Shuning uchun aralashmani filtrlashda hosil bo'ladigan cho'kmaning analiz qilish uchun konsolidasiya koeffisiyentini o'zgaruvchi qilib olamiz.

Tekis filtrlanuvchi elementni qaraylik. Filtrlash jarayonida aralashmaning yo'nalashga teskari ravishda filtr qatlami qandaydir z_0 bo'lsin. Vaqt o'tishi davomida filtr qatlami bosimning ta'sir farqidan qat'iy nazar o'zgarmas bo'lsin. Aralashma filtrga tushgandan so'ng uzluksiz $h(t)$ cho'kma qatlami chiziqli bo'lmagan holda o'sib boradi, ya'ni cho'kma – aralashma chegarasi ko'chib boradi. U hoda bu soxalarni ikkita soxashga ajratish mumkin: $\Omega_1(0, z_0)$ - filtrlanuvchi qatlam sohasi va $\Omega_2(z_0, h(t))$ - cho'kma sohasi, bu yerda albatta $z = h(t)$ - qo'zg'aluvchan chegara. Bu shartlarda jarayon xuddi Stefan masalasiga mos keladi.

Noma'lum qo'zg'aluvchi chegara h(t) chiziqlimas masalaga keladi. (2.31) − (2.35) masalani sonli yechish uchun $Q = \{0 \le t \le T, \ 0 \le z \le h(t)\}$ sohaga to'r kiritamiz:

$$z_i = i \cdot f_i, \quad i = \overline{1, M_0 + N}, \qquad (2.36)$$

$$t_j = j \cdot \tau, \quad j = \overline{1, N}, \qquad (2.37)$$

Bu erga f_i – koordinata o'zgaruvchi qadami z bo'yicha; M_0 – tugunlar soni, boshlang'ich z_0 filtrlash qatlamigacha bo'lgan; N – $[0,\mathrm{T}]$ kesmadagi vaqt qatlami tugunlar soni; τ – vaqt qadami. Koordinata qadami $f_1 = \ldots = f_{M_0} = h,\ h = \dfrac{z_0}{M_0},\qquad f_{M_0+j} = h_j,\ j = \overline{1,N},\ h_j$ – kattalik cho'kma-suspensiya qo'zg'alish chegarasidagi $\lfloor t_{j-1}, t_j \rfloor,\ j = \overline{1,N}$ intervalidagi qadam.

(2.31) – (2.35) masalaga mos quyidagi sxemani kiritamiz:

$$\frac{p_i^j - p_i^{j-1}}{\tau} = \frac{2\cdot b}{f_{i+1} + f_i}\cdot\left(\frac{p_{i+1}^j - p_i^j}{f_{i+1}} - \frac{p_i^j - p_{i-1}^j}{f_i}\right),\quad i = \overline{1, M_0 + j - 1},\quad j = \overline{1,N},$$

(2.38)

$$p_0^j = p_2,\quad j = \overline{0,N}, \qquad (2.39)$$

$$p_{M_0+j}^j = p_1,\quad j = \overline{0,N}, \qquad (2.40)$$

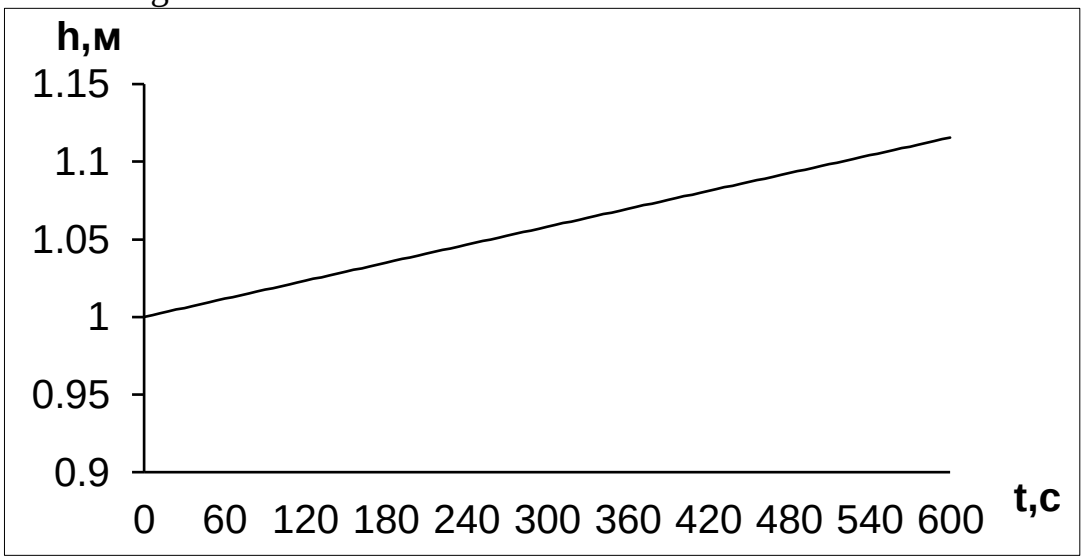
$$p_i^0 = p_0,\quad i = \overline{1, M_0 - 1}, \qquad (2.41)$$

$$\frac{p_{M_0+j}^j - p_{M_0+j-1}^j}{f_{M_0+j}} = l\cdot\frac{f_{M_0+j}}{\tau},\quad j = \overline{1,N}, \qquad (2.42)$$

Bu erda $p_i^j = p(z_i, t_j),\ i = \overline{1, M_0 + j - 1},\ j = \overline{1,N}$;

$$p_0 = p_2 + \frac{z_i\cdot(p_1 - p_2)}{z_0},\ i = \overline{0, M_0}.$$

(2.38) – (2.42) sonli echish uchun quyidagi parametrlarni qabul qilamiz: p_1 =436 MPa; p_2=100 MPa; l=19,642·10^{10} Pa· s· m^{-2}; b=5,31·10^{-7} m^{-2}·s^{-1}; T=600 s, z_0=1 m. quyidagi rasmda filtrlash hosil bo'ladigan cho'kma qatlamining osjib borishi tasvirlangan.



Adabiyotlar

1. Нигматулин Р.И. Динамика многофазных сред. Т. II. М., Наука, 1987.- 389с.
2. Abdusaidov S.U ” ISSIQLIK O’TKAZUVCHANLIK TENGLAMALARINI SONLI YECHISH”. "Экономика и социум" №7(134) 2025 https://www.iupr.ru/_files/ugd/b06fdc_8ad11bc174984b479be03af4f254bbfe.pdf?index=true

Jalilova Ch. Z.
o'qituvchi
geografiya kafedrasi
Buxoro davlat pedagogika instituti
Bobokalonova M. Z.
talaba
geografiya va iqtisodiy bilim asoslari dasturi
Buxoro davlat pedagogika instituti

BUXORO IXTISOSLASHTIRILGAN “JAYRON” PITOMNIGI – EKOTURIZM OBYEKTI SIFATIDA

Annotatsiya: *Ushbu maqolada Buxoro ixtisoslashtirilgan "Jayron" pitomnikining turistik imkoniyatlari o‘rganilgan. Maqolada "Jayron" pitomnigining tashkil etilishi, hozirgi faoliyati, pitomnikdagi fauna va flora haqida so‘z boradi. Shuningdek, pitomnikda turistlar uchun yo‘lga qo‘yilgan qulayliklar ham yoritilib berilgan.*

Kalit so’zlar: *Buxoro viloyati, tabiat, "Jayron"pitomniki, turizm, ekoturizm, qo‘riqlanadigan maskanlar, hayvonlar, o’simliklar, cho’l.*

Jalilova Ch. Z.
lecturer
department of geography
Bukhara State Pedagogical Institute
Bobokalonova M. Z.
student
geography and fundamentals of economic knowledge program
Bukhara State Pedagogical Institute

BUKHARA SPECIALIZED “JAYRON” BREEDING CENTER AS AN ECOTOURISM SITE

Annotation: *This article studies the tourist potential of the Bukhara specialized "Jayron" nursery. The article discusses the organization of the "Jayron" nursery, its current activities, the fauna and flora in the nursery. The amenities provided for tourists in the nursery are also highlighted.*

Keywords: *Bukhara region, nature, "Jayron" nursery, tourism, ecotourism, protected areas, animals, plants, desert.*

Buxoro ixtisoslashtirilgan “Jayron” pitomnigi Qizilqum cho‘lining janubiy etaklarini o‘z ichiga oladi. Buxoro ixtisoslashtirilgan “Jayron” pitomnigi davlat tabiatni muhofaza qilish, kamyob hayvon turlarini ko‘paytirish ilmiy-tadqiqot muassasasi hisoblanadi. Buxoro ixtisoslashtirilgan “Jayron” pitomnigi hududi – Kogon va Qorovulbozor shaharlari orasida, A-380 avtomagistrali bo‘ylab Buxoro

viloyatining Buxoro tumani hududida joylashgan. Maydoni 16522 gektar bo‘lib, shundan 1-hudud 5145 gektar, sim to‘siq bilan himoyalangan, 2-hudud 11377 gektar ochiqlik maydonidan iborat.

Pitomnikning tabiiy sharoiti cho‘l iqlimiga xos bo‘lib, Qizilqum cho‘lining Janubi-g‘arbiy qismi, Karnabcho‘l massivida landshaftlaridan iborat. Hudud dengiz sathidan o‘rtacha 332 m balandlikda bo‘lib, past tepalikli qumlar, taqirlar, sho‘rxoklar, gipsli qatlam, toshloqlar va ko‘llardan iborat. 1 - hududning janubiy qismi turli xil sho‘rlanish darajasiga ega 3 ta ko‘ldan iborat ko‘llar majmuasi mavjud. Ko‘llardagi suv Amu-Buxoro kanalidan oqib o‘tadigan ariq, yer osti sizot suvlari va yillik yog‘in miqdori hisobidan shakllanadi. 2 - hududning Qaynagach past tog‘i yaqinida yer osti sizot suvlaridan shakllanadigan turli darajadagi sho‘rlanishga ega 4 ta kichik tabiiy suvliklar joylashgan.

“Jayron” pitomnigi qurg‘oqchil zonada joylashgan bo‘lib, keskin kontinental iqlimi bilan ajralib turadi. Havo harorati, yozda + 43, +48 °S ga, qishda esa -16, -23 °S ga tushishi mumkin. Yillik yog‘in miqdori 150-200 mm atrofida. Pitomnik hududida saksovulzorlar, to‘qaylar, tuzli botqoq va taqir o‘simliklari mavjud. Pitomnikda o‘simliklarning 46 oila, 182 turkumga mansub, 267 turdagi yuksak o‘simliklar o‘sadi. Pitomnik faunasi tarkibida qushlarning 257 turi, sutemizuvchilarning 36 turi, baliqlaring 8 turi, sudralib yuruvchilarning 18 turi, suvda va quruqlikda yashovchilarning 2 turi, umurtqasizlarning 700 ga yaqin turi uchraydi. Pitomnikda quyidagi asosiy sutemizuvchi turlari maxsus sharoitlarda ko‘paytiriladi: jayron (1086 bosh), turkman quloni (76 bosh), prjeval oti (22 bosh), buxoro tog‘ qo‘yi (38 bosh), buxoro bug‘usi (1 bosh).

Jayron pitomnigida ekoturizm masalasida ijobiy ishlar amalga oshirilgan. Ekologik turizmni amalga oshirish uchun 8 ta ekomarshrutlar ishlab chiqilgan:

1-marshrut - voler majmuasi, uzunligi 500 m. piyoda sayohat vaqt davomiyligi 30 daqiqa.

2-marshrut - voler majmuasi - kichik tuzli ko‘l, uzunligi 2 km, piyoda sayohat vaqt davomiyligi 2 soat.

3-marshrut - Voler kompleksi – ko‘llar – birinchi kuzatuv minorasi, uzunligi 5 km, piyoda sayohat vaqt davomiyligi 4 soat.

4-marshrut - Voler kompleksi – Amu- Buxoro mashina kanali bo‘ylab o‘tadigan janubiy yo‘l. Avtomobilda sayohat: uzunligi 7 km, vaqt davomiyligi 1,5-2 soat.

5-marshrut - Voler kompleksi - Amu- Buxoro mashina kanali bo‘ylab o‘tadigan janubiy yo‘l - 2-ochiqlik hududi bo‘ylab sayohat. Avtomobilda sayohat masofa 40 km, vaqt davomiyligi 4-5 soat. Yo‘nalish uchun cho‘lda yura oladigan avtomobil kerak bo‘ladi. Ushbu marshrut 1- va 4-marshrutlarni ham ko‘rish imkonini o‘z ichiga oladi.

6- marshrut. Qaynagach tog‘i. Piyoda sayohat: masofa 14 km. Vaqt davomiyligi 5-6 soat.

7-marshrut (piyoda) va 8-marshrut (avtomobilda). Kechki ya'ni tundagi sayohatlar. Ikkinchi hududda avtoulovda sayohat: uzunligi 10-15 km, davomiyligi 3 soat.

Pitomnikga yaqin aholi punktlari Qorovulbozor tumanidagi “Cho‘lquvar” MFY (10 km) va Kogon shahri (25 km) hisoblanadi. Pitomnik hududida mehmonxona va “Tashrif markazi” binosi qurilgan. Unda mehmonlar uchun sharoitlar ham ko‘zda tutilgan. Jayron pimomnigi viloyat markazi – Buxoro shahridan 42 km, Kogon shahridan 25 km, Qorovulbozor tumanidan 15 km masofada joylashgan. Bu noyob maskan 1977 - yilda barpo etilgan bo‘lib, muhofaza qilinadigan hudud maqomiga ega. Bugungi kunda, qo‘riqxonaning maydoni 16,5 ming gektarni tashkil qiladi va undagi hayvonlar yarim volyer sharoitda parvarish qilinadi. Ekologik markazni yaratish jarayonida, noyob hayvonlar yashashi uchun yaroqli ulkan hudud simto‘r bilan o‘raldi va hayvonlar, shu jumladan, jayronlarni, qishloqlaridagi mahalliy aholi va Qizilqum cho‘li kengliklaridan yig‘b kelindi. O‘sha paytlarda, ko‘plab oilalar jayronlarni tovuslar kabi uylarida bezak sifatida saqlashar edi. Hudud, noqonuniy ovchilar va bosqinchilardan himoya qilina boshladi.

Bugungi kunda, ekomarkazda hayvonlarni parvarishlash uchun barcha sharoitlar yaratilgan. Markazning yaratilishi, nafaqat jayronlar, balki boshqa ko‘plab noyob sutemizuvchilar, qushlar, baliqlar, hasharotlar va sudralib yuruvchilar sonining ko‘paytirilishiga imkon berdi. Pitomnikda, uzun tikonli tipratikonlar va qulonlar, Prjevalskiy otlari va Buxoro tog‘ qo‘ylari, aylanma shoxli echkilar va pushti saqoqushlar, turnalar va oqqushlar, burgutlar va lochinlar, kulrang echkemarlar va O‘zbekistondagi cho‘l gududlarida yashovchi boshqa ko‘plab hayvonlarini ko‘rish mumkin. Unda, Amu-Buxoro mashina kanalidan kelib quyiladigan ko‘llar mavjud bo‘lganligi uchun hayvonlar doimo ichimlik suvi bilan ta’minlangan.

Hozirda pitomnik hududi katta sur’atlar bilan obodonlashtirilmoqda. Tez kunlarda, noyob hayvonlarni tomosha qilish imkonini beruvchi qo‘shimcha sayyohlik yo‘nalishlari ochiladi. O‘rta Osiyoda yashovchi yovvoyi otlarning kenja turi - Prjevalskiy otlarini tomosha qilish – kishiga katta zavq bag‘ishlaydi. Bunday otlar juda noyob bo‘lib, hozirgi kunda dunyoda ularning taxminan ikki ming donasi saqlanib qolgan. Kelgusida pitomnikda hayvonlar sonini ko‘paytirish, ilmiy tadqiqotlarni kengaytirish, maxsus saytda 3D-sayohatlar yaratish ishlari rejalashtirilmoqda, unga tutash hududlarda esa qo‘shimcha sayyohlik obyektlari tashkil etish va boshqa yana ko‘plab ishlar rejalashtirmoqda.

“Jayron” pitomnigi Qizilqum cho‘lining janubi-g‘arbida joylashgan bo‘lib, 40 yildan ortiqroq vaqt mobaynida kamyob jonivorlarni ko‘paytirish bilan shug‘ullanadi. Uning faoliyati tufayli jayronlar, qulonlar, Prjyevalskiy otlari, Buxoro tog‘ qo‘ylari, Buxoro bug‘ulari va vinsimon shoxli echkilari populyatsiyasi tobora o‘sib bormoqda. Ammo jonivorlar sonining ko‘payishi ozuqa zaxiralari bilan bog‘liq muammolarni keltirib chiqardi. Uni hal qilish uchun “Jayron” pitomnigi “Do‘stlar klubi”ni – jonivorlarni yaxshi ko‘radigan kompaniyalar hamjamiyatini tashkil etdi, ularning xayriya yordamlari ozuqa sotib olishga sarflanadi. «Ozuqa sotib olish masalasi pitomnik oldida har yili yuzaga keladi. Bugungi kunda to‘silgan hududda 955 ta jayron, 155 ta qulon va 25 ta Prjyevalskiy oti yashaydi. Tabiat faqat 800 ta jonivorni boqa oladi. Qolganlarini

ochlikdan qirilib ketishdan saqlash – bugugngi kunnig dolzarb vazifasimiz. Pitomnik xodimlari yon-atrofdagi qo‘shni hududlardan turli o‘t-o‘lanlar, qamish, tuya yantog‘i, qandim kabilarni yig‘ib keladilar, lekin bu yetarli emas. Hayvonlarning yashab qolishi uchun homiylardan ko‘rsatilayotgan ko‘mak asos bo‘la oladi. Pitomnikga KNAUF kompaniyasi muntazam ravishda ko‘maklashib keladi, ularning yordamlari bilan arpa sotib olinmoqda. Bu qo‘shimcha ozuqa jonivorlarning qishdan chiqib olishiga yordam beradi. Hayvonlarga butun yil davomida qo‘shimcha ozuqa berib turiladi. 2024-yil oktyabr holatiga ko‘ra, bu yerda maxsus ko‘paytiriladigan 816 bosh jayron, 76 bosh ta turkman quloni, 21 bosh Prjevalskiy oti, 28 bosh Buxoro tog‘ qo‘yi va 1 bosh Buxoro bug‘usi bor edi. Ular biostansiyaning ixcham, lekin xavfsiz to‘siqlar ichida erkin harakatlanish imkoniga ega. Unda yana saksovulzorlar, to‘qaylar, tuzli botqoq va ko‘lllar mavjud. Pitomnikda qushlarning 250 dan ortiq, sudralib yuruvchilarning 18 dan ortiq, baliqlarning 15 ga yaqin va o‘simliklarning 250 dan ortiq turi uchraydi. Pitomnik ilmiy xodimi Po‘lat Toshevning aytishicha, shulardan 57 tasi noyob, O‘zbekiston Qizil kitobiga kiritilgan turdagi jonivorlar hisoblanadi. Bu pitomnikning nomi “Jayron” deb atalishi bejiz emas. Jayronlar — O‘rta Osiyoning timsoli, yugurishda to‘xtovsiz, ziyrak va jozibali hayvonlar. Ular nafaqat biologik, balki madaniy ahamiyatga ham ega. O‘zbek xalq og‘zaki ijodi, rassomchiligi va hunarmandchiligiga nazar tashlar ekansiz, go‘zallik va ozodlik ramzi sifatida jayronlar namoyon bo‘lishini ko‘rasiz. Hatto, fotograflar uchun ham bu jonzotlarni suratga tushirish eng murakkab, biroq eng zavqli lahzadir. Ular kameradan qo‘rqmaydi, balki sizni kuzatadi – odamzod va tabiat o‘rtasidagi aloqa shu yerda qayta tiklangandek bo‘ladi, go‘yo.

So‘nggi yillarda “Jayron"da ekoturizm yo‘nalishlari faol rivojlantirilmoqda. Bu nafaqat mahalliy, balki xorijiy mehmonlar uchun ham qiziqarli yo‘nalishga aylangan. Tashrif buyuruvchilarga hayvonlar hayoti bilan yaqindan tanishish, tabiiy muhitda kuzatuv olib borish va 20 kishilik mehmonxonada tunash imkoni yaratilgan. Qolaversa, unda gid bilan piyoda yoki avtomobilda ekskursiya qilish, kuzatuv minorasidan hayvonlarni tomosha qilish, avtomobil tunda sayrga chiqish, jayronlar oralab yurish, ularni oziqlantirish, quyosh chiqishi va botishida tabiatni kuzatish mumkin.

Ekoturizmni rivojlantirish uchun Buxoro viloyatidagi “Jayron” pitomnigida turistik infrastruktura tashkil etilgan. Bu yerda tashrif markazi, muzey, kuzatuv binosi va maydonlari yaratiladi, shuningdek, o‘quvchilar va talabalar uchun ekskursiyalar tashkil etilmoqda. Pitomnikni turizmning yangi yo‘nalishi sifatida rivojlantirish maqsadida bu yerda tashrif markazi hamda pitomnik va uning tarixi haqida ma’lumot beradigan maxsus muzey yaratilgan. Pitomnikda shuningdek bog‘liq maxsus suvenirlar liniyasi, brend do‘konlari hamda tematik kafelar tashkil etilishi rejalashtirilgan. Pitomnik xorijiy va mahalliy sayyohlar uchun kerakli texnikalar bilan ta’minlanib, shu jumladan, avtomobil, kvadrotsikl, live-kameralar, fotoqopqonlar ijarasi yo‘lga qo‘yiladi. Turizmni rivojlantirish qo‘mitasining ta’kidlashicha, ushbu turistik infrastruktura yaratilishi natijasida “Jayron” pitomnigi yiliga 20 mingga yaqin sayyohni qabul qilish salohiyatiga ega bo‘ladi.

O‘zbekistonda so‘nggi yillarda turistlarning ko‘p tashrif buyurishi yurtimizning tabiiy hududlariga bo‘lgan qiziqishlari ortib bormoqda. Shu bois, Jayron pitomnikda ham keyingi yillarda turistik manzillarni ko‘paytirish mehmonlarning e’tiborini jalb qilish borasida ibratli ishlar olib borilmoqda.

Foydalanilgan adabiyotlar ro‘yxati

1. Баратов П. Ўзбекистоннинг табиий географияси. Ўқув қўлланма. –Т.: Ўқитувчи, 1996. – 264 б.
2. Гафарова С.М., Гуламов М.И. Современная физико-географическая и экологическая характеристика города Бухары // Universum: химия и биология: электрон. научн. журн. 2021. 12 (90).
3. Nazarov I.Q., Allayorov I.Sh. Buxoro geografiyasi. Buxoro, 1994.
4. Buxoro viloyati o’lkashunoslik atlasi. O’zbekiston Respublikasi Yer resurslari, geodeziya, kartografiya va Davlat kadastri davlat qo’mitasi. – Toshkent, 2014.

UDK:378.4:614.2:37.018.43

Jonibekov J. J.
assistant professor
department of medical radiology and nuclear medicine
Abu Ali ibn Sino Bukhara State Medical Institute
http//orcid:0009-0004-4155-2650

ASSESSMENT OF THE COMPETITIVENESS OF HIGHER EDUCATIONAL INSTITUTIONS IN THE HEALTHCARE SYSTEM

Annotation: *The operational efficiency strategy is aimed at achieving results that significantly exceed the results of competitors engaged in similar activities. Strategic positioning is aimed at carrying out activities that are fundamentally different from those of competitors or include alternative approaches to similar activities. This article discusses marketing strategies for the development of medical higher education institutions. It provides data on the impact of external and internal factors on the quality of education in medical higher education institutions.*

Key words: *medicine, marketing, management, quality, service, competitiveness, strategy.*

Intraduction

In the context of the ongoing transformation of the healthcare system of Ukraine, the task of finding a model of an effective national healthcare system, adequate to the modern realities of society and competitive in the global space, remains extremely relevant. Before proceeding to the analysis of the competitiveness management system of health care institutions, it is necessary to conditionally characterize the current state of the national health care system. Unfortunately, the existing health care system in Ukraine does not allow to implement the desired principles of marketing relations in the emerging market of medical services [1]. It is well known that a market economy cannot be imagined without such concepts as "competition" and "competitiveness". In countries with developed market economies, public and private health care institutions have existed for many years in conditions of sectoral competition, but in Ukraine the competitive environment is still not developed. The main factors of low and sometimes even absent competitiveness among Ukrainian healthcare institutions are as follows: – a revolutionary transition from the administrative and planning system of the Semashko healthcare model to the uncontrolled process of forming marketing relations in the context of the evolutionary formation of the healthcare market; conservative form of ownership of health care institutions, as well as uncertainty of the formation and development of small and medium-sized businesses in the existing health care system[2]. This does not correspond to classical economic laws and conditions of competition and competitiveness; – the

predominance of the public sector in health care in Ukraine, which is absolutely regulated and financed by the state. This creates a state monopoly in the healthcare sector; – lack of modern managers in the public health system who are able to competently solve organizational, financial and other management problems and tasks of the health care institution; – absence in the educational programs of Ukrainian medical universities of such discipline as "Management of competitiveness in health care", and unfortunately, as a rule, even the absence of the discipline "Management in health care"; – unjustified caution in the implementation of evidence-based planning methods, such as system analysis, forecasting, optimization of medical activities, etc. in the context of the formation of the health care market; – lack of political will in making sound management decisions to bring to the logical implementation of modern mechanisms, methods and forms of continuous improvement of the quality of medical care. Other factors contributing to the inefficiency of the competitive environment in Ukrainian healthcare are the following: – gaps in legislation (permitting and incentive mechanisms, such as licensing and accreditation); – poor access to medical information, for example, on the quality of services provided; – high differentiation of services, which leads to significant variation in prices and the need of the population for different health services, as well as interference in pricing; – heterogeneity of patients (level and structure of morbidity and disability, socio-economic characteristics, etc.[4]. When studying the problem of formation and management of the competitive environment of production and consumption of medical services, it is necessary to understand the negative role of incentives in the health care system, which contribute to the creation of conditions for the absence or unproductive competition. Some factors that cause this problem and in principle do not allow to form a competitive environment in health care are listed below. 1. Multilevel system of consumers (intermediaries) of medical services, such as: a) the state (program of state guarantees of free medical care); b) patients (exclusion of the consumer of medical services from the system of active influence on the quality of medical care); c) management of health care institutions (bureaucratic directive-command regulation of relations between patients and health care workers); d) physicians (making decisions about treating their patients and providing that treatment takes place in a competitive and economic vacuum); e) health insurance organizations (in the Ukrainian healthcare model there is just voluntary medical insurance). 2. Conflicting interests of the subjects of production and consumption of medical services. 3. Patients are responsible for paying for medical services, and doctors are not responsible for the quality of medical services provided. 4. Lack of objective indicators of the quality of medical care for patients and doctors. 5. Impossibility of establishing an unambiguous link between the price and quality of the provided medical service. 6. A specific feature of the patient as a consumer of medical services, which distinguishes him from consumers of other (non-medical) goods and services, is a kind of absolute priority of preserving life and health, without regard to possible costs. 7. Lack of opportunity and extremely insufficient awareness of patients

about the prices of medical services from different doctors. Certain sensitivity in obtaining such information directly from the attending physician; 8. Lack of financial resources for the majority of the population to pay for quality medical care according to their wishes and choices; 9. Subjectivity of the decision-making process among the population regarding the choice of institution, specialist, treatment and preventive measures, based only on their own impressions and opinions of friends, image, reputation and ability to persuade doctors. In general, health care is of great importance for society and has a number of features that distinguish it from other spheres of socio-economic activity, which greatly complicates the transition of this sphere to market conditions and creates preconditions for a number of reservations in the application of market principles. Unresolved aspects of the problem. All of the above leads the researchers to the conclusion that in the current state of domestic health care (more precisely, in the emerging sphere of production and consumption of medical services), there is no fundamental management system. And, consequently, there are no relevant relations of subjects, such as competition. This makes it virtually impossible to implement such a mechanism to improve the quality of medical services [5].

Materials and methods

The purpose of the article. Thus, the challenge is to offer theoretical tools for creating a system of competitiveness management of health care institutions that will ensure their sustainable growth and market stability. 2. Theoretical foundations of competition in the healthcare sector Analyzing various literature sources, starting with Adam Smith, it can be argued that there are many definitions of the concept of competition. Much less research is devoted to competition in the healthcare sector. Thus, it is necessary to adapt the existing definition of competition to this practical area. While analyzing different definitions, the authors came to the following understanding of the term competition in the healthcare sector: is a state and process of relations between the subjects of production and consumption of medical services within the framework of a specific civilized form of competition between medical workers (doctors) to achieve the highest degree of satisfaction of the patient's target needs. Today, competition in the field of health care exists both between state, municipal and private health care institutions, and between state and municipal institutions (district and regional polyclinics, hospitals, etc.), as well as between doctors themselves as specialists providing medical services. Its accessibility is ensured by law, based on the patient's right to choose a doctor and medical institution, as well as in fact, as evidenced by modern medical practice. Thus, competition is an objective and necessary function of the activity and development of the health care market. The key role of competition in health care is the potential to provide a mechanism for reducing health care costs. According to the authors, many aspects and factors of functioning and development of health care institutions and medical practice can be synthesized in competitiveness. At the same time, the competitive environment itself is ambiguous and contradictory.

Conclusion

Researchers identify some contradictions that arise in the functioning of competition in the healthcare sector. In particular, they include the following:

The purpose of the standard is to provide a common management tool for institutions that provide educational services and products. The importance of assessing the extent to which students and stakeholders meet the requirements, as well as continuously improving them, lies in regulating the activities of educational institutions.

Based on this document, the most likely interests of an organization that implements a management system for educational institutions are:

- aligning goals and objectives with educational policies;
- ensuring equal and comprehensive quality education for all, as well as promoting a sense of social responsibility;
- improvement of individual educational processes, as well as the possibility of continuous education for all students, especially those in need of special attention, and users of distance learning;
- balanced processes that allow for awareness and improvement of efficiency levels, as well as evaluation of criteria

Referans:

1. Harris, I. C., & McDaniel, R. R. (1993). Untangling healthcare competition, health care managers must recognize the three-dimensional nature of competition. Health Progress, November, vol. 30, pp. 20–23. Mark, T. L., & Coffey, R. M. (2001).
2. Studying the effects of health plan competition: are available data resources up to the task? Health Services Research, vol. 36 (no. 1, part II), pp. 253–275. Miller, R. H. (1996).
3. Competition in the health system: good news and bad news. Health Affairs, Summer, vol. 15 (no. 2), pp. 312–320. Porter, M. E. (1998
4. Competitive Advantage: Creating and Sustaining Superior Performance. New York: The Free Press. Porter, M. E., & Teisberg, E. O. (2004).
5. Redefining competition in health care. Harvard Business Review, vol. 82 (no. 6), pp. 65–72.

Jumaxanov Sh. Z., geografiya fanlari doktori (DSc),
dotsent
Namangan davlat universiteti
Xasanova Sh. D., geografiya mutaxassisligi magistranti
Namangan davlat universiteti
Namangan shahri, O‘zbekiston

NORIN TUMANIDA AHOLINING TABIIY HARAKATI VA DEMOGRAFIK O‘ZGARISHLAR DINAMIKASI

Annotatsiya: *Maqolada Norin tumani aholisi tabiiy harakati va demografik rivojlanishining 2010–2024-yillar davomidagi asosiy transformatsiya jarayonlari ilmiy jihatdan tahlil qilingan. Tadqiqotda tug‘ilish, o‘lim, tabiiy o‘sish, nikoh va ajrim ko‘rsatkichlari hamda migratsiya jarayonlarining 14 yillik dinamikasi statistik ma’lumotlar asosida o‘rganilgan. Aholi sonining o‘sish sur’atlari, yosh tarkibi, hududiy farqlar va demografik jarayonlarga ta’sir etuvchi ijtimoiy-iqtisodiy omillar tizimli ravishda bayon qilingan. Nikoh va ajralish ko‘rsatkichlarining demografik barqarorlikka ta’siri, shuningdek migratsiya saldosining mehnat resurslari shakllanishidagi o‘rni va ahamiyati baholandi. Tadqiqot natijalari Norin tumanining ijtimoiy-iqtisodiy rivojlanishi, demografik prognozlash va mahalliy boshqaruv jarayonlari uchun amaliy ahamiyatga ega.*

Kalit so‘zlar*: Demografik jarayonlar, tug‘ilish, o‘lim, nikoh, ajrim, tabiiy o‘sish, migratsiya, aholi tarkibi, demografik tahlil, aholi dinamikasi.*

Jumakhonov Sh. Z., doctor of geographical sciences (DSc)
associate professor
Namangan State University
Khasanova Sh. D., master's degree in geography
Namangan State University
Namangan, Uzbekistan

NATURAL POPULATION MOVEMENT AND THE DYNAMICS OF DEMOGRAPHIC CHANGES IN THE NORIN DISTRICT

Abstract: *This article provides a scientific analysis of the key transformation processes in the natural population movement and demographic development of the Norin district during the period 2010–2024. The study examines statistical data on birth rates, mortality, natural population growth, marriage and divorce indicators, as well as the 14-year dynamics of migration processes. Population growth rates, age structure, territorial differences, and socio-economic factors influencing demographic trends are systematically presented. The impact of marriage and divorce rates on demographic stability, as well as the role and significance of migration balance in shaping labor resources, is evaluated. The research findings hold practical importance for the socio-*

economic development of the Norin district, demographic forecasting, and local governance processes.

Keywords: *demographic processes, birth rate, mortality, marriage, divorce, natural population growth, migration, population structure, demographic analysis, population dynamics.*

Kirish

So‘nggi yillarda mamlakatimizda demografik jarayonlarni chuqur o‘rganish, aholining tabiiy harakati ko‘rsatkichlarini tahlil qilish va ularni hududiy darajada ilmiy asosda boshqarish masalalariga alohida e’tibor qaratilmoqda. Chunki aholi sonining o‘sish sur’atlari, tug‘ilish va o‘lim ko‘rsatkichlari, tabiiy o‘sish darajasi bevosita ijtimoiy-iqtisodiy rivojlanishning muhim ko‘rsatkichlaridan biri hisoblanadi. Shu bois, aholining tabiiy harakatini tahlil etish demografik siyosatni yaxshilash va barqaror rivojlanishni ta’minlashda muhim ahamiyatga ega.

Norin tumani Namangan viloyatining iqtisodiy-geografik jihatdan muhim hududlaridan biri bo‘lib, so‘nggi yillarda demografik jarayonlarda sodir bo‘layotgan o‘zgarishlar hududning ijtimoiy-iqtisodiy rivojlanishiga bevosita ta’sir ko‘rsatmoqda. Aholi sonining barqaror o‘sishi, yoshlar ulushining yuqoriligi va migratsiya jarayonlarining faollashuvi tuman demografik tarkibida sezilarli dinamikani yuzaga keltirmoqda. Ushbu omillar hududning mehnat resurslari salohiyatini qayta baholash, xizmat ko‘rsatish tarmoqlarini kengaytirish va infratuzilmani optimallashtirish zaruratini oshiradi.

Tumanda demografik o‘sish bilan bog‘liq ehtiyojlarning ortib borishi ta’lim, sog‘liqni saqlash, transport, uy-joy va ijtimoiy xizmatlar kabi iqtisodiy-ijtimoiy soha yo‘nalishlari bo‘yicha yangi rejalashtirish yondashuvlarini talab qilmoqda. Shuningdek, aholi zichligidagi hududiy farqlar, ichki migratsiya oqimlarining yo‘nalishi va aholining iqtisodiy faollik ko‘rsatkichlaridagi tafovutlar tuman ichida hududiy o‘sish jarayonlarini nomutanosibligini ko‘rsatadi.

Mazkur jarayonlarni ilmiy asosda o‘rganish demografik salohiyatdan samarali foydalanish, hududni ijtimoiy-iqtisodiy rivojlantirish bo‘yicha strategiyalarni ishlab chiqish Norin tumanining iqtisodiy-geografik imkoniyatlarini kengaytirish uchun muhim ahamiyatga ega.

Tadqiqotning maqsad va vazifalari

Norin tumanida kechayotgan geodemografik transformatsiya jarayonlari – aholining tabiiy o‘sishi, migratsiya harakatidagi o‘zgarishlarni ilmiy asosda tahlil qilish hamda ularning ijtimoiy-iqtisodiy rivojlanishga ta’sirini aniqlash hisoblanadi. Ushbu maqsadni amalga oshirishda quyidagi vazifalar belgilab olingan:

–Norin tumani aholi soni dinamikasi va tabiiy o‘sish sur’atlarini tahlil qilish;

– migratsiya jarayonlarining hududiy xususiyatlarini o‘rganish;

– Norin tumanining demografik rivojlanishiga oid xulosalar va takliflar ishlab chiqish.

Adabiyotlar tahlili va metodologiyasi

Ushbu maqolani yoritib berishda rasmiy demografik va ijtimoiy-iqtisodiy statistik to‘plamlar ma’lumotlaridan foydalanilgan. Tahlillarni amalga oshirishda geografik taqqoslash, monografik tahlil, statistik tahlil metodlaridan foydalanilgan.

Mamlakatimiz mustaqillikka erishgach, demografik jarayonlarni bozor iqtisodiyoti va hududiy rivojlanish tamoyillari asosida tahlil qilish zarurati yuzaga keldi. Aholi soni, tarkibi, migratsiya oqimlari va mehnat resurslarining joylashuvi masalalari bugungi kunda ijtimoiy-iqtisodiy siyosatning muhim yo‘nalishlaridan biri hisoblanadi. Geodemografik jarayonlarning hududiy xususiyatlarini o‘rganishga bag‘ishlangan ilmiy izlanishlar olib borilgan. Xususan, Q.X.Abdurahmonov[1], M.Q.Qoraxonov [8], I.R.Mullajonov [9], A.S.Soliyev [2;6], A.A.Qayumov[4], R.G.Asanov [5], M.Bo‘riyeva [3], Z.N.Tojiyeva [7] kabi olimlarning tadqiqotlarida markaziy o‘rin olgan. Jumladan, aholi soni, tug‘ilishi, o‘limi, nikoh va ajralish, tabiiy o‘sish dinamikasi jarayonlari hamda joylashuvi kabi demografik jarayonlarni va bu jarayonlarga ta’sir etuvchi omillar chuqur tahlil etilgan.

Asosiy qism

Norin tumani ma’muriy-hududiy jihatdan Namangan viloyati hududining 2,8 foizi, aholisining esa 5,7 foizi to‘g‘ri keladi. So‘nggi yillarda Norin tumanida aholining tabiiy harakati, ya’ni tug‘ilish, o‘lim, nikoh, ajralish va tabiiy o‘sish ko‘rsatkichlari demografik rivojlanishning asosiy ko‘rsatkichlaridan biri sifatida diqqat markazida bo‘lib kelmoqda. Ushbu jarayonlarni o‘rganish hududda aholi sonining dinamikasi, sog‘liqni saqlash tizimi samaradorligi va ijtimoiy-iqtisodiy sharoitlarning ta’sirini aniqlashda muhim ahamiyat kasb etadi.

Jadval ma’lumotlaridan ko‘rinib turibdiki, tumanda har yili aholi soni o‘rtacha 3,2 ming kishiga oshib borayotganini ko‘rish mumkin. 2010–2024-yillar davomida Norin tumanining demografik rivojlanishida izchil o‘sish tendensiyasi kuzatilib, hududning tabiiy harakati ijobiy dinamikani namoyish etadi**.**

2010-yilda aholi soni 131,1 ming nafarni tashkil etgan bo‘lsa , bu ko‘rsatkich 2024-yilga kelib 178,5 ming nafarga yetgan, bu 47,4 ming kishiga o‘sganini ko‘rsatadi. Aholi sonining bunday barqaror o‘sishi hududda tug‘ilishning yuqoriligi, me’yoriy demografik yosh tarkibi, o‘rtacha umr ko‘rishning asta-sekin uzayishi va o‘limning nisbatan past darajada qolishi bilan izohlanadi.

Mutlaq o‘sishning yillar bo‘yicha tebranishi tumanda demografik jarayonlarning turli mikroomillar ta’sirida shakllanayotganini ko‘rsatadi. 2010-yildagi yuqori (9,3 ming) o‘sish, asosan, 2000-yillar oxirida shakllangan yuqori tug‘ilish avlodining reproduktiv yoshga kirishi bilan bog‘liq bo‘lsa, 2015-yildan keyingi yillarda bu ko‘rsatkich nisbatan barqarorlashib, 2–3,3 ming kishi oralig‘ida saqlanib kelmoqda. Bu Norin tumanida demografik o‘sishning keskin sakrashsiz, barqaror tipda kechayotganini ko‘rsatadi.

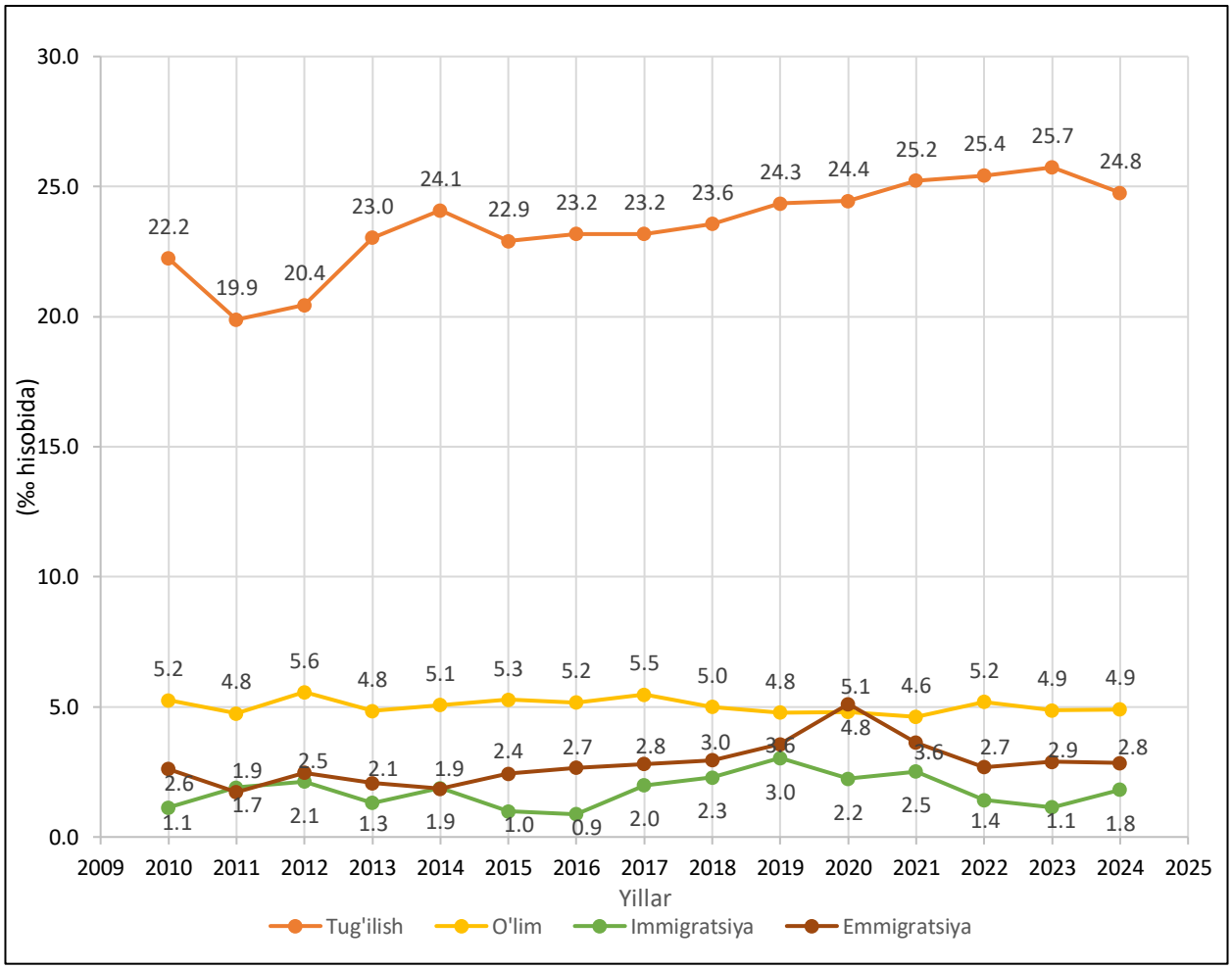
1-jadval

2010–2024-yillarda Norin tumani aholisi demografik xususiyatlari bo‘yicha asosiy ko‘rsatkichlar

T/r	Yillar	Doimiy aholi soni (ming kishi)	Tug‘ilish (ming kishi)	O‘lim (kishi)	Tabiiy o‘sish (ming kishi)	Ko‘chib ketganlar (kishi)	Ko‘chib kelganlar (kishi)	Migratsiya saldosi (kishi)
1	2010	131 100	2915	688	2227	342	149	-193
2	2011	140 400	2792	667	2125	242	267	25
3	2012	142 500	2914	794	2120	352	303	-49
4	2013	144 600	3331	700	2631	300	190	-110
5	2014	147 200	3545	746	2799	273	277	4
6	2015	149 900	3433	791	2642	364	148	-216
7	2016	152 400	3532	788	2744	406	133	-273
8	2017	154 900	3591	848	2743	435	308	-127
9	2018	157 500	3712	788	2924	465	361	-104
10	2019	160 300	3903	766	3137	572	487	-85
11	2020	163 300	3992	786	3206	835	365	-470
12	2021	166 100	4190	767	3423	602	418	-184
13	2022	169 300	4305	880	3425	455	240	-215
14	2023	172 500	4440	840	3600	498	198	-300
15	2024	175 800	4353	863	3490	499	320	-179

Izoh: Ushbu jadval O‘zbekiston Respublikasi statistika qo‘mitasi rasmiy sayti: www.stat.uz ma’lumotlari asosida mualliflar tomonidan tuzildi[11]

Tabiiy ko‘payish koeffitsiyenti 2010-yildagi 17 ‰ dan 2023-yilda 20,9 ‰ ko‘rsatkichini qayd etib, tumanda yuqori tabiiy o‘sish darajasi mavjudligini tasdiqlaydi. Ushbu ko‘rsatkich tumanning demografik faol hududlardan biri ekanligini ko‘rsatadi. Aholi tarkibida yoshlar ulushining yuqoriligi, tug‘ilishning barqaror o‘sishi, o‘limning pastligi- bularning barchasi tumanning demografik salohiyatining yuqoriligini ifodalaydi. Shuningdek, aholi sonining o‘zgarishi tug‘ilish va o‘lim, immigratsiya va emigratsiya jarayonlari natijasida ham namoyon bo‘ladi. Chunonchi, 2010–2024-yillarda Norin tumanining demografik jarayonlari muntazam o‘sish bilan birga ayrim keskin siljishlarni ham ko‘rsatadi (1-rasm)



1-rasm. Norin tumanida aholi takror barpo bo‘lish dinamikasi (2010–2024-yillar)[10][11]

Tug‘ilish koeffitsiyenti davr boshidagi 22,2 ‰ dan 2024-yilda 24,8 ‰ ga ko‘tarilgan bo‘lib, tumanda tug‘ilishning sezilarli ravishda ortganini ko‘rsatadi. Ayniqsa, 2020-yildan keyingi yillarda tug‘ilish ko‘rsatkichining tez o‘sishi kuzatiladi. Bu holat bir nechta omillar bilan izohlanadi:

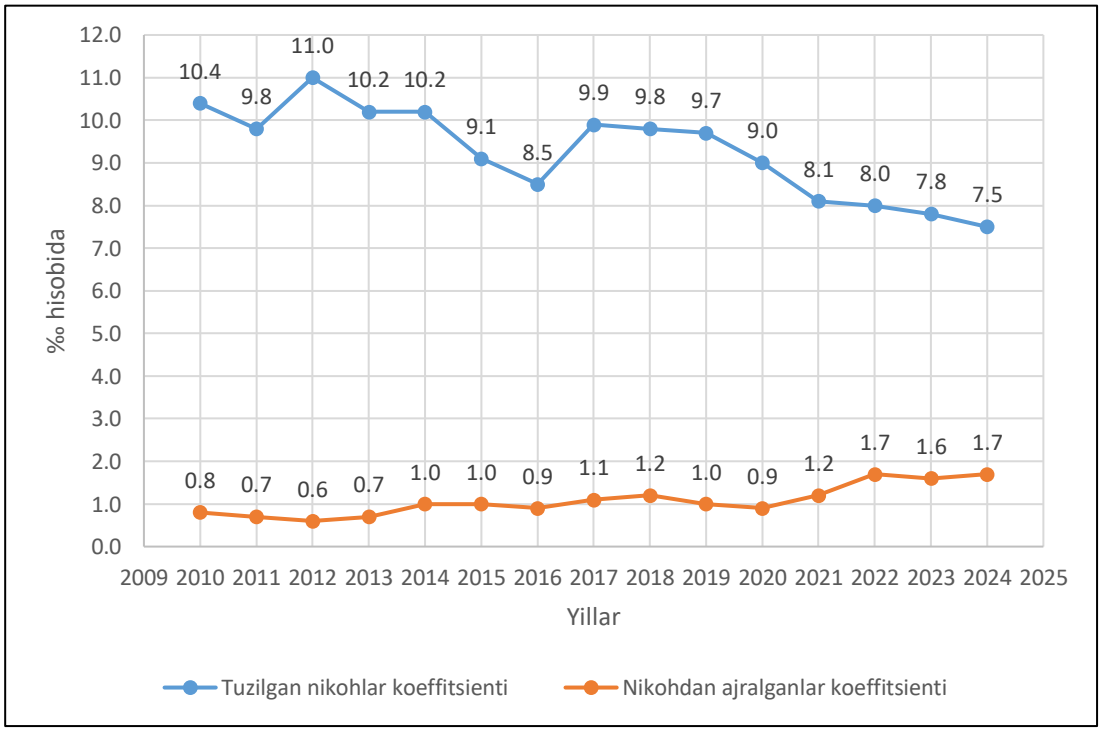
- reproduktiv yoshdagi ayollar ulushining oshishi;
- ijtimoiy-iqtisodiy barqarorlikning kuchayishi;
- yosh oilalarga davlat tomonidan ko‘rsatilayotgan qo‘llab-quvvatlovlar;
- oilaviy qadriyatlarning nisbatan konservativ saqlanishi.

O‘lim koeffitsiyenti 2010–2024-yillar oralig‘ida 5,2–4,9‰ diapazonida tebrangan bo‘lib, umumiy demografik fon uchun past ko‘rsatkich sanaladi. Ayrim yillarda o‘limning biroz oshishi (masalan, 2022-yil 5,2‰) sog‘liqni saqlash tizimidagi mavsumiy kasalliklar, global pandemiya ta’siri yoki iqlim sharoitlaridagi o‘zgarishlar bilan izohlashimiz mumkin. Migratsion jarayonlarda esa immigratsiya ko‘rsatkichlari davr mobaynida past bo‘lib, 1,0–2,5‰ oralig‘ida shakllangan. Ularning o‘zgarishi keskin emas, lekin 2020-yilda kuzatilgan

pasayish global pandemiya sharoitining migratsiya jarayonlariga bevosita ta’siri bilan bog‘liq bo‘lishi mumkin. Keyingi yillarda bu ko‘rsatkich asta-sekin tiklangan bo‘lsa-da, daraja hanuz past bo‘lib qolmoqda.

Bunga zid ravishda, emigratsiya ko‘rsatkichlari ancha baland va faolroq o‘zgaruvchanlikka ega. 2010–2014-yillarda emigratsiya barqaror bo‘lgan bo‘lsa, 2015-yildan boshlab o‘sish kuzatiladi. 2020-yilda emigratsiyaning 5,1 ‰ gacha keskin ko‘tarilishi tashqi, iqtisodiy va ijtimoiy omillarning kuchayganidan dalolat beradi. Bu davr pandemiya bilan mos kelgani emigratsiya oqimining vaqtinchalik, ammo sezilarli kuchayishiga sabab bo‘lgan. 2021-yildan boshlab ko‘rsatkich yana me’yoriy darajaga qaytgan. Umuman olganda, 2010–2024-yillar davomida Norin tumanida kuzatilgan demografik jarayonlar – yuqori tug‘ilish, past o‘lim va ijobiy tabiiy o‘sish kabi asosiy ko‘rsatkichlar bilan tavsiflanadi. Tumanda migratsion jarayonlarning ulushi yuqori bo‘lishiga sabab- hududda aholi bandligi muammosi mavjudligidir.

Nikoh va ajrimlar demografik jarayonlarning muhim tarkibiy qismlaridan biri bo‘lib, aholining ijtimoiy-iqtisodiy hayoti, madaniy qadriyatlari va turmush tarzi bilan chambarchas bog‘liqdir. Nikohlar sonining o‘sishi jamiyatda oilaviy institutning barqarorligi, yoshlar orasida turmush qurish tendensiyasining yuqoriligi va tabiiy o‘sish jarayonining faolligi bilan izohlanadi. Aksincha, ajrimlar sonining ortishi ijtimoiy muhitdagi o‘zgarishlar, iqtisodiy bosimlar, migratsiya oqimlari, bog‘liq bo‘lishi mumkin. Turmush sharoitlaridagi farqlar va oilaviy qadriyatlardagi transformatsiyalar bilan bog‘liq bo‘lishi mumkin.



2-rasm. Norin tumani aholisining nikoh va ajralish ko‘rsatkichlari dinamikasi (2010-2024-yillar) [10]

2-rasmdagi ma’lumotlar 2010 va 2024-yillarda qayd etilgan nikohlar hamda nikohdan ajralishlar koeffitsiyentlari qiyosiy tahlil qilingan. Ma’lumotlarga ko‘ra, tuzilgan nikohlar soni 2010-yil 10,4 ‰ yoki *1361 kishi*dan 2024-yilda 7,5‰- *1320 kishi*ga kamaygan. Bu ko‘rsatkich 3,0 ‰ pasayishni tashkil etadi. Mazkur pasayish ijtimoiy-demografik jarayonlarning o‘zgarishi, oilaviy institut barqarorligidagi o‘zgarishlar, iqtisodiy omillar va turmush tarzi bilan bog‘liqdir .

Shu bilan birga, nikohdan ajralishlar soni keskin o‘sish tendensiyasini ko‘rsatmoqda. 2010-yilda 0,8 ‰ (*102 kishi*) bo‘lgan ajralishlar soni 2024-yilga kelib 1,7 ‰ (*294 kishiga)* yetgan, ya’ni deyarli uch barobarga oshgan. Bu holat oilaviy barqarorlikning pasayishi, oilaviy nizolar, psixologik bosimlar, mehnat migratsiyasi, iqtisodiy qiyinchiliklar yoki axborot-kommunikatsiya vositalarining oilaviy munosabatlarga ta’sirining kuchayishi kabi omillar bilan izohlash mumkin [1; 113-bet].

Natijalar shuni ko‘rsatadiki, 2010–2024-yillar davomida nikohlar sonida nisbatan barqarorlik kuzatilgan bo‘lsa-da, ajralishlar sonining keskin ortishi demografik vaziyatga salbiy ta’sir ko‘rsatishi mumkin. Aholi tarkibida oilaviy muvozanatning buzilishi, tug‘ilish ko‘rsatkichlariga ham bilvosita ta’sir qilishi ehtimoli mavjud. Shundan kelib chiqib, oilani mustahkamlash, psixologik maslahat xizmatlarini kengaytirish, yosh oilalarga ijtimoiy ko‘mak va ma’naviy-ma’rifiy qo‘llab-quvvatlash dasturlarini kuchaytirish zarur.

Yuqoridagi tahlillardan kelib chiqqan holda quyidagilarni **xulosa** sifatida keltirish mumkin:

1. 2010–2024-yillar davomida Norin tumani aholisi tabiiy harakati barqaror va ijobiy dinamikaga ega bo‘lib, tug‘ilishning muntazam ortib borishi, o‘limning past darajada saqlanishi va tabiiy o‘sishning yuqoriligi hududning demografik salohiyatini mustahkamlaydi. Shu bilan birga, nikohdan ajralishlar sonining oshishi oilaviy barqarorlikka salbiy ta’sir ko‘rsatishi mumkin, bu esa tug‘ilish dinamikasiga bilvosita ta’sir etishi ehtimolini ko‘rsatadi.

2. Migratsiya jarayonlari tuman ijtimoiy-iqtisodiy rivojlanishi bilan uzviy bog‘liq bo‘lib, immigratsiya past, emigratsiya esa yuqori darajada saqlanib kelmoqda. 2020-yilda kuzatilgan emigratsiyaning oshishi pandemiya va tashqi-iqtisodiy omillarning bevosita ta’sirini aks ettiradi. Uzoq muddatli istiqbolda bu mehnat resurslarining qisqarish xavfini yuzaga keltiradi.

3. Tuman demografik rivojlanishini optimallashtirish uchun yosh oilalarni moliyaviy va ma’naviy qo‘llab-quvvatlash, reproduktiv salomatlikni mustahkamlash va nikoh–ajralish jarayonlarini monitoring qilish zarur. Shu bilan birga, psixologik maslahat xizmatlarini kengaytirish oilaviy barqarorlikni mustahkamlashga xizmat qiladi.

4. Migratsiyani boshqarish mexanizmlarini takomillashtirish, mahalliy ish o‘rinlarini yaratish va mehnat bozorini rag‘batlantirish tumanning iqtisodiy-ijtimoiy barqarorligini ta’minlashga yordam beradi. Emigratsiya oqimlarini kamaytirish uchun malakali kadrlarni va yoshlarni hududda saqlash strategiyasi ishlab chiqilishi zarur.

5. Aholi soni va tabiiy harakat ko‘rsatkichlarini doimiy monitoring qilish, hududiy demografik farqlarni hisobga olgan holda ijtimoiy xizmatlar va infratuzilmani optimallashtirish, shuningdek, mahalliy demografik siyosatni ilmiy asosda shakllantirish Norin tumanining uzoq muddatli demografik xavfsizligini va ijtimoiy-iqtisodiy rivojlanishini ta’minlaydi.

Foydalanilgan adabiyotlar

1. Abdurahmonov Q.X. Demografiya: [O‘quv qo‘llanma]. – Toshkent: Noshir, 2011. – 296 b.
2. GadoyevK ., Berdiyeva S. O‘zbek geografiya fani fidoyilari. – Toshkent, 2015.
3. Bo‘riyeva M. O‘zbekistonda oila demografiyasi. – Toshkent: Universitet, 1997. – 157 b.
4. Qayumov, A.A., Yakubov O‘.Sh., Abdullayev A.G. Aholi geografiyasi va demografiya asoslari: o‘quv qo‘llanma. – Toshkent: Fan va texnologiya, 2011. – 160 b.
5. Asanov R.G. Aholi geografiyasi. – Toshkent: O‘qituvchi, 1990. – 248 b.
6. Soliyev A.S., Jumaxanov Sh.Z., Toshpo‘latov A.M. Iqtisodiy va ijtimoiy geografiya [Darslik]. – Namangan: “Mashrab”, 2024. – 408 b.
7. Тожиева З.Н. Ўзбекистон Республикасида демографик жараёнлар ва уларнинг ҳудудий хусусиятлари // г.ф.д. (DSc) илмий дар. олиш у-н ёз. дисс. автореферати. – Тошкент, 2017. –76 б.
8. Караханов М.К. Подготовка и использование квалифицированных кадров рабочих и специалистов в Узбекистане в послевоенный период: автореферат дис. … канд. экон. наук. – Ташкент, 1958. – 17 с. URL:https://search.rsl.ru/ru/record/01006293471
9. Муллядзянов И.Р., Ата-Мирзаев О.Б., Буриева М.Р. Рождаемость в Узбекистане (рецензия) // Общественные науки в Узбекистане. – 1992. – № 3. – С. 63.
10. O‘zbekiston Respublikasi Milliy statistika qo‘mitasi Namangan viloyati hududiy statistika boshqarmasi. URL: https://namstat.uz
11. O‘zbekiston Respublikasi Milliy statistika qo‘mitasi. URL:https://stat.uz

Qambarov A. M.
katta o‘qituvchisi
o‘zbek tili, pedagogika va jismoniy madaniyat kafedrasi
Andijon qishloq xo‘jaligi va agrotexnologiyalar institute

KASBIY KOMPETENSIYALARNING TA’LIM YO‘NALISHLARIGA TA’SIRI

Annotatsiya: *Maqolada kasbiy kompetensiyalarning zamonaviy ta’lim tizimidagi o‘rni, ularning turli ta’lim yo‘nalishlari rivojiga ta’siri, kompetensiyaviy yondashuvning nazariy asoslari hamda mehnat bozori bilan integratsiyalashuv jarayoni ilmiy jihatdan tahlil qilinadi. Shuningdek, kompetensiyalarni ta’lim jarayoniga implementatsiya qilish mexanizmlari, modulli yondashuv, amaliyotga yo‘naltirilgan o‘qitish va interfaol metodlarning funksional samaradorligi yoritiladi. Tadqiqot natijalarida kompetensiyalarni shakllantirishning turli ta’lim yo‘nalishlaridagi o‘ziga xos jihatlari va ularni takomillashtirish bo‘yicha takliflar ilgari suriladi.*

Kalit so‘zlar: *kasbiy kompetensiya; ta’lim yo‘nalishlari; kompetensiyaviy yondashuv; amaliy ko‘nikma; mehnat bozori talablari; modulli ta’lim; texnik ta’lim; pedagogik kompetensiya.*

Kambarov A. M.
senior lecturer
department of uzbek language, pedagogy and physical education
Andijan Institute of Agriculture and Agrotechnologies

THE IMPACT OF PROFESSIONAL COMPETENCIES ON EDUCATIONAL PROGRAMMES

Abstract: *The article provides a scientific analysis of the role of professional competencies in the modern education system, their impact on the development of various educational programmes, the theoretical foundations of the competency-based approach, and the process of integration with the labour market. The study also examines the mechanisms of implementing competencies into the educational process, the modular approach, practice-oriented teaching, and the functional effectiveness of interactive methods. Based on the research findings, proposals for improving competency development and insights into their specific features across different fields of study are presented.*

Key words: *professional competency; educational programmes; competency-based approach; practical skills; labour market requirements; modular education; technical education; pedagogical competency.*

Zamonaviy oliy ta’lim tizimida malakali, raqobatbardosh va bozor talablari asosida shakllangan mutaxassislar tayyorlash ustuvor vazifalardan hisoblanadi.

Global iqtisodiyotning jadal rivojlanishi, texnologik yangiliklar, raqamli transformatsiya va mehnat bozori dinamikasi ta’lim jarayonining tubdan yangilanishini talab qilmoqda. Aynan shu jarayonda kasbiy kompetensiyalar ta’lim natijalarining markaziy o‘lchovi sifatida namoyon bo‘ladi.

Kasbiy kompetensiya — bu mutaxassisning o‘z faoliyatini samarali, ijodiy va mas’uliyat bilan amalga oshira olishini ta’minlaydigan integrativ bilim, ko‘nikma, malaka, kasbiy qadriyatlar va shaxsiy sifatlar majmuidir. Pedagogik adabiyotlarda kompetensiya bilimlardan ko‘ra kengroq tushuncha bo‘lib, u individual tajriba va amaliy harakatlar bilan boyigan, faoliyatga yo‘naltirilgan kategoriya sifatida izohlanadi.

O‘zbekiston ta’lim tizimida ham kompetensiyaviy yondashuv bosqichma-bosqich joriy qilinib, davlat ta’lim standartlari, o‘quv rejalari va modul asosidagi dasturlar aynan kompetensiyalar tizimiga mos holda qayta ishlab chiqilmoqda. Bu esa ta’lim mazmunining amaliyot bilan uyg‘unlashuvini, bitiruvchilarning bandlik darajasini hamda kasbiy moslashuvchanligini oshirishga xizmat qiladi.

Ushbu tadqiqotning maqsadi — kasbiy kompetensiyalarning turli ta’lim yo‘nalishlariga ta’sirini ilmiy asosda tahlil qilish, ularni shakllantirishning samarali mexanizmlarini aniqlash va amaliy tavsiyalar ishlab chiqishdan iboratdir.

Tadqiqot metodologiyasi kasbiy kompetensiyalarning ta’lim yo‘nalishlariga ta’sirini ilmiy asosda o‘rganish uchun bir nechta yondashuvlarning uyg‘unlashuviga tayandi. Nazariy-metodologik asos sifatida kompetensiyaviy yondashuv bo‘yicha xalqaro va milliy normativ hujjatlar, pedagogik va psixologik adabiyotlar tahlil qilindi. Kontent-tahlil orqali o‘quv dasturlari, davlat ta’lim standartlari va mehnat bozori talablarida kompetensiyalarning aks etish darajasi o‘rganildi. Qiyosiy tahlil yordamida texnik, pedagogik, iqtisodiy va tabiiy fanlar yo‘nalishlari kompetensiyalarining o‘zaro farqlari va umumiy jihatlari aniqlashtiriladi.

Tizimli yondashuv kasbiy kompetensiyaning bilim, ko‘nikma, kommunikativ, shaxsiy va raqamli komponentlardan iborat tuzilishini baholashga imkon berdi. Diagnostik metodlar yordamida talabalarning amaliy tayyorgarligi, malaka darajasi va ta’lim jarayonining kompetensiyaga yo‘naltirilganligi tahlil qilindi. Ekspert baholash metodi orqali soha mutaxassislarining fikrlari o‘rganilib, kompetensiyaviy yondashuvning amaliy samaradorligi bo‘yicha xulosalar olindi. Analitik-sintez metodi to‘plangan ma’lumotlarni umumlashtirish va yakuniy ilmiy xulosani shakllantirishda qo‘llandi.

Bu metodlar majmuasi kasbiy kompetensiyalarning ta’lim yo‘nalishlariga ta’siri, ularni shakllantirish mexanizmlari va mehnat bozori bilan uyg‘unlashuvini har tomonlama o‘rganishga imkon berdi.

Nazariy jihatdan kompetensiya, kompetensiyaviy yondashuv, modulli o‘qitish va amaliyotga yo‘naltirilgan ta’lim bo‘yicha mavjud xalqaro va mahalliy ilmiy manbalar tahlil qilindi. UNESCO, OECD, World Bank ta’lim standartlari va O‘zbekiston DTS talablari solishtirildi.

Natijada turli ta’lim yo‘nalishlarida (texnik, iqtisodiy, pedagogik, tabiiy fanlar) kompetensiyalar tizimi o‘zaro qiyosiy tahlil qilindi.

Shu o‘rinda kompetensiyalarning mehnat bozori ehtiyojlariga moslashuv darajasi o‘rganildi. Ish beruvchilar talablari va ta’lim dasturlari o‘rtasidagi uyg‘unlik aniqlashtirish natijasida kasbiy kompetensiyalar tarkibi, komponentlari va ularni ta’lim jarayoniga integratsiya qilishning tizimli modeli ishlab chiqildi.

Tadqiqot natijalari kasbiy kompetensiyalarning ta’lim yo‘nalishlari kesimidagi ta’sirini to‘rt asosiy blokda aks ettirdi.

Kompetensiya quyidagi yetti asosiy komponentdan tashkil topishi aniqlashtirildi:

1. Kasbiy bilimlar – nazariy asoslar.
2. Amaliy ko‘nikmalar – faoliyat jarayonida namoyon bo‘ladigan texnik malakalar.
3. Metodologik tayyorgarlik – tahlil, rejalashtirish, baholash.
4. Kommunikativ kompetensiya – muloqot va jamoaviy faoliyat.
5. Shaxsiy kompetensiya – mas’uliyat, intizom, tashabbuskorlik.
6. Axborot–raqamli savodxonlik – zamonaviy texnologiyalarni qo‘llay olish.
7. Refleksiv-metakognitiv kompetensiyalar – o‘z-o‘zini baholash va rivojlantirish.

Mazkur komponentlar barcha ta’lim yo‘nalishlarida o‘rganilayotgan kasbiy faoliyatning mazmuniga mos holda shakllanadi.

Texnik, muhandislik va ishlab chiqarish sohalarida kompetensiyalar quyidagilarga olib keladi:

- texnologik jarayonlarni boshqarish sifatining oshishi;
- ishlab chiqarish samaradorligi va xavfsizligining ta’minlanishi;
- muammoli vaziyatlarda innovatsion qarorlar qabul qilish tezligi;
- raqamli texnologiyalarni qo‘llash qobiliyati;
- konstruktorlik va loyihalashtirish ko‘nikmalarining rivojlanishi.

Texnik ta’limda kompetensiyalar ko‘proq amaliyotga yo‘naltirilgan bo‘lib, kompetensiya darajasi mutaxassisning mehnat samaradorligini bevosita belgilaydi.

Pedagogik yo‘nalishlarda kompetensiyalar quyidagi natijalarga olib keladi:

- pedagogik mahorat va metodik tayyorgarlikning kuchayishi;
- o‘quv jarayonida innovatsion metodlarning qo‘llanishi;
- psixologik monitoring va diagnostika sifatining oshishi;
- shaxsiy va kommunikativ kompetensiyalarning rivojlanishi;
- ta’lim jarayonining interfaollashishi.

Bu yo‘nalishda kompetensiyalar ko‘proq kommunikativ, metodik va psixologik tarkiblarga tayanadi.

Iqtisodiy ta’limda kompetensiyalar quyidagilarni ta’minlaydi:

- iqtisodiy tahlil va prognoz qilish ko‘nikmalari rivojlanadi;
- biznes jarayonlarni boshqarish samaradorligi oshadi;
- marketing, moliya va risklarni boshqarish kompetensiyalari shakllanadi;
- tadbirkorlik madaniyati kuchayadi;
- strategik fikrlash rivojlanadi.

Bu yo‘nalishlarda kompetensiyalar iqtisodiy tafakkurni chuqurlashtirish hamda bozor talablariga mos kadr tayyorlashning asosiy omilidir.

Tabiiy fanlar yo‘nalishida kompetensiyalar:

- ilmiy-tadqiqot ko‘nikmalarini kuchaytiradi;
- laboratoriya ishlarining sifatini oshiradi;
- ekologik va sanoat xavfsizligi bo‘yicha mas’uliyatni kuchaytiradi;
- analitik va eksperimental fikrlashni rivojlantiradi.

Mazkur yo‘nalishlarda kompetensiyaning asosiy o‘lchovi — ilmiy-tadqiqot faoliyati samaradorligidir.

Bugungi mehnat bozori malakali mutaxassisdan quyidagi sifatlarni talab qiladi:

- moslashuvchanlik;
- ijodiy fikrlash;
- jamoada ishlash;
- raqamli ko‘nikmalar;
- muammolarni hal qilish qobiliyati.

Ta’lim yo‘nalishlarida kompetensiyaviy yondashuvning joriy etilishi bitiruvchilarning bandlik darajasini sezilarli oshirishi aniqlanmoqda.

Tadqiqot tahlillari shuni ko‘rsatadiki, kompetensiyalarni shakllantirish jarayoni barcha ta’lim yo‘nalishlarida bir xil kechmaydi. Texnik yo‘nalishlarda amaliy ko‘nikmalar ustun bo‘lsa, pedagogik yo‘nalishlarda kommunikativ va metodik kompetensiyalar yetakchi ahamiyatga ega. Iqtisodiyot yo‘nalishida strategik fikrlash va tahliliy kompetensiya muhim bo‘lsa, tabiiy fanlarda ilmiy-tadqiqot kompetensiyalari markaziy o‘rinni egallaydi.

Shuningdek:

- kompetensiya ta’lim mazmunining yangilanishini talab qiladi;
- o‘quv dasturlari mehnat bozori talablariga mos bo‘lishi lozim;
- amaliyotga yo‘naltirilgan o‘qitish ta’limning asosiy poydevori bo‘lishi kerak;
- raqamli kompetensiya barcha yo‘nalishlarda umumiy asosiy kompetensiya sifatida qaralishi zarur.

Kompetensiyaviy yondashuvning to‘liq natija berishi uchun universitet, korxona va mehnat bozori o‘rtasidagi hamkorlik yuqori darajada bo‘lishi shart.

Xulosa o‘rnida shuni ta’kidlashimiz mumkinki, kasbiy kompetensiyalarning ta’lim yo‘nalishlariga ta’siri ta’lim tizimi rivojining eng muhim omillaridan biri hisoblanadi. Tahlillar shuni ko‘rsatadiki, kompetensiyaviy yondashuv ta’lim mazmunini modernizatsiya qilish, amaliyotning ulushini oshirish, talabalarni real ish sharoitiga tayyorlash va bitiruvchilarning mehnat bozoriga moslashuvchanligini kuchaytirishga xizmat qiladi.

Turli ta’lim yo‘nalishlarida kompetensiyalar turlicha namoyon bo‘lsa-da, ularning umumiy maqsadi — yuqori malakali, kreativ, innovatsion fikrlovchi va amaliy faoliyatga tayyor mutaxassislar tayyorlashdan iborat.

Foydalanilgan adabiyotlar.

1. O‘zbekiston Respublikasi Prezidenti. “Ta’lim to‘g‘risida”gi Qonun. – Toshkent, 2020.
2. O‘zbekiston Respublikasi Oliy va o‘rta maxsus ta’lim vazirligi. Oliy ta’limning davlat ta’lim standartlari (DTS). – Toshkent, 2021–2024.
3. “Kadrlar tayyorlash milliy dasturi”. – Toshkent: O‘zbekiston, 1997.
4. OECD. “Key Competencies for a Successful Life and a Well-Functioning Society”. – Paris: OECD Publishing, 2003.
5. UNESCO. “Education for the 21st Century: Competency-Based Approach”. – Paris: UNESCO, 2015.
6. Turg‘unov, S. “Texnik ta’limda amaliy kompetensiyalarni shakllantirish metodlari”. // Pedagogika va psixologiya jurnali. – 2021. – №4.
7. World Bank. “Skills Development for Employability”. – Washington, 2018.

Karshiyeva F. Z.
assistant
Samarkand State Medical University
Abbosova H. A.
student
Samarkand State Medical University
Gaipnazarova D. E.
student
Samarkand State Medical University

INTEROPERABILITY CHALLENGES IN MEDICAL INFORMATION SYSTEMS

Abstract: *Interoperability in medical information systems is critical for seamless data exchange, coordinated care, and efficient healthcare delivery. Despite significant advancements in health information technology, challenges related to system integration, data standardization, security, and organizational policies continue to impede effective interoperability. This article explores the major interoperability challenges in medical information systems, their impact on clinical workflow, patient safety, and healthcare quality, and discusses strategies to overcome these barriers. Emphasis is placed on technical, semantic, organizational, and regulatory dimensions of interoperability to provide a comprehensive understanding of the current landscape and future directions.*

Keywords: *Medical information systems, interoperability, health information exchange, electronic health records, data integration, healthcare IT*

Introduction

The integration of medical information systems is essential for providing high-quality, patient-centered healthcare. Interoperability—the ability of diverse information systems to exchange, interpret, and use data effectively—enables clinicians to access accurate and timely patient information across multiple platforms and institutions. Effective interoperability improves care coordination, reduces duplication of tests, minimizes medical errors, and enhances clinical decision-making.

Despite its recognized importance, interoperability remains a persistent challenge in healthcare. Medical information systems often vary in terms of architecture, data formats, coding standards, and communication protocols. The lack of uniformity complicates the sharing of patient information between hospitals, laboratories, pharmacies, and outpatient clinics. Furthermore, privacy, security, and regulatory compliance requirements impose additional constraints on data exchange.

As healthcare systems become increasingly digital, the volume and complexity of patient data continue to grow. Electronic Health Records (EHRs), laboratory information systems (LIS), picture archiving and communication

systems (PACS), and telemedicine platforms generate heterogeneous datasets that must be integrated for effective clinical decision support. Overcoming interoperability challenges is therefore vital for maximizing the potential of medical information systems to improve workflow efficiency, patient outcomes, and healthcare quality.

Discussion

Interoperability challenges in medical information systems can be categorized into technical, semantic, organizational, and regulatory domains.

Technical Challenges: Variability in system architecture, software platforms, and communication protocols hinders seamless data exchange. Legacy systems often lack compatibility with modern health IT solutions, creating barriers to integration. Inconsistent implementation of interfaces and standards further complicates interoperability.

Semantic Challenges: Differences in data coding, terminology, and representation affect the interpretation and meaningful use of exchanged information. Standardized vocabularies such as SNOMED CT, LOINC, and ICD are critical for ensuring semantic interoperability, but inconsistent adoption across institutions limits their effectiveness.

Organizational Challenges: Healthcare organizations may have diverse policies, workflows, and priorities, resulting in fragmented data-sharing practices. Lack of coordination among IT departments, clinical staff, and administrative personnel can impede the implementation of interoperable systems.

Regulatory and Security Challenges: Compliance with data protection laws, such as HIPAA, GDPR, or local privacy regulations, is essential for safeguarding patient information. However, strict security protocols and consent requirements may limit data exchange between systems, creating tension between privacy and interoperability goals.

Impact on Clinical Workflow and Patient Care: Poor interoperability can lead to incomplete patient records, delayed diagnoses, duplicated tests, medication errors, and fragmented care. Conversely, effective interoperability improves workflow efficiency, enhances clinical decision-making, and supports evidence-based medicine by providing comprehensive patient information at the point of care.

Strategies for Improvement: Implementing universal data standards, adopting health information exchange (HIE) platforms, promoting vendor collaboration, and integrating middleware solutions can enhance interoperability. Continuous staff training, governance frameworks, and policy alignment across institutions are equally important to ensure sustainable interoperability practices.

Conclusion

Interoperability in medical information systems is a cornerstone of efficient, safe, and patient-centered healthcare. Despite technological advancements, numerous challenges—including technical incompatibility, semantic discrepancies, organizational barriers, and regulatory constraints—continue to impede seamless data exchange. Addressing these challenges requires coordinated

efforts among healthcare providers, IT vendors, policymakers, and regulatory bodies. By implementing standardized data formats, promoting health information exchange, and fostering collaboration across institutions, healthcare organizations can overcome interoperability barriers, improve clinical workflow, reduce errors, and enhance overall patient outcomes. Future advancements in healthcare IT, coupled with robust interoperability frameworks, have the potential to revolutionize data-driven care, support precision medicine, and facilitate global health information integration.

References:

1. Adler-Milstein, J., & Jha, A. K. (2017). HITECH act drove large gains in hospital electronic health record adoption. Health Affairs, 36(8), 1416–1422. https://doi.org/10.1377/hlthaff.2016.1651
2. Kuperman, G. J., & McGowan, J. J. (2013). Potential of health information technology to enhance patient safety. Journal of the American Medical Association, 309(10), 1051–1052. https://doi.org/10.1001/jama.2013.2040
3. Wager, K. A., Lee, F. W., & Glaser, J. P. (2017). Health care information systems: A practical approach for health care management (4th ed.). Jossey-Bass.
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne'matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne'matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Karshiyeva F. Z.
assistant
Samarkand State Medical University
Abduraximova M. I.
student
Samarkand State Medical University
Sobirova M. Sh.
student
Samarkand State Medical University
Xolboyeva S. X.
student
Samarkand State Medical University
Ilxomova S. I.
student
Samarkand State Medical University

MODERN IT TOOLS FOR MANAGING AND ANALYZING MEDICAL DATABASES

Abstract: *The rapid growth of digital health systems requires efficient tools for managing and analyzing medical databases. Modern information technologies enable healthcare institutions to store, process, and interpret large volumes of clinical, diagnostic, and administrative data with high accuracy. By integrating advanced database management systems, cloud technologies, artificial intelligence, and analytical platforms, medical organizations can improve diagnostic precision, optimize clinical workflows, and support evidence-based decision-making. This article examines key IT tools used in the management and analysis of medical databases and highlights their role in enhancing healthcare efficiency and data-driven medical practice.*

Keywords: *Medical databases, IT tools, digital health, data management, clinical informatics, artificial intelligence, big data analytics, healthcare optimization.*

Introduction

The rapid digital transformation of the healthcare sector has placed medical databases at the center of clinical, administrative, and research activities. As healthcare institutions generate massive volumes of data—from electronic health records (EHRs), laboratory information systems, radiological archives, genomic sequencing platforms, and wearable health-monitoring devices—the need for efficient and intelligent data management tools has become more critical than ever. Medical data are characterized not only by their large volume but also by their variety, complexity, and the necessity for high-level accuracy and confidentiality. Consequently, traditional database approaches, which rely on rigid structures and

limited analytical capabilities, are no longer sufficient to meet modern healthcare requirements.

In this context, modern IT tools offer transformative solutions for handling structured, semi-structured, and unstructured medical information. Advanced database management technologies, such as relational systems and flexible NoSQL architectures, enable healthcare organizations to design robust data infrastructures capable of supporting complex clinical workflows. Cloud computing platforms expand these capabilities by providing scalable storage, seamless interoperability, and real-time access to patient information across departments, regions, and even international medical networks. This is especially important for telemedicine services, emergency decision-making, and multispecialty clinical collaborations.

Moreover, the rise of artificial intelligence and machine learning has significantly expanded the analytical potential of medical databases. These technologies assist clinicians in identifying patterns within diagnostic images, predicting disease progression, detecting risks at early stages, and personalizing treatment strategies. The integration of big data analytics platforms allows medical researchers to process epidemiological datasets, analyze population health trends, and conduct large-scale clinical studies with unprecedented speed and precision.

In addition to enhancing data processing capabilities, modern IT tools improve the security and regulatory compliance of medical databases. Encryption technologies, access control mechanisms, and auditing systems ensure data confidentiality and protect against unauthorized access or cyber threats. This is essential for maintaining trust between patients and healthcare providers as well as for meeting international standards such as HIPAA and GDPR.

Overall, the adoption of modern IT tools for managing and analyzing medical databases represents a critical step toward building intelligent, efficient, and sustainable healthcare systems. These technologies not only streamline clinical operations but also lay the foundation for data-driven medical practice, enabling healthcare institutions to leverage information as a strategic asset for improving patient care and advancing scientific research.

Discussion

Modern IT tools used in medical database management offer comprehensive solutions for ensuring data accuracy, security, accessibility, and analytical depth. Relational database systems such as MySQL and PostgreSQL provide structured storage for electronic medical records, whereas NoSQL platforms like MongoDB and Cassandra support flexible handling of unstructured or semi-structured data, including genomic sequences, radiological images, and sensor-generated information from wearable devices.

Cloud technologies, particularly those offered by Amazon Web Services, Microsoft Azure, and Google Cloud, enable scalable and secure storage, ensuring continuity of medical services and ease of data sharing across multiple institutions. Cloud-based integration also enhances collaboration between clinicians, researchers, and laboratories by simplifying access to centralized datasets.

Artificial intelligence plays a pivotal role in analyzing medical data, especially in predictive modeling, image interpretation, and clinical decision support systems. Machine learning algorithms help detect disease patterns, predict patient outcomes, and reduce diagnostic errors. Big data analytics platforms such as Apache Spark and Hadoop facilitate real-time processing of massive datasets, supporting advanced research and population-level health monitoring.

Furthermore, data visualization tools, including Tableau and Power BI, transform complex medical data into user-friendly dashboards that assist physicians and administrators in monitoring clinical performance, identifying trends, and evaluating treatment effectiveness. The integration of cybersecurity tools ensures data confidentiality and compliance with international medical data protection regulations.

Conclusion

Modern IT tools significantly enhance the management and analysis of medical databases, providing healthcare institutions with powerful capabilities for improving clinical workflows, supporting accurate diagnostics, and enabling informed decision-making. By utilizing advanced database systems, cloud technologies, big data analytics, and artificial intelligence, medical organizations can transition toward more efficient, transparent, and evidence-based healthcare models. The continuous development of digital solutions will further strengthen medical informatics and create new opportunities for personalized medicine, automated clinical systems, and scientific research. Implementing these technologies in a systematic and secure manner is essential for building a robust and future-ready healthcare infrastructure.

References:

1. Abouzahra, M., & Tan, J. (2020). Medical database management systems: Challenges and future trends. Journal of Medical Systems, 44(6), 1–12.
2. Belle, A., Thiagarajan, R., Soroushmehr, S. M. R., Navidi, F., Beard, D. A., & Najarian, K. (2015). Big data analytics in healthcare. BioMed Research International, 2015, 1–11.
3. Chen, M., Wang, L., & Zhang, L. (2022). Cloud-based medical data storage and sharing technologies in healthcare. IEEE Access, 10, 10234–10249.
4. Ne’matov, N., & Ne’matova, N. (2022). OLIY TA’LIM TIZIMI TALABALARIGA O’ZBEK TILINI O’QITISHDA AXBOROT TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.

7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Karshiyeva F. Z.
assistant
Samarkand State Medical University
Tursunaliyeva D. M.
student
Samarkand State Medical University
Baxtiyorova O. B.
student
Samarkand State Medical University
Rajabova D. R.
student
Samarkand State Medical University
Kabulova S. K.
student
Samarkand State Medical University

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN MEDICAL DIAGNOSTICS

Abstract: *The rapid integration of information and communication technologies (ICT) into modern medicine has transformed diagnostic processes, enabling faster, more accurate, and more cost-effective identification of diseases. Digital imaging systems, telemedicine platforms, artificial intelligence–based diagnostic tools, and cloud-based data storage have significantly improved the quality and accessibility of diagnostic services. This article explores the fundamental role of ICT in medical diagnostics, examining how digital solutions contribute to early disease detection, clinical decision support, and patient management. The study highlights the advantages, challenges, and future prospects of adopting ICT-driven diagnostic technologies in healthcare systems.*

Keywords: *ICT, medical diagnostics, digital imaging, telemedicine, artificial intelligence, clinical decision support, health information systems.*

Introduction

The evolution of medical diagnostics has been strongly influenced by advances in information and communication technologies, which have facilitated a shift from traditional manual methods toward highly automated, data-driven, and interconnected diagnostic systems. Diagnostic accuracy and speed are crucial determinants of treatment success, patient prognosis, and healthcare efficiency. ICT solutions—ranging from electronic health records to advanced digital imaging software—have become central components of the modern diagnostic ecosystem. They allow clinicians to access patient histories instantly, compare digital images across time, evaluate laboratory data using automated algorithms, and conduct remote consultations when in-person visits are not possible.

The increasing availability of high-performance computing, cloud storage, and machine learning algorithms has further expanded the diagnostic potential of ICT. These technologies support real-time analysis of complex datasets such as radiographs, MRI scans, biosignals, and genomic sequences. Moreover, telemedicine platforms have emerged as critical tools for delivering diagnostic services to rural, remote, and underserved areas, ensuring that patients receive timely evaluations regardless of geographic constraints. As global healthcare challenges grow in complexity, ICT offers powerful solutions to enhance diagnostic precision, reduce medical errors, and support personalized medicine approaches.

Discussion

ICT plays a multifaceted role in improving medical diagnostics by enhancing data accessibility, analytical capacity, and clinical collaboration. Digital imaging technologies such as PACS (Picture Archiving and Communication Systems) have replaced conventional film-based imaging, enabling clinicians to store, retrieve, and analyze high-resolution images quickly. These systems often integrate with artificial intelligence tools capable of identifying subtle abnormalities that may not be easily detected by the human eye, such as early-stage tumors, microcalcifications, or atypical cardiac rhythms.

Telemedicine platforms provide another significant contribution by facilitating remote diagnostic evaluations. Physicians can assess symptoms, review diagnostic images, and recommend treatments without requiring patients to travel long distances. This has proven especially valuable during public health emergencies and in regions with limited access to medical specialists. ICT-based laboratory information systems further streamline diagnostic workflows by automating sample tracking, reducing errors in test reporting, and providing clinicians with instant access to laboratory results.

Artificial intelligence and machine learning have become powerful engines of diagnostic innovation. Algorithms trained on large datasets can perform differential diagnosis, detect disease patterns, and even predict future health risks based on historical data. These technologies improve diagnostic accuracy and serve as decision-support tools that assist clinicians in making evidence-based conclusions. Cloud technologies enhance this process by allowing vast amounts of diagnostic information to be stored securely and shared across multiple healthcare institutions, promoting collaboration and accelerating clinical research.

Despite these benefits, ICT adoption also presents challenges, including concerns about data security, the risk of diagnostic overreliance on automated systems, and the need for continuous training of healthcare professionals. Nevertheless, the advantages of ICT in diagnostics far outweigh the obstacles, making it an indispensable component of modern healthcare.

Conclusion

The integration of information and communication technologies into medical diagnostics represents one of the most transformative shifts in contemporary healthcare. ICT solutions not only improve diagnostic accuracy but

also redefine how clinicians interact with medical data, collaborate across institutions, and deliver patient-centered care. The ability to store and analyze vast amounts of clinical information, combined with advanced visualization and artificial intelligence tools, has fundamentally changed the diagnostic landscape, enabling earlier disease detection, more precise interpretation of medical images, and faster clinical decision-making.

Telemedicine and digital platforms have played an especially crucial role in extending diagnostic services to underserved populations, creating new opportunities for equitable access to healthcare. These systems have improved continuity of care by ensuring that diagnostic data remain available across different levels of the healthcare system. Furthermore, cloud technologies have revolutionized data sharing and interdisciplinary collaboration, allowing specialists from various regions and even countries to participate in diagnosis, thus enriching clinical expertise and improving the quality of medical assessments.

The growing presence of AI-driven decision-support systems has opened new pathways for predictive and personalized diagnostics. Machine learning algorithms can detect patterns that are invisible to human observers, identify high-risk patients, and support early interventions that significantly improve treatment outcomes. As these technologies continue to evolve, they will increasingly support clinicians in managing complex diagnostic tasks, reducing workload, and minimizing the likelihood of human error.

However, the benefits of ICT must be accompanied by strong data protection policies, ethical safeguards, and continuous training for medical personnel. Ensuring cyber-secure, interoperable, and user-friendly ICT systems is essential for maintaining patient trust and enabling smooth adoption within healthcare institutions. Additionally, the development of clear regulatory frameworks will help balance innovation with safety.

In summary, ICT has become a cornerstone of modern medical diagnostics, driving innovation across clinical imaging, laboratory analysis, remote consultations, and predictive modeling. Its continued advancement will be vital for addressing future healthcare challenges, fostering precision medicine, and achieving higher standards of diagnostic care globally. As healthcare systems increasingly transition toward digital and data-driven models, the strategic implementation of ICT will determine their effectiveness, resilience, and ability to meet the growing demands of modern medicine.

References:

1. Abreu, P. H., & Santos, J. (2021). Artificial intelligence in medical imaging diagnostics: Current trends and future perspectives. Computers in Biology and Medicine, 137, 104836.
2. Bashshur, R., Shannon, G., Bashshur, N., & Yellowlees, P. (2016). The empirical foundations of telemedicine interventions for chronic disease management. Telemedicine and e-Health, 22(5), 342–375.

3. Chen, M., Hao, Y., & Wang, L. (2018). Disease diagnosis and classification using machine learning and artificial intelligence approaches. IEEE Access, 6, 33742–33756.
4. Ne’matov, N., & Ne’matova, N. (2022). OLIY TA’LIM TIZIMI TALABALARIGA O’ZBEK TILINI O’QITISHDA AXBOROT TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Karshiyeva F. Z.
assistant
Samarkand State Medical University
Tursunov A. J.
student
Samarkand State Medical University
Aslonov J. O.
student
Samarkand State Medical University
Abdinazarov E. S.
student
Samarkand State Medical University
Kalbaeva X. K.
student
Samarkand State Medical University

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE DEVELOPMENT OF MEDICAL SERVICE INFRASTRUCTURE

Abstract: *Information and communication technologies (ICT) have become a vital component of modern healthcare infrastructure, significantly contributing to the efficiency, accessibility, and sustainability of medical services. The integration of digital tools into healthcare systems enhances patient management, streamlines information exchange, optimizes clinical workflows, and facilitates data-driven decision-making. This paper examines the role of ICT in the development of medical service infrastructure, emphasizing how digital platforms, electronic health records, telemedicine, and automated management systems contribute to improved service delivery. The study also highlights the challenges and opportunities associated with implementing ICT-based solutions in healthcare institutions.*

Keywords: *ICT, healthcare infrastructure, digital health, medical services, telemedicine, EHR systems, health informatics, clinical workflow optimization.*

Introduction

The transformation of healthcare systems in recent decades has been profoundly shaped by the widespread adoption of information and communication technologies. As global healthcare needs expand and demands for higher-quality services increase, medical institutions must rely on efficient, scalable, and integrated infrastructures. ICT plays a central role in addressing these demands by enabling advanced communication channels, digital storage solutions, automated clinical processes, and real-time data exchange. In many modern health systems, ICT serves as the backbone for managing patient information, coordinating clinical services, and improving collaboration among healthcare professionals.

Electronic health records (EHRs), telemedicine platforms, mobile health applications, digital diagnostic tools, and hospital information systems have reshaped how healthcare is delivered. These technologies enhance transparency, reduce administrative burdens, and support continuity of care. Furthermore, ICT contributes to the development of medical infrastructure by improving resource allocation, ensuring timely access to critical information, and enabling remote monitoring and consultation services. As healthcare institutions transition toward data-driven models, understanding the role of ICT in building robust and efficient service infrastructure becomes increasingly important. This article explores the contributions of ICT to healthcare development and evaluates its impact on the quality and accessibility of medical services.

Discussion

The implementation of ICT in medical service infrastructure offers numerous advantages that contribute to overall system improvement. One of the most significant benefits is enhanced communication within and between healthcare organizations. Digital communication platforms facilitate the rapid exchange of patient data, consultation reports, laboratory results, and imaging files, which reduces delays in diagnosis and treatment. Additionally, integrated hospital information systems ensure that clinical departments operate in a coordinated manner, minimizing duplication of services and improving workflow efficiency.

Electronic health records play a key role in centralizing patient information, ensuring that clinicians have immediate access to accurate and up-to-date data. This improves clinical decision-making and reduces medical errors. Telemedicine services further expand the accessibility of healthcare by enabling remote consultations, follow-up visits, and specialized care for patients living in rural or underserved regions. During public health emergencies, such as pandemics, telemedicine becomes an essential part of maintaining uninterrupted medical service delivery.

ICT also strengthens medical infrastructure by supporting resource management and administrative functions. Automated scheduling systems, digital inventory management, and clinical decision-support tools reduce operational costs and optimize staff workloads. Data analytics platforms contribute to public health planning by identifying disease trends, predicting medical resource needs, and supporting population health management.

Despite its benefits, the integration of ICT into healthcare infrastructure faces several challenges. These include cybersecurity risks, the need for reliable internet connectivity, limited digital literacy among staff, and high initial investment costs. Nonetheless, ongoing advancements in digital technologies provide promising opportunities for further enhancing healthcare delivery, especially through artificial intelligence, mobile health platforms, and cloud-based system integration.

Conclusion

The integration of information and communication technologies into medical service infrastructure represents a transformative force that is reshaping the structure, efficiency, and sustainability of modern healthcare systems. ICT enables healthcare organizations to evolve from traditional, paper-based, fragmented workflows into interconnected, data-driven, and patient-centered service models. By improving communication channels, supporting real-time data access, and automating administrative and clinical processes, ICT significantly enhances the operational capacity of healthcare institutions.

One of the most notable outcomes of ICT adoption is the improvement in service accessibility. Telemedicine platforms, mobile health applications, and remote monitoring systems reduce geographic barriers, allowing patients in rural, mountainous, or underserved regions to receive timely consultations and diagnostic evaluations. This contributes to greater equity in healthcare provision and helps reduce the burden on overcrowded medical facilities. Additionally, by facilitating continuous patient monitoring and follow-up care, ICT-based solutions help prevent complications, reduce hospital readmissions, and support chronic disease management.

ICT also plays a crucial role in increasing transparency and quality of healthcare services. Electronic health records ensure that clinicians have a comprehensive and longitudinal view of patient health, which enhances diagnostic accuracy and supports evidence-based decision-making. Integrated hospital information systems reduce medical errors, minimize duplication of tests, and enable seamless coordination across departments such as laboratories, radiology units, and emergency services. This creates a more efficient workflow environment, ultimately improving patient outcomes and reducing healthcare costs.

Furthermore, the adoption of ICT strengthens strategic management and long-term planning within healthcare institutions. Data analytics platforms allow administrators to monitor service performance, predict patient flow, optimize resource allocation, and identify emerging public health trends. Such capabilities are essential for developing resilient healthcare systems capable of responding effectively to crises such as pandemics or natural disasters.

However, the successful implementation of ICT requires overcoming several challenges, including cybersecurity risks, digital inequality, system interoperability issues, and the need for continuous professional training. Addressing these challenges necessitates strong institutional leadership, well-designed regulatory frameworks, and sustained investment in digital infrastructure.

In conclusion, ICT serves as a foundational pillar in the development of modern medical service infrastructure. Its ability to enhance service delivery, support clinical excellence, and enable strategic health system management makes it indispensable in shaping the future of healthcare. As digital technologies continue to evolve—particularly in the fields of artificial intelligence, cloud

computing, and mobile health—healthcare systems that effectively integrate ICT will be better positioned to provide high-quality, efficient, and equitable services to populations worldwide. The long-term sustainability and competitiveness of medical institutions will increasingly depend on their capacity to leverage ICT not just as a tool, but as a core component of their organizational strategy.

References:

1. Agarwal, R., Gao, G., DesRoches, C., & Jha, A. K. (2010). The digital transformation of healthcare: Current status and the road ahead. Information Systems Research, 21(4), 796–809.
2. Alotaibi, Y. K., & Federico, F. (2017). The impact of health information technology on patient safety. Saudi Medical Journal, 38(12), 1173–1180.
3. Bashshur, R., Shannon, G., Bashshur, N., & Yellowlees, P. (2016). The empirical foundations of telemedicine interventions for chronic disease management. Telemedicine and e-Health, 22(5), 342–375.
4. Ne’matov, N., & Ne’matova, N. (2022). OLIY TA’LIM TIZIMI TALABALARIGA O’ZBEK TILINI O’QITISHDA AXBOROT TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Khidirov Z. E.
assistant
department of human anatomy
Samarkand State Medical University
Samarkand, Uzbekistan

ON THE ROLE OF AFFERENT NEURON IN MAINTAINING STRUCTURAL INTEGRITY AND ADEQUATE DIFFERENTIATION OF TISSUE

Abstract: *The article studies the dynamics of changes in the activity of nonspecific esterase in large and small alveolar cells of differentiated cat lung. Sensory denervation of the lungs in mammals was achieved by bilateral extirpation of the corresponding spinal nodes, as well as by removing the vagus nerve. Sensory denervation of the lungs causes the appearance of a complex of typical changes in its tissues.*

Keywords: *dogs, cats, rabbits, rats, cells, nucleus, denervation, differentiation, tissue, lungs.*

Introduction

Literature data indicate that the appearance of giant cells is characteristic of various types of poorly differentiated tissues [1,5,6]. Chronic inflammatory processes in the human lungs, refractory to antibiotic therapy, may in some cases be the result of a pathological process caused by impaired nerve conduction [4,2,7]. Morphological changes in tissues after deafferentation are the end result of destructive lesions, the origin of which lies in metabolic disturbances. Changes in metabolic processes in denervated tissues have been studied by many researchers [3,8,9].

Purpose of the study

To investigate the role of afferent neurons in maintaining the structural integrity and adequate tissue differentiation.

Materials and methods

Dogs, cats, rabbits, and rats served as experimental animals. Lung tissue served as the subject of the study. Sensory denervation of the lungs in mammals was achieved by bilateral extirpation of the corresponding spinal ganglia, as well as by removal of the vagus nerve. Both standard hematoxylin and eosin staining methods, such as the Vanison method, and specialized neurohistological methods, such as the Bilshovsky-Gross method modified by Lavrentiev, were used.

Study results

The data obtained indicate the occurrence of similar changes in the lung tissue of experimental animals of this class after both types of surgery. Microscopic changes in differentiated lung tissue are similar in all types of experimental animals. They are characterized primarily by severe vasomotor disturbances. All layers of the vascular wall exhibit a number of morphological

changes. Endothelial cells appear swollen and hypertrophied. Smooth muscle cell nuclei often become elongated, constricted, and tortuous. Exudation of the liquid portion of the blood from the vessels leads to pulmonary edema. Exudative phenomena are most pronounced in rodents. One of the characteristic features of deafferentation changes in all experimental animals is the penetration of polynuclear cells from dilated vessels into the tissue, forming massive leukocyte infiltrations in various areas of the lung. The greatest intensity of this phenomenon is observed 10-12 days after surgery. Despite a subsequent decrease in infiltration, it remains pronounced at all subsequent observation periods. Leukocyte infiltration of lung tissue is most intense in rodents and cats. The lymphoid nature of filtration is clearly one of the reasons for the moderate Ron tissue filtration by pseudoeosinophilic leukocytes in representatives of this class of animals. It should be noted that during organ deafferentation, despite the dilation of vascular lumen, researchers have never observed pronounced edema or tissue infiltration by leukocytes. Obviously, factors somehow related to the specific trophic function of various types of nerve fibers play a role in this process. Against the background of vascular disorders, edema, and tissue infiltration by polymorphonuclear leukocytes, a number of signs indicating a disruption of the normal structure of lung tissue components appear. By the end of the first week after deafferentation, the bronchial lumen, especially the small ones, is filled with mucus containing leukocytes, macrophages, and cells of desquamated epithelium. In some areas of the bronchial epithelium, a transition from multi-row to single-row is observed. In other cases, bronchial epithelial cell proliferation is visible. Goblet cells hypertrophy, and their numbers increase sharply. Bronchial glands are characterized by a decrease in secretion. Proliferating glandular cells can completely or partially obstruct the gland lumen. In the lungs of rodents and birds, this phenomenon occurs earlier and is more pronounced than in dogs and cats. The main elements of lymphoid clusters are lymphocytes and reticular cells of varying degrees of maturity. The latter vary greatly in size, and their cytoplasm becomes more basophilic. A sharp increase in the number of mitoses in reticular cells is noted. Both in the area of lymphoid clusters and in other areas of the lung parenchyma, the number of plasma and mast cells increases significantly. The appearance of giant cells in the tissue is characteristic of deafferentation changes. Giant cells are rare in intact mammalian lungs. We have never encountered them in the lungs of unoperated animals of other classes. Giant cells with several peripherally located small nuclei are also observed in rodents. Along with parenchymal changes, certain abnormalities are also observed in the stroma of differentiated lungs. Fibroplastic cells become polymorphic, their nuclei vary in size, and the nucleoli become larger. Changes in the fibrous structures of the perivascular, peribronchial, and septal connective tissue can be destructive or formative. In some cases, fragmentation of some collagen fibers is observed. Destructive changes in the elastic fibers occur later and consist of a loss of their tortuous shape, sometimes with clumpy disintegration. Long-term observations reveal a slight decrease in the intensity of deafferentation changes. The observed

morphological changes in the tissues of differentiated lungs indicate the appearance of signs indicating a loss of the high specificity of the tissue elements. Numerous studies show that when poorly differentiated cells appear, they also exhibit an increase in the nuclear-to-plasma ratio. This increase in the nuclear-to-plasma ratio during cell differentiation is associated with the loss of specialization and the primary function of autonomic function. Analyzing cytophysiological data from tissue cells deprived of sensory innervation suggests a shortened latency period and increased proliferative and mitotic activity.

Conclusion

Thus, the occurrence of similar changes in lung tissue after sensory denervation in animals of various species, families, and classes demonstrates the important role and pivotal significance of the sensory neuron in maintaining the structural integrity and adequate differentiation of the areas of the body it innervates. The most significant characteristic of deafferentation changes is the acquisition of a poorly differentiated character by cellular elements and the loss of their high morphofunctional specificity.

References:

1. Ахмедова, С. М., Коржавов, Ш. О., Маматалиев, А. Р., Миразимова, И. Б., & Рузиева, Н. Д. (2020). Антропометрические показатели физического развития у детей до 5 лет в самаркандской области. In SCIENTIFIC RESEARCH IN XXI CENTURY (pp. 250-258).
2. Паязов Ш. Н. ГИСТОЛОГИЧЕСКАЯ СТРУКТУРА ПЕЧЕНИ БЕЛЫХ БЕЗПОРОДНЫХ КРЫС //Экономика и социум. – 2024. – №. 11-1 (126). – С. 1286-1290.
3. Mamataliyev A. R. HISTOTOPOGRAPHY OF THE PROSTATE GLAND IN THE RABBIT //Экономика и социум. – 2025. – №. 2-1 (129). – С. 319-321.
4. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 3(02), 22-27.
5. Sadinovich U. S., Erkinovich K. Z., Abdurafikovich D. H. Study Of The Morphometric Indicators Of The Liver Of Album Rats Under The Effect Of 3 Different Anti-Inflammatory Medicines In Polyprogramsis //Central Asian Journal of Medical and Natural Science. – 2023. – Т. 4. – №. 6. – С. 450-455.
6. MAMATALIYEV A. R. AGE-RELATED MORPHOLOGICAL CHANGES IN THE NERVE STRUCTURES OF THE APPENDIX IN RABBITS //ЭКОНОМИКА. – С. 199-201.
7. Mamataliyev A. R. QUYONLARDA CHUVALCHANGSIMON OSIMTASI NERV TUZILMALARINING YOSHGA BOGLIQ MORFOLOGIK OZGARISHLARI //Экономика и социум. – 2025. – №. 3-1 (130). – С. 199-201.
8. Хидиров З. Э. ОҚ ЗОТСИЗ КАЛАМУШЛАР ЖИГАРИНИНГ МЕЪЁРДАГИ МАКРОСКОПИК ВА ГИСТОЛОГИК ПАРАМЕТРЛАРИ //YANGI O ‘ZBEKISTON, YANGI TADQIQOTLAR JURNALI. – 2024. – Т. 1. – №. 3. – С. 194-205.

9. Паязов Ш. Н. ИССЛЕДОВАНИЕ МОРФОМЕТРИЧЕСКИХ ПОКАЗАТЕЛЕЙ ПЕЧЕНИ БЕЛЫХ БЕЗПОРОДНЫХ КРЫС ПОД ВОЗДЕЙСТВИЕМ ПРОТИВОВОСПАЛИТЕЛЬНЫХ СРЕДСТВ ПАРАЦЕТАМОЛА, АСПИРИНА И ИБУПРОФЕНА ПРИ ПОЛИПРОГМАЗИИ //Экономика и социум. – 2024. – №. 11-1 (126). – С. 1275-1279.

Khidirov Z. E.
assistant
department of human anatomy
Samarkand State Medical University
Samarkand, Uzbekistan

RECONSTRUCTION OF THE VENOUS BED OF THE RABBIT'S PELVIC LIMBS WHEN CREATING REDUCED CIRCULATION

Abstract: *The article studies the reorganization of the venous bed of the rabbit's pelvic limbs when creating reduced circulation. When creating reduced circulation, there is a significant reorganization of the venous bed of the operated limb, expressed in the formation of both bypass muscle pathways and the development of direct anastomoses.*

Key words: *rabbit, venous vessel, arterial bed, venous bed, thigh, venography, anatomical preparation.*

Introduction

While numerous domestic and international researchers have studied the dynamics of arterial remodeling during this surgical procedure, little attention has been paid to the study of venous remodeling [1.2]. The literature contains a number of indications of significant differences in the physiological responses of blood vessels in the pulmonary and systemic circulations [5.6]. The strength of the saphenous vein ensures the resistance of the venous wall to increasing intraluminal pressure and its resistance to intramural injury [3,4]. The elastic properties of the venous wall characterize the ability of the saphenous vein to recover from deformation, namely, to maintain its structure even under new hemodynamic conditions [7,8,9]. Therefore, we studied the state of the venous bed during the creation of reduced blood flow.

Purpose of the study

To experimentally study the remodeling of the venous bed of the rabbit pelvic limbs during the creation of reduced blood flow.

Materials and methods

The experiment was conducted on 32 rabbits of both sexes weighing 2–2.5 kg. Fragments of the femoral, sciatic, and deep femoral veins, as well as the femoral artery above the origin of the deep femoral artery, were resected on the right limb. Observation periods ranged from 1 to 90 days. The venous system was examined using intracalcaneal venography and anatomical dissection.

Results of the study

Analysis of the obtained data showed that during the first week, a dense network of small venous vessels is detected in all organs of the operated limb. The anterior femoral vein dilates and the number of its tributaries increases. Small venous vessels connect the distal ends of the resected veins with the external vein surrounding the thigh, the caudal vein and the distal section of the deep femoral

vein. The number of small vessels of the skin and fascia increases and their main vessels dilate. After 15-30 days, the number of small veins decreases slightly, individual veins dilate, connecting the distal sections of the femoral and sciatic veins with the distal section of the deep femoral vein, the sciatic vein with the caudal vein; the femoral vein with the internal iliac; The distal segment of the deep vein connects with the external circumflex femoral vein, the proximal segment of the sciatic vein, and the internal iliac vein. The veins of the skin and fascia remain dilated.

Subsequently (45-60 days), against a background of decreasing number of small veins, individual dilated venous vessels are visible, the direction and topography of which corresponds to those described in the previous period. Anastomoses are revealed between the resected segments of the sciatic and deep femoral veins. Concurrently, dilated cutaneous veins are observed.

After 75-90 days, we observed the development of collaterals and anastomoses, the topography of which can be represented as follows: bypass routes connecting the distal segment of the femoral vein with the deep femoral vein and the internal iliac vein pass through the anterior and adductor muscle groups. Thus, when creating reduced blood flow, significant restructuring of the venous bed of the operated limb occurs, manifested by the formation of both bypass muscular pathways and the development of direct anastomoses. The distal segment of the sciatic vein is connected by collaterals running in the posterior and medial muscle groups with the deep femoral vein, the caudal vein, and the internal iliac vein. Outflow from the distal segment of the deep femoral vein occurs through vessels running in the anterior and posterior muscle groups. The former connects it with the external vein surrounding the thigh, while the latter connects it with the proximal segment of the sciatic vein and the internal iliac vein. Furthermore, an anastomosis is identified connecting the distal and proximal segments of the sciatic vein.

Conclusion

Development of these vessels occurs within 2-3 months after surgery. Compensatory restructuring of the vascular bed with reduced blood circulation apparently ensures normal blood circulation, since we did not observe any pathological phenomena in the operated limb.

References:

1. Ахмедова, С. М., Коржавов, Ш. О., Маматалиев, А. Р., Миразимова, И. Б., & Рузиева, Н. Д. (2020). Антропометрические показатели физического развития у детей до 5 лет в самаркандской области. In SCIENTIFIC RESEARCH IN XXI CENTURY (pp. 250-258).
2. Паязов Ш. Н. ГИСТОЛОГИЧЕСКАЯ СТРУКТУРА ПЕЧЕНИ БЕЛЫХ БЕЗПОРОДНЫХ КРЫС //Экономика и социум. – 2024. – №. 11-1 (126). – С. 1286-1290.
3. Mamataliyev A. R. HISTOTOPOGRAPHY OF THE PROSTATE GLAND IN THE RABBIT //Экономика и социум. – 2025. – №. 2-1 (129). – С. 319-321.

4. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 3(02), 22-27.
5. Sadinovich U. S., Erkinovich K. Z., Abdurafikovich D. H. Study Of The Morphometric Indicators Of The Liver Of Album Rats Under The Effect Of 3 Different Anti-Inflammatory Medicines In Polyprogramsis //Central Asian Journal of Medical and Natural Science. – 2023. – Т. 4. – №. 6. – С. 450-455.
6. MAMATALIYEV A. R. AGE-RELATED MORPHOLOGICAL CHANGES IN THE NERVE STRUCTURES OF THE APPENDIX IN RABBITS //ЭКОНОМИКА. – С. 199-201.
7. Mamataliyev A. R. QUYONLARDA CHUVALCHANGSIMON OSIMTASI NERV TUZILMALARINING YOSHGA BOGLIQ MORFOLOGIK OZGARISHLARI //Экономика и социум. – 2025. – №. 3-1 (130). – С. 199-201.
8. Хидиров З. Э. ОҚ ЗОТСИЗ КАЛАМУШЛАР ЖИГАРИНИНГ МЕЪЁРДАГИ МАКРОСКОПИК ВА ГИСТОЛОГИК ПАРАМЕТРЛАРИ //YANGI O ‘ZBEKISTON, YANGI TADQIQOTLAR JURNALI. – 2024. – Т. 1. – №. 3. – С. 194-205.
9. Паязов Ш. Н. ИССЛЕДОВАНИЕ МОРФОМЕТРИЧЕСКИХ ПОКАЗАТЕЛЕЙ ПЕЧЕНИ БЕЛЫХ БЕЗПОРОДНЫХ КРЫС ПОД ВОЗДЕЙСТВИЕМ ПРОТИВОВОСПАЛИТЕЛЬНЫХ СРЕДСТВ ПАРАЦЕТАМОЛА, АСПИРИНА И ИБУПРОФЕНА ПРИ ПОЛИПРОГМАЗИИ //Экономика и социум. – 2024. – №. 11-1 (126). – С. 1275-1279.

Khodjaeva N. T.
teacher
english language and literature department
Termez State University

COMMUNICATIVE APPROACH: FACTORS OF EFFECTIVENESS IN LANGUAGE TEACHING

Abstract. *The communicative approach has become one of the most influential methodologies in modern language teaching due to its emphasis on meaningful interaction and real-life communication. This article examines the key factors that determine the effectiveness of the communicative approach in developing learners' language competence. Drawing on linguistic, pedagogical, and psychological perspectives, the study analyzes the role of communicative competence, learner-centered instruction, interaction patterns, authenticity of materials, and the teacher's facilitative role.*

Keywords: *communicative approach, language teaching, communicative competence, interaction, learner-centered learning.*

Introduction

The increasing need for effective communication in a globalized world has led to a shift in language teaching methodologies from form-focused instruction to meaning-oriented approaches. Among these, the communicative approach has gained prominence as it prioritizes the functional use of language in real-life situations. Unlike traditional methods that emphasize grammatical accuracy in isolation, the communicative approach views language primarily as a tool for interaction and social exchange.

Despite its widespread adoption, the effectiveness of the communicative approach depends on a range of pedagogical and contextual factors. Understanding these factors is essential for optimizing teaching practices and achieving desired learning outcomes. This article aims to analyze the main factors that influence the effectiveness of the communicative approach in language teaching.

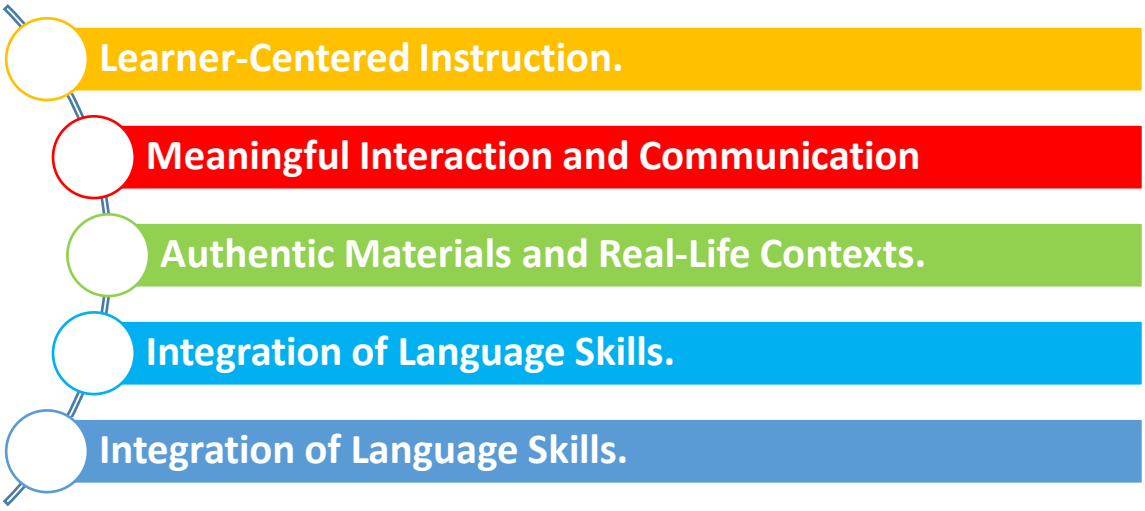
Main part

The communicative approach is grounded in the concept of communicative competence, which extends beyond grammatical knowledge to include sociolinguistic, discourse, and strategic competencies. This theoretical framework emphasizes the ability to use language appropriately in different social contexts and for various communicative purposes.

From a pedagogical perspective, the communicative approach is closely linked to constructivist and interactionist theories of language learning. These theories highlight the importance of active learner participation, meaningful input, and interaction in the process of language acquisition. Language learning is

viewed as a dynamic process that develops through communication rather than through rote memorization.

Key factors of effectiveness in communicative language teaching



Learner-Centered Instruction

One of the primary factors contributing to the effectiveness of the communicative approach is its learner-centered nature. Learners are actively involved in the learning process, participating in discussions, role plays, problem-solving tasks, and collaborative activities. This active engagement increases motivation and creates opportunities for meaningful language use.

Meaningful Interaction and Communication

Effective communicative language teaching relies on frequent and purposeful interaction. Pair and group work, information-gap activities, and communicative tasks encourage learners to negotiate meaning, express ideas, and respond to others. Such interaction supports the development of fluency and pragmatic competence.

Authentic Materials and Real-Life Contexts

The use of authentic materials, such as newspapers, videos, interviews, and real-world scenarios, enhances the relevance of language learning. Authenticity exposes learners to natural language use and helps bridge the gap between classroom learning and real-life communication. This factor significantly increases the practical value of language instruction.

Integration of Language Skills

The communicative approach promotes the integrated development of listening, speaking, reading, and writing skills. Communicative tasks often require learners to combine multiple skills simultaneously, reflecting real communicative situations. This integration contributes to a more holistic development of language competence.

The Role of the Teacher

In the communicative classroom, the teacher acts primarily as a facilitator, organizer, and guide. Rather than dominating classroom discourse, the teacher

creates communicative opportunities, provides feedback, and supports learners' language development. Effective teacher facilitation is essential for maintaining a balance between fluency and accuracy.

Despite its advantages, the communicative approach faces several challenges. Large class sizes, limited instructional time, exam-oriented curricula, and insufficient teacher training may hinder effective implementation. Additionally, learners with low proficiency levels may experience difficulties participating in communicative activities without adequate scaffolding.

To address these challenges, teachers should adapt communicative techniques to their specific teaching contexts, gradually increasing task complexity and providing linguistic support. Assessment practices should also align with communicative objectives, focusing on functional language use rather than solely on grammatical accuracy.

Conclusion

The communicative approach remains a highly effective methodology in language teaching when supported by appropriate pedagogical conditions. Its effectiveness depends on factors such as learner-centered instruction, meaningful interaction, authenticity, skill integration, and the teacher's facilitative role. By addressing contextual challenges and implementing communicative principles thoughtfully, educators can enhance learners' communicative competence and prepare them for successful real-world language use. Future research should focus on empirical studies examining the interaction between these factors across diverse educational settings.

Reference:

1. Akhmedova, K. T., & Fatullaev, S. F. (2024). CASE STUDIES AND BEST PRACTICES IN DEVELOPING COMMUNICATIVE COMPETENCE IN ECONOMICS STUDENTS. Экономика и социум, (12-2 (127)), 83-85.
2. Fakhriddinovna, K. B. (2019). THE USE OF INTERACTIVE METHODS FOR TEACHING ENGLISH LANGUAGE THE AGES OF 5-6. European Journal of Research and Reflection in Educational Sciences, 7.
3. Khodjaeva, N. T. (2019). Some Peculiarities And The Ways Of Giving Instructions On Reading Tests. International Journal of Research, 499-505.
4. Khodjaeva, N. T. (2020). Modifying materials on listening comprehension. Актуальные научные исследования в современном мире, (11-12), 28-31.
5. Ходжаева, Н. Т. (2018). УЛУЧШЕНИЕ ПИСЬМЕННЫХ НАВЫКОВ НА АНГЛИЙСКОМ ЯЗЫКЕ. Гуманитарный трактат, (38), 6-7.

Khodjaeva S. A.
assistant
department of phthisiology and pulmonology
Samarkand State Medical University
Samarkand, Uzbekistan
https://orcid.org/ 0000-0002-4181-8664

ADJUSTABLE DETERMINANTS OF PERINATAL CENTRAL NERVOUS SYSTEM DAMAGE IN NEWBORNS IN CONTEMPORARY SETTINGS

Abstract: Relevance. *In recent years, the problem of perinatal central nervous system hypoxia has become particularly relevant.* ***Purpose:*** *to determine the prognostic role of some risk factors for hypoxic encephalopathy in newborns in the Samarkand region.* ***Materials and methods:*** *80 newborns with moderate and severe perinatal CNS damage were examined: The first group consisted of 40 newborns with moderate perinatal CNS damage of hypoxic origin; the second group consisted of 40 newborns suffering from a similar pathology of a severe form. The control group of our study included 30 healthy newborns. General clinical examination of patients included: detailed collection and analysis of anamnestic data (obstetric assessment of the course of the ante-, intra- and perinatal periods).* ***Results:*** *our analysis of relative risk indicators (RR) in newborns of the main and control groups allows us to conclude that the modifying risk factors for moderate-severity perinatal encephalopathy are multiple abortion risks during this pregnancy, preeclampsia, moderate-severity anemia, acute laryngitis, and urogenital tract pathology. Modifying factors of severe perinatal hypoxic encephalopathy are the presence of stillborn children in the woman's history, the father's smoking, the mother's excess weight and obesity, the presence of chronic infection foci in the body, and infectious bacterial pathology.*

Key words: *newborns, risk factors, perinatal encephalopathy, relative risk, reliability*

Relevance

From today's perspective, perinatal encephalopathy of hypoxic origin in newborns is becoming particularly relevant in neonatology, which, in turn, leads to severe clinical complications and disability in adulthood.

Purpose: to identify and establish the significance of some modifying factors of brain damage of a hypoxic nature in newborns under current conditions.

Materials and methods

We conducted a study of the anamnesis, clinical, instrumental, and laboratory data of 80 newborns with perinatal CNS damage, who were in the neonatal pathology department and the intensive care unit of the newborns' intensive care unit of the Children's Multidisciplinary Medical Center of the city of Samarkand in 2022-2024. The patients were divided into II groups: group I consisted of 40 newborns with moderate-degree hypoxic perinatal encephalopathy.

The II group of patients consisted of 40 newborns with a similar pathology, but with a severe degree. The control group of our study included 30 healthy newborns. Undefined social risk factors (mother's health status and obstetric history, etc.), gender, age, and clinical parameters were analyzed. During the clinical examination of women, the anamnesis was analyzed (obstetrical in the woman, ante-, intra- and perinatal period of the child). A detailed assessment of the parents' social status, the presence of comorbidities in them, the duration from the onset of symptoms to the time of medical appeal, the date and time of hospitalization, and the localization of patients' medical appeals were provided. In the anamnesis data, the features of the mother's nutritional behavior during this pregnancy, the type of feeding of the child during the newborn period, are reflected in detail. Further, the data we collected were entered into a computer database with subsequent statistical processing. Further, the analysis was conducted using the "Statistica 6.0" statistical software package, calculating the arithmetic mean (M), the error of the arithmetic mean (m), and Student's t-test (t). At $p<0.05$, the results were considered statistically significant.

Results and their discussion. Our research was aimed at analyzing modifying risk factors when applying the method of calculating relative risk with a 95% confidence interval. Our results are shown below:

Table 1

Antenatal modifying factors in group I of newborns

Predictors	Group I (n=40)		Control group (n=30)		P	RR	DI min	DI max
	abs.	%	abs.	%				
Stillbirths	4	10	1	3.3	>0.5	1,444	0.885	2,257
Miscarriages	3	7.5	1	3.3	>0.5	1,338	0.731	2,449
Abortions	9	22.5	1	3.3	<0.05	1,742	1,265	2,400
Risk of abortion	15	37.5	4	13.3	<0.05	1,611	1,120	2,317
Induced pregnancy	4	10.0	2	6.7	>0.5	1,185	0.647	2,172
Multiple pregnancies	2	5.0	1	3.3	>0.5	1.175	0.514	2.688
Severe toxicosis	11	27.5	2	6.7	<0.05	1.663	1.178	2.348
Fetal hypoxia	18	45.0	2	6.7	<0.05	2.045	1.448	2.889
Stress during pregnancy	20	50	10	33.3	>0.5	1.333	0.894	1.989

Note: *p – statistical significance, RR-relative risk*

In group I of newborns, factors such as previous abortions, RR 1742 (1.265; 2 400), repeated threat of termination of pregnancy PP 1 611 (1 120; 2.317), preeclampsia PP 1.633 (1.178; 2.384), fetal hypoxia during pregnancy PP 2.045 (1.448; 2.889). undefined Thus, these factors can be called modifying factors for the formation of moderate encephalopathy caused by hypoxia in the perinatal period of life (Table 1).

In the II group of newborns, factors such as stillbirths in the mother's anamnesis, RR 1,524 (1,000; 2,323), repeated abortions in the mother RR 1,833

(1,346; 2,497), repeated episodes of threatened abortion of this pregnancy RR 1,917 (1,317; 2789), severe toxicosis RR 1,817 (1,303; 2,536). Factors such as fetal hypoxia in the antenatal period of RR 6,243 (2,774; 14,049) and maternal stress during pregnancy of RR 2,250 (1,315; 3,849) represented the highest risk for developing severe perinatal encephalopathy (Table 2).

Table 2

Antenatal modifying factors in group II of newborns

Predictors	Group I (n=40)		Control group (n=30)		P	RR	DI min	DI max
	abs.	%	abs.	%				
Stillbirth	6	15,0	2	6,6	>0.5	1,647	1,000	2,438
Miscarriages	3	7.5	1	3.3	>0.5	1,338	0.731	2,449
Abortions	11	27.5	1	3.3	<0.05	1,833	1,346	2,497
Risk of abortion	20	50.0	4	13.3	<0.05	1,917	1,317	2,789
Induced pregnancy	7	17.5	2	6.7	<0.05	1,438	0.946	2,186
Multiple pregnancy	3	7.5	1	3.3	>0.5	1,338	0.731	2,449
Severe toxicosis	14	35.0	2	6.7	<0.05	1,817	1,303	2,536
Fetal hypoxia	35	87.5	2	6.7	<0.05	6,243	2,774	14,049
Stress during pregnancy	30	75	10	33.3	<0.05	2,250	1,315	3,849

Note: *P – significance of differences between groups, RR-relative risk*

Table 3

Analysis of social and hygienic risk factors for perinatal encephalopathy according to the relative risk criteria in group I

Factor	I group (n=40)		Counter. group (n=30)		P	RR	CI min	CI max
	abs.	%	%	abs.				
Higher education	3	7.5	14	46.7	<0.05	0.253	0.089	0.717
Mother's age over 35 years	4	10	--	-	<0.05	1,833	1,471	2,285
Mother's occupational hazards	5	12.5	--	-	<0.05	1,857	1,483	2,326
Father's bad habits	11	27.5	8	26.7	>0.5	1,018	0.648	1,600
Closely related marriage	6	15	--	-	<0.05	1,882	1,495	2,369
Unregistered marriage	1	2.5	1	3.3	>0.5	0.872	0.215	3.539

Note: *P – significance of differences between groups, RR-relative risk*

Analysis of social and hygienic risk factors for grade II perinatal encephalopathy in group I showed that maternal age over 35 years RR 1,833 (1,471; 2,285), occupational hazards in the mother RR 1,857 (1,483; 2,326) and closely related marriage RR 1,882 (1,495; 2,369) were the most significant in the formation of pathology (tab. 3).

When assessing the social, as well as epidemiological risk factors for severe hypoxic encephalopathy among newborns of group II, the modifier was the mother's age over 35 years (RR 1.764 (1.495; 2.369)), occupational hazards in the mother (RR 1.789 (1.449; 2.210)) and closely related marriage (RR 1.938 (1.523; 2.466)), as well as the presence of bad habits the father has RR 1,966 (1,254; 3,084) (Table 4).

Table 4

Analysis of social and hygienic risk factors for perinatal encephalopathy according to the relative risk criteria in group II

Factor	II group (n=40)		Counter. group (n=30)		P	RR	CI min	CI max
	abs.	abs.	%	abs.				
Higher education	2	5	14	46.7	<0.05	0.178	0.048	0.657
Mother's age over 35 years	6	15	--	-	<0.05	1,882	1,495	2,369
Mother's occupational hazards	2	5	--	-	<0.05	1,789	1,449	2,210
Father's bad habits	26	65.0	8	26.7	<0.05	1,966	1,254	3,084
Closely related marriage	8	20	--	-	<0.05	1,938	1,523	2,466
Unregistered marriage	1	2.5	1	3.3	>0.5	0.872	0.215	3.539

Note: *P – significance of differences between groups, RR-relative risk*

Conclusions

Thus, our calculation of the relative risk (RR) for a number of parameters in newborns of the main and control groups showed that the modifying risk factors for the formation of encephalopathy of hypoxic genesis, which arose in the perinatal period of life, are repeated threats of miscarriage, preeclampsia, mother's age over 35, moderate anemia, acute laryngitis, urogenital diseases. We established the significance of the fact of stillbirth in the mother's history, the father's smoking, the presence of excess body weight and obesity in the mother, the presence of chronic foci of infection in the mother's body, urogenital infection, bacterial infectious pathology.

References

1. Abqari S. et al. Profile and risk factors for congenital heart defects: A study in a tertiary care hospital. Annals of pediatric cardiology. 2016; 3(9). 216.
2. Adzhablayeva D.N. Main epidemiological indicators of respiratory tuberculosis among children and adolescents in the Samarkand region: the state of the problem and possible ways to resolve it. Universum: medicine and pharmacology. 2014; 9 (10). 2. (in Russ).
3. Hascoet J. M. The Safety And Efficacy Of Nitric Oxide Therapy InPremature Infants / J.M.Hascjet. The J. of Pediatrics. 2022;146. 318-323.

4. Jaeggi E. T. Assessment of the evolution of normal fetal diastolic function during mid- and late gestation by spectral Doppler tissue echocardiography / E.T. Jaeggi, M. Nii, K.S. Roman et al. J. Am. Soc. Echocardiogr. 2019;19. 1431-1437.
5. Josefsson A. Reproductive patterns and pregnancy outcomes in women with congenital heart disease - a Swedish population-based study. Acta Obstetricia et Gynecologica Scandinavica. 2021; 6(90). 659-665.
6. Smirnova A. V. et al. Method for predicting perinatal hypoxic lesions of the central nervous system in newborns. Clinical Laboratory Diagnostics. 2019; 2(64), 89-93. (in Russ).
7. Sozayeva D. I., Berezhanskaya S. B. Pathogenetic mechanisms of formation of cerebral disorders in young children who have undergone hypoxia in the perinatal period. Modern problems of science and education. 2021; 4.122-128. (in Russ).

Kholmominova O. J.
teacher
department of pedagogy
Termez State Pedagogical Institute
Abdisamatova M. A.
master's student
Termez State Pedagogical Institute

THE ORETICAL AND METHODOLOGICAL FOUNDATIONS OF INCLUSIVE EDUCATION: CONCEPTUAL APPROACHES, STUDENT CHARACTERISTICS AND INNOVATIVE PEDAGOGY

Abstract. *This extended scientific article covers the formation of inclusive education, its theoretical and methodological foundations, historical stages, psychological and pedagogical characteristics of students with special educational needs, and the scientific foundations of innovative approaches that need to be applied to the inclusive education process. The article provides an in-depth analysis based on modern global pedagogical research, educational reforms in Uzbekistan, theories of special pedagogy and differential psychology. The importance of inclusive education for the education system, its philosophical, social and psychological criteria, student support mechanisms, and methodological foundations for adapting the educational process are scientifically covered.*

Keywords: *inclusive education, special needs, integration, social model, psychological and pedagogical characteristics, innovative approaches, UDL model, differentiated education, educational strategies.*

The idea of inclusive education is being formed inextricably linked to today's globalization, human capital development policies, democratic values, and the humanistic paradigm of education. Its theoretical and methodological foundations are based on the integration of many scientific fields, such as psychology, pedagogy, special pedagogy, sociology, social philosophy, neuropsychology, and differential education. In this sense, it would be correct to interpret inclusive education not only as a matter of children with special educational needs, but also as a process of making the educational environment convenient, flexible, and providing equal opportunities for all students. The development of science shows that the formation of inclusive education is based on a deep understanding of the nature of human development and the appropriate design of the pedagogical process.[1] The concept of inclusive education has historically undergone an evolutionary process in terms of its content and essence. Until the middle of the 20th century, children with disabilities were educated separately in special boarding schools, but later approaches based on the idea of \u200b\u200b“integration” emerged. The integration model involved adapting the student to the existing education system, and in many cases the educational

process did not sufficiently meet their needs. Therefore, starting in the 1990s, the international pedagogical community began to move towards the concept of “inclusion”. The adoption of the Salamanca Declaration in 1994 made inclusive education a priority of world education policy. This document recognized inclusion as the main mechanism for creating equal opportunities for all members of society. The modern inclusive education model is directly related to the concept of person-centered education, constructivism, Vygotsky's sociocultural approach, activity theory, the paradigm of social justice, and the interpretation of disability based on the social model. The methodological basis of inclusive education is determined by the laws of development of the student's personality, the dynamics of his cognitive processes and the mechanisms of social interaction. Vygotsky's theory of the "zone of proximal development" serves as a methodological basis for determining the level of support for the student in teaching. Researchers note that in an inclusive environment, the student's motivation, social activity, speech communication and self-management skills are formed at a much higher rate.

Working with students with special educational needs is a central component of inclusive education, and their psychological and pedagogical characteristics require a thorough analysis. These students may have a slow rate of development of cognitive processes, a slowdown in reaction to instructions and speech activity, decreased emotional stability, scattered attention, insufficient memory, and difficulty in social communication. However, scientific sources emphasize that these students can achieve a high level of social adaptation and cognitive growth in an adapted educational environment. In this regard, comprehensive pedagogical diagnostics, the creation of an individual development program, an assessment of the initial psychological state, and the complex use of practical exercises that develop intuition, perception, memory, thinking, and speech are necessary. Special pedagogical research shows that the successful development of these students is closely related to identifying their strengths, building the learning process around these opportunities, and building positive self-awareness and self-confidence in the student.

Innovative approaches in inclusive education are one of the leading factors in improving the quality of education. Digital technologies allow the creation of electronic educational resources, virtual learning modules, adaptive diagnostics based on artificial intelligence, and multimodal presentations that are adapted to the individual needs of students. The Universal Design for Learning (UDL) model, widely used in inclusive education, is one of the most scientifically based concepts for adapting the learning process, allowing students to receive, process, and express knowledge through different methods[5]. This model involves adapting teaching based on student needs, using multi-channel presentation, tasks of different levels of complexity, multimodal materials, and various strategies for engaging students.

The effectiveness of inclusive education also depends on a multidisciplinary cooperation system. Cooperation between teachers, psychologists, defectologists, speech therapists, deaf and hearing teachers, typhloid educators, as well as parents

is important in correctly determining the trajectory of student development. Such cooperation is interpreted in scientific research as a “multi-component inclusive model”. This model provides a comprehensive approach to the student, integrated methodological support and social adaptation. The methodological foundations of inclusive education are based on such principles as humanizing the pedagogical process, justice, equality, appreciation of diversity, supporting the pace of individual development, and strengthening social adaptation. Large-scale reforms are being implemented in the education system of Uzbekistan based on these principles. The Law "On Support for Persons with Special Educational Needs" strengthened the normative-legal and methodological foundations of inclusive education and made it possible to introduce new approaches to the activities of educational institutions. In conclusion, the theoretical and methodological foundations of inclusive education are a complex system aimed at developing the student's personality, the implementation of which is ensured through innovative approaches, psychological and pedagogical support, digital technologies, adapted programs and multidisciplinary cooperation. The scientific basis of inclusive education is an important factor in improving the quality of the educational process, establishing equality and social justice in society.

References used

1. Ainscow, M. Inclusive Education and the Challenge of Diversity. Routledge, 2019.
2. UNESCO. Salamanca Statement and Framework for Action on Special Needs Education. 1994.
3. Florian, L. The Sage Handbook of Special Education. Sage Publications, 2020.
4. Vygotsky, L. Mind in Society. Harvard University Press, 1978.
5. Rose, D., Meyer, A. Universal Design for Learning. CAST, 2006.
6. Smith, T. Inclusive Pedagogy: Theory and Practice. Cambridge University Press, 2021.
7. Law of the Republic of Uzbekistan. On support of persons with special educational needs, 2021.
8. Loreman, T., Deppeler, J. Effective Inclusive Schools. Pearson, 2015.
9. Mittler, P. Working Towards Inclusive Education. David Fulton, 2000.
10. Booth, T., Ainscow, M. Index for Inclusion. Bristol, 2011.

Kiyomov B. E.
assistent
odam anatomiyasi kafedrasi
Samarqand Davlat Tibbiyot Universiteti
Samarqand, O‘zbekiston

TAJRIBA SHAROITIDA SUBARAXNOIDAL QON QUYILISHIDA KAPILLYAR TOMIRLARDA MORFOLOGIK O'ZGARISHLAR

Аннотация: *Ushbu maqolada eksperimental sharoitlarda itlarda avtogen subaraknoid qon ketishi paytida kapillyar tomirlardagi gistotopografik o'zgarishlar o'rganiladi. Asosiy miya arteriyalarining spazmi, xususan, miya qon tomirlanishida bevosita ishtirok etadigan arteriolalarning spazmi, o'z navbatida, miya qon tomir avariyasining sababi hisoblanadi.*

Kalit so'zlar: *eksperiment, it, araxnoid mater, qon ketishi, asosiy tomirlar, kapillyarlar, avtogen qon, endotelial hujayra.Kiyamov B. É. assistent,*

Kiyamov B. E.
assistant
department of human anatomy
Samarkand State Medical University
Samarkand, Uzbekistan

MORPHOLOGICAL CHANGES IN CAPILLARY VESSELS IN SUBARACHNOID BLEEDING UNDER EXPERIMENTAL CONDITIONS

Abstract. *The content of the article is devoted to the study of histotopographic changes in capillary vessels during autogenous subarachnoid hemorrhage of the brain in dogs under experimental conditions. Spasm of the main arteries of the brain, especially spasm of arterioles directly involved in the vascularization of the brain, in turn, causes disruption of cerebral blood circulation.*

Keywords: *experiment, dog, arachnoid membrane of the brain, hemorrhage, main vessels, capillaries, autogenous blood, endothelial cell.*

Kirish

Miya anevrizmalarining yorilishi natijasida miyada qon tomir spazmi va ikkilamchi ishemik o'zgarishlar travmatik bo'lmagan subaraxnoid qon ketishining eng jiddiy asoratlari qatoriga kiradi [1,2,3]. Serebrovaskulyar patologiyaning sezilarli darajada tarqalishi tufayli, ayniqsa, ishemiya, miya shishi, asab hujayralarining shikastlanishi va miya qon tomir yorilishining rivojlanishiga olib keladigan arterial spazmning uzoq davom etadigan bosqichida arterial spazm bilan birga keladigan subaraxnoid qon ketishini modellashtirishda miyaning pia

materining asosiy arteriyalari va arteriolalarining ultrastrukturasini tahlil qilish zarur [6,7,8].

Tadqiqotning maqsadi

Tajriba sharoitida subaraxnoidal qon quyilishida kapillyar tomirlarda morfologik o'zgarishlarni o`rganish.

Materiallar va usullar

Tajriba sharoitida narkoz tasirida itlarning bosh miyadagi asosiy arteriyalari va pia mater arteriolalarining (miya to`qimasiga bevosita kirib boruvchi asosiy arteriyalarning terminal shoxlari) ultrastrukturasi o`rganildi. Xayvonning orqa miya suyuqligiga autogen qon yuborilgandan keyin 3-5-kunlarda o'rganildi.

Natijalar

Orqa miya suyuqligiga autogen qon yuborilgandan uch kun o'tgach, arterial endotelial hujayralar sitoplazmasida donador sitoplazmatik retikulum, erkin ribosomalar va polisomalar, mitoxondriyalar va lizosomalar elementlarining ko'payishi kuzatildi. Hujayra yadrolari ko'pincha tartibsiz oval shaklga ega bo'ladi. Endotelial hujayralarning yumaloqlanishi va asta-sekin ajralishi hujayralararo bo'shliqlarning sezilarli darajada kengayishiga olib keladi. Adventitiyada yakka eritrotsitlar yoki 2-3 nm makrofaglar guruhlari aniqlanadi. Media bo'ylab silliq mushak hujayralarining sarkoplazmasida, tashqi membranaga qaragan miotsitlarning yuzaki qatlamlarida va ichki membranaga tutashgan qatlamlarda miofilamentning kamyoblanish sohalari topiladi. Miyofilamentlarning kamyoblanish sohalari perinuklear zonada va hujayralarning periferik mintaqalarida kuzatiladi; ularning shakli notekis oval bo'lib, 100-30 nm o'lchamda. Bu sohalarda ba'zan strukturasiz osmiofil shakllanishlar, shuningdek, oval shakllanishlar ham aniqlanadi. Shu bilan birga, miotsitlar sarkoplazmasida donador sitoplazmatik retikulum elementlari sonining ko'payishi, erkin ribosomalar va polisomalar va lizosomalarning paydo bo'lishi kuzatiladi. Tashqi va o'rta membranalardagi o'zgarishlar fonida arteriyalarning ichki elastik membranasi buklanadi va endotelial hujayralarning shakli va yo'nalishi o'zgaradi. Hujayralarning uzun o'qi ko'pincha arteriyalar lümeniga nisbatan radial yo'naltirilgan bo'ladi. Hujayralarning sitoplazmatik chiqib ketishning tomir bo`shlig`ida uzunligi 250-4200 nm va kengligi 100-2800 nm. Endotelial hujayralarning sitoplazmatik chiqib ketishi notekis oval yoki cho'zilgan yadroni o'z ichiga olishi mumkin. Endotelial hujayralarning shakli har xil: yumaloq, qum soati shaklida yoki. Arterial bo`shlig`i radial yo'naltirilgan hujayralar tomonidan ancha masofada "bo'shliqlar" ga bo'linishi mumkin. Endotelial hujayralar yuzasida 500-1300 nm o'lchamdagi plazma chuqurchalari mavjud. Hujayra sitoplazmasida erkin ribosomalar, polisomalar, donador sitoplazmatik retikulum elementlari va lizosomalar soni ortadi. Itlarning pia materidagi arteriolalar intimasining silliq mushak hujayralarining ultrastrukturasi, ichki elastik membrananing konfiguratsiyasi va endotelial hujayralardagi o'zgarishlar odatda asosiy arteriyalardagi o'zgarishlarga mos keladi. Miyofilamentlarning kamyoblanish sohalari miotsitlar sarkoplazmasida ham uchraydi; Ichki elastik membrana buklangan, endotelial hujayralarning bo'laklari tomir bo`shlig`iga chiqib turadi va

sitoplazmatik chiqib ketishlar orasida "bo'shliqlar" mavjud. Ilgari, shunga o'xshash eksperimental sharoitlarda, itlarda miyaning asosiy arteriyalarining tashqi (yuzaki) nerv pleksusining paravazal nerv magistrallarining ultrastrukturasini o'rganish jarayonida biz endoteliyning ultrastrukturasida, nerv magistrallarining perineuriumida, medullar nerv tolalari aksonlarida (miyelin qobig'ida bo'shliqlar paydo bo'lishi, neyrofilamentlarning aglomeratsiyasi, mitoxondrial shish) va kamroq darajada anamnez nerv tolalari aksonlarida (neyrofilamentlarning notekis taqsimlanishi, mitoxondrial shish) o'zgarishlarni aniqladik.

Xulosa

Shunday gilib, miya gon-tomirlaridagi morfologik substratlarining yaxlitligini buzilishining natijasida paydo bo'ladigan arterio-arteriolalar spazmida muhim patogenetik bog'liqliklar hisoblanadi. Asosiy miya arteriyalarining spazmi, xususan, miya qon tomirlanishida bevosita ishtirok etadigan arteriolalarning spazmi, o'z navbatida, miya qon tomir yorilishining sababi hisoblanadi.

Foydalanilgan adabiyotlar

1. Abdullayeva D. R., Ismati A. O., Mamataliyev A. R. Osobennosti gistologicheskogo stroyeniya vnepechenochnix jelchnix protokov u kris //golden brain. – 2023. – T. 1. – №. 10. – S. 485-492.2
2. Mamataliyev A. R. Osobennosti neyrogistologicheskoye stroyeniye intrazonalnogo nervnogo apparata vne pechenochnix jelchnix protokov u kris //ekonomika i sotsium. – 2024. – №. 3-2 (118). – S. 692-695.
3. Narbayev, S., Minzhanova, G., Zubova, O., Toshbekov, B., Rasulovich, M. A., Sapaev, B., ... & Khudaynazarovna, T. I. (2024). Behavioral adaptations of Arctic fox, Vulpes lagopus in response to climate change. Caspian Journal of Environmental Sciences, 22(5), 1011-1019.
4. Mamataliyev A., Oripov F. Gistologicheskoye stroyeniye intramuralnogo nervnogo apparata общего jelchnogo protoka i jelchnogo puzrya u krolika, v norme i posle udaleniye jelchnogo puzirya //Jurnal biomeditsini i praktiki. – 2021. – T. 1. – №. 3/2. – S. 117-125.
5. Mamataliyev A. R., Oripov F. S. Kuyonlarda jigardan tashki ut yullarining odatda va ut xaltasini olib tashlagandan sungi gistologik uzgarish //journal of biomedicine and practice. – 2021. – T. 6. – №. 3. – S. 117-125.
6. Mamataliyev A. R., Sh R. S., Zohidova S. H. eksperimental jigar sirrozi sharoitida pastki porto kaval venoz tizimi morfologiyasining o`rganilganlik darajasi //Ekonomika i sotsium. – 2024. – №. 4-1 (119). – S. 1346-1350.
7. Mamataliyev A. R. narusheniye innervatsii i mutatsionniy protsess v tkani //Ekonomika i sotsium. – 2025. – №. 4-2 (131). – S. 876-880.
8. Mamataliyev A. R. i dr. anatomo-topograficheskoye stroyeniye i aktivnoye sokraщeniye stenok vorotnoy venы laboratornых jivotnых //Akademicheskiye issledovaniya v sovremennoy nauke. – 2024. – T. 3. – №. 30. – S. 163-168.

UDC 616.398-008.9:616-089.87

Madaripova D. A.
department of hematology and clinical laboratory diagnostics
Bukhara State Medical institute
https://orcid.org/0009-0009-9547-9264

MICROELEMENT DEFICIENCIES AFTER SURGICAL TREATMENT OF OBESITY: EARLY DIAGNOSIS AND PREVENTION STRATEGIES

Abstract: *Background: Bariatric surgery is an effective intervention for obesity management but often leads to significant deficiencies in microelements and vitamins due to altered gastrointestinal anatomy and reduced absorption. Objective: This study aims to evaluate the dynamic changes in serum levels of iron, zinc, copper, vitamin B12, and vitamin D before and after bariatric surgery, and to identify early diagnostic biomarkers for timely prevention and management of deficiencies. Methods: A total of 130 patients aged 20–55 who underwent bariatric surgery were followed for 12 months. Serum and urine levels of selected microelements and vitamins were measured preoperatively and at 1, 3, 6, and 12 months postoperatively. Results: The most pronounced declines were observed in iron, vitamin B12, and zinc levels, particularly within the first three months post-surgery. Copper levels remained relatively stable, while vitamin D showed a progressive decrease. Early postoperative monitoring using biomarkers such as ferritin and 25(OH)D proved valuable in predicting and managing deficiencies. Conclusion: Routine laboratory monitoring and personalized supplementation protocols are essential for preventing microelement deficiencies after bariatric surgery. Early intervention based on dynamic biomarker changes can improve long-term outcomes and patient quality of life.*

Keywords: *Bariatric surgery; micronutrient deficiency; iron; vitamin B12; vitamin D; zinc; copper; early diagnosis; nutritional monitoring; obesity treatment.*

Introduction

Obesity has become a global epidemic, affecting more than 650 million adults worldwide according to the World Health Organization [1]. It is associated with numerous health complications, including type 2 diabetes, cardiovascular disease, and certain cancers. Bariatric surgery has proven to be an effective intervention for sustained weight loss and remission of obesity-related comorbidities [2]. Despite its benefits, bariatric surgery can lead to significant nutritional deficiencies, particularly in essential microelements and vitamins [3]. Iron, zinc, copper, vitamin B12, and vitamin D are among the most commonly affected nutrients [4]. These deficiencies can result in fatigue, anemia, neurological disorders, impaired immunity, and poor wound healing [5]. Early detection and management of such deficiencies are critical for preventing long-

term complications and improving postoperative outcomes [6]. This study aims to evaluate the dynamic changes in essential microelements and vitamins following bariatric surgery and to identify early diagnostic biomarkers for timely prevention and intervention.

Materials and Methods

This prospective cohort study included 130 patients aged 20 to 55 who underwent bariatric surgery. Patients were monitored for a minimum of 12 months. Blood and urine levels of iron (Fe), zinc (Zn), copper (Cu), vitamin B12, and vitamin D were evaluated at baseline (pre-operative) and at 1, 3, 6, and 12 months post-operatively. All assessments were conducted using standard clinical laboratory methods and validated biomarkers.

Results

The study revealed a significant decline in iron, zinc, and vitamin B12 levels in the early post-operative period, particularly at the 1st and 3rd month marks. Copper levels showed only a mild decrease, while vitamin D deficiency was observed in more than half of the patients by the 3rd month. Gender differences were noted, with female patients showing more pronounced deficiencies. Dynamic monitoring helped identify patterns and critical time points for supplementation.Table 1. Dynamics of Serum Microelement and Vitamin Levels Following Bariatric Surgery at Five Time Points.

Table 1

Microelement and Vitamin Levels at Different Time Points

Timepoint	Iron (Fe), µg/dL	Zinc (Zn), µg/dL	Copper (Cu), µg/dL	Vitamin B12, pg/mL	Vitamin D, ng/mL
Pre-op	85	95	100	450	30
1 month	60	75	92	320	22
3 months	55	68	89	280	20
6 months	65	70	91	300	24
12 months	70	73	93	330	27

This table presents the quantitative assessment of serum levels of key microelements (iron, zinc, copper) and vitamins (B12 and D) at baseline (preoperative), and at 1, 3, 6, and 12 months after bariatric surgery. A notable decline in iron and zinc levels is evident during the first three months, with partial recovery by month 12, although values remain below baseline. Vitamin B12 levels demonstrate a continuous downward trend up to 6 months, then exhibit slight recovery. Copper levels remain relatively stable, with minimal fluctuation. Vitamin D levels, initially at insufficient range, continue to decrease postoperatively, underscoring the need for early preventive supplementation. These trends highlight the dynamic shifts in micronutrient status following bariatric surgery and support the need for close laboratory surveillance during the first year.

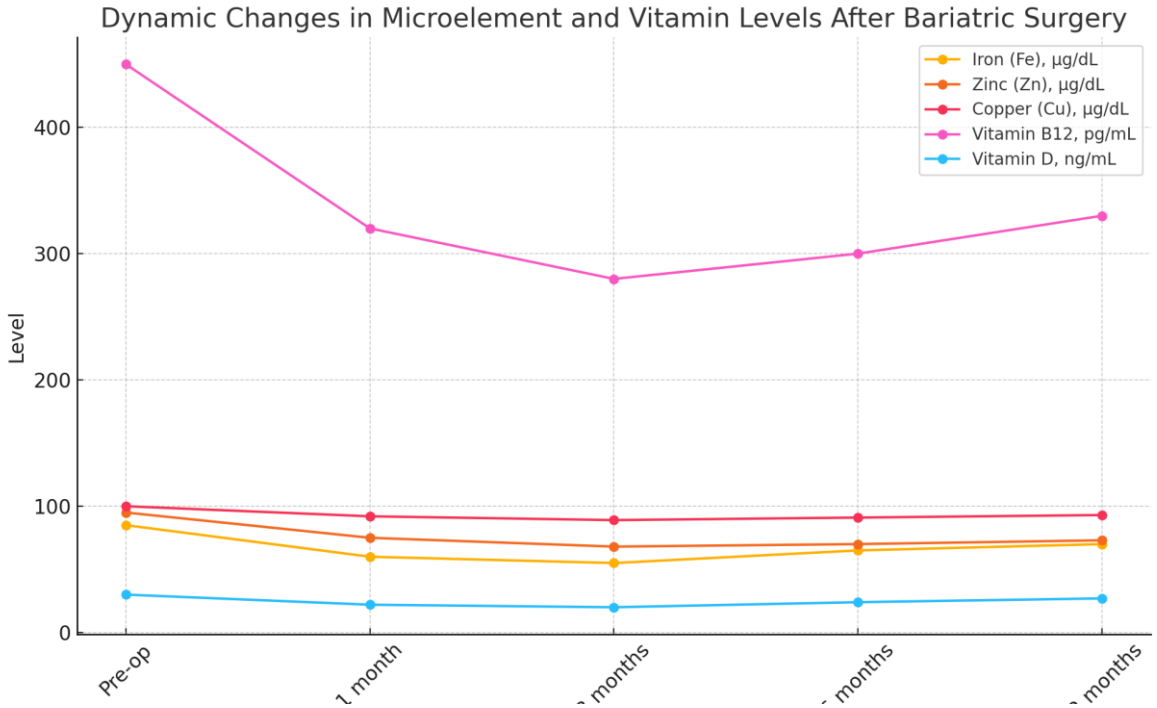


Figure 1. Temporal Trends in Serum Levels of Iron, Zinc, Copper, Vitamin B12, and Vitamin D Over 12 Months Following Bariatric Surgery

The line graph visually demonstrates the dynamic evolution of key micronutrient and vitamin concentrations at specified intervals (pre-op, 1, 3, 6, and 12 months post-op). The most pronounced reductions occur in iron and vitamin B12 levels during the early postoperative phase, indicating high susceptibility to depletion. Zinc follows a similar trajectory, though to a slightly lesser degree. In contrast, copper shows relative stability, suggesting it may be less affected by malabsorption mechanisms. Vitamin D levels decline progressively throughout the year, reaching a nadir at 6 months. The diagram emphasizes the need for time-specific, targeted monitoring and supplementation protocols tailored to each nutrient's absorption kinetics and risk profile.

Discussion

The high prevalence of micronutrient deficiencies following bariatric surgery underscores the importance of implementing robust postoperative nutritional monitoring programs [7]. In particular, iron and vitamin B12 deficiencies tend to manifest early and can lead to severe anemia and neurological dysfunction if left unaddressed [8]. Zinc deficiency may impair wound healing and immune response, while low copper levels have been associated with hematologic and neurological abnormalities [9]. Vitamin D deficiency remains one of the most persistent issues post-surgery, with implications for bone health and calcium metabolism [10].

One notable aspect of our findings is the temporal pattern of deficiency onset. Iron and vitamin B12 dropped significantly by the first month, highlighting the need for early intervention. These results align with prior studies suggesting that the first 3 to 6 months post-surgery are critical for nutritional surveillance [11].

Moreover, differences between genders observed in our cohort support the need for individualized supplementation protocols tailored to patient characteristics, such as sex, age, and surgery type [12].

This study also emphasizes the value of dynamic biomarkers such as ferritin, serum 25(OH)D, and urinary trace elements in providing early warning signals before clinical symptoms develop. Routine use of these markers can improve outcomes by allowing clinicians to anticipate and prevent deficiencies proactively [13]. Finally, the integration of nutritional education, regular lab assessments, and timely supplementation should be standard components of postoperative care in bariatric patients [14, 15].

Conclusion and Recommendations

This study underscores the necessity of routine monitoring of micronutrients after bariatric surgery. Iron and vitamin B12 should be given particular attention due to their rapid decline and significant impact on recovery. Preventive strategies should include baseline assessments and scheduled supplementation based on dynamic biomarker changes. Further research is needed to optimize micronutrient therapy protocols tailored to patient-specific needs.

Furthermore, the identification of critical time points—particularly the first three months post-surgery—emphasizes the need for structured follow-up schedules. Patients should undergo biochemical screening at regular intervals to detect and address deficiencies before the onset of clinical symptoms. Healthcare providers must adopt a proactive rather than reactive approach, incorporating routine laboratory testing into standard postoperative care pathways.

In addition, educational interventions should be provided to patients prior to surgery to improve awareness regarding the risks of micronutrient deficiencies. Postoperative counseling and tailored dietary plans developed in collaboration with clinical nutritionists can reinforce adherence to supplementation protocols. Multidisciplinary teams involving surgeons, endocrinologists, and dietitians should be integral to the long-term management of bariatric patients.

References

1. Mechanick JI, et al. Clinical practice guidelines for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient—2019 update.
2. Angrisani L, et al. Bariatric surgery worldwide 2018.
3. O'Kane M, et al. BOMSS guidelines on perioperative and postoperative biochemical monitoring and micronutrient replacement for patients undergoing bariatric surgery.
4. Via MA, Mechanick JI. Nutritional and Micronutrient Care of Bariatric Surgery Patients.
5. Gletsu-Miller N, Wright BN. Mineral malnutrition following bariatric surgery.
6. Pereira S, et al. Micronutrient deficiencies following bariatric surgery: Risks and recommendations.
7. Shawe J, et al. Pregnancy after bariatric surgery: Consensus recommendations for periconception, antenatal and postnatal care.

8. Aills L, et al. ASMBS Allied Health Nutritional Guidelines for the Surgical Weight Loss Patient.
9. Bloomberg RD, et al. Nutritional deficiencies following bariatric surgery: what have we learned?
10. Heber D, et al. Endocrine and nutritional management of the post-bariatric surgery patient: an Endocrine Society Clinical Practice Guideline.
11. Ernst B, et al. Micronutrient deficiencies in morbidly obese patients before and after bariatric surgery.
12. Krolak C, et al. Nutrient Deficiencies after Sleeve Gastrectomy: A Five-Year Retrospective Study.
13. Zhang C, et al. Micronutrient deficiencies 1 year after laparoscopic sleeve gastrectomy in Chinese patients.
14. Ben-Porat T, et al. Prevalence of nutritional deficiencies among adolescents after sleeve gastrectomy.
15. Vargas-Ruiz AG, et al. Prevalence of iron, folate, and vitamin B12 deficiency in patients after laparoscopic Roux-en-Y gastric bypass.

Madrahimov A. M.
associate professor
Namangan State Technical University
Makhmudov J. N.
master's student

ROAD SAFETY PROBLEMS

Annotation: *This study investigates the influence of road conditions and environmental factors on road safety, focusing on seasonal changes, visibility, speed selection and accident frequency on the national road network of Uzbekistan. Statistical analysis of accident records from 2020–2023 obtained from the Ministry of Internal Affairs shows that up to 28–32% of all crashes occur under adverse road-surface conditions, while visibility restrictions (fog, snow and darkness) account for approximately 18% of reported incidents. The research identifies critical road segments with elevated accident rates and provides engineering recommendations for reducing speed-related collisions by applying seasonal control, improved pavement maintenance and weather-responsive warning systems.*

Keywords: *road safety, accident rate, road conditions, weather, seasonal factors, slippery pavement, visibility.*

Introduction

Road accidents are rarely caused by a single factor; rather, they result from a complex combination of road conditions, driver decisions and environmental influence. In Uzbekistan, the number of registered motor vehicles increases annually by 7–10%, which has intensified accident occurrence on road sections with poor pavements and limited visibility.

Understanding the quantitative effect of seasonal and climatic factors is crucial for designing safer road networks, especially in mountainous and steppe regions where snow, wind and low visibility significantly reduce vehicle stability. A serious explanation of this issue is given in paragraph 10.1 of the Traffic Rules [6], according to which if there is a danger of a collision that the driver can detect, he must take all possible measures to reduce the speed until the car stops. This reduces the significance of the driver's fault and increases the significance of the incident road conditions.

Data and Methods.

Data sources:

- official accident database (2020–2023)
- traffic police statistics
- weather observation reports
- field measurements on selected road segments

Indicators analyzed:

- accident frequency
- seasonal distribution
- friction coefficient
- visibility distance
- vehicle speed
- wind velocity
- Evaluation methods
- descriptive statistics
- regression analysis
- correlation between surface condition and crash frequency
- assessment of critical road sections

To assess road-surface risk, the coefficient of adhesion (μ) was used:

$$\mu = \frac{F\text{adh}}{F\text{norm}}$$

Lower values of μ correspond to higher accident probability, especially during winter months.

Results and Discussion

The unsatisfactory condition of the coating (32%) leads to a decrease in the coefficient of adhesion and an increase in the braking distance of vehicles, and in some cases there is a risk of skidding.

1. Seasonal influence. Analysis shows that accident rates increase by:

- 32% in winter
- 21% in autumn
- 14% in spring
- compared to summer baseline values

Loss of friction due to snow and ice is the main contributing factor.

2. Visibility reduction. Road sections with limited visibility (fog, snowstorm, darkness) demonstrate accident probability increase of **18–23%**, particularly in mountainous regions.

3. Impact of pavement conditions. Poor pavement condition contributes to:

- 32% of skidding accidents
- 68% of increased braking distance
- up to 24% higher rear-end collision probability

4. Side wind effects

Cross-wind measurements indicate that at wind speeds above 20 m/s, high-profile vehicles have a significantly increased overturning risk. Simulation results show:

Vehicle speed	Dangerous wind velocity
60–80 km/h	15 m/s
100 km/h	10 m/s
120 km/h	5 m/s

5. Road geometry.

Curvature, longitudinal slope and narrowed lanes lead to collision increase by 12–17% during snow accumulation.

Drivers typically compensate by lowering speed; however, insufficient warning, lack of maintenance and poor signage generate additional crash risk.

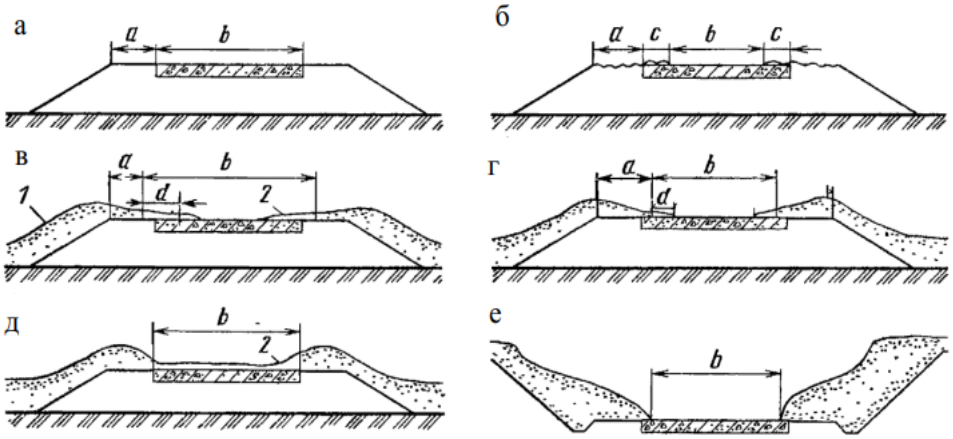


Figure 1. Road use at different times of the year:
a-in summer; b-on roads that have not been repaired in spring and autumn, in winter on regularly cleared snow areas in the absence of roadside intervention; g-if there are obstacles on the roadside, d-if the road is not completely cleared of snow, or there are snow piles on the roadside; e-in potholes; a-the actual width of the roadside; b-the width of the used carriageway; C-the lines of the pavement contaminated in spring and autumn; d-the lines of compacted snow or ice; 1-loose snow; 2-compacted snow or ice.

Conclusion

The findings demonstrate that seasonal and environmental factors significantly increase road-accident probability on national highways. Road-surface conditions, visibility limitations and cross-wind effects must be considered when planning maintenance schedules and traffic-safety measures.

To improve safety, the following strategies are recommended:

- winter-specific speed limitations,
- seasonal friction-enhancing pavement treatments,
- installation of weather-adaptive traffic signs,
- strengthening of wind-protection on elevated roads
- continuous monitoring of critical segments.

Further research should involve simulation models and long-term datasets in order to develop predictive safety algorithms.

References:

1. Madraximov A., Abduganiyev S., Boymirzayev Q. DETERMINE THE SPEED OF THE VEHICLE //Экономика и социум. – 2025. – №. 1-1 (128). – С. 138-142.

2. Абдуганиев Ш. О. У. и др. АНАЛИЗ И ОЦЕНКА ДОРОЖНО-ТРАНСПОРТНЫХ ПРОИСШЕСТВИЙ (ПДД) В ОБЕСПЕЧЕНИИ БЕЗОПАСНОСТИ ДОРОЖНОГО ДВИЖЕНИЯ //Universum: технические науки. – 2023. – №. 2-3 (107). – С. 60-63.
3. Elvik R. Why some road safety problems are more difficult to solve than others //Accident analysis & prevention. – 2010. – Т. 42. – №. 4. – С. 1089-1096.
4. Negmatov S. S. et al. Setting Time of Powder Composites and the Effect of Chemical Reagents //Key Engineering Materials. – 2021. – Т. 899. – С. 675-680.
5. Normirzaev A. R. et al. Safety of the movement on valley and perevalny sites of mountain roads //Europaische Fachhochschule. – 2015. – №. 1. – С. 85-86.

Majidov B. Sh.
lecturer
department of agronomy and ecology
Karshi State University

UZBEKISTAN'S NATIONAL FOOD SECURITY STRATEGY: INSTITUTIONAL REFORMS, FAO ALIGNMENT, MONITORING EFFECTIVENESS, AND GLOBAL TRENDS

Annotation: *This article conducts a scientifically grounded analysis of Uzbekistan's National Food Security (NFS) Strategy, focusing on its recent shift from a state-centric model to a market-oriented, resilient food system. It examines the nature and impact of deep institutional reforms, particularly the de-monopolization of the sector and land tenure changes, and evaluates the strategy's alignment with FAO's four pillars (Availability, Access, Utilization, Stability) and relevant international guidelines. Crucially, the paper assesses the operational effectiveness of the National Monitoring System (NMS), using metrics like the food import coverage ratio (K) to highlight vulnerabilities—such as structural monitoring deficiencies and exposure to global supply chain volatility. The findings position the Strategy within global agri-food trends (climate change, post-harvest loss reduction, green agenda) and argue that long-term success requires sustained institutional momentum and the integration of advanced, evidence-based governance, especially regarding M&E and resilience-building measures.*

Keywords*: Uzbekistan, Food Security, Institutional Reforms, FAO Standards, National Monitoring System, Global Trends, Agricultural Policy, Resilience, Land Tenure, Agri-Food System.*

President Shavkat Mirziyoyev has consistently framed food security as an issue of national resilience, directly connecting population dynamics and resource scarcity to the need for scientific innovation and efficiency. A core, scientifically based quote that encapsulates this strategic priority is:

"In the current conditions of rapid population growth, where the population of our country increases by almost 1 million people annually, and with limited land and water resources, ensuring the stability of the domestic market can only be achieved through a rational, science-based approach and sharp increase in productivity."

Uzbekistan's strategic shift, particularly since the adoption of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030, moves beyond traditional state-centric, self-sufficiency models toward a market-oriented, resilient food system. The core of the institutional reform lies in decreasing direct state involvement in sector management, fostering a favorable agribusiness environment, and establishing transparent land and water relations. Key measures include

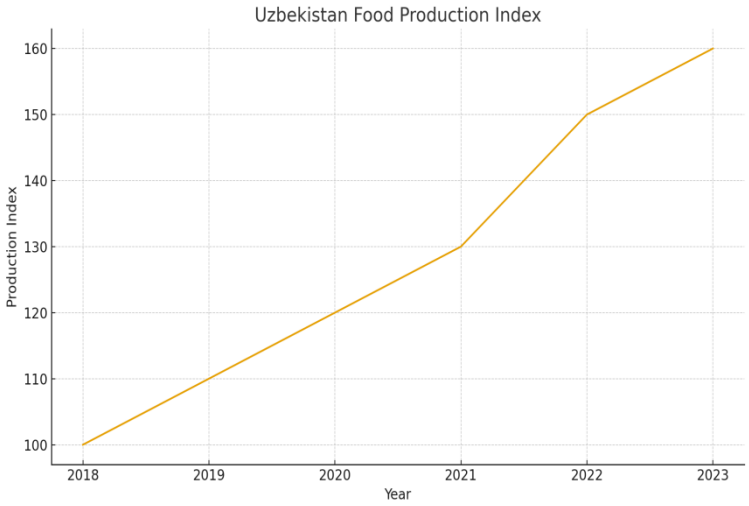


Chart 1. Growth of the food production index in Uzbekistan (2018–2023)

The ongoing revision of the Land Code, with technical support from the Food and Agriculture Organization (FAO), to strengthen land tenure security and develop a market for land use rights.[1] This legislative transformation is crucial for unlocking private investment and fostering sustainable land management, directly addressing the country's historic reliance on centralized land governance.[2]

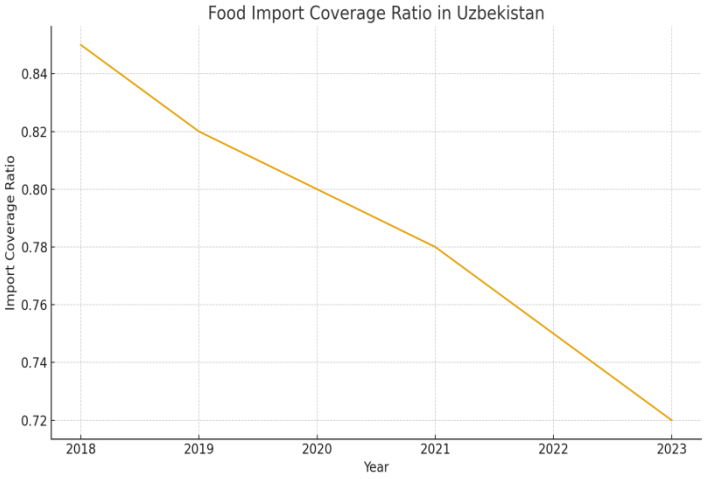


Chart 2. Dynamics of food import coverage ratio (2018–2023)

The alignment of the national strategy with international benchmarks is evident in the adoption of the FAO's four pillars of Food Security: Availability, Access, Utilization, and Stability. Specific reforms, such as the strengthening of the food safety control system through collaboration with FAO and the advancement of a new Food Law, directly harmonize national legislation with international standards, including the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security.[3] This commitment not only protects consumer health and promotes balanced nutrition but also enhances the competitiveness of Uzbekistan's agricultural exports in the global marketplace, a critical component of economic stability.

Assessing the effectiveness of the National Monitoring System (NMS**)** reveals a dynamic, albeit still evolving, mechanism. The NMS utilizes indicators encompassing both physical and economic accessibility of food, going beyond mere production

volume.[4] While data confirms substantial growth in the production of staple foods—with a significant increase in cereals, vegetables, and livestock products—challenges remain. The analysis of the food import coverage ratio (K), a key metric for physical availability, shows that while initially at an acceptable level, it has experienced a decline in recent years, pushing the physical availability of food toward the "low" level. This underscores a vulnerability to global market volatility and domestic demand pressure, which is compounded by rapid population growth. Furthermore, structural monitoring challenges, such as insufficient technical capacity for strategic monitoring and evaluation (M&E) within some government institutions and the historical issue of centralized, siloed policy-making, necessitate continuous improvement in evidence-based governance. The introduction of drone-based monitoring for efficient land use is a notable innovation, but comprehensive, integrated M&E remains an area for reinforcement.

Table 1.
Dynamics of key food indicators in Uzbekistan (2018–2023)

Year	Food Production Index (2018 = 100)	Import Coverage Ratio (K)	Explanation
2018	100	0.85	Baseline year for comparison
2019	110	0.82	Increased domestic output; slight rise in import dependency
2020	120	0.80	COVID-19 disruptions affecting logistics and supply chains
2021	130	0.78	Expansion of agro-industrial clusters and modernization efforts
2022	150	0.75	Significant growth in crop yields; rise in export volumes
2023	160	0.72	Increased vulnerability to imports amid rising domestic demand

In conclusion, Uzbekistan’s food system has demonstrated impressive resilience and growth, yet careful monitoring and proactive management are required to maintain sustainability. Continued focus on technological innovation, structural diversification, and strategic policymaking will not only reduce import dependence but also strengthen the nation’s position in regional and global food markets. Implementing these measures will provide a robust framework for achieving long-term food security, supporting sustainable economic development, and fostering self-reliance in the agricultural sector.

List of references used

1. O‘zbekiston Respublikasi Prezidenti. (2019). O‘zbekiston Respublikasi qishloq xo‘jaligini rivojlantirish strategiyasi 2020–2030.
2. Oziq-ovqat xavfsizligini ta’minlash bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida Qaror. (2021).
3. Oziq-ovqat xavfsizligi to‘g‘risidagi Qonun. (2020).

4. Ekologiya, atrof-muhitni muhofaza qilish va iqlim o‘zgarishi vazirligi. (2023). Iqlim o‘zgarishi va qishloq xo‘jaligi barqarorligi bo‘yicha milliy hisobot.
5. FAO. (2011). The State of Food Insecurity in the World. Food and Agriculture Organization of the United Nations.
6. FAO. (2014). The State of Food and Agriculture: Innovation in family farming. Rome.
7. FAO. (2012). Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests. Rome: United Nations.
8. FAO. (2023). Food Security Indicators – Methodology and Metadata.

Makhmudova Z. I.
assistant
Samarkand State Medical University
Yusupova Y. O.
student
Samarkand State Medical University
Toremuratova U. J.
student
Samarkand State Medical University
Mammatkulova Y. I.
student
Samarkand State Medical University
Saidxonova N. I.
student
Samarkand State Medical University

BIG DATA ANALYTICS IN PERSONALIZED MEDICINE

Abstract: *Big Data Analytics (BDA) has revolutionized the field of personalized medicine by enabling the analysis of large and complex healthcare datasets to inform individualized patient care. By integrating genomic, clinical, lifestyle, and environmental data, BDA facilitates precise diagnosis, treatment optimization, and risk prediction. This article explores the key methodologies, applications, and challenges associated with big data analytics in personalized medicine. The study highlights how advanced computational tools improve patient outcomes, support preventive strategies, and promote data-driven decision-making while addressing issues related to data privacy, interoperability, and ethical considerations.*

Keywords: *Big data analytics, personalized medicine, precision healthcare, genomics, predictive analytics*

Introduction

The era of personalized medicine represents a paradigm shift from traditional “one-size-fits-all” approaches to healthcare toward individualized treatment strategies based on the unique genetic, clinical, and environmental profile of each patient. The exponential growth of healthcare data, including electronic health records (EHRs), genomic sequences, wearable device outputs, and imaging studies, has created unprecedented opportunities for the application of Big Data Analytics (BDA) in medical practice.

Big Data Analytics refers to the process of collecting, processing, and analyzing vast, heterogeneous datasets to identify patterns, correlations, and predictive insights. In personalized medicine, BDA allows clinicians and researchers to uncover previously hidden associations between genetic variants, lifestyle factors, and disease outcomes. This information can then be used to tailor

interventions that maximize therapeutic efficacy while minimizing adverse effects. Additionally, BDA enables population-level insights, helping healthcare systems implement preventive strategies and allocate resources more efficiently.

The integration of machine learning, artificial intelligence, and statistical modeling with big data platforms enhances the predictive power of personalized medicine. By analyzing complex datasets in real-time, BDA facilitates early disease detection, precision diagnostics, and customized treatment plans. However, challenges such as data standardization, interoperability between healthcare systems, ethical concerns, and ensuring patient data privacy remain critical barriers to full implementation.

Discussion

Big Data Analytics (BDA) has demonstrated transformative potential in personalized medicine across multiple domains, including genomics, pharmacogenomics, clinical decision support, predictive modeling, and population health management. In genomics, BDA enables the identification of genetic variants associated with complex diseases, allowing researchers and clinicians to develop targeted therapies and precision treatment plans. By analyzing large-scale genomic datasets, including whole genome and exome sequencing, BDA can uncover subtle genetic patterns that contribute to disease susceptibility, progression, and drug response variability. This capability facilitates the design of personalized therapeutic regimens that maximize efficacy while minimizing adverse effects.

Pharmacogenomics represents another critical area in which BDA has substantial impact. Through the integration of genomic, clinical, and pharmacological data, predictive models can identify patients who are likely to benefit from specific medications or who are at risk of experiencing severe side effects. This approach reduces the trial-and-error nature of medication prescription and enhances patient safety, adherence, and overall treatment outcomes. Furthermore, BDA enables the identification of novel drug targets and repurposing opportunities by analyzing multi-dimensional datasets from clinical trials, real-world evidence, and electronic health records (EHRs).

Clinical decision support systems powered by BDA integrate patient-specific information with population-level data and evidence-based guidelines. These AI-enabled systems can provide personalized recommendations regarding diagnostics, therapy selection, and follow-up care. Predictive modeling of longitudinal patient records allows early identification of individuals at high risk for chronic diseases such as diabetes, cardiovascular disorders, and cancer. By leveraging real-time physiological data from wearable devices and remote monitoring systems, BDA enables continuous patient assessment and dynamic adjustment of treatment strategies, thereby promoting proactive care and improving long-term health outcomes.

In addition to individual-level care, BDA contributes to population health management by identifying trends, risk factors, and health disparities across large cohorts. By analyzing aggregated data, healthcare organizations can optimize

resource allocation, design targeted prevention programs, and monitor the effectiveness of public health interventions. The insights gained from BDA can inform policy decisions, reduce healthcare costs, and improve system-level efficiency.

Despite these advantages, the implementation of BDA in personalized medicine faces significant challenges. Data heterogeneity, including variations in data formats, standards, and quality across multiple sources, can impede accurate analyses. Ensuring interoperability between EHR systems, genomic databases, and wearable device outputs requires robust data integration frameworks. Additionally, the ethical, legal, and social implications of big data utilization, such as patient consent, privacy, algorithmic bias, and transparency, must be carefully addressed. Clinicians also require training and support to interpret complex analytics and incorporate them effectively into clinical decision-making. Addressing these challenges is essential for realizing the full potential of BDA in personalized medicine and for maintaining trust in healthcare systems.

Overall, Big Data Analytics represents a paradigm shift in the delivery of personalized healthcare. By integrating diverse datasets, advanced analytical tools, and AI-driven predictive modeling, BDA enables precise risk assessment, optimized treatment strategies, and improved patient outcomes. Its adoption has the potential not only to transform individual patient care but also to enhance the efficiency and effectiveness of healthcare systems on a larger scale.

Conclusion

Big Data Analytics is transforming personalized medicine by providing insights that enable precise, individualized, and proactive healthcare. Through the integration of genomics, clinical data, and real-time patient monitoring, BDA supports early disease detection, optimized treatment strategies, and improved patient outcomes. It empowers healthcare providers to move beyond generalized approaches and deliver care tailored to the unique characteristics of each patient.

The successful application of BDA in personalized medicine depends on high-quality, interoperable data, advanced analytical tools, and multidisciplinary collaboration between clinicians, data scientists, and policymakers. Addressing ethical and regulatory challenges, including patient privacy, data security, and transparency of algorithms, is essential to ensure responsible and effective use. In conclusion, Big Data Analytics offers a powerful foundation for precision healthcare, enabling personalized interventions, predictive insights, and evidence-based decision-making that have the potential to revolutionize modern medicine.

References:

1. Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: promise and potential. Health Information Science and Systems, 2(1), 3. https://doi.org/10.1186/2047-2501-2-3

2. Dash, S., Shakyawar, S. K., Sharma, M., & Kaushik, S. (2019). Big data in healthcare: management, analysis and future prospects. Journal of Big Data, 6(1), 54. https://doi.org/10.1186/s40537-019-0230-3

3. Wang, Y., Kung, L., & Byrd, T. A. (2018). Big data analytics: understanding its capabilities and potential benefits for healthcare organizations. Technological Forecasting and Social Change, 126, 3–13. https://doi.org/10.1016/j.techfore.2015.12.019
4. Kourou, K., Exarchos, T. P., Exarchos, K. P., Karamouzis, M. V., & Fotiadis, D. I. (2015). Machine learning applications in cancer prognosis and prediction. Computational and Structural Biotechnology Journal, 13, 8–17. https://doi.org/10.1016/j.csbj.2014.11.005
5. Collins, F. S., & Varmus, H. (2015). A new initiative on precision medicine. The New England Journal of Medicine, 372(9), 793–795. https://doi.org/10.1056/NEJMp1500523
6. Chen, R., Snyder, M. (2013). Systems biology: personalized medicine for the future? Current Opinion in Pharmacology, 13(4), 623–628. https://doi.org/10.1016/j.coph.2013.08.003
7. Shickel, B., Tighe, P. J., Bihorac, A., & Rashidi, P. (2018). Deep EHR: a survey of recent advances in deep learning techniques for electronic health record (EHR) analysis. IEEE Journal of Biomedical and Health Informatics, 22(5), 1589–1604. https://doi.org/10.1109/JBHI.2017.2757361
8. Deo, R. C. (2015). Machine learning in medicine. Circulation, 132(20), 1920–1930. https://doi.org/10.1161/CIRCULATIONAHA.115.001593
9. Obermeyer, Z., & Emanuel, E. J. (2016). Predicting the future — big data, machine learning, and clinical medicine. The New England Journal of Medicine, 375(13), 1216–1219. https://doi.org/10.1056/NEJMp1606181
10. Luo, Y., Szolovits, P., & Dighe, A. (2016). Using machine learning to predict laboratory test results. American Journal of Clinical Pathology, 145(6), 778–788. https://doi.org/10.1093/ajcp/aqw112

Mallayeva M. M.
assistenti
umumiy gigiyena va ekologiya kafedrasi
SamDTU
Mallayeva G. B.
Do‘stlik Abu Ali ibn Sino nomidagi jamoat salomatligi texnikumi
Kungratova M. I.
Suzangaron Abu Ali ibn Sino nomidagi jamoat salomatligi texnikumi
Abduxalimova D. A.
talabasi
biotexnologiya, injiniring va farmatsiya fakulteti

BIOTEXNOLOGIYA VA BIOMEDITSINA MUHANDISLIGI MUAMMOLARI

Annotatsiya*: Ushbu maqolada biotexnologiya va biomeditsin muhandisligi sohalarida yuzaga kelayotgan asosiy muammolar ko‘rib chiqilgan. Gen muhandisligi, klonlash, sintetik biologiya kabi innovatsion yo‘nalishlardagi etik va huquqiy ziddiyatlar, xalqaro me’yoriy bazaning yetarli emasligi va bioxavfsizlikka oid xavflar ilmiy tahlil qilingan. Biomeditsina mahsulotlarini standartlashtirish, sifat nazoratining samaradorligi, hujayra madaniyatlari va sanoat miqyosiga chiqarishdagi texnik to‘siqlar yoritilgan. Shu bilan birga, tibbiyot tizimi bilan integratsiyaning yetishmasligi, mutaxassislar tayyorlashdagi muammolar, moliyalashtirishning cheklanganligi va texnologik bog‘liqlik kabi omillar ham tahlil etilgan. Ekologik xavflar, GMOlarninng nazoratsiz tarqalishi, laboratoriya bioxavfsizligi, chiqindilarni tozalash va barqaror biotexnologiya tamoyillarini joriy etishning dolzarbligi alohida ko‘rsatib o‘tilgan. Maqolada keltirilgan xulosalar biotexnologiya rivojining xavfsiz va samarali bo‘lishi uchun kompleks yondashuv, me’yoriy baza takomillashuvi, xalqaro hamkorlik va mutaxassislar tayyorlashning kuchaytirilishi zarurligini asoslaydi.*

Kalit so‘zlar*: Biotexnologiya, biomeditsin muhandisligi, gen muhandisligi, standartlashtirish, biomateriallar, hujayra madaniyati, bioxavfsizlik, GMO, ekologik xavf, tibbiyot integratsiyasi, nanobiotexnologiya, barqaror biotexnologiya, me’yoriy baza, innovatsion texnologiyalar.*

Mallayeva M. M.
assistant
department of general hygiene and ecology
SamDTU
Mallayeva G. B.
Friendship Abu Ali ibn Sino Public Health College
Kungratova M. I.
Suzangaron Abu Ali ibn Sino Public Health College
Abduxalimova D. A.
student
Faculty of Biotechnology, Engineering and Pharmacy

PROBLEMS OF BIOTECHNOLOGY AND BIOMEDICAL ENGINEERING

Abstract: *This article examines the main challenges emerging in the fields of biotechnology and biomedical engineering. A scientific analysis is presented of ethical and legal conflicts in innovative areas such as genetic engineering, cloning, and synthetic biology, as well as the insufficiency of the international regulatory framework and risks related to biosafety. Issues of standardization of biomedical products, effectiveness of quality control, and technical barriers associated with cell cultures and scaling up to industrial production are highlighted. In addition, factors such as insufficient integration with the healthcare system, challenges in specialist training, limited funding, and technological dependence are analyzed. Particular attention is paid to environmental risks, uncontrolled spread of GMOs, laboratory biosafety, waste management, and the importance of implementing principles of sustainable biotechnology. The conclusions of the article substantiate the need for a comprehensive approach, improvement of the regulatory framework, expansion of international cooperation, and strengthening of specialist training to ensure the safe and effective development of biotechnology.*

Key words: *Biotechnology, biomedical engineering, genetic engineering, standardization, biomaterials, cell culture, biosafety, GMOs, environmental risk, healthcare integration, nanobiotechnology, sustainable biotechnology, regulatory framework, innovative technologies.*

Kirish

Biotexnologiya va biomeditsin muhandisligi — bu zamonaviy fanning biologiya, kimyo, tibbiyot, axborot texnologiyalari va muhandislik sohalari tutashgan muhim yo‘nalishlaridir. Ular kasalliklarni aniqlash, davolash va oldini olishning yangi usullarini yaratishga, shuningdek, yangi biomateriallar, dori vositalari va tibbiy uskunalarni ishlab chiqishga qaratilgan.

So‘nggi o‘n yilliklardagi katta yutuqlarga qaramasdan, mazkur sohalarda rivojlanish va amaliyotga joriy etishni cheklovchi qator jiddiy muammolar mavjud.

1. Etik va huquqiy muammolar

Biotexnologiyadagi eng dolzarb masalalardan biri — gen muhandisligi, klonlash va inson genomini tahrirlash bilan bog‘liq etik jihatdir.

CRISPR/Cas9 texnologiyasi, sintetik biologiya va hujayra reprogrammalash kabi usullar inson genetik kodiga aralashishning mumkinligi haqida jamoatchilik orasida tortishuvlarga sabab bo‘lmoqda.

Bunday tadqiqotlarni tartibga soluvchi yagona xalqaro huquqiy baza mavjud emasligi, genetik texnologiyalardan nazoratsiz foydalanish xavfini keltirib chiqaradi va bioetika tamoyillarining buzilishiga olib kelishi mumkin.

2. Standartlashtirish va sifat nazorati muammolari

Biomeditsin texnologiyalarning jadal rivojlanishi yaratilayotgan mahsulotlarning xavfsizligi va samaradorligini kafolatlaydigan aniq me’yorlar va standartlarni talab etadi. Ammo ko‘pgina innovatsion yechimlar me’yoriy hujjatlardan tezroq paydo bo‘lmoqda.

Biomateriallar, sun’iy a’zolar, biomoslashuvchi qoplamalar va dori vositalarini yetkazib berishning nanotuzilmaviy tizimlarini baholash uchun yagona standart usullar yetishmasligi muammo bo‘lib qolmoqda.

3. Texnik va ishlab chiqarish qiyinchiliklari

Murakkab biotexnologik tizimlarni yaratish uchun yuqori aniqlikdagi sintez, hujayra yetishtirish va fiziologik jarayonlarni modellashtirish usullari zarur.

Asosiy qiyinchiliklar quyidagilardan iborat:

• 3D-biochop etish va to‘qimalar yetishtirish texnologiyalarining yetarlicha takomillashmaganligi;

• hujayra madaniyatlarining noustuvorligi;

• jihozlar va sarf materiallarining yuqori qiymati;

• laboratoriya natijalarini sanoat miqyosigacha kengaytirish murakkabligi.

Bu omillar ilmiy ishlanmalarni amaliyotga joriy etish va tijoratlashtirish jarayonini sekinlashtiradi.

4. Tibbiyot bilan integratsiya muammolari

Biomeditsin muhandisligi faol rivojlanayotganiga qaramasdan, olimlar, muhandislar va amaliy shifokorlar o‘rtasidagi hamkorlik yetarli darajada yo‘lga qo‘yilmagan.

Ko‘pincha tadqiqot natijalari fan va tibbiyot tizimlari o‘rtasidagi uzilishlar sababli tibbiyot muassasalariga yetkazilmaydi.

Bundan tashqari, tibbiy xodimlar zamonaviy biotexnologik yechimlardan foydalanish uchun zarur bilim va ko‘nikmalarga hamisha ega emas.

5. Moliyaviy va tashkiliy to‘siqlar

Biotexnologiya sohasidagi tadqiqotlar juda qimmat va uzoq muddatli sarmoyalarni talab qiladi.

Ayniqsa, rivojlanayotgan mamlakatlarda moliyalashtirish muammosi katta loyihalarni amalga oshirish imkoniyatini cheklaydi.

Shuningdek, chet el texnologiyalari va jihozlariga bog‘liqlik milliy texnologik mustaqillikni pasaytiradi.

Muhandislik, biologiya va tibbiyot tutashgan sohada ishlay oladigan mutaxassislar yetishmasligi ham jiddiy to‘siq hisoblanadi.

6. Ekologik va bioxavfsizlik xavflari

Gen muhandisligi va mikrobiologik ishlab chiqarish sohalarida biotexnologiyalarning rivojlanishi katta salohiyat bilan bir qatorda jiddiy ekologik va bioxavfsizlik muammolarini ham keltirib chiqaradi.

Asosiy xavf — genetik o‘zgartirilgan organizmlar (GMO), rekombinant mikroorganizmlar, virus vektorlari va boshqa biologik agentlarning nazoratsiz tarqalishi natijasida tabiiy ekotizimlarga va inson salomatligiga ta’sir ko‘rsatish ehtimolidadir.

Biotexnologik eksperimentlar jarayonida GMOlarning laboratoriya yoki ishlab chiqarish obyektlaridan tashqariga chiqib ketish ehtimoli mavjud.

Bunday organizmlar tabiiy populyatsiyalar bilan gen almashinuviga kirishib, biologik muvozanatni buzishi va kutilmagan oqibatlarga olib kelishi mumkin.

Ayniqsa, qishloq xo‘jaligida transgen o‘simliklar va mikroorganizmlardan foydalanish xavfli hisoblanadi, chunki ularning changlari va sporalari katta masofagacha tarqalishi orqali tabiiy ekotizimlarni ifloslantirishi mumkin.

Biologik xavfsizlik darajalari (BSL — Biological Safety Levels) qoidalariga rioya qilish biologik xavfli agentlar bilan ishlashda majburiy hisoblanadi.

Sterilizatsiya, chiqindilarni utilizatsiya qilish va dezinfeksiya masalalariga yetarli e’tibor berilmasligi xodimlarning yoki atrof muhitning zararlanishiga sabab bo‘lishi mumkin.

Ayrim laboratoriyalarda, ayniqsa rivojlanayotgan mamlakatlarda, BSL-2 va BSL-3 xalqaro standartlari to‘liq bajarilmaydi, bu esa favqulodda holatlar xavfini oshiradi.

Biotexnologik ishlab chiqarish chiqindilarini utilizatsiya qilish ham muammo bo‘lib qolmoqda, chunki ular faol mikroorganizmlar, antibiotiklar, fermentlar va kimyoviy moddalarni o‘z ichiga oladi.

To‘g‘ri qayta ishlanmagan bunday chiqindilar tuproq va suv manbalarini ifloslantirib, tabiiy biokimyoviy aylanishni buzishi mumkin.

Shu sababli fizik-kimyoviy va biologik tozalash usullarini o‘z ichiga olgan samarali neytrallash va rekultivatsiya texnologiyalarini ishlab chiqish zarur.

Sintetik biologiya va nanobiotexnologiya kabi zamonaviy yo‘nalishlar ham ehtimoliy xavf manbaidir.

Yaratilgan sun’iy mikroorganizmlar yoki nanotuzilmalar tirik hujayralar bilan o‘zaro ta’sirga kirishib, kutilmagan mutatsiyalar, biointegratsiya yoki ekotizimdagi disbalansga sabab bo‘lishi mumkin.

Bu texnologiyalarni tartibga soluvchi global me’yorlarning yo‘qligi “biotexnologik qurol” yoki ilmiy jamoatchilik nazoratidan tashqari tajribalarning paydo bo‘lish xavfini kuchaytiradi.

Shu bois, tadqiqotchilarda ekologik tafakkurni shakllantirish, o‘z faoliyati oqibatlari uchun mas’uliyat hissini kuchaytirish va “barqaror biotexnologiya” tamoyillarini joriy etish muhim ahamiyatga ega.

Biotexnologiya rivoji ekologik etika va barqaror rivojlanish tamoyillariga asoslanishi kerak.

Bu xavfsiz gen o‘zgartirish usullaridan foydalanish, bioparchalanadigan materiallar va energiya tejamkor texnologiyalardan samarali foydalanishni nazarda tutadi.

Faqat tabiat oldidagi mas’uliyatni innovatsiyalar bilan uyg‘unlashtirgan holdagina biotexnologiyalarning salbiy oqibatlarini oldini olish va tabiiy muhit bilan muvofiq rivojlanishni ta’minlash mumkin.

Xulosa

Biotexnologiya va biomeditsin muhandisligi insoniyat oldida hayot sifatini oshirish va uning davomiyligini uzaytirish uchun beqiyos imkoniyatlar ochmoqda.

Biroq bu sohalarning keyingi rivojlanishi etik, huquqiy, texnik va tashkiliy muammolarni kompleks hal etishni talab qiladi.

Bu fanlarning kelajagi ilmiy tadqiqotlarni integratsiya qilish, me’yoriy bazani takomillashtirish, ta’limga investitsiya kiritish va xalqaro hamkorlikni rivojlantirishga bog‘liq.

Faqat shunday shartlar bajarilgan taqdirdagina biotexnologik innovatsiyalar jamiyat manfaatlari uchun xavfsiz va samarali xizmat qila oladi.

Adabiyotlar ro‘yxati

1. Brundtland, G.H. Our Common Future. Oxford University Press, 1987.
2. Daly, H., & Farley, J. Ecological Economics: Principles and Applications. Washington: Island Press, 2011.
3. United Nations Environment Programme (UNEP). Global Environment Outlook 6 (GEO-6). Nairobi, 2019.
4. O‘zbekiston Respublikasi Ekologiya, atrof-muhitni muhofaza qilish va iqlim o‘zgarishi vazirligi. O‘zbekiston Respublikasining ekologik siyosati bo‘yicha hisobot, 2023.
5. Abdullayev, M. Atrof-muhit muhofazasi va ekologik xavfsizlik asoslari. Toshkent: Fan nashriyoti, 2020.
6. Qodirova, N., Sharipov, B. “Yashil iqtisodiyotning milliy rivojlanish strategiyalaridagi o‘rni”, Ekologiya va hayot, №4, 2022.
7. .Бахриева, Д. У., & Хамраева, Ш. Ш. (2025). ВЫРАЩИВАНИЕ И ПЕРЕРАБОТКА ЛЕКАРСТВЕННЫХ РАСТЕНИЙ: ПУТИ РЕШЕНИЯ АКТУАЛЬНЫХ ПРОБЛЕМ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(1), 19-25.
8. Хасанова, Г. Р., Магрипова, Д. Ф., & Алибоева, Ш. У. (2025). РОЛЬ ЛИМОНА В ЖИЗНИ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(1), 26-32.
9. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
10. Хасанова, Г. Р., Юнусова, Ш., Рафикова, Ш. В., Алибоева, Ш. У., & Мамаюсупова, З. Б. (2025). ИСПОЛЬЗОВАНИЕ ФИТОТЕРАПИИ В

РАННЕМ ДЕТСКОМ ВОЗРАСТЕ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 200-207.
11. Хасанова, Г. Р., Исрофилова, Ш., Тургунбоева, Н., & Юсупов, Ш. (2025). ЭМАН МЕВАЛАРИНИНГ КИМЁВИЙ ТАРКИБИНИ АНИҚЛАШ УСУЛЛАРИ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 208-214.
12. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
13. Хасанова, Г. Р., Эшниязова, Н. А., & Турабоева, Л. М. (2025). ВЛИЯНИЕ БИОЛОГИЧЕСКИ АКТИВНЫХ И ЛЕКАРСТВЕННЫХ МОЛЕКУЛ НА ОРГАНИЗМ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(4), 61-66.
14. Хасанова, Г. Р. (2025). ХИМИЧЕСКИЙ АНАЛИЗ БИОЛОГИЧЕСКИ АКТИВНЫХ ВЕЩЕСТВ В КОРНЕВИЩАХ И КОРНЯХ ДЕВЯСИЛ ВЫСОКИЙ-INULA HELENIUM L., ПРОИЗРАСТАЮЩЕГО НА ТЕРРИТОРИИ СРЕДНИЙ АЗИИ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 79(3), 157-164.

УДК: 616.71-018.46-002-036.12-89 .

Mamadiyarova D. U., PhD
dotsenti
Samarqand davlat tibbiyot univesiteti
Samandarov U. Y.
talabasi
davolash ishi fakulteti
Raximberdiyeva R. Sh.
talabasi
davolash ishi fakulteti
Samarqand Davlat Tibbiyot Universiteti

GLUKOKORTIKOIDLARNING ORGANIZMDAGI FIZIOLOGIK JARAYONLARDAGI AHAMIYATI

Annotatsiya: *Ushbu maqolada glukokortikoidlarning (GK) fiziologik xususiyatlari, ularning biosintezi, immun tizimga ta`siri hamda metabolik buzilishlardagi roli keng yoritib berilgan. GKlarning asosiy vakili bo`lgan kortizol gipotalamus-gipofiz-buyrak usti (HPA) tizimi tomonidan boshqariladi va uning sintezi buyrak usti bezining po'stloq zona fasciculata qismida xolesterindan boshlanadi. Biosintez jarayoni StAR oqsili vositasida xolesterinning mitoxondriyaga ko`chirilishi, CYP11A1, CYP17A1, CYP21A2 va CYP11B1 fermentlarning ishtirokida pregnenolon, 17-gidroksiprogesteron va kortizol hosil bo`lishi bosqichlarini o`z ichiga oladi. Maqolada GKlarning immunomodulyator xususiyatlari, xususan neytrofillar miqdorining ortishi, limfotsitlar sonining kamayishi, apoptozning kuchayishi va immunosupressiv ta`sir mexanizmlari bayon qilingan.*

Kalit so`zlar: *glukokortikoidlar, immun tizimi, xolesterin, kortizol, glukokortikosteroidlar, giperkortitsizm, kardiovaskulyar xavflar, angiogenez*

Mamadiyarova D. U., PhD
associate professor
Samarkand State Medical University
Samandarov U. Y.
student
Faculty of Therapeutic Work
Raximberdiyeva R. Sh.
student
Faculty of Therapeutic Work
Samarkand State Medical University

IMPORTANCE OF GLUCOCORTICOIDS IN PHYSIOLOGICAL PROCESSES IN THE ORGANISM

Annotation: *This article provides a comprehensive review of the physiological properties of glucocorticoids (GCs), their biosynthesis, effects on the immune system, and their role in metabolic disorders. The main representative of GCs, cortisol, is controlled by the hypothalamic-pituitary-adrenal (HPA) axis, and its synthesis begins from cholesterol in the zona fasciculata of the adrenal cortex. The biosynthesis process includes the transport of cholesterol into mitochondria by the StAR protein, and the formation of pregnenolone, 17-hydroxyprogesterone, and cortisol with the participation of CYP11A1, CYP17A1, CYP21A2, and CYP11B1 enzymes. The article describes the immunomodulatory properties of GCs, in particular, an increase in the number of neutrophils, a decrease in the number of lymphocytes, increased apoptosis and mechanisms of immunosuppressive action.*

Keywords: *glucocorticoids, immune system, cholesterol, cortisol, glucocorticosteroids, hypercorticism, cardiovascular risks, angiogenesis*

Kirish

Glukokortikoidlar organizmning stressga javob berishida, metabolik jarayonlarni va immun tizimini boshqarishda markaziy o`rin tutadigan steroid gormonlar guruhi. Ularning asosiy vakili bo`lgan kortizol gipotalamus-gipofiz-buyrak usti (**HPA**) o`qi tomonidan nazorat qilinadi va uning sekretsiyasi sutkalik ritm hamda turli xil stress omillariga sezgir tarzda boshqariladi. Glukokortikoidlarning biosintezi adrenal korteksning zona fasciculata qismida amalga oshadi va dastlabki substrat xolesterin hisoblanadi.

So`nggi yillarda o`tkazilgan ilmiy tadqiqotlar natijasiga ko`ra, glukokortikoidlar (**GK**) nafaqat metabolik jarayonlar, balki immun tizim faoliyati ustidan ham chuqur va murakkab ta`sir ko`rsatishi aniqlangan. Shu bilan birga, kortizolning metabolik jarayonlarga ta`siri fiziologik moslashuvning muhim tarkibiy qismi bo`lsada, uning miqdorini surunkali yuqori darajaga ko`tarilishi natijasida insulin rezistentligi, abdominal semirish, dislipidemiya va steroid diabet kabilar kelib chiqishi mumkin.

Ushbu maqola GK larning fiziologiyasini 3 asosiy yo`nalishda yoritib beradi: ularning biosintezi, immun tizimga ta`siri va kortizolning metabolik buzilishlardagi roli. Mazkur yo`nalishlarning chuqur yoritilishi GK larning normal gomeostazni saqlashdagi o`rni hamda patalogik holatlarda ularning ahamiyatini yanada chuqurroq tushunishga yordam beradi.

Tadqiqot materiallari va usullari.

Ushbu maqola glukokortikoidlarningta'sir mexanizmiga oid ilmiy manbalar, monografiyalar va so`nggi yillarda o`tkazilgan eksperimental tadqiqotlar asosida yozilgan. Tahlil jarayonida glukokortikoidlar biosintezi, ularning immun tizimi hujayralariga ta`siri, metabolik buzilishlardagi o`rni hamda angiogenez jarayoniga ta`siri bo`yicha adabiyotlar o`rganilgan. Mazkur ma`lumotlar GKlarning biosintezida ishtirok etuvchi ferment tizimlari (CYP11A1, CYP17A1, CYP21A2, CYP11B1), StAR oqsili va ACTH ta`siri haqidagi ilmiy xulosalarga tayangan holda tahlil qilindi. Shuningdek, immun tizimmidagi o`zgarishlar, limfotsitlar va monotsitlarning miqdoriy dinamikasi, apoptoz mexanizmlardagi rolini tavsiflovchi adabiyotlar umumlashtirildi. Metabolik jarayonlar, giperkortitsizm, qandli diabet, dislipidemiya va angiogenezdagi o`zgarishlar bo`yicha eksperimental tadqiqotlar natijalari solishtirildi.Tadqiqotda klinik ma`lumotlar yoki bemorlar ustida o`tkazilgan eksperimentlar qo`llanilmagan, barcha xulosalar mavjud ilmiy adabiyotlar tahliliga asoslangan.

Olingan natijalar

Glukokortikoidlarning biosintezi murakkab jarayon bo`lib, adrenal korteksning zona fasciculata qismida kechadi. Biosintezning boshlang`ich substrati bo`lgan xolesterinni mitoxondriyaga StAR (Steroidogenic Acute Regulatory) oqsili ko`chirib o`tkazadi. StAR ACTH tomonidan boshqariladigan va **cAMP/PKA** signal yo`li orqali faollashadigan oqsil.

Mitoxondriyaga yetib kelgan xolesterin **CYP11A1** (20,22-desmoloza) fermenti ishtirokida pregnenolonga aylantiriladi. Keyin pregnenolon sarkoplazmatik retikulumga o`tib, **CYP17A1** (17α-gidroksilaza) ta`sirida 17-gidroksipregnenolonga aylanadi. Mana shu ferment orqali GK sintez yo`li mineralokortikoidlar yo`lidan farq qiladi. Keyingi bosqichda 17-gidroksiprenenolon **3β-HSD** yordamida 17-gidroksiprogesteronga oksidlanadi. Bu ferment steroidogenezning markaziy komponentlaridan biri hisoblanadi va buning yetishmasligi natijasida turli endokrin disfunksiyalar kelib chiqadi. 17-gidroksiprogesteron esa **CYP21A2** (**21-gidroksilaza**) tomonidan 11-dezoksikortizolga gidroksillanadi. CYP21A2 mutatsiyalari tug`ma adrenal giperplaziyaning asosiy etiologik omili sifatida klinik ahamiyatga ega.

GK lar biosintezining so`nggi bosqichi mitoxondriyada amalga oshadi. **CYP11B1** (**11β-gidroksilaza**) 11-dezoksikortizolni kortizolga aylantiradi. Yakuniy mahsulot kortizol qon oqimiga chiqariladi va o`zing quyidagi funksiyalarini bajaradi: metabolik, immunomodulyator va stressga moslashuv.

Glukokortikoidlar biosintezining barcha bosqichlari gipotalamus-gipofiz-buyrak usti (**HPA**) o`qi tomonidan boshqariladi. ACTH StAR ekspressiyasini oshiribgina qolmay, CYP11A1, CYP17A1, CYP21A2 va CYP11B1

fermentlarning transkripsiyasini ham oshiradi. Shuning uchun ham ACTH darajasining o`zgarishi glukokortikoid ishlab chiqarilishining asosiy fiziologik regulyatori hisoblanadi.

Glukokortikoid goemonlar immunitet tizimining neyroendokrin regulyatsiyasida normal holatda va patologik holatda muhim rol o`ynaydi.

D.V.Lanin, N.V.Zaytseva va boshqalarning maqolasida va monografiyasida mualliflar GKning immunitet tizimi hujayralariga ta`sir qilish mexanizmlari haqidagi ta`limot tarixini shartli ravishda **uch bosqichga** bo`lishadi.

Birinchi bosqich (1936 y. – 1970-yillarning boshi) – GKning limfotik ta`siri haqida ma`lumot olish.

Ikkinchi bosqich 1970-yillarning oxirini qamrab oladi. T-limfotsitlarning suyak iligi va biriktiruvchi to`qimalarga migratsiyasining qayta taqsimlanish mexanizmlari batafsil o`rganilgan.

Uchinchi bosqichda (1990-yillar) GK tomonidan induksiya qilingan, steroid retseptorlari Nur77 bilan bog`liq bo`lgan apoptoz jarayonlari aniqlandi.

Endi GK ta`sirida immun tizimida yuz beradigan miqdoriy o`zgarishlarga to`xtalib o`tsak. GK periferik qondagi neytrofil granulotsitlar (NG) miqdorini oshiradi. Bu esa ularnini to`qimalarga migratsiyasi tormozlanishi natijasida yuz beradi. Monositlar soni esa kamayadi. Limfotsitlar, ayniqsa $CD4^+$ (Th1 va Th2) limfotsitlar miqdori ularning apoptozi hisobiga kamayadi.

Hozirgi vaqtda GKning immunitetning hujayra va gumoral bo`g`inlarining turli tarkibiy qismlariga, hamda organizmning nosfetsifik rezistentligiga ta`sirining molekulyar mexanizlari faol o`rganilmoqda.

Preparat dozasiga va GK-terapiya davomiyligiga bog`liq bo`lgan immunosupressiv ta`sirlari quyidagilarda iborat.

Mononuklear fagotsitlarning klirens funksiyasini susaytiradi;

Immunoglobulinlarning Fc-fragmentiga retseptorlar va hujayra adgeziyasi molekulalari ekspressiyasini tormozlaydi;

Leykotsitlarning yallig`lanishli hujayra emigratsiyasini bostiradi;

Autoimmun javobni bostiradi;

Yetilmagan timotsitlarda apoptozni induksiyalaydi (qo`zg`atadi).

Stress holatida qonda turli fermentlarning faolligi ortadi, ularning ko`pchiligi nospetsifik mitogen ta`sir ko`rsatib, keyinchalik B-limfotsitlarning plazmositar faollashuvini rag`batlantiradi. Bu jarayon organizmning nospetsifik rezistentligini saqlashda ahamiyatga ega. Qondagi GKlar darajasining oshishi ham shu mexanizmni qo`llab-quvvatlaydi. Shu bilan birga, limfoid to`qimalarda GKning ta`siri dozaga bog`liq tarzda limfotsit funksiyalarining umumiy susayishiga olib keladi. Bundan tashqari, organizmda GKning limfolitik faolligini cheklay oladigan boshqa maxsus induktor tizimlar ham mavjud. Ularga korteksolon, progesteron, testosteron va estradiol kiradi.

GK jigarda metabolik jarayonlarni kuchaytirsa, limfoid to`qimalarda aksincha uni ingibirlaydi, bu jarayon retseptor darajasidagi mexanizmlar bilan bog`liq. Masalan, progesteron va korteksolon kalamush talog`i leykotsitlarida GK-retseptor o`zaro ta`sirini raqobatli ravishda ingibirlaydi.

Kortizolning sutkalik sekretsiyasi 15-30 mg ni tashkil etadi. Kortizol plazmada erkin, oqsil bilan bog`langan va metabolitlar shaklida bo`ladi. Normada erkin kortizol qondagi umumiy miqdorining taxminan 5% ini tashkil etadi. Kortizolning taxminan 90% i gormonga yuqori moyillikka ega bo`lgan transkortin (alfa-2-globulin) bilan bog`lanadi. 5% dan kamrog`i past moyillikka ega bo`lgan albumin bilan bog`lanadi. Shuni takidlab o`tish kerakki, kortizolning biologik faolligi, ya`ni to`qimalarga bevosita ta`siri aynan erkin kortizol bilan bog`liq.

Normada glukokortikosteroidlar (GKS) barcha almashinuv turlarida (oqsil, ulgevod, lipid almashinuvida) ishtirok etadi, shu sababli giperkortitsizmda patofiziologik va klinik o`zgarishlar keng diapazonda bo`ladi. GK larning ortiqcha ishlab chiqarilishi gipofiz o`smalarida adrenokortikotrop gormon (AKTG) darajasining oshishi (Itsenko-Kushing kasalligi), kortikotropinga o`xshash moddalarni ishlab chiqaradigan boshqa hujayralardan (bronxlar, timus, oshqozon osti bezi) kelib chiqqan o`smalar, yoki buyrak usti bezi po`stlog`i tomonidan kortizolning ortiqcha sintezlanish (Itsenko-Kushing sindromi) natijasi bo`lishi mumkin. Ushbu orfan (kam uchraydigan) kasalliklar misolida kortizol ortiqchaligining organlar va to`qimalarga turli ta`sirlari o`rganilgan.

Giperkortitsizmda glukoza tolerantligining buzilishi yoki qandli diabet kuzatiladi, bu esa glukoneogenizning rag`batlanishi va insulin rezistentligining rivojlanishi, oqsillar katabolizmining kuchayishi, mushak massasining kamayishi, terining yupqalashishi, osteoporoz, limfoid to`qimaning involutsiyasi, yog` to`qimasining o`ziga xos qayta taqsimlanishi va morfologik tarkibining o`zgarishi bilan bog`liq.

Tadqiqot ma`lumotlari shuni ko`rsatadiki, semizlik va 2-toifa qandli diabetda (QTD), ko`pincha o`sma to`qimasi tomonidan gormonning haddan tashqari ko`p ishlab chiqarilishi bilan bog`liq bo`lmagan funksional giperkortitsizm aniqlanadi. Jahon Sog`liqni Saqlash Tashkiloti (JSST) ini ma`lumotlariga ko`ra, 2007-yilda dunyoda 523 million semizlik bilan og`rigan bemor ro`yxatga olingan. JSSTning 2025-yildagi prognozlariga ko`ra dunyo aholisining yarmi ortiqcha vaznga ega. Xalqaro Diabet Federatsiyasi (IDF) ma`lumotlariga ko`ra, dunyo aholisi bo`yicha kattalar (20-79 yosh) orasida QTD tarqalishi taxminan 9% ni yoki mutlaq raqamlarda 415 million kishini tashkil qiladi. Ekspertlarning prognozlariga ko`ra, 2040-yilga kelib ularning soni 642 millionga yetadi. Kardiovaskulyar buzilishlarning asosida yotgan ushbu metabolik omillardan tashqari, kortizol angiogenezga ingibitor ta`sir ko`rsatadi. Agiogenez deganda, to`qimalar reparatsiyasi va ishemiyasi bilan kechadigan boshqa kasalliklar, masalan, yurak ishemik kasalligi, pastki oyoq-qo`lning surunkali arterial yetishmovchiligi va hokazo uchun zarur bo`lgan yangi qon tomirlarning o`sish jarayoni tushuniladi.

Angiogenizning gipoksiya orqali tartibga solinishi gomeostazning muhim tarkibiy qismi hisoblanadi. Normada, to`qimalarda kislorod miqdorining kamayishiga javoban, gipoksiya bilan induksiya qilingan omil Ia (HIF-1) yangi tomirlarning o`sishini rag`batlantiradi. Xuddi mana shu jarayon ishemiyalangan to`qimalarda ham ishlaydi.

HIF-1 tomonidan nazorat qilinadigan tomir endotelial o`sish omilining (VEGF) ishlab chiqarilishi angiogenez uchun hal qiluvchi ahamiyatga ega bo`lgan autokrin signal uzatishga olib keladi. Angiogenezdagi ko`plab biologik jarayonlar, hujayradan tashqari matritsaga invaziya va endotilial hujayralar tomonidan naycha shakllanishi HIF-1 orqali gipoksiya sharoitida rag`batlantiriladi. HIF-1 o`z navbatida bu jarayonlarda muhim rol o`ynaydigan o`nlab genlarning transkripsiyasini faollashtiradi.

Tadqiqot ma`lumotlari shuni ko`rsatadiki, miokardning patologik qayta qurilishi, uning gipertrofiyasi va keyinchalik yurak yetishmovchiligi rivojlanishi bilan dilatatsiyasi jarayonida HIF-1 asosiy rollardan birini o`ynaydi. HIF-1 VEGF ishlab chiqarilishini rag`batlantiradi va bu esa endotelial hujayralar yuzasidagi retseptor bilan bog`lanadi. Shundan so`ng, endoteliotsetlarning proliferatsiyasi va migratsiyasini rag`batlantiruvchi ERK (Ras-ERK va MAPK/ERK) signal yo`li faollashadi.

GKlar vositasidagi angiogenezning ingibrlanishi fiziologiya, patofiziologiya va ayrim kasalliklarga terapevtik yondashuvlarda muhim rol o`ynaydi. Biroq, glukokortikoidlarning yangi qon tomirlarini o`sishini ingibirlash mexanizmlari to`liq o`rganilmagan. James J. Logie va hamkasblarining ekspremental tadqiqoti shuni ko`rsatadiki, hatto kortizolning fiziologik darajalari ham endotelial hujayralar tomonidan tomir naychasining shakllanishini to`g`ridan-to`g`ri oldini olish orqali angiogenezni bostiradi. Angiogenez jarayonida endotelial hujayralar faol proliferatsiya qila boshlaydi, buning natijasida yangi hosil bo`lgan tomirlarning ichki qatlamini tashkil etuvchi yuqori tartibli hujayra chiqilari shakllanadi.

Kortizol ta`siri natijasida hujayralararo kontaklar hosil bo`lishi kamayadi, ammo shu bilan birga endotelial hujayralarning proliferatsiyasi, migratsiyasi yoki hayotiy faoliyati yomonlashmaydi. Avvalgi tadqiqotlar shuni ko`rsatadiki, GKlar VEGF sintezini ingibrlash orqali angiogenezni susaytiradi, bu esa kortizolning naychalar shakllanishini boshlaydigan ignal yo`llariga ingibitor ta`sirini isbotlaydi.

Shunday qilib kortizolning gipersekretsiyasi natijasida VEGF orqali vositalangan angiogenez buziladi, bu esa yurak faoliyati jarayonlarining dezadaptatsiyasiga va og`ir yurak yetishmovchiligining rivojlanishiga tezroq olib keladi.

Xulosa

Glukokortikoidlar organizmda stressga moslashuv, metabolik jarayonlarnin boshqarish va immun tiziming regulyatsiyasida markaziy ahamiyatga ega bo`lgan steroid gormonlar guruhi. Ularning sintezi adrenal korteksda murakkab fermentativ jarayonlar orqali amalga oshadi va HPA o`qi tomonidan boshqariladi. GKlarning immun tizimga ta`siri miqdoriy va sifat jihatdan sezilarli bo`lib neytrofillar soning ortishi, limfotsitlarning kamayishi, apoptozning kuchayishi va immunosupressiv mexanizmlar bilan namoyon bo`ladi. Kortizolning surunkali oshishi metabolik sindrom, insulin rezistentligi, yog` to`qimasining qayta taqsimlanishi, oqsil katabolizmi va angiogenezning susayishi kabi patologik jarayonlarga olib kelishi aniqlangan. Ayniqsa, VEGF ishlab chiqarilishi va HIF-1

faolligining pasayishi natijasida angiogenezning buzilishi yurak va qon tomir tizimida dezadaptatsion o`zgarishlar yuzga kelishiga sabab bo`ladi. Umuman olganda, glukokortikoidlar organizmning gomeostazi uchun zarur bo`lsa-da, ularning surunkali ortiqchaligi ko`plqab tizimlarda chuqur patologik jarayonlarni keltirib chiqaradi. Shu bois GKlarning fiziologiyasi va patofiziologiyasini chuqur o`rganish klinik amaliyot uchun muhim ilmiy asos bo`lib xizmat qiladi.

Foydalanilgan adabiyotlar ro`yxati

1. Cain, D. W., & Cidlowski, J. A. (2017). Immune regulation by glucocorticoids. Nature Reviews Immunology, 17(4), 233-247.
2. Walker, B. R. (2007). Glucocorticoids and cardiovascular disease. European Journal of Endocrinology, 157(5), 545-559.
3. Kater CE, Giorgi RB, Costa-Barbosa FA. Classic and current conceptss in adrenal steroidogenesis: a reappraisal, Archives of Endocrinology and Metabolism. 2022;66(1):77-87
4. Taves MD, et al. Extra-adrenal glucocorticoid biosynthesis: implications for autoimmune and inflammatory disorders. Pubmed, 2020.
5. Наталья Олеговна Цой, and Олег Гиленович Цой. "Глюкокортикоидные гормоны и иммунная система" Астана медициналық журналы, vol. 109, no. 3, 2021, pp. 4-13.
6. S.G . Utkurovna, AG Ablakulovna, NU Rahmatullaevna, TS Bahodirovna, ...
7. The condition of pro-and antioxidant systems in children with acute laryngotracheitis with immunomodulating therapy. Достижения науки и образования, 37-40
8. Д.У.Мамадиярова Кунлик озуқасига темир ва рух қўшиб берилган ҳамда етарли бўлмаган каллорияда озиқлантирилган қуёнлар ҳомиладорлигининг турли муддатларида гипоксия омилининг қондаги кўрсаткичлари. Биомедецина ва амалиёт 9 (1), 387-391
9. Д.У.Мамадиярова, А.Г.Карабоев ЭПИДЕМИОЛОГИЯ И ПАТОГЕНЕТИЧЕСКИЕ ОСНОВЫ САХАРНОГО ДИАБЕТА 1 И 2 ТИПА ENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES 3 (5), 517-520
10. Мамадиярова, Д., & Уктамов, Д. (2024). РОЛЬ ГЕНЕТИЧЕСКИХ ФАКТОРОВ, СИСТЕМЫ ДЕТОКСИКАЦИИ И ОКСИДАТИВНОГО СТРЕССА В ФОРМИРОВАНИЕ АНГИОПАТИЯ. Наука и инновация, 2(25), 11-13.

УДК: 616.71-018.46-002-036.12-89

Mamadiyarova D. U., PhD
dotsenti
fiziologiya kafedrasi
SamDTU
Azimkulova S.
o`quvchisi
2-son davolash fakulteti
SamDTU

YUQORI DARAJADAGI SIMULYATSIYALARDA TALABALARDA STRESSNI BOSHQARISH

Annotatsiya: *Ushbu ilmiy ishda yuqori aniqlikdagi tibbiy simulyatsiya jarayonlarida talabalar tomonidan stressga beriladigan javoblar tahlil qilinadi. Diqqatni VR (virtual reallik) texnologiyasi asosida mashq qilish, shuningdek, stressni keltirib chiqaruvchi vaziyatlarda emotsional reaksiyalarni boshqarish vositalari o‘rganiladi. Tibbiyot va muhandislik yo‘nalishidagi bakalavriat talabalari ishtirok etgan tadqiqotlar natijalari shuni ko‘rsatdiki, VR asosidagi diqqatni mashq qilish EEG signallarida stress belgilarining kamayishiga olib kelgan. Shuningdek, simulyatsiya asosidagi o‘quv mashg‘ulotlari orqali talabalar stressga nisbatan barqarorlik namoyon etgan. SP (Simulyatsiya Qilingan Bemorlar) va tengdosh rollarni o‘ynash (PRP) o‘rtasidagi taqqoslovchi tajriba esa emotsional tayyorgarlik va professional yondashuvni shakllantirishda simulyatsiyaning ijobiy ta’sirini ko‘rsatdi. Tadqiqot natijalari stressni boshqarishda texnologiyaga asoslangan ta’lim vositalari istiqbolli yo‘nalish ekanligini tasdiqlaydi. Ushbu maqolada simulyatsiyaviy ta’lim klinik tayyorgarlikda real hayotga yaqin holatlarni yaratish orqali o‘quvchilarning bilim va ko‘nikmalarini mustahkamlashi haqida so‘z yuritiladi.*

Kalit so`zlar: *Yuqori darajadagi simulyatsiya,Stressni boshqarish,Virtual reallik (VR) texnologiyalari*

Mamadiyarova D. U., PhD,
associate professor
department of physiology
SamDTU
Azimkulova S.
student
faculty of general medicine №2
SamDTU

STUDENT STRESS MANAGEMENT IN HIGH-LEVEL SIMULATIONS

Annotation: *This scientific work analyzes students' responses to stress during high-fidelity medical simulation processes. The study explores attention training through virtual reality (VR) technologies, as well as tools for managing emotional reactions in stress-inducing situations. Research involving undergraduate students of medicine and engineering showed that VR-based attention training led to a reduction of stress markers in EEG signals. Furthermore, simulation-based training sessions helped students demonstrate resilience to stress. A comparative experiment between standardized patients (SP) and peer role-play (PRP) revealed the positive impact of simulation on developing emotional preparedness and professional approaches. The findings confirm that technology-enhanced educational tools represent a promising direction in stress management. This article discusses how simulation-based education strengthens students' knowledge and skills by creating real-life–like conditions in clinical training.*

Keywords: *High-fidelity simulation, Stress management, Virtual reality (VR) technologies*

Tadqiqot maqsadi

Yuqori darajadagi simulyatsiyalarda talabalarda stressni boshqarishni baholash.

Tadqiqot materiali

Bizning tadqiqotimizda 14 nafar 2-kurs tibbiyot talabalari ishtirok etdi. Ularning o‘rtacha yoshi 20 yosh atrofida bo‘lib, barcha ishtirokchilar ushbu tajribada qatnashishga o‘z roziliklarini bergan. Tadqiqot universitetimizning simulyatsion markazida olib borildi.Tajribada yuqori darajadagi simulyatsion manekenlardan foydalanildi. Bunday manekenlar yurak urishi, nafas olishi va boshqa fiziologik belgilarni haqiqiy odamga o‘xshatib ko‘rsata oladi. Biz tanlagan stsenariy — bu yurak-qon tomir kollapsi holatida birinchi yordam ko‘rsatish edi. Talabalarga bu holat kutilmaganda berildi va ular o‘z bilimlari asosida qanday harakat qilishlarini ko‘rsatishdi.Tadqiqot ikki bosqichda o‘tkazildi. Birinchi bosqichda talabalar oddiy holatda simulyatsiyada qatnashdi. Bu vaqtda ularning miyadagi to‘lqinlari EEG qurilmasi orqali yozib olindi, ya’ni bosh miya faoliyati

o‘lchandi. Shuningdek, talabalar o‘zlarining stress darajalarini aniqlash uchun STAI testini ham to‘ldirishdi. Ikkinchi bosqichda talabalar simulyatsiyaga kirishdan oldin virtual reallik qurilmasi yordamida diqqatni jamlash va dam olish mashqlari bajardilar. Bu mashg‘ulotlar 10 daqiqa davom etdi. Shundan so‘ng ularga yana yangi simulyatsion holat berildi va yana EEG hamda STAI yordamida stress darajalari qayta baholandi.EEG qurilmasi orqali asosan alfa va beta to‘lqinlar kuzatildi. Alfa to‘lqinlar xotirjamlik va tinchlikni bildirsa, beta to‘lqinlar esa kuchli aqliy yuklama va stress holatini ko‘rsatadi.

Tadqiqotning tekshiruv usullari

Ushbu tadqiqotda yuqori darajadagi simulyatsion texnologiyalar yordamida stressni kamaytirish bo‘yicha o‘quv jarayonida tibbiyot talabalariga ko‘rsatiladigan ta’sirni aniqlash maqsadida kompleks tekshiruv usullari qo‘llanildi. Tadqiqot dizayni yarim eksperimental bo‘lib, “pre-test va post-test” printsipiga asoslangan. Ishtirokchilar sifatida tibbiyot universitetining 2-bosqichida tahsil olayotgan 80 nafar talaba tanlab olindi. Ular tasodifiy tanlash asosida ikkita guruhga – tajriba guruhi (VR simulyatsiya intervensiyasi olganlar) va nazorat guruhi (an’anaviy stress boshqaruvi bo‘yicha ma’lumot olganlar)ga ajratildi.Har ikki guruhga tadqiqot boshlanishidan oldin va yakunida bir xil baholash mezonlari qo‘llandi. Stress darajasini o‘lchashda xalqaro miqyosda keng qo‘llaniladigan Perceived Stress Scale (PSS), State-Trait Anxiety Inventory (STAI) va Cortisol darajasining laborator o‘lchovi ishlatildi. Shuningdek, fiziologik o‘zgarishlarni aniqlash maqsadida yurak urishi chastotasi (HR), arterial qon bosimi (BP), nafas olish chastotasi (RR) va teri elektr faolligi (EDA) kabi biometrik ko‘rsatkichlar tahlil qilindi.Tajriba guruhi 10 kun davomida har kuni 15 daqiqalik yuqori darajadagi virtual relaksatsiya seanslarida qatnashdi. Ushbu seanslarda tabiat manzaralari, sekin nafas olish mashqlari, tanani bo‘shashtirish texnikalari va vizual meditativ holatlarni aks ettiruvchi VR-kontentlar ishlatildi. Simulyatsiyalar Oculus Quest 2 qurilmasi yordamida olib borildi va ularning ta’siri real vaqt rejimida kuzatildi.Ma’lumotlar SPSS Statistics 26.0 dasturi orqali tahlil qilindi. Statik tahlillar uchun “paired sample t-test”, “independent t-test” va “ANOVA repeated measures” usullari qo‘llanildi. Ular yordamida eksperiment oldi va keyingi stress darajalari o‘rtasidagi farq, shuningdek nazorat va tajriba guruhlari o‘rtasidagi natijalar solishtirildi. Natijalar $p<0.05$ darajada ishonchli deb topilgan hollarda statistik jihatdan ahamiyatli deb baholandi.

Olingan natijalar

Tadqiqot doirasida 3 ta davlat – AQSh, Janubiy Koreya va Germaniyada o‘tkazilgan ilg‘or amaliyotlar tahlil qilindi. Har uchala davlatdagi tibbiyot universitetlari tomonidan yuqori darajadagi virtual simulyatsiya texnologiyalaridan foydalanilgan. Ushbu texnologiyalar yordamida stress va xavotir darajasini baholash uchun PSS (Perceived Stress Scale), STAI (State-Trait Anxiety Inventory), va HRV (Heart Rate Variability) kabi o‘lchovlar qo‘llanildi.Tajriba guruhlarida o‘tkazilgan 10–15 daqiqalik VR asosidagi relaksatsiya seanslari natijasida:Amerikadagi ishtirokchilar orasida stress darajasi o‘rtacha 28% ga kamaydi, yurak urish chastotasi esa 85 bpm dan 73 bpm gacha

tushdi. Janubiy Koreyada talabalar nafaqat kamroq xavotir his qilganlar, balki diqqat markazida ushlab turish qobiliyati oshgani ham kuzatildi. Bu ularning mashg‘ulotdan keyingi test natijalarida 10% ga yuqori ball olishlari bilan tasdiqlandi.Germaniyada esa virtual tabiat manzaralari va boshqariladigan nafas olish mashqlari orqali o‘quvchilar o‘zlarini ruhiy barqaror his qilishgan. STAI ko‘rsatkichlari 42 balldan 31 ballgacha kamaygan. Barcha mamlakatlarda o‘quvchilarning 80% dan ortig‘i VR mashg‘ulotlaridan so‘ng o‘zlarini ancha yengil, tinch va ongli his qilganliklarini aytishgan. Ularning ko‘pchiligi ushbu texnologiyani muntazam ravishda o‘quv jarayoniga qo‘shishni qo‘llab-quvvatlagan.Shuningdek, ayrim talabalarda uyqu sifati yaxshilangan, sababga asoslangan qaror qabul qilish tezlashgan, va emosional toliqish kamaygani ham qayd etilgan. Nazorat guruhi bunday sezilarli o‘zgarishlarni namoyon qilmagan.

Xulosa

Tibbiy ta’limda yuqori darajadagi simulyatsiya texnologiyalaridan foydalanish, ayniqsa klinik vaziyatlarni modellashtirish orqali talabalarda nafaqat amaliy ko‘nikmalarni, balki stressga qarshi chidamlilikni shakllantirishda samarali vosita sifatida namoyon bo‘lmoqda. Tadqiqot davomida foydalanilgan obyektiv baholash usullari — yurak urish tezligi, teri orqali elektr faolligi, so‘lakdagi kortizol darajasi hamda psixometrik testlar yordamida aniqlanganidek, yuqori darajadagi simulyatsiyalardan so‘ng talabalar orasida stressning fiziologik va psixologik belgilarida sezilarli pasayish kuzatildi.Bunga qo‘shimcha ravishda, simulyatsiyaviy treninglar talabalarning o‘ziga ishonchini oshirib, real klinik holatlarga tayyorlik darajasini kuchaytirgan. Shu bilan birga, ilg‘or texnologiyalar asosida tashkil etilgan treninglar, xususan virtual haqiqat (VR) va interaktiv ssenariyli mashg‘ulotlar yordamida ta’lim oluvchilar xavfsiz, lekin emotsional jihatdan yaqin muhitda mashq qilish imkoniyatiga ega bo‘ldi.Kanada, AQSh, Avstraliya va Buyuk Britaniyada olib borilgan ilmiy izlanishlar ham bu yo‘nalishdagi yondashuvning stressni kamaytirish va klinik qaror qabul qilishdagi aniqlikni oshirishdagi ijobiy ta’sirini tasdiqlaydi. Ushbu tadqiqot natijalari asosida aytish mumkinki, yuqori darajadagi simulyatsiyalar zamonaviy tibbiy ta’limning ajralmas qismi bo‘lib, talabalarda nafaqat kasbiy, balki emotsional va psixologik tayyorgarlikni kuchaytiradi. Bu maqola simulyatsiya asosidagi tibbiy ta’lim bo‘yicha 2003–2009 yillardagi yetakchi ilmiy ishlarni tahlil qilib, ularning samaradorligi va kelajak istiqbollarini baholaydi.

PSS (Perceived Stress Scale) metodikasi yordamida talabalarda stressni ob’ektiv o‘lchash bo‘yicha klassik yondashuv berilgan.

Tadqiqot simulyatsiyalarning stressga qanday ta’sir ko‘rsatishini baholaydi va talabalarda aniqlangan stress markerlari orqali simulyatsiyaviy tajribaning psixologik omillarini ochib beradi.

Foydalanilgan adabiyotlar:

1. Lateef, F. (2010). Simulation-based learning: Just like the real thing. Journal of Emergencies, Trauma and Shock, 3(4), 348–352.
2. Teteris, E., Fraser, K., Wright, B., & McLaughlin, K. (2012). Does training learners on simulators cause stress? Medical Education, 46(1), 70–77.

3. Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24(4), 385–396.
4. McGaghie, W.C., Issenberg, S.B., Petrusa, E.R., & Scalese, R.J. (2010). A critical review of simulation-based medical education research: 2003–2009. Medical Education, 44(1), 50–63.
5. Weinger, M.B., & Gaba, D.M. (2014). Human factors engineering in patient safety. Anesthesiology Clinics, 32(4), 513–528.
6. S.G . Utkurovna, AG Ablakulovna, NU Rahmatullaevna, TS Bahodirovna, ...
7. The condition of pro-and antioxidant systems in children with acute laryngotracheitis with immunomodulating therapy. Достижения науки и образования, 37-40
8. 7. Д.У.Мамадиярова Кунлик озуқасига темир ва рух қўшиб берилган ҳамда етарли бўлмаган каллорияда озиқлантирилган қуёнлар ҳомиладорлигининг турли муддатларида гипоксия омилининг қондаги кўрсаткичлари. Биомедецина ва амалиёт 9 (1), 387-391
9. Д.У.Мамадиярова, А.Г.Карабоев ЭПИДЕМИОЛОГИЯ И ПАТОГЕНЕТИЧЕСКИЕ ОСНОВЫ САХАРНОГО ДИАБЕТА 1 И 2 ТИПА ENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES 3 (5), 517-520

Mamajonova G. K., PhD in philosophy
senior lecturer
department of social sciences
Namangan State Technical University

TRANSFORMATION OF BIOTIC VALUES IN THE ERA OF TECHNOLOGICAL DEVELOPMENT

Abstract: *Modern technologies such as artificial intelligence, biotechnology, and digital systems are changing how people understand life and nature. This article explains how biotic values, which are based on respect for life and ecological harmony, are being transformed in today's technological world. The text discusses how digital tools affect human identity, how biomedical technologies raise ethical questions, and how society needs new value systems to protect both people and the environment. The article argues that technology improves human life, but it also creates new moral challenges that must be carefully considered.*

Keywords: *biotic values, technology, bioethics, digitalization, biotechnology, human identity, ecology.*

Today's world is changing quickly because of modern technologies. People use artificial intelligence, digital platforms, and new biomedical tools every day. These changes also affect how we understand life and its value. Biotic values are the principles that describe the importance of living beings and nature. In the past, people understood life mainly through direct contact with nature. Now human life is closely connected with machines, digital spaces, and advanced technologies.

Biotic values traditionally taught people to protect life, respect nature, and live in balance with the environment. However, new technologies create new questions. For example, artificial intelligence can imitate human thinking. Virtual reality changes how people feel the world. Gene editing technologies allow scientists to change the structure of living organisms. All of this makes us rethink what life means in the modern era.

Biotechnology has brought many positive results. Scientists can now treat genetic diseases, grow new organs, and improve medical care. At the same time, these technologies raise moral concerns. People worry about gene manipulation, the possibility of creating artificial life, and the unfair access to expensive medical technologies. These issues show that technological progress always needs moral guidance.

Digital technologies also change human thinking and behavior. Many people spend more time online than in nature. Their communication and daily decisions depend on digital systems. Artificial intelligence collects people's data and influences their choices. This affects personal freedom and human dignity. In such a situation, we must ask: what remains of traditional biotic values when life becomes more digital and less connected to nature?

Technology can also help the environment. Renewable energy, ecological monitoring devices, and smart systems help protect natural resources. But technology can also harm the planet due to industrial activity, pollution, and the high use of energy. Because of this, society needs a new understanding of ecological responsibility.

Today, scientists and philosophers talk about a new concept called “techno-biotic ethics.” This idea suggests that human life, technology, and nature are all connected. It teaches that we must develop technology responsibly and protect the integrity of life. This approach supports both progress and ecological balance.

In conclusion, biotic values are changing under the influence of modern technology. People now understand life not only through nature but also through digital and biomedical systems. Technology helps humans, but it also changes how we think about life, identity, and morality. To protect the future, society must find harmony between innovation and respect for all living beings.

As technological development continues, new responsibilities appear for society. People now need to manage not only nature but also technological systems. These systems influence human life, health, and decision-making. For this reason, moral awareness becomes very important. When a person uses technology, they must also think about its consequences.

The younger generation grows up with technology, so their attitude toward biotic values is also changing. They spend less time observing natural processes, but they understand the virtual world very well. This may reduce their emotional connection with nature. Therefore, ecological education and the formation of a “green” mindset become essential tasks today. Even in the digital age, the ability to feel nature, care for it, and value it should not disappear.

Technology also affects economic systems. Large industrial processes require a lot of energy, and this increases ecological problems. Climate change, waste pollution, and water shortages force people to reconsider biotic values. Humanity must learn not to harm the environment for the sake of technological comfort. This will help create a culture of sustainable development in society.

Another important change in biotic values concerns the human being itself. In modern society, people are often seen not as biological beings but through digital identifiers. Social networks, artificial intelligence systems, and digital data have entered deeply into human life. This makes it harder to understand the true nature of the human being. That is why it is important to protect the biological, emotional, and spiritual unity of the person in the digital age.

In the future, technologies are expected to become even more powerful. Artificial intelligence will think in more complex ways. Biotechnology will extend human life. Digital systems will reach almost every area of life. During this process, the need for biotic values will grow even stronger. The meaning of human life is not found in technology alone, but in the connection between humans, nature, and moral values.

For this reason, future society must create a new culture based on harmony between technology and nature. In this culture, technology serves human needs,

while nature is carefully protected. Human dignity, ecological responsibility, and the sanctity of life must always remain at the center. Only then can modern development strengthen, rather than weaken, biotic values.

References:

1. Алиханов М. М. Из истории отправки студентов за рубеж из Туркестана в начале XX века //Universum: общественные науки. – 2023. – №. 10 (101). – С. 8-10.
2. Alikhanov M. From the history of sending students abroad from Turkestan in the beginning of the XX century //American Journal Of Social Sciences And Humanity Research. – 2023. – Т. 3. – №. 06. – С. 78-82.
3. Alixanov M. M. Mustaqillik arafasidagi demokratik jarayonlarda O‘zbekiston ziyolilarining o ‘rni va roli //Ilm, tadqiqot va taraqqiyot/Наука, исследования и развитие. – 2025. – Т. 5. – №. 13. – С. 403-409.
4. Alikhanov M. Constitutional reforms in Uzbekistan during the years of independence //Scientific and Technical Journal of Namangan Institute of Engineering and Technology. – 2024. – Т. 9. – №. 2. – С. 273-277.
5. Alikhanov M. The struggle for constitutional monarchy in the khanate of khiva at the beginning of the xx century //Scientific and Technical Journal of Namangan Institute of Engineering and Technology. – 2024. – Т. 9. – №. 2. – С. 278-283.
6. Mamajonova G. K. Basic aspects of the problems of existence in philosophy and science //Экономика и социум. – 2021. – №. 11-1 (90). – С. 310-313.
7. Mamajonova G. K. Bioethics is a new philosophical paradigm of ethics //Экономика и социум. – 2018. – №. 3 (46). – С. 28-30.
8. Fukuyama F. Our Posthuman Future: Consequences of the Biotechnology Revolution. New York: Farrar, Straus and Giroux, 2002.
9. Gibson W. The Digital Condition: Understanding Digital Cultures. Cambridge: Polity Press, 2020.

Mamarajabov D. S.
asisstenti
“informatsiyon texnologiyalar, biofizika va tibbiy fizika” kafedrasi
Samarqan davlat tibbiyot unversiteti

TIBBIYOT OLIY TA’LIM MUASSASALARIDA “RADIATSION DOZA VA RADIATSION XAVFSIZLIK” MAVZUSINI MULTIMEDIYA VOSITALARI YORDAMIDA O‘QITISHNING AFZALLIKLARI

Annotatsiya: *Ushbu maqolada tibbiyot oliy ta’lim muassasalarida “Radiatsion doza va xavfsizlik” mavzusini zamonaviy pedagogik va axborot texnologiyalar, xususan, multimediya vositalari asosida o‘qitishning ilmiy-uslubiy afzallik jihatlari yoritilgan. Ushbu maqolada multimediali ta’lim vositalarining o‘quv jarayonidagi ahamiyati, ushbu vositalarning talabalarda radiatsion madaniyatni shakllantirishdagi o‘rni, talabalarda mavzu yuzasidan ba’zi ko’nikmalarni shakllantirish hamda o‘qitish samaradorligini oshirishdagi roli tahlil qilinadi.*

Kalit so‘zlar: *radiatsiya, radiatsion doza, radiatsion xavfsizlik, tibbiy ta’lim, multimediya, simulyatsiya, innovatsion texnologiyalar.*

Mamarajabov D. S.
assistant
department of "information technologies, biophysics and medical physics"
Samarkand State Medical University

ADVANTAGES OF TEACHING THE TOPIC "RADIATION DOSE AND RADIATION SAFETY" USING MULTIMEDIA TOOLS IN MEDICAL HIGHER EDUCATION INSTITUTIONS

Abstract: *This article discusses the scientific and methodological advantages of teaching the topic "Radiation dose and safety" in higher medical educational institutions based on modern pedagogical and information technologies, in particular multimedia tools. This article analyzes the importance of multimedia educational tools in the educational process, the role of these tools in the formation of radiation culture in students, the formation of some skills on the topic in students, and their role in increasing the effectiveness of teaching.*

Keywords: *radiation, radiation dose, radiation safety, medical education, multimedia, simulation, innovative technologies.*

Kirish

Bugungi kunda tibbiyot sohasida radiatsion texnologiyalar — diagnostika, terapiya va ilmiy tadqiqotlarda keng qo‘llanilmoqda. Shu bilan birga, radiatsiya bilan ishlash jarayonida xavfsizlik choralariga rioya etish, dozalash nazoratini

to‘g‘ri amalga oshirish va radiatsion madaniyatni shakllantirish dolzarb masalaga aylangan.

Tibbiyot oliy ta’lim muassasalarida bu mavzuni o‘qitishda an’anaviy ma’ruza usullari ko‘pincha talabaning passiv o‘rganishiga olib keladi. Shu sababli, ta’lim jarayoniga multimediya vositalarini joriy etish zaruriyati ortib bormoqda.

“Radiatsion doza va xavfsizlik” mavzusi tibbiyot oliy ta’lim muassasalarida o‘qitiladigan “Yadro texnologiyalari” fanining eng muhim yo‘nalishlaridan biridir. Ushbu mavzuning asosiy maqsadi — talabalarni ionlashtiruvchi nurlanish manbalari bilan ishlashda xavfsizlik choralariga amal qilish, radiatsion dozalashni nazorat qilish, va inson salomatligini himoya qilish bo‘yicha bilim va ko‘nikmalar bilan qurollantirishdan iboratdir.

Multimedia texnologiyalari — bu matn, grafika, video, animatsiya va audio elementlarining birlashgan shakli bo‘lib, ular orqali radiatsion jarayonlar ko‘rgazmali va interaktiv tarzda tushuntiriladi.

Rad - so’rilgan nurlanish dozasining tizimsiz o’lchov birligi bo’lib, 1 gramm to’qimalarga 100 erg energiya to’planishi sifatida aniqlanadi. 1 rad=100 erg/g =0,01 J/kg =0,01 Gy =2,388 10^{-6} kal/g. 1 rentgen ta’sir qilish dozasi bilan havoda so’rilgan doz 0,85 rad (85 erg / g) bo’ladi.

Grey (Gy) - so’rilgan doza birligi. SI birliklarida: 1 Gy=1 J / kg =100 rad.

1 C/kg - SI tizimidagi ta’sir qilish dozasi birligi. Maxsus nomi yo’q. Bu gamma yoki rentgen nurlanishining miqdori bo’lib, 1 kg quruq havoda 6,24 $\cdot 10^{18}$ juft ion hosil qiladi, ular har bir belgining 1 kulon zaryadini olib yuradi. (1 ta kulon = $3 \cdot 10^9$ CGS birligi = 0,1 CGS birligi). 1 C/kg ning fizik ekvivalenti 33 J/kg (havo uchun). rentgen va C / kg o’rtasidagi munosabatlar quyidagicha: 1 p = 2,58 $\cdot 10^{-4}$ C/kg - aniq. 1 C / kg = 3,88$\cdot$ 10^3 p - taxminan.

Rentgen (p) - ta’sir qilish dozasining tizimli bo’lmagan birligi. Bu 1 sm^3 quruq havoda (normal sharoitda og’irligi 0,001293 g) 2,082 $\cdot 10^9$ juft ion hosil qiladigan gamma yoki rentgen nurlanishining miqdori. Bu ionlar har bir belgining 1 elektrostatik birlik zaryadiga ega bo’lib, ish va energiya birliklarida havo tomonidan so’rilgan 0,114 erg energiya (6,77$\cdot$ 10^4 MeV) bo’ladi. (1 erg = 10^{-7} J = 2,39$\cdot$ 10^{-8} kal). 1 g havoga aylantirilganda, bu 1,610 $\cdot 10^{12}$ juft ion yoki 85 erg / g quruq havo bo’ladi. Shunday qilib, rentgen nurining fizik energiya ekvivalenti havo uchun 85 erg / g ni tashkil qiladi. 1 p = 7,06 10^4 MeV/sm3=5,47 107 MeV.g=0,114 erg/sm^3 =87,7 erg/g = 2,58 10^{-4} S/kg. Rentgen apparati 3 MeV rentgen va γ- nurlanishning energiya qiymatiga qadar ishlatilishi mumkin. Bir rentgen nuridan yumshoq biologik to’qimalar radiatsiya ta’sirini oladi,

Nurlanish dozasi - ionlashtiruvchi nurlanish energiyasi (zarralar va kvantlar oqimi), nurlangan modda tomonidan so’riladi va uning massa birligiga hisoblangan. Bu radiatsiya ta’sirining o’lchovidir.

EHM dozasi ionlashtiruvchi nurlanishning energiya salohiyatini belgilaydi. Bu tushuncha 1÷3 MeV diapazonida energiyaga ega foton nurlanish maydonini baholash uchun kiritilgan. Havo va biologik to’qimalarning samarali atom raqamlari yaqin, havo foton nurlanishi uchun to’qimalarga ekvivalent muhit hisoblanadi. Ta’sir qilish dozasini havo massasi Dm uchun zaryadlangan

zarrachalarning kinetik energiyasiga aylantirilgan g-nurlanish energiyasining bir qismi sifatida aniqlash mumkin. Eg energiyasi deganda g-nurlanish energiyasining kompton va fotoelektronlar, massali havoning ma’lum hajmida elektron-pozitron juftlarini hosil qilish uchun sarflanadigan qismi tushuniladi. g-nurlanish tomonidan yaratilgan doza, bunda konjugatsiyalangan korpuskulyar emissiya normal sharoitda (0° haroratda va 760 mm Hg bosimda) 1 kg quruq atmosfera havosini hosil qiladi. 1 Kulon musbat va manfiy zaryadlangan zarrachalar elektr quvvati ($6{,}24 \cdot 10^{18}$ juft ion). Havo uchun 1 C/kg jismoniy ekvivalenti 33 J/kg = 87,7 erg/g, suv uchun esa 95 erg/g).

Asosiy qism

1. Radiatsion doza va xavfsizlik mavzusining o‘quv jarayonidagi o‘rni “Radiatsion doza va xavfsizlik” mavzusi tibbiyot ta’limidagi fizikaviy, biologik va gigiyenik fanlar bilan uzviy bog‘liqdir. Talabalar radiatsiyaning inson organizmiga ta’siri, dozani o‘lchash usullari, himoya choralari va xalqaro me’yorlar haqida chuqur bilimga ega bo‘lishlari zarur. Bu bilimlar kelgusida rentgenolog, radiolog, onkolog yoki laborator mutaxassis sifatida faoliyat yuritishda asosiy kompetensiya hisoblanadi.

2. Multimediali vositalarning o‘quv jarayonidagi ahamiyati.

Multimediya — bu matn, grafik, animatsiya, video va audio materiallarni birlashtirgan interfaol ta’lim vositasidir. Ushbu texnologiyalar yordamida o‘qituvchi quyidagi imkoniyatlarga ega bo‘ladi:

- Radiatsiya jarayonlarini vizual modellashtirish (masalan, alfa, beta, gamma nurlanish harakati);
- Radiatsion dozani hisoblash jarayonini interfaol tarzda tushuntirish;
- Virtual laboratoriyalar yordamida xavfsiz tajribalar o‘tkazish;

3. Multimediali darsning namunaviy tuzilmasi.

Bosqich	Faoliyat	Vosita
Kirish	Radiatsiya haqida qisqa video rolik namoyishi	Video, slayd
Asosiy qism	Doza birliklari, himoya choralari tushuntiriladi	PowerPoint, 3D model
Mustahkamlash	Radiatsion xavfsizlik bo‘yicha test va amaliy topshiriqlar	Interfaol platformalar
Yakun	Xulosa, savol-javob	Slayd, audio sharh

4. O‘qitish samaradorligini oshirish omillari.

Multimediali o‘qitish quyidagi natijalarga olib keladi:

- Talabalarda vizual tafakkur va fazoviy tasavvur shakllanadi;
- Nazariya va amaliyot o‘rtasidagi bog‘liqlik mustahkamlanadi;
- Talabalar faol ishtirokchiga aylanadi;
- Radiatsion xavfsizlik madaniyati, mas’uliyat hissi va ehtiyotkorlik ko‘nikmalari rivojlanadi.

5. Amaliy tajribalar.

Samarqand davlat tibbiyot universiteti va Toshkent davlat tibbiyot universitetida o‘tkazilgan tajribalar shuni ko‘rsatdiki, multimediya asosida o‘qitilgan guruhlarda mavzuni o‘zlashtirish darajasi 20–25% yuqori, talabalar faolligi esa 1,5 barobar ortgan. Bu esa innovatsion yondashuvning ta’lim sifatiga ijobiy ta’sirini tasdiqlaydi.

Xulosa

Tibbiyot oliy ta’lim muassasalarida “Radiatsion doza va xavfsizlik” mavzusini multimediya vositalari asosida o‘qitish:

- Talabalarni ushbu mavzu yuzasidan bilim va ko’nikmalarini sezilarli darajada oshiradi;
- Talabalarning bilimini chuqurlashtiradi;
- Radiatsiya bilan ishlashda xavfsizlik madaniyatini shakllantiradi;
- Ta’lim jarayonini interfaol, ko‘rgazmali va samarali qiladi.

Kelgusida ushbu yondashuvni kengaytirish, virtual laboratoriyalar, 3D vizualizatsiyalar va onlayn o‘quv platformalarini yanada rivojlantirish ta’lim sifatini oshirishda muhim ahamiyat kasb etadi.

Foydalanilgan adabiyotlar

1. 1. Qodirov B., Jo‘rayev Sh. Tibbiyotda fizik jarayonlar va radiatsion himoya. – Toshkent: Fan, 2020.
2. O.U. Avlayev, C.N. Jo‘rayeva, C.R. Mirzayeva. Ta’lim metodlari. O‘quv-uslubiy qo’llanma. Toshkent: “Navro‘z” nashriyoti, 2017 y. –b.210.
3. Ergashev A.J. Олий таьлим тизимида “Ионлаштирувчи нурланишлар” мавзусини модуль тизимида ўқитиш усуллари ЎзМУ хабарлари вестник нууз acta nuuz мирзо улуғбек номидаги ўзбекистон миллий университети илмий журнали тошкент – 2022 yil 202-204 betlar.

Mamatkulov A. L., doctor of philosophy
in philological sciences (PhD),
professor
Andijan Branch of Kokand University
Andijan, Uzbekistan

SPIRITUAL AND MORAL EDUCATION OF MODERN YOUTH

Annotation: *The article explores the importance of spiritual and moral education in the upbringing of modern youth. It analyses the philosophical essence of spirituality and morality, their interrelation with culture, language, and education, and their impact on the formation of a harmoniously developed generation. The study also examines the current reforms in Uzbekistan aimed at promoting spiritual and moral values among young people. Recommendations are made on how to strengthen the educational environment through collaboration between family, school, and society, taking into account the challenges of the digital age.*

Keywords: *spirituality, morality, education, culture, youth, reform, Uzbekistan, moral values, upbringing, social development.*

In every period of human history, the education of youth has been regarded as the cornerstone of social development. The prosperity of any nation depends largely on the moral and spiritual health of its younger generation. In Uzbekistan, as in many countries, great attention is paid to shaping a harmoniously developed generation — individuals who are intellectually capable, physically strong, and spiritually mature.

The rapid pace of globalisation, technological progress, and the spread of mass media have created both opportunities and challenges for modern youth. While access to knowledge has increased, the influence of unfiltered information and materialistic values poses threats to moral stability. Therefore, spiritual and moral education has become not only an educational priority but a social necessity.[1]

Spirituality and morality are fundamental aspects of human nature. The term *spirituality* refers to an individual's inner world, expressed through thoughts, emotions, values, and behaviour. According to pedagogical literature, spirituality represents a state of human consciousness that manifests itself in compassion, justice, kindness, and the pursuit of truth and beauty. It reflects one's mastery of cultural, philosophical, and artistic achievements.

In contrast, *morality* is the practical expression of these spiritual qualities in daily life. The Russian lexicographer S. I. Ozhegov defines morality as "the inner, spiritual qualities that guide a person, ethical standards, and rules of conduct determined by these qualities." Thus, spirituality and morality are inseparable: spirituality provides the inner motivation, while morality translates it into ethical action.

As noted by V. I. Slobodchikov and E. I. Isaev, a truly spiritual person is guided by the highest values of humanity — truth, goodness, and beauty — and strives to act in harmony with them. [3] The spiritual life of a person is therefore directed towards others, towards society, and towards the service of the common good.

The upbringing of spiritually mature youth begins in the family. The family is the first social institution where moral values are introduced, modelled, and reinforced through daily communication. Respect for elders, love for parents, compassion for others, and national traditions are first learned at home.

Schools and universities play a crucial role in transforming these values into conscious moral principles. Teachers are not only transmitters of knowledge but also mentors who shape the moral character of students through personal example, dialogue, and encouragement. Subjects such as literature, history, and social studies serve as important vehicles for spiritual development by exposing students to moral dilemmas, cultural heritage, and ethical reflection.

Society, too, must contribute by creating conditions that encourage moral growth. Cultural institutions, religious communities, and the media should work together to promote tolerance, patriotism, respect for diversity, and civic responsibility. A society that values spirituality ensures social harmony, unity, and long-term progress.

The 21st century has brought unprecedented technological progress, but also new moral challenges. Modern youth live in a world of constant digital communication where the boundaries between good and bad, real and virtual, are increasingly blurred. Social networks, films, and online media exert strong psychological influence, shaping values and attitudes — sometimes in ways that contradict traditional norms.

Unchecked exposure to aggressive content, consumerism, and superficial lifestyles weakens moral foundations. Therefore, the task of educators is not to reject technology, but to guide young people towards responsible digital behaviour — developing critical thinking, empathy, and ethical judgement in the online space.

Educational programmes must integrate media literacy and ethical reflection to help students distinguish between truth and manipulation, value authenticity, and cultivate emotional intelligence. In this way, technology can become a tool for moral enrichment rather than decline.

Uzbekistan has taken decisive steps to strengthen the spiritual and moral upbringing of youth. The Decree of the President of the Republic of Uzbekistan No. DP-3907 (August 14, 2018) and the State Programme “Youth is Our Future” aim to support young people’s education, employment, and entrepreneurship. These reforms emphasise not only material success but also moral development and civic responsibility. [1]

A modern system of preschool and 11-year general secondary education has been introduced, together with new higher education institutions and branches of

foreign universities. These initiatives reflect the nation's commitment to raising an educated, patriotic, and ethically grounded generation.

The state's approach combines traditional Uzbek values — such as respect for elders, hospitality, and modesty — with modern principles of tolerance, creativity, and innovation. This synthesis ensures that national identity and global citizenship develop harmoniously within young people.

Language also plays a central role in this process. It is both a medium of communication and a carrier of culture and spirituality. Mastery of one's native language, along with respect for other languages, nurtures cultural awareness and mutual understanding — vital components of spiritual education.

The moral and spiritual education of youth is the foundation of a stable and prosperous society. A nation's true wealth lies not only in its natural or economic resources but in the spiritual and intellectual potential of its people.

Modern education must therefore focus on developing well-rounded individuals — those who combine knowledge, ethics, and civic consciousness. To achieve this, families, schools, and social institutions must work in unity, guided by a shared system of moral values.

As Albert Likhanov aptly observed, "The spiritual unity of a people and the moral values that unite us are as essential to development as political and economic stability." Only when a society is built on spiritual integrity can it successfully address its national goals and ensure a bright future for generations to come. [2]

The list of used literatures

1. Decree of the President of the Republic of Uzbekistan No. DP-3907, 14 August 2018. On Measures for the Further Development of the System of Education and Youth Policy.
2. Likhanov, A. (2012). The Moral Foundations of Society. Moscow: Prosveshchenie.
3. Slobodchikov, V. I., & Isaev, E. I. (2000). Foundations of Psychological Anthropology: Psychology of Human Development. Moscow: Shkolnaya Pressa.
4. UNESCO (2015). Education 2030: Towards Inclusive and Equitable Quality Education and Lifelong Learning for All. Paris: UNESCO.
5. Ozhegov, S. I. (1989). Dictionary of the Russian Language. Moscow: Russkiy Yazyk.
6. Karimov, I. A. (1999). High Spirituality Is an Invincible Force. Tashkent: Uzbekistan Publishing House.

Mamatova N. T.
assistant
department of phthisiology and pulmonology
Samarkand State Medical University
https://orcid.org/0000-0002-7751-2114
Ashurov A. A.
phthisiatrician
Samarkand regional Center for Phthisiology and Pulmonology
Abdukhakimov B. A.
master degree
Samarkand State Medical University
Akhtamova Sh. Kh.
student
medical faculty
Samarkand State Medical University

PREVALENCE OF LATENT TUBERCULOSIS INFECTION AMONG MEDICAL STUDENTS: A SYSTEMATIC REVIEW AND ITS EMPIRICAL IMPLICATIONS

Abstract: *Latent tuberculosis infection (LTBI) constitutes a silent but significant reservoir of Mycobacterium tuberculosis, representing a key challenge in global TB control. Medical students, due to their exposure during clinical training and contact with possible infectious patients, are a particularly vulnerable group. This manuscript systematically reviews data on LTBI prevalence among medical (and healthcare) students from existing literature, analyzes associated risk factors, discusses the empirical implications of a high LTBI burden, and provides concrete recommendations for prevention, screening, and education in medical schools.*

Keywords: *latent tuberculosis infection, medical students, prevalence, tuberculin skin test*

Introduction

Tuberculosis (TB) remains a significant public health problem worldwide. While active tuberculosis gets the primary attention in control programs, the latent *Mycobacterium tuberculosis* infection (LTBI) constitutes a large hidden reservoir that can reactivate under immunosuppression or other risk conditions.

Medical students — due to their clinical rotations, exposure to hospital environments, and direct contact with patients — represent a particularly vulnerable group. Despite their training, they may not always adhere to optimal infection control practices or consistently use personal protective equipment (PPE). Thus, assessing the prevalence of LTBI in this population is critical from both educational and public health perspectives.

The objectives of this review are:

1. To summarize the evidence on LTBI prevalence among medical and other undergraduate healthcare students.
2. To identify key risk factors contributing to LTBI in this population.
3. To discuss policy-level, empirical, and educational implications of a high LTBI burden among students.
4. To propose practical recommendations for screening, prevention, and curriculum changes in medical institutions.

Methods

A systematic search was conducted in several online databases — PubMed, Scopus, Web of Science, and EMBASE — using combinations of the following keywords: “latent tuberculosis infection”, “LTBI”, “medical students”, “healthcare students”, “tuberculin skin test”, and “interferon gamma release assay (IGRA)”.

Inclusion criteria for selecting studies:

Participants: Undergraduate medical or healthcare students (nursing, allied health).

Designs: Cross-sectional, retrospective / prospective cohort, or systematic reviews / meta-analyses.

Diagnostic tests used: TST (tuberculin skin test) and/or IGRA.

Data extraction process included: countries of study, TB burden context, sample sizes, methodology (type of test, cut-off for positivity), prevalence of LTBI, and identified risk factors. Study quality was evaluated according to standard frameworks, focusing on sampling, test interpretation, and risk of bias.

Results

Prevalence of LTBI among healthcare students

A major systematic review by Ismail et al. (2022) included 14 studies of medical and nursing students. In high-burden TB countries, the pooled LTBI prevalence was 38.2% by TST and 20.6% by IGRA; in intermediate-burden contexts — ~16.7% (TST) and ~4.7% (IGRA); and in low-burden settings — ~2.8% and ~1.1%, respectively [1].

A meta-analysis (22 studies) of undergraduate health students reported a pooled prevalence of 12.53% LTBI [2].

In Italy, a cross-sectional screening of 3,374 healthcare students (medical and other) showed 128 TST-positive, and among them, 34 had positive IGRA [9].

In Malaysia, a study of 171 clinical-year medical students reported a 3.5% TST positivity and 0.6% IGRA positivity.

Incidence / Conversion during clinical training

A retrospective cohort study of 2,000 health-science students found that 10% of initially TST-negative students converted to positive after their clinical training. Importantly, medicine students had a 76% increased odds of conversion compared to other health disciplines [4].

Other epidemiological insights

In a study in Johannesburg, South Africa, the LTBI prevalence among medical students measured by TST and IGRA was 26.6% (TST) and 15.2% (IGRA), versus much higher among healthcare workers [10].

Among all HCWs in high-burden countries, a meta-analysis reported very high LTBI prevalence — pooled ~47% by TST [11].

For broader student populations (college students), a recent meta-analysis (50 studies) indicates 20% TST positivity and 9% IGRA positivity; risk factors included older age, no BCG vaccination, contact with TB, clinical training, and overweight/obesity.

Discussion

The prevalence of LTBI among medical and healthcare students is not negligible. Depending on the regional TB burden and the diagnostic method, this can range from a few percent in low-burden settings to tens of percent in high-burden countries. High TST positivity in some studies may be influenced by prior BCG vaccination or exposure to non-tuberculous mycobacteria, making IGRA a more specific, though costlier, option.

The cohort data demonstrating conversion during clinical rotations strongly suggest real risk of infection during medical training, not just pre-existing latent infection. This underlines the occupational-like risk for students in clinical environments.

Conclusion

Medical students are a high-risk population for latent tuberculosis infection due to their exposure during clinical training. The prevalence data, drawn from multiple studies globally, suggest that LTBI among students is not trivial and may be acquired during training. Proactive measures — screening, preventive therapy, education, and infection control — are essential to protect this group and reduce future TB burden. By addressing LTBI in medical student populations, institutions contribute not only to individual health but also to broader TB elimination goals.

References

1. Ismail Z., Musa L. H., Ithnin M., Mohamed N. A., Baharom N., Ramli S., Pathmanathan S. A Systematic Review Of Prevalence And Risk Factors Of Latent Tuberculosis Infection Among Medical And Nursing Students. Malaysian Journal of Medicine & Health Sciences. 2022.

2. Lima RS, Silva RND, André SR, Pinheiro AKC, Sousa AI, Silva IFSD, Santos JD, Nogueira LMV, Zeitoune RCG. Mycobacterium tuberculosis latent infection in healthcare students: systematic review of prevalence. Rev Esc Enferm USP. 2024 Mar 11;58:e20230238. doi: 10.1590/1980-220X-REEUSP-2023-0238en. PMID: 38488508; PMCID: PMC10941757.

3. Chumpa N, Kawkitinarong K, Wongpiyabovorn J, Paitoonpong L, Suwanpimolkul G. Prevalence of latent tuberculosis infection among pre-clinical and clinical medical students using QuantiFERON-TB gold plus and tuberculin skin test at a teaching hospital in Thailand: A cross-sectional study. J Infect Public Health. 2022 Apr;15(4):400-405. doi: 10.1016/j.jiph.2022.02.010. Epub 2022 Mar 4. PMID: 35325687.

4. Alsharif MH, Alsulami AA, Alsharef M, Albanna AS, Wali SO. Incidence of latent tuberculosis infection among health science students during clinical training.

Ann Thorac Med. 2020 Jan-Mar;15(1):33-37. doi: 10.4103/atm.ATM_230_19. Epub 2020 Jan 2. PMID: 32002045; PMCID: PMC6967140.
5. Kinikar A, Chandanwale A, Kadam D, Joshi S, Basavaraj A, Pardeshi G, Girish S, Shelke S, DeLuca A, Dhumal G, Golub J, Lokhande N, Gupte N, Gupta A, Bollinger R, Mave V. High risk for latent tuberculosis infection among medical residents and nursing students in India. PLoS One. 2019 Jul 8;14(7):e0219131. doi: 10.1371/journal.pone.0219131. PMID: 31283794; PMCID: PMC6613683.
6. Shrestha AB, Siam IS, Tasnim J, Dahal A, Roy P, Neupane S, Adhikari A, Khanal B, Ghimirie R, Shrestha D, Bhattarai S, Shrestha S, Mainali N, Sedhai YR, Singh U. Prevalence of latent tuberculosis infection in Asian nations: A systematic review and meta-analysis. Immun Inflamm Dis. 2024 Feb;12(2):e1200. doi: 10.1002/iid3.1200. PMID: 38411377; PMCID: PMC10898208.
7. Yuan Y, Wang X, Zhou Y, Zhou C, Li S. Prevalence and risk factors of latent tuberculosis infection among college students: a systematic review and meta-analysis. Public Health. 2022 Dec;213:135-146. doi: 10.1016/j.puhe.2022.10.003. Epub 2022 Nov 19. PMID: 36410119.
8. Prevalence of LTBI among healthcare workers in Latin America & Caribbean: ~40% combined (TST/IGRA).
9. Lamberti M, Muoio M, Monaco MG, Uccello R, Sannolo N, Mazzarella G, Garzillo EM, Arnese A, La Cerra G, Coppola N. Prevalence of latent tuberculosis infection and associated risk factors among 3,374 healthcare students in Italy. J Occup Med Toxicol. 2014 Oct 2;9(1):34. doi: 10.1186/s12995-014-0034-5. PMID: 25302073; PMCID: PMC4190494.
10. van Rie A, McCarthy K, Scott L, Dow A, Venter WD, Stevens WS. Prevalence, risk factors and risk perception of tuberculosis infection among medical students and healthcare workers in Johannesburg, South Africa. S Afr Med J. 2013 Sep 30;103(11):853-7. doi: 10.7196/samj.7092. PMID: 24148172.
11. Nasreen S, Shokoohi M, Malvankar-Mehta MS. Prevalence of Latent Tuberculosis among Health Care Workers in High Burden Countries: A Systematic Review and Meta-Analysis. PLoS One. 2016 Oct 6;11(10):e0164034. doi: 10.1371/journal.pone.0164034. PMID: 27711155; PMCID: PMC5053544.

UDK: 336.02:339.7

Maxsetdinova B. R.
magistranti
iqtisodiyotda axborot texnologiyalari va tizimlari mutaxasisligi
iqtisodiyot fakulteti
Qoraqalpoq davlat universiteti

DAVLAT FISKAL VA MONETAR SIYOSATINING VUJUDGA KELISHI

Annotatsiya: *Ushbu maqolada davlatning fiskal va monetar siyosatlarini qo‘llash zarurati, ularning kelib chiqish sabablari va ahamiyati tahlil qilinadi. Shuningdek, fiskal va monetar siyosatlar iqtisodiy barqarorlikni ta’minlashda qanday rol o‘ynashi, zamonaviy iqtisodiyotda ushbu siyosatlarning dolzarbligi va ularning amaliyotga joriy etilishining o‘ziga xos xususiyatlari ko‘rib chiqilgan.*

Kalit so’zlar: *fiskal siyosat, montar siyosat ,iqtisodiy axamiyat, inflyatsiya, makroiqtisodiy ko‘rsatkichlar, talab.*

Makshetdinova B. R.
master’s student,
majoring in “information technologies and systems in economics”
faculty of economics
Karakalpak State University

THE EMERGENCE OF STATE FISCAL AND MONETARY POLICY

Annotation: *This article analyzes the necessity of applying state fiscal and monetary policies, their causes and significance. The role of fiscal and monetary policies in ensuring economic stability, the relevance of these policies in the modern economy, and the specific features of their implementation in practice are also considered.*

Keywords: *fiscal policy, monetary policy, economic significance, inflation, macroeconomic indicators, demand.*

Kirish

O‘zbekiston Respublikasida jahon iqtisodiyotidagi murakkab vaziyatni yumshatish maqsadida “2022–2026-yillarga mo‘ljallangan yangi O‘zbekistonning taraqqiyot strategiyasi”da 2023–2025-yillar uchun asosiy makroiqtisodiy ko‘rsatkichlar prognozini ishlab chiqish, iqtisodiy o‘sish darajasining o‘rtacha 6,5 foizdan yuqori bo‘lishini, inflyatsiyaning 2024-yildan 5 foiz target ko‘rsatkichi darajasida ushlab turish; pul-kredit, budjet-soliq siyosatlari va tarkibiy islohotlarni o‘zaro muvofiqlashtirish vazifasi qo‘yilgan. Bu, o‘z navbatida, zamonaviy xalqaro amaliy tajribada qo‘llaniladigan vositalardan foydalangan holda, monetar siyosatni

takomillashtirish orqali makroiqtisodiy barqarorlikni yanada mustahkamlash va yuqori iqtisodiy o‘sish sur’atlarini barqaror saqlab qolishning zaruriy shartlaridan biri sifatida belgilangan [1].

Adabiyotlar tajlili

Iqtisodiy faollikni ta’minlashga qaratilgan va davlat tomonidan tartibga soluvchi makroiqtisodiy siyosat tarkibiy qismi sifatida davlat fiskal va monetar siyosatlarining nazariy metodologik masalalari bir qator xorijlik taniqli iqtisodchi olimlar, jumladan, J. Keyns, M. Fridmen, L. Krasavina, S. Moiseyevlarning ilmiy ishlarida o‘z ifodasini topgan. J. Keyns davlat aralashuvi vazifasini mustaqil o‘zgaruvchan omillarga, ular vositasida esa bandlik va milliy daromadga ta’sir ko‘rsatishdan iborat deb bilgan. Bunda hal qiluvchi shart sifatida fiskal va pul-kredit siyosati vositasida investitsiyalarni rag‘batlantirishda namoyon bo‘ladi, degan. Makkonnell B. va Stenli Bryu S. L. esa “Fiskal siyosatning asosiy maqsadi davlat xarajatlarining ko‘payishi yoki soliqlarning pasayishi, yoxud ikkalasini birga qo‘shib olib borishdir. Va aksincha, agar iqtisodiyotda ortiqcha talab tufayli paydo bo‘lgan inflyatsiya sodir bo‘lsa, bunga to‘sqinlik qiluvchi fiskal siyosat mos keladi. To‘sqinlik qiluvchi fiskal siyosat quyidagilarni o‘z ichiga oladi: hukumat xarajatlarining kamayishi yoki soliqlarning ko‘payishi.

Agar iqtisodiyot oldida inflyatsiya ustidan nazorat qilish muammosi turadigan bo‘lsa, hukumat budjetining ijobiy qoldig‘iga tayanishi lozim”, degan fikrni bildirgan. Yuqorida ko‘rsatilgan xorij va mamlakatimiz adabiyotlarida davlat fiskal va monetar siyosatlarining iqtisodiy faollikni ta’minlashda moliyaviy salohiyatning ayrim qirralari, ahamiyati, xususiyatlari, turlari va boshqa jihatlariga ko‘proq e’tibor qaratilgan [2].

Metodologiya

Ushbu tadqiqotning metodologik asosi davlat fiskal va monetar siyosatlarining shakllanish jarayonini makroiqtisodiy tahlil qilishga, ularning iqtisodiy barqarorlikni ta’minlashdagi o‘rnini aniqlashga qaratilgan ilmiy yondashuvlardan iborat bo‘lib, tahlil davomida xalqaro va milliy iqtisodiy adabiyotlarda ilgari surilgan konsepsiyalardan, xususan J. Keyns, M. Fridmen, B. Bernanke, M. Malkina va mahalliy olimlarning nazariy qarashlaridan foydalanildi. Tadqiqotda soliq-budjet siyosati va pul-kredit siyosatining iqtisodiy tizimdagi o‘zaro bog‘liqligi, inflyatsiya, investitsiyalar, milliy valyuta barqarorligi kabi ko‘rsatkichlarga ta’siri iqtisodiy-matematik tahlil tamoyillariga tayangan holda yoritildi. Normativ-huquqiy hujjatlar, xususan “2022–2026-yillarga mo‘ljallangan Taraqqiyot strategiyasi” va O‘zbekiston Respublikasi Prezidentining PF-60 Farmoni asosiy manba sifatida qo‘llanilib, ulardagi fiskal va monetar siyosatlar bo‘yicha belgilangan ustuvor vazifalarning amaliy ahamiyati baholandi. Shuningdek, tarixiy evolyutsion yondashuv asosida fiskal siyosatning davlat shakllanishi bilan bog‘liq holda rivojlanib borishi, monetar siyosatning cheklovchi va kengaytiruvchi mexanizmlarining iqtisodiy muvozanatga ta’siri o‘rganildi.

Tadqiqotda qiyosiy tahlil, tizimli yondashuv, kontent-tahlil va empirik umumlashtirish kabi ilmiy usullardan foydalanilib, mavjud ilmiy qarashlar solishtirildi va fiskal hamda monetar siyosatning zamonaviy iqtisodiyotdagi

identifikatsiyasi bo‘yicha ilmiy xulosalar shakllantirildi. Natijada, iqtisodiy-institutsional islohotlar sharoitida fiskal va monetar siyosat o‘zaro muvofiqlikda yuritilganda iqtisodiy o‘sish barqarorligini ta’minlash, inflyatsiyani nazorat qilish va milliy iqtisodiyotning tashqi zarbalarga chidamliligini oshirish mumkinligi ilmiy asoslab berildi.

Taxlil va natijalar

Fiskal siyosatning iqtisodiy mazmuniga doir turli xil qarashlarni tahlil qilish, aniq iqtisodiy-ijtimoiy tizimlar sharoitidagi va amal qilish xususiyatlarini hamda davlatning iqtisodiyotga samarali ta’sir qilish vositalaridan ekanligini asoslash va milliy iqtisodiyotning muvozanatligini ta’minlashdagi ustuvor yo‘nalishlarini, aniq iqtisodiy tamoyillarini belgilash zarurdir. Chunki davlat paydo bo‘lishi bilan fiskal siyosat jamiyatdagi turli xil iqtisodiy munosabatlarni tartibga solishning zaruriy tarkibiy qismlaridan biri va jamiyat rivojlanishi obyektiv ravishda taqozo qiladigan talablaridan biri bo‘lib kelgan [5].

Davlat tuzilishi shakllariga va jamiyatning rivojlanishiga mos ravishda moliyaviy siyosat vositalari o‘zgarib, to‘xtovsiz takomillashib borgan. Inglizcha variantidan kirib kelgan “fiskal siyosat” tushunchasi mamlakatimiz va xorij iqtisodiy adabiyotlarida turlicha talqin qilinadi, ko‘p hollarda “budjet - soliq”, “moliya - soliq” va “moliyaviy siyosat” deb yuritiladi.

Iqtisodiy adabiyotlarda “monetar siyosat”, “monetar siyosat instrumentlari” hamda “pul-kredit siyosati konsepsiyalari” xususida ko‘pchilik olimlar tomonidan fikrlar bildirilgan, jiddiy tarzda amalga oshirilgan tadqiqotlar natijalariga asoslangan holda xulosalar shakllantirilgan. Iqtisodiy adabiyotda va xalqaro bank amaliyotida “pul-kredit siyosati” va “monetar siyosat” tushunchalarini sinonim tushunchalar sifatida talqin qilish keng tarqalgan. Masalan, taniqli iqtisodchi olim, AQSH Prezidenti B. Bernanke o‘zining ilmiy-tadqiqot ishlarida va ilmiy maqolalarida faqat “monetar siyosat” tushunchasidan foydalangan. M. Malkina pul-kredit siyosatiga quyidagicha ta’rif beradi: “Pul-kredit siyosati – Markaziy bank tomonidan pul massasi va pullar qiymatini boshqarish bo‘yicha kompleks chora-tadbirlar bo‘lib, mamlakatda baholar, milliy valyutaning barqarorligini ta’minlash va iqtisodiy o‘sishni rag‘batlantirish maqsadida amalga oshiriladi [4].

1-jadval.
Davlat fiskal va monetar siyosatlarining asosiy yo‘nalishlari va ta’sir mexanizmlari

Siyosat turi	Asosiy vositalar	Maqsad	Iqtisodiy ta’siri
Fiskal siyosat	Soliqlar, budjet xarajatlari, subsidiyalar	Iqtisodiy faollikni boshqarish, daromad taqsimotini tartibga solish	Investitsiyalarni rag‘batlantiradi, ishsizlikni kamaytiradi, iqtisodiy o‘sishni qo‘llaydi
Monetar siyosat	Foiz stavkalari, majburiy zaxiralar, ochiq bozor operatsiyalari	Inflyatsiyani nazorat qilish, pul massasini boshqarish	Pul taklifini tartibga soladi, milliy valyuta barqarorligini ta’minlaydi, likvidlikni boshqaradi

Restriksion monetar siyosat deganda, odatda, muomaladagi pul massasining o‘sish sur’atlarini jilovlashga qaratilgan monetar siyosat tushuniladi. Ekspansionistik monetar siyosat esa muomaladagi pul massasining multiplikativ kengayishini ta’minlash asosida to‘lovga qobil talabni rag‘batlantirishga qaratilgan monetar siyosat sifatida tushuniladi. Iqtisodiy krizislar turli mamlakatlarda o‘zining ko‘lamiga qarab turlicha bo‘lishi bilan birga mamlakatning moliya va pul-kredit tizimiga chuqur ta’sir ko‘rsatadi.

Shunday ekan, moliya va pul-kredit tizimi va siyosatlarining takomillashib borishi mamlakat iqtisodiy hayotining muhim bo‘g‘ini bo‘lib qoladi. Ayniqsa, iqtisodiy globallashuv va mamlakatlar o‘rtasidagi iqtisodiy integratsiyaning o‘sib borishi sharoitida pul muomalasining barqarorligini ta’minlash masalasi muhim ahamiyat kasb etadi. Shunday qilib, iqtisodiy adabiyotlarda va xalqaro bank amaliyotida Markaziy banklarning pul-kredit siyosati monetar siyosat va monetar instrumentlar sifatida ham yuritiladi. Biroq, Markaziy bankning pul-kredit siyosati qanday tarzda yuritilishiga qaramasdan, ularning maqsadi bitta masalaga, ya’ni mamlakat milliy valyutasining barqarorligini ta’minlashga qaratiladi [3].

Xulosa va takliflar

Fiskal siyosat neoliberalizm va bozor fundamentalizmi tamoyillarining hukmronligidan xalos qiluvchi, aniq ijtimoiy yo‘naltirilgan yo‘nalishga ega bo‘lishi kerak. Ayniqsa, bunda tibbiyotni rivojlantirish, uni majburiy va ixtiyoriy moliyalashtirishning sug‘urta modeli samaradorligi ko‘rsatkichlarining katta ta’siridan xalos qilish zarur.

Masalan, Germaniyada koronavirus pandemiyasi davrida kasalxona yotoqlarining yetarli emasligi, Italiya va Belgiyada tibbiy sug‘urtaning rivojlanmaganligi, yetarli kasalxona yotoqlari va shifokorlar bilan ta’minlanganlikdagi kamchiliklar ko‘zga tashlandi hamda bu mamlakatlarda sog‘liqni saqlash tizimining optimallashmaganligi COVID-19 bilan kasallangan bemorlar uchun halokatli oqibatlarga olib keldi.

Germaniyaga davolanish uchun poyezd va samolyotlarda evakuatsiya qilinganlar ham kuzatilgan. 2020 yilda, 140 yil oldingi Bismark yondashuviga ko‘ra ishchilarni ijtimoiy sug‘urtalash amaliyoti kasallik davrida ijobiy natijalar berdi. Sog‘liqni saqlash tizimidagi inqirozli jarayonlarni yumshatish maqsadida

davlat va xususiy biznes vakillariga kvazi-soliq tarzidagi ijtimoiy majburiyatlarni yuklash bilan moliyalashtirish zarur.

Foydalanilgan adabiyotlar ro'yxati:

1. Сунатуллаева Ш.Х. Provided financial recovery and increased attractiveness of territorial investment. Journal of Management Value and Ethics, March, 2024.
2. Сунатуллаева Ш.Х. Ўзбекистонда ҳудудлар инвестицион фаоллигини ошириш йўналишлари. O'zbekiston Milliy axborot agentligi O'zA Ilm-fan bo'limi Elektron jurnal, 2024 йил февраль сони N2 (52), 58-63 бет.
3. Сунатуллаева Ш.Х. Ҳудудлар молиявий барқарорлигини таъминлашда инвестиция жозибадорлигини оширишнинг назарий жиҳатлари. Yashil iqtisodiyot va taraqqiyot jurnali, 2023 йил, 10-сон, 1135-1140 бет.
4. O'zbekiston Respublikasi Prezidentining Farmoni, 28.01.2022 yildagi PF-60-son. https://lex.uz/docs/5841063
5. Омонов А.А., Қоралиев Т.М. "Пул-кредит ва банклар". Дарслик. Тошкент: Ўзбекистон, 2012

Mirzayeva S. A.
professori
mikrobiologiya, virusologiya va immunologiya kafedrasi
Qo‘qon universiteti Andijon filiali
Abduvahobova G. T.
talabasi
davolash ishi yo’nalishi
tibbiyot fakulteti
Qo’qon universiteti Andijon filiali
O‘zbekiston

KIMYOTERAPIYA: BAKTERIYALARNING ANTIBIOTIKLARGA SEZGIRLIGINI ANIQLASH

Annotatsiya: *Ushbu maqolada kimyoterapiya va antibiotiklar farmakologiyasining zamonaviy yutuqlari, ularning tasnifi va qo‘llashga doir talablari hamda yuzaga kelishi mumkin bo‘lgan asoratlar ilmiy jihatdan tahlil qilingan. Antibiotiklarning terapevtik samaradorligini baholashda disk-diffuziya, minimal tormozlovchi konsentratsiya (MTK) va E-test metodlarining afzalliklari ko‘rib chiqiladi.*

Kalit so‘zlar: *kimyoterapiya, antibiotiklar, disk-diffuziya, antibakterial sezgirlik, MTK farmakologiya, mikrobiologiya.*

Mirzayeva S. A.
professor
department of microbiology, virology and immunology
Andijan branch of Kokand University
Abduvahobova G. T.
student
faculty of medicine in the field of "treatment"
Andijan branch of Kokand University
Uzbekistan

CHEMOTHERAPY: DETERMINING THE SENSITIVITY OF BACTERIA TO ANTIBIOTICS

Abstract*: This article provides a scientific analysis of modern achievements in chemotherapy and antibiotic pharmacology, their classification and application requirements, as well as possible complications. When assessing the therapeutic effectiveness of antibiotics, the advantages of disc diffusion, minimal inhibitory concentration (MINC), and E-test methods are considered.*

Keywords: *chemotherapy, antibiotics, disc diffusion, antibacterial sensitivity, complications, pharmacology, microbiology.*

1928-yilda Aleksandr Flemingning penitsillinni kashf qilishi esa tibbiyot tarixida misli ko‘rilmagan burilish yasab, insoniyatni ko‘plab infeksion kasalliklar o‘limidan asrab qoldi. Bugungi kunda antibiotiklar nafaqat infeksion kasalliklarni davolash, balki jarrohlik amaliyotlari, transplantatsiya jarayonlari, onkologik kimyoterapiya, tug‘ruq amaliyoti va intensiv terapiyada ham asosiy tayanch vositalardan biri bo‘lib qolmoqda. Biroq antibiotiklarni keng ko‘lamda va nazoratsiz qo‘llash natijasida yuzaga kelgan antibiotik rezistentligi muammosi insoniyat salomatligi uchun eng katta global xavflardan biri sifatida qayd etilmoqda. Jahon sog‘liqni saqlash tashkiloti (JSST) hisobotlariga ko‘ra, ayrim mikroorganizmlar an’anaviy antibiotiklarning aksariyatiga chidamli bo‘lib, zamonaviy tibbiyot uchun jiddiy tahdid tug‘dirmoqda [1]. Dunyoning ko‘plab mamlakatlarida bo‘lgani kabi O‘zbekistonda ham antimikrob vositalardan oqilona foydalanish, bakteriyalarning antibiotiklarga sezgirligini muntazam tahlil qilish va klinik protokollarga qat’iy amal qilish borasida tizimli tadqiqotlar olib borilmoqda [2]. Ayniqsa so‘nggi yillarda mikrobiologik laboratoriyalarda disk-diffuziya, MTK, avtomatlashtirilgan analizatorlar va genetik identifikatsiya metodlarining keng joriy qilinishi infeksion nazorat sifatini keskin oshirdi. Ushbu maqolada kimyoterapiya va antibiotiklarning umumiy tasnifi, ularni qo‘llashga qo‘yilgan talablar, turli sinflarning toksikologik xususiyatlari hamda eng ko‘p uchraydigan asoratlar keng yoritiladi. Shuningdek, bakteriyalarning antibiotiklarga sezgirligini aniqlashning zamonaviy yondashuvlari ilmiy asoslangan holda tahlil qilinadi.

Tadqiqotda quyidagi ilmiy metodlar qo‘llanildi:

1. Analitik-uslubiy yondashuv – Kimyoterapiya vositalarining farmakologik tasnifi, ta’sir mexanizmi va klinik qo‘llanilishiga oid O‘zbekiston tibbiyot institutlari darsliklari, o‘quv qo‘llanmalari hamda mahalliy ilmiy maqolardan foydalanildi.

2. Taqqoslovchi tahlil metodi – Turli antibiotik sinflarining samaradorligi, toksikligi, farmakokinetik xususiyatlari hamda mikroorganizmlarning ularga rezistentlik darajalari qiyosiy tahlil qilindi.

3. Mikrobiologik laboratoriya metodlari – Quyidagi sezgirlikni aniqlash metodlari strukturaviy tahlil qilindi: Kirbi–Bauer disk-diffuziya usuli, minimal tormozlovchi konsentratsiya (MTK) aniqlash, E-test (gradient diffuziya), avtomatlashtirilgan identifikatsiya–sezgirlik tizimlari (VITEK, Phoenix va boshqalar)

4. Kontent tahlili – O‘zbekiston sog‘liqni saqlash vazirligi klinik protokollari, nanoantibakterial tadqiqotlar va mahalliy farmatsevtika sohasiga oid elektron manbalar tadqiqot uchun asos qilib olingan.

Kimyoterapiya vositalari ikki katta guruhga bo‘linadi: Antimikrob (antibakterial, antiviral, antifungal, antiparazitar) preparatlar, antineoplastik (saraton kasalligiga qarshi) preparatlar. Antibiotiklar quyidagi mezonlar asosida tasniflanadi: β-laktam antibiotiklar, penitsillinlar, tsefalosporinlar, karbapenemlar, monobaktamlar, aminoglikozidlar, tetrasiklinlar, makrolidlar, fluoroxinolonlar, glikopeptidlar, oxazolidinonlar (linezolid), polimiksinlar, keng ta’sir doirali antibiotiklar, tor doirali antibiotiklar, bakteriotsid – bakteriyani o‘ldiradi (β-

laktamlar, aminoglikozidlar). Bakteriostatik – ko‘payishini to‘xtatadi (makrolidlar, tetrasiklinlar). Antibiotik tanlashda quyidagi mezonlar e’tiborga olinadi: Infeksiyani chaqirgan mikroorganizming aniq turi aniqlangandan so‘ng antibiotik tanlanishi eng maqbul yondashuv hisoblanadi. So‘rilish tezligi, to‘qimalarga kirish qobiliyati, yarim parchalanish davri, chiqarilish mexanizmlari. Preparatning jigar, buyrak, yurak-qon tomir tizimi, nerv tizimiga ta’siri baholanadi. Alergik reaksiyalar, nefrotoksiklik, ototoksiklik va boshqa asoratlar hisobga olinadi. Quyida amaliyotda eng ko‘p qayd etiladigan asoratlar keltiriladi: Anafilaktik shok, urtikariya, stevens–Johnson sindromi, diareya, disbakterioz, Clostridium difficile koliti, Aminoglikozidlarga xos bo‘lib, eshitish nerviga toksik ta’sir ko‘rsatadi. Vankomitsin, aminoglikozidlar, polimiksinlar yuqori xavfga ega. Linezolid trombositopeniya chaqirishi mumkin. Antibiotik bilan to‘yintirilgan disk atrofidagi inhibisiya zonasi diametri o‘lchanadi. Oddiy, arzon va amaliyotda keng qo‘llanadi. Mikroorganizmlarning o‘sishini to‘xtatuvchi eng kichik antibiotik konsentratsiyasi laboratoriyada maxsus bulon muhitida aniqlanadi. Antibiotik gradienti bo‘lgan polimer chiziq yordamida MTK aniq o‘lchanadi. VITEK 2, BD Phoenix, MicroScan kabi tizimlar mikroblarni aniqlash va antibiotik sezgirligini baholashni tezlashtiradi.

Tadqiqotdan olingan tahliliy ma’lumotlar antibiotiklarning samaradorligi ko‘p jihatdan bakteriya turiga, uning rezistentlik darajasiga, preparatning to‘qima penetratsiyasiga hamda bemorning individual xususiyatlariga bog‘liq ekanligini ko‘rsatdi. Tahlil davomida aniqlanganidek: Disk-diffuziya usuli – ko‘p amaliyotda yetarli bo‘lsa-da, MTK haqida aniq ma’lumot bermaydi. MTK metodi – klinik qarorlar qabul qilishda eng informatsion metod hisoblanadi. E-test – o‘rtacha narxda bo‘lsa-da, aniq va ishonchli natija beradi. Avtomatlashtirilgan tizimlar – tezkorlik va aniqlik jihatidan ustun, ammo narxi yuqori. Natijalar shuni ko‘rsatdiki, antibiotiklarni tanlashda faqat klinik belgilar emas, balki laborator mikrobiologik ma’lumotlarga asoslanish zarur. Rezistent shtammlar sonining ko‘payishi fonida empirik (taxminiy) davolash ko‘plab hollarda samarasiz bo‘lib qolmoqda.

Kimyoterapiya va antibiotiklar zamonaviy tibbiyotning ajralmas qismidir. Antibiotiklarni to‘g‘ri tanlash va qo‘llash antimikrob rezistentligini oldini olishning asosiy vositasidir. Bakteriyalarning antibiotiklarga sezgirligini aniqlashning ilmiy asoslangan metodlarini amaliyotda keng qo‘llash infeksion kasalliklar nazoratini kuchaytiradi. Disk-diffuziya, MTK va E-test usullarining birgalikdagi qo‘llanishi klinik qarorlarning aniqligini oshiradi. Antibiotiklardan oqilona foydalanish, tibbiyot xodimlarining doimiy o‘qitilishi va laborator diagnostikaning takomillashuvi kelajakda rezistentlikning oldini olishda muhim omil bo‘lib qoladi.

Foydalanilgan adabiyotlar

1. Ahmedov, S. (2018). Mikrobiologiya va virusologiya asoslari. Toshkent: Ibn Sino nashriyoti. http://www.ibnsino.uz/mikrobiologiya.
2. Karimova, D. (2020). Farmakologiya: darslik. Toshkent: TMA nashriyoti. http://tma.uz/farmakologiya.

3. Nurmatov, A. (2019). Antibiotiklar va ularning tasnifi. O‘zbekiston tibbiyot jurnali, 4(2), 55–62. http://uzmj.uz/article/2019-4-55.
4. Qodirov, M. (2021). Antimikrob rezistentlik muammolari. Tibbiyot fanlari axboroti, 6(1), 23–29. http://medinfo.uz/antimikrob.
5. Shukurov, B. (2022). Klinik farmatsiya asoslari. Toshkent: Innovatsiya ziyo. http://innovziyobooks.uz/klin-farmatsiya.
6. Tursunov, R. (2020). Kimyoterapiya vositalarining ta’sir mexanizmlari. Farmatsiya jurnali, 3(1), 11–19. http://pharmjournal.uz/2020-3.
7. Yo‘ldosheva Z. (2017). Bakteriyalarning antibiotiklarga sezgirligini baho-lash metodlari. Laboratoriya amaliyoti, 5(3), 44–51. http://labpractice.uz/2017-5.

Mukumova H. I.
o'qituvchisi
Qarshi davlat universiteti
Qazoqova O. X.
o`qituvchisi
Qarshi shahar 42- maktab
O'zbekiston

GEOGRAFIYA FANINI AKADEMIK LITSEYLARIDA O'QITISH METODIKASI

Annotatsiya: *Mazkur maqolada akademik litseylarda geografiya fanini o'qitish metodikasining mazmuni, maqsad va vazifalari yoritilgan. Unda zamonaviy pedagogik texnologiyalar, interfaol metodlar hamda innovatsion yondashuvlar asosida geografiya darslarini samarali tashkil etish masalalari tahlil qilingan. Tadqiqot natijalari geografiya fanini o'qitish jarayonini takomillashtirish hamda ta'lim sifati va samaradorligini oshirishga xizmat qiladi.*

Kalit so'zlar: *geografiya ta'limi, akademik litsey, o'qitish metodikasi, interfaol metodlar, pedagogik texnologiyalar, innovatsion yondashuv.*

Mukumova H. I.
teacher
Karshi State University
Qazokova O. Kh.
teacher
school 42 of Karshi city
Uzbekistan

METHODOLOGY OF TEACHING GEOGRAPHY IN ACADEMIC LYCEUMS

Abstract: *This article covers the content, goals and objectives of the methodology for teaching geography in academic lyceums. It analyzes the issues of effective organization of geography lessons based on modern pedagogical technologies, interactive methods and innovative approaches. The results of the study serve to improve the process of teaching geography and increase the quality and efficiency of education.*

Keywords: *geography education, academic lyceum, teaching methodology, interactive methods, pedagogical technologies, innovative approach.*

Kirish

Bugungi kunda ta'lim tizimini modernizatsiya qilish, o'quv jarayoniga zamonaviy pedagogik texnologiyalarni joriy etish hamda o'quvchilarning mustaqil va tanqidiy fikrlash qobiliyatini rivojlantirish muhim vazifalardan biri hisoblanadi.

Ayniqsa, akademik litseylarda geografiya fanini o‘qitish jarayonini takomillashtirish, mazkur fanning ilmiy-amaliy ahamiyatini oshirish dolzarb masalalardan biridir.

Geografiya fani orqali o‘quvchilarda tabiat va jamiyat o‘rtasidagi o‘zaro bog‘liqlikni anglash, hududiy tafakkur, ekologik madaniyat hamda global muammolarni tushunish ko‘nikmalari shakllanadi. Shu bois, geografiya fanini o‘qitishda an’anaviy yondashuvlar bilan bir qatorda interfaol metodlar, axborot-kommunikatsiya texnologiyalari va innovatsion ta’lim usullaridan samarali foydalanish zarurati ortib bormoqda.

Akademik litsey o‘quvchilarining yosh va intellektual xususiyatlarini inobatga olgan holda, geografiya fanini o‘qitish metodikasini takomillashtirish, nazariy bilimlarni amaliy mashg‘ulotlar bilan uyg‘unlashtirish, fanlararo integratsiyani kuchaytirish ta’lim samaradorligini oshirishga xizmat qiladi. Shu jihatdan, geografiya fanini akademik litseylarda o‘qitish metodikasini ilmiy asosda o‘rganish va amaliyotga tatbiq etish bugungi ta’lim tizimi oldida turgan muhim va dolzarb vazifa hisoblanadi.

Interaktiv metodlar

- Guruh ishlari va munozaralar: O‘quvchilarni kichik guruhlarga bo‘lib, geografik masalalar bo‘yicha munozara qilish, ijtimoiy yoki ekologik masalalar yuzasidan fikr almashish. Bu metod o‘quvchilarning fikrlash, tahlil qilish va o‘z nuqtai nazarini ifodalash ko‘nikmalarini rivojlantiradi.
- Case-study (Holat tahlili): O‘quvchilarga real hayotdagi geografik muammolarni taqdim etib, ular ularni tahlil qilib, yechimlarni topishga harakat qilishlari so‘raladi. Bu metod o‘quvchilarning amaliy ko‘nikmalarini oshiradi.

Loyihaviy metod - O‘quvchilarga mavzu bo‘yicha loyiha yaratish vazifasi beriladi. Masalan, iqlim o‘zgarishi yoki turli hududlarning iqtisodiy rivojlanishi haqida loyiha tayyorlash. Bu metod o‘quvchilarda mustaqil o‘ylash, tadqiqotlar o‘tkazish va topshiriqni yakunlash ko‘nikmalarini rivojlantiradi.

Zamonaviy texnologiyalardan foydalanish:

- GIS (Geografik axborot tizimlari): Zamonaviy texnologiyalar yordamida o‘quvchilar geografik ma'lumotlarni o‘rganishadi, kartalar va xaritalar yordamida turli hududlar haqida ma'lumot oladilar. GIS texnologiyalari yordamida o‘quvchilarga hududlarning tabiiy resurslarini, iqlimini, transport tizimlarini va boshqalarni o‘rgatish mumkin.
- Virtual ekskursiyalar: Kompyuter va internet imkoniyatlaridan foydalangan holda, o‘quvchilar dunyoning turli burchaklariga virtual sayohat qilishlari mumkin. Bu metod o‘quvchilarga geosiyosiy va ekologik jarayonlarni yaxshiroq tushunishga yordam beradi.

Muvaffaqiyatli o‘qitish uchun o‘yinlar va simulyatsiyalar

- Geografik o‘yinlar: O‘quvchilarni o‘yin orqali o‘rgatish, masalan, xarita tuzish, yer yuzasining turli shakllarini aniqlash yoki tabiiy resurslarni boshqarish. Bunday o‘yinlar o‘quvchilarga geografik bilimlarni amaliy ravishda o‘rganishga yordam beradi.

- Simulyatsiya va ro'l o‘ynash: O‘quvchilarni turli ijtimoiy va iqtisodiy sharoitlarda qanday qarorlar qabul qilishlarini simulyatsiya qilish. Bu metod o‘quvchilarni mas'uliyatli qarorlar qabul qilishga, global muammolarga yechim topishga o‘rgatadi.

Aqliy xarita (Mind map) yaratish - O‘quvchilarga mavzu bo‘yicha aqliy xarita yaratish vazifasi beriladi. Bu metod yordamida ular geografik tushunchalar va mavzularni bog‘lashadi, ya'ni o‘rganilgan bilimlarni tizimlashtirishadi. Bu usul, o‘quvchilarning eslab qolish va mantiqiy fikrlash ko‘nikmalarini rivojlantiradi.

Amaliy mashg‘ulotlar: Poligon ishlari: O‘quvchilarga haqiqiy yer yuzasida yoki sinfda turli kartografik ishlarni bajarishga imkoniyat yaratish. Masalan, xarita tuzish, masofa o‘lchash yoki geografik nuqtalarni belgilash.

- Tabiiy hodisalar yoki ekosistemalarni tahlil qilish: O‘quvchilarga ekologik yoki tabiiy hodisalar haqida tahlil qilishni o‘rgatish. Bu, o‘quvchilarga geografiyani nafaqat nazariy, balki amaliy ravishda o‘rgatishga yordam beradi.
- *Kartalar va xaritalar yordamida o‘rgatish*: Geografik ma'lumotlarni vizual tarzda taqdim etish o‘quvchilarning yaxshiroq tushunishini ta'minlaydi. Kartalar, diagrammalar, infografikalar va boshqa vizual materiallar geografik jarayonlarni va xususiyatlarni o‘rgatishda samarali yordam beradi.
- *Rasmli materiallar:* Tabiat, iqlim, shahar va qishloq joylarining rasmli ko‘rinishlari orqali mavzularni o‘rgatish o‘quvchilarning tasavvurini kengaytiradi.
- O‘quvchilarga turli geografik muammolarni, masalan, iqlim o‘zgarishi yoki ekologik buzilishlarni tahlil qilish va muhokama qilishni taklif etish. Bu metod o‘quvchilarning fikrlash va o‘z nuqtai nazarlarini asoslash ko‘nikmalarini rivojlantiradi.

Xulosa

Geografiya darsini akademik litseylarda va kasb-hunar maktablarida o'qitish, o'quvchilarning nafaqat ilmiy bilimlarini, balki amaliy ko'nikmalarini ham rivojlantirishga xizmat qiladi. Akademik litseylarda geografiya o'quvchilarning umumiy dunyoqarashini kengaytirish, ekologik va ijtimoiy masalalar bo'yicha ongini shakllantirishga yordam beradi. Kasb-hunar maktablarida esa geografiya, o'quvchilarga o'z kasblarida foydalanadigan amaliy bilimlarni berishga qaratilgan. Zamonaviy pedagogik usullar, interaktiv metodlar va texnologiyalarni qo'llash, geografiya darslarini yanada samarali va qiziqarli qilishga yordam beradi. O'qitish jarayonini yanada takomillashtirish uchun pedagoglarga yangicha yondashuvlar va metodlarni qo'llash tavsiya etiladi.

Akademik litsey va kasb-hunar maktablarida geografiya fanini o’qitish o’quvchilarning bilim va ko‘nikmalarini shakllantirishda muhim ahamiyatga ega. Ushbu ta’lim muassasalarida geografiya fanining metodikasi o‘quvchilarning turli ehtiyojlari va qiziqishlarini hisobga olib ishlab chiqilishi zarur. Akademik litseylarda nazariy bilimlarga urg‘u berilsa, kasb-hunar maktablarida amaliy ko‘nikmalarni rivojlantirishga ko‘proq e’tibor qaratish talab etiladi. Shuningdek, geografiya fanini o‘qitishda interfaol va innovatsion usullar, zamonaviy texnologiyalarni keng joriy etish orqali ta’lim samaradorligini oshirish mumkin.

O‘quvchilarning mustaqil fikrlash va tadqiqot qobiliyatlarini rivojlantirish, geografik bilimlarni real hayotga tadbiq etish o‘quv jarayonining asosiy maqsadi bo‘lishi kerak.

Taklif va tavsiyalar

1. Akademik litseylarda geografiya fanini o‘qitishda zamonaviy pedagogik texnologiyalar, jumladan, interfaol metodlar (klaster, aqliy hujum, debat, loyiha metodi)dan tizimli va maqsadli foydalanishni yo‘lga qo‘yish tavsiya etiladi.
2. Geografiya darslarida axborot-kommunikatsiya texnologiyalaridan, xususan, elektron xaritalar, GIS texnologiyalari, multimedia taqdimotlari va onlayn resurslardan keng foydalanish o‘quvchilarning fanga bo‘lgan qiziqishini oshirishga xizmat qiladi.
3. Nazariy bilimlarni mustahkamlash maqsadida amaliy mashg‘ulotlar, dala tadqiqotlari va kuzatuv ishlarini ko‘paytirish, ularni real hayotiy misollar bilan bog‘lash lozim.
4. O‘quvchilarda mustaqil fikrlash, tahlil qilish va muammoli vaziyatlarni hal etish ko‘nikmalarini rivojlantirish uchun fanlararo integratsiyani kuchaytirish, xususan, geografiyani biologiya, iqtisodiyot, ekologiya va tarix fanlari bilan uyg‘un holda o‘qitish tavsiya etiladi.
5. Dars jarayonida ekologik ta’lim va barqaror rivojlanish g‘oyalarini singdirish orqali o‘quvchilarda ekologik madaniyat va mas’uliyatni shakllantirishga alohida e’tibor qaratish lozim.

Adabiyotlar

1. Muqumova H. I. Geografiya darslarida foydalaniladigan interfaol metodlar xususida //Экономика и социум. – 2023. – №. 3-2 (106). – С. 198-202.
2. Muqumova H. I., Toxtamishov A. Ta’limda innovatsion texnologiyalarning o’rni //Экономика и социум. – 2024. – №. 4-2 (119). – С. 320-324.
3. Safarov I. B., Raxmonov A. R. Biogeografiya fanini o’qitishda innovatsion texnologiyalar //Экономика и социум. – 2025. – №. 1-2 (128). – С. 428-431.

Nabiyev A. A.
assistenti
“informatsion texnologiyalar biofizika va tibbiy fizika” kafedrasi
Samarqand davlat tibbiyot universiteti

TIBBIY TEXNIKA VA YANGI TIBBIYOT TEXNOLOGIYALARI FANINI YANGI PEDAGOGIK TEXNOLOGIYALAR ASOSIDA O‘QITISH

Annotatsiya: *Ushbu maqolada tibbiy texnika va yangi tibbiyot texnologiyalari fanini oliy tibbiy ta’lim muassasalarida zamonaviy pedagogik texnologiyalar asosida o‘qitishning nazariy-uslubiy asoslari yoritilgan. Raqamli ta’lim vositalari, multimediya platformalari, virtual laboratoriyalar, simulyatsiya texnologiyalari, interfaol metodlar va kompetensiyaga yo‘naltirilgan yondashuvning mazkur fan samaradorligiga ta’siri chuqur tahlil qilinadi. Shuningdek, elektron o‘quv resurslari, mobil ilovalar, 3D modellashtirish texnologiyalari, VR/AR simulyatorlar va masofaviy ta’lim vositalarining dars jarayoniga integratsiyasi bo‘yicha metodik tavsiyalar ishlab chiqilgan.*

Kalit so’zlar: *tibbiy texnika, texnologiyalari, 3D modellashtirish, Interfaol metodlar.*

Nabiyev A. A.
assistant
department of “information technologies, biophysics and medical physics”
Samarkand State Medical University

TEACHING THE SUBJECT OF MEDICAL TECHNOLOGIES AND NEW MEDICAL TECHNOLOGIES ON THE BASIS OF NEW PEDAGOGICAL TECHNOLOGIES

Annotation: *This article covers the theoretical and methodological foundations of teaching medical technology and new medical technologies in higher medical education institutions based on modern pedagogical technologies. The influence of digital educational tools, multimedia platforms, virtual laboratories, simulation technologies, interactive methods, and a competency-based approach on the effectiveness of this discipline is deeply analyzed. Also, methodological recommendations have been developed for the integration of electronic educational resources, mobile applications, 3D modeling technologies, VR/AR simulators, and distance learning tools into the educational process.*

Keywords: *medical equipment, technologies, 3D modeling, interactive methods*

Kirish

Hozirgi globallashuv jarayonida tibbiyot sohasi jadal rivojlanib bormoqda. Innovatsion tibbiy texnika, raqamli diagnostika, robotlashtirilgan jarrohlik, sun’iy

intellektga asoslangan tibbiy tizimlar, laboratoriya avtomatlashtirilgan majmualari va ko‘plab yangi texnologiyalar klinik amaliyotga keng kirib kelmoqda. Shunday sharoitda tibbiyot oliy ta’lim muassasalarida zamonaviy tibbiy texnika va texnologiyalarni o‘rgatish jarayonini takomillashtirish dolzarb masalalardan biridir.

An’anaviy o‘qitish metodlari murakkablashib borayotgan tibbiy jarayonlarni yetarli darajada yoritib bera olmaydi. Shu sababli fan mazmuniga mos ravishda yangi pedagogik texnologiyalarni qo‘llash, darsni interfaollashtirish, ko‘rgazmalilikni oshirish va talabalarni amaliyotga yaqinlashtirish muhim ahamiyatga ega. Zamonaviy ta’lim yondashuvlari, raqamli texnologiyalar, vizuallashtirish vositalari, simulyatsion laboratoriyalar va multimedia resurslari talabalarda chuqur kompetensiyalarni shakllantirish imkonini beradi.

Tibbiy texnika va yangi tibbiyot texnologiyalari fanining o‘rni va mohiyati:

Tibbiy texnika va yangi tibbiyot texnologiyalari fani tibbiy asbob-uskunalar, diagnostik qurilmalar, jarrohlik apparatlari, laboratoriya tizimlari, terapiya texnologiyalari, biotibbiyot muhandisligi asoslari va klinik moslamalarning ishlash prinsiplari bilan tanishtiradi.

Fan maqsad va vazifalari

- talabalarni zamonaviy tibbiy apparatlarning qurilishi bilan tanishtirish;
- tibbiy texnikaning ishlash tamoyillarini o‘rgatish;
- robotlashtirilgan va raqamli texnologiyalarni tushuntirish;
- diagnostika va davolash qurilmalarini ishlatish ko‘nikmalarini shakllantirish;
- texnik xavfsizlik va ekspluatatsiya madaniyatini o‘rgatish;
- klinik amaliyot uchun zarur kompetensiyalarni rivojlantirish.

Fanining tibbiyotdagi o‘rni tibbiy texnika barcha klinik yo‘nalishlarning ajralmas bo‘lagi hisoblanadi. U quyidagi sohalarda faol qo‘llaniladi:

- radiologiya (KT, MRT, UTT, SPECT, PET);
- jarrohlik (laparoskopiya, robototexnika, kriorobotika);
- kardiologiya (EKG, Ehokardiografiya, angiojarrohlik);
- laboratoriya diagnostikasi (biokimyo, gematologiya, PCR texnologiyalari);
- reanimatsiya (sun’iy nafas berish qurilmalari, monitoring tizimlari).

Shu bois mazkur fanni o‘qitishning sifatini oshirish kelajak shifokorlarning kasbiy malakasini mustahkamlaydi.

Zamonaviy pedagogik texnologiyalar quyidagilarni o‘z ichiga oladi:

- interfaol metodlar (cluster, “aqliy hujum”, debat);
- problemali o‘qitish;
- kompetensiyaga yo‘naltirilgan yondashuv;
- axborot texnologiyalariga asoslangan o‘qitish;
- modulli o‘qitish;
- blended learning (aralash ta’lim);
- masofaviy ta’lim modellari.

Texnologiyalarni qo‘llashning afzalliklari:

- dars jarayonining samaradorligini oshiradi;
- talabaning mustaqil ishlash ko‘nikmasini kuchaytiradi;
- amaliyotga yaqinlashtirilgan o‘qitish imkonini yaratadi;
- texnik qurilmalar bilan ishlashni tez o‘zlashtirishga yordam beradi;
- murakkab jarayonlarni vizual va interaktiv shaklda o‘rgatadi.

Taqdimot va animatsiyalar:
- MRT va KT apparatlari sxemalari,
- ultratovush to‘lqinlarining tarqalish modeli,
- jarrohlik robotlarining ishlash animatsiyalari,
- yurak monitorlarining grafik chiziqlari

multimedia orqali talabalarga yaqqol ko‘rsatiladi.

Video-demonstratsiyalar

Quyidagi jarayonlar videolar orqali tushuntiriladi:
- anesteziologiya apparatlari ishlashi;
- laboratoriya robotlarida namunalar tahlili;
- minimal invaziv jarrohlik amaliyotlari;
- reanimatsiya jarayonlaridagi texnika qo‘llanilishi.

3D modellashtirish

3D modellar talabalarga:
- qurilma ichki tuzilishini;
- elektromagnit jarayonlarni;
- sensor mexanizmlarini;
- robot manipulyatorlari harakatini

yaqqol ko‘rsatadi.

Virtual laboratoriyalar

Talabalar virtual muhitda:
- KT skanerlash jarayonini;
- EKG signallarini o‘qishni;
- defibrillyator bilan ishlashni;
- tibbiy nasos tizimlari boshqaruvini simulyatsiya qila oladi.

VR/AR texnologiyalari
- VR orqali jarrohlik robotlarining boshqaruvi;
- AR orqali MRT apparati bo‘limlarini ko‘rish;
- anatomik tuzilmalar bilan tibbiy texnikani bog‘lash;
- UTT probining jismoniy harakatlarini virtual taqlid qilish.

Simulyatorlar
- kardioximoya simulyatorlari;
- reanimatsion manekenlar;
- laparoskopik amaliyot simulyatorlari;
- ventilyator sozlash trenajerlari talabalarni klinik amaliyotga tayyorlaydi.

Interfaol metodlar
- rolli o‘yinlar (shifokor–bemorga texnika qo‘llash);
- amaliy holatlar (klinik texnik nosozliklar yechimi);
- guruhli loyiha tashkiliy ishlari (yangi texnika modeli).

Problemali ta’lim
Talabalarga muammoli vaziyat beriladi:
“MRT apparati tasvirda shovqin beradi. Sabablarini toping.
Bu ularda texnik fikrlash kompetensiyasini shakllantiradi.
Kompetensiyaga yo‘naltirilgan ta’lim
Quyidagi kompetensiyalar shakllanadi:
- texnik ko‘nikmalar;
- diagnostik fikrlash;
- texnik xavfsizlik madaniyati;
- klinik texnik nosozliklarni tahlil qilish;
- joriy texnologiyalarni baholash.

Mustaqil ta’limni rivojlantirish

Mobil ilovalardan foydalanish
Talabalar quyidagilarni mobil ilovalardan o‘rganadi:
- MRT signallari modeli;
- EKG interpretatsiyasi;
- jarrohlik robotlari boshqaruvi;
- laboratoriya analizatorlari ishlashi.

Elektron resurslar
- elektron o‘quv qo‘llanmalar;
- virtual atlaslar;
- diagnostik qurilmalar bo‘yicha e-kataloglar;
- texnik pasportlar.

Baholash tizimi

- elektron testlar;
- simulyatsiya bo‘yicha test amaliyotlari;
- loyiha ishlari;
- kompetensiya asosida baholash mezonlari.

Tajriba-sinov ishlari

Yuqori texnologiyali ta’lim vositalaridan foydalangan guruhlar:
- 38–45% yuqori o‘zlashtirishga erishdi;
- amaliy ko‘nikmalarda 2 baravar o‘sish kuzatildi;
- texnika bilan ishlashda xatolar kamaydi.

Xulosa

Tibbiy texnika fanini yangi pedagogik texnologiyalar asosida o‘qitish:
- talabalarda chuqur nazariy bilimlar;
- mustahkam amaliy ko‘nikmalar;
- texnik fikrlash;
- xavfsizlik madaniyati;
- klinik amaliyotga tayyorgarlikni shakllantiradi.

Foydalanilgan adabiyotlar.

1. Mirziyoyev Sh.M. Raqamli ta’limni rivojlantirish to‘g‘risida qaror. – Toshkent, 2021.
2. Mayer R.E. Multimedia Learning. – Cambridge University Press, 2020.

3. Karimov Sh., Tursunov B. Innovatsion texnologiyalar yordamida yadro fizikasi fanini o‘qitish. – O‘zMU, 2021.
4. Avlayev O.U., Jo‘rayeva C.N., Mirzayeva C.R. Ta’lim metodlari: o‘quv-uslubiy qo‘llanma. – Toshkent: “Navro‘z” nashriyoti, 2017. – 210 b.
5. Ergashev A.J. Oliy ta’lim tizimida “Ionlashtiruvchi nurlanishlar” mavzusini modul tizimida o‘qitish usullari. – O‘zMU Xabarlari, Toshkent, 2022. – 202–204 b.
6. Ergashev A.J. Oliy ta’limda yadro texnologiyalari fanini o‘qitishda didaktik o‘yin topshiriqlarini tayyorlash texnologiyasi. – NamDU ilmiy axborotnomasi, 2022, №7, 353–359 b.

UDC 616-073.75

Nasriddinov B. Z.
assistant
department of medical radiology and nuclear medicine
Abu Ali ibn Sino Bukhara State Medical Institute
https://orcid.org/0009-0004-5786-4093

METHODOLOGY AND CLINICAL SIGNIFICANCE OF MAGNETIC RESONANCE SPECTROSCOPY

Annotation: *The clinical application of magnetic resonance spectroscopy (MRS) has long been limited by its low sensitivity. In recent years, the development of clinical MRI systems with high magnetic field strengths, such as three Tesla, and the sensitivity of their pulses with optimized radiofrequency have significantly improved. As a result, in vivo MRS has become an increasingly common technique in the clinic. In particular, a description of the main resonances present in brain MR spectra is given, along with several examples of deviations from the normal spectral pattern associated with inborn errors of metabolism. In addition, the possible role of MRS in oncology is illustrated by examples of MR spectra of brain tumors.*

Keywords: *Magnetic resonance spectroscopy, MRS, diagnostics, Methodology, Metabolism, Brain diseases.*

Relevance

Magnetic resonance (MR) spectroscopy is commonly known as an analytical technique for identifying molecules in chemistry and determining their biophysical properties. The main clinical application of nuclear magnetic resonance is to obtain detailed anatomical images of the human body using magnetic resonance imaging. However, not only MRI, but also NMR spectroscopy has several clinical and biomedical applications. When NMR is used in vivo, and in particular in the clinic, the convention is to omit the term "nuclear" from the name, since the inclusion of this part can lead to false associations with nuclear medicine, radioactive materials, and ionizing agents. Therefore, in vivo NMR spectroscopy is called magnetic resonance spectroscopy (MRS). As in its application in chemistry, MRS allows the detection of relatively small molecules, typically at concentrations of 0.5–10 mM, with sufficient flexibility inside or outside cells or extracellular spaces. The resulting MR spectra provide information about metabolic pathways and their changes, making MRS a well-suited technique for monitoring metabolic changes due to disease and monitoring treatment. This review provides an overview of in vivo MRS methodology and clinical cases, from which those familiar with the chemical applications of MR spectroscopy can learn about its clinical application. The main focus is on 1H MRS of the human brain, which is the main clinical application of MRS. Since it is not possible to

provide a complete description of all biomedical applications of in vivo MRS, this review is limited to examples of human brain MRS in the detection of inborn errors of metabolism, brain cancer diagnosis, and research.

Materials and Methods

MR spectra can be obtained using various nuclei of several metabolites in the human body, such as 1H, 31P, 19F, 13C, 23Na, all of which can provide valuable metabolic and physiological information. However, in biomedicine, 1H MRS is mainly used due to the high sensitivity of the 1H nucleus, the almost 100% availability of this isotope, and the abundance of this nucleus in most metabolites. In addition, 1H MRS can be performed relatively easily using standard radiofrequency (RF) coils of clinical MR imaging systems designed for diagnostic MR imaging. In fact, the MR signal of 1H nuclei in water and fat are used to obtain MR images. Common clinical MR systems have magnetic field strengths ranging from 0.2 to 3 Tesla (T). In MRS applications, it is usually the smaller metabolite signals that are of interest, rather than the water and fat signals, that are of interest, so a sufficiently strong magnetic field is required. Therefore, most clinical MRS measurements are performed using MR systems with field strengths of 1.5 T or higher. In particular, the advent of clinical MR systems with field strengths of 3 T has improved the signal-to-noise ratio in MR spectra and made it possible to obtain spectra from smaller volumes.

Results and Discussion

For 1H MRS, an RF body coil mounted inside a magnetic bore can be used as an RF transmitter in conjunction with another coil placed on the surface or around the body to receive the RF signal. Another possibility is to use a transmit-receive coil used for both transmission and reception. In recent years, many improvements have been made to MR coil design, such as the development of various phased array designs, which have led to increased sensitivity. A smaller surface area than the coil provides higher MRS, but the sensitive region is much smaller. In the phased array coil concept, a higher MRS can be combined with an extended field of view (FOV) by combining multiple surface coils. For MRS using cores other than 1H, standard MR coils cannot be used, but special coils tuned to the desired core must be purchased or built. These often consist of multiple coils, one of which is tuned to the desired core, such as 31P or 13C, and the other tuned to 1H for separation or polarization transfer. For all MRI and MRS examinations, some safety precautions should be taken against potential hazards arising from the main magnetic field, changing magnetic field gradients, or RF radiation. No harmful physiological effects are known to result from the main magnetic field of 1.5-3 T clinical MR systems, but the strong magnetic field attracts ferromagnetic objects. It should be determined whether the patient has an implanted electronic device such as a pacemaker or internal defibrillator, or other magnetic materials such as cochlear implants or ferromagnetic aneurysm clips. Also, the presence of metal fragments in critical locations, e.g., in the eye or brain, is a contraindication for MRI examination. And even a doctor entering the room with loose metal objects such as pens or scissors in his pocket can pose a risk to the patient lying in

the magnet, as these objects can be directed towards the patient by the strong forces of the magnetic field. In addition, watches and credit cards should be left outside the room, as they can be damaged by the magnetic field.

Changing magnetic field gradients causes acoustic noise, for which patients should wear ear protection. In addition, rapid gradient changes can cause nerve stimulation, but such rapid changes are not commonly used in MRS, and the gradients used in clinical scanners are monitored and a warning is issued if the gradient changes are too rapid. The net effect may be a slight warming of the patient (1-2C) by the RF radiation. The amount of energy absorbed per tissue mass, defined as the Specific Absorption Rate (SAR), is also monitored and strictly limited in clinical MR systems. One non-safety-related contraindication is claustrophobia. Patients with severe claustrophobia, as well as patients who are not able to lie still, such as young children, may need to be sedated or anesthetized for the MRI scan. MRS data acquisition. Typically, an MRS scan begins with the acquisition of some anatomical MR images of the organ of interest. These MR images are then used as a guide to select the tissue volume from which the MR spectrum will be acquired. In single voxel spectroscopy (SVS), this can be a single volume located in a tumor or a specific location where metabolism may be disturbed due to the patient's disease. Another option is magnetic resonance spectroscopic imaging (MRSI), originally introduced as chemical shift imaging, in which a large volume is divided into several small voxels, each of which generates a spectrum simultaneously. This technique, which is a kind of hybrid of MRS and MRI, is suitable for determining spatial distributions, for example, for identifying the area affected by tumor infiltration. In 1H MRS, methods such as chemical shift water suppression (CHESS; Haase et al. 1985) or water suppression enhanced by T1 effects (WET; Ogg et al. 1994) are usually used to suppress the water signal when acquiring metabolite spectra. Additionally, a spectrum is obtained without water suppression, which can be used for line shape correction and quantification.

The main SVS techniques used to obtain 1H MR spectra, mainly applied to the brain, are point-resolution spectroscopy (PRESS; Ordidge et al. 1985; Bottomley 1987) and stimulated echo acquisition. The main difference between STEAM and PRESS is that in STEAM, a stimulated echo is acquired with three 90 pulses and a second echo is acquired with a 90-excitation pulse, followed by two 180 refocusing pulses in PRESS. In both methods, each of the three pulses is combined with a gradient in the X, Y, or Z direction, which is used to select a slice in that direction. Only the signal of a quadrature sound (one voxel) is focused and acquired in all three slices. The echo time (TE) can be changed by changing the delay times between pulses. If a longer TE is used, the signal is reduced due to T2 and the phase of the multilet signals is shifted due to J-coupling. For quantitative measurements, a combination of a short echo time and a long repetition time (TR) is usually used to obtain signals with minimal signal loss due to T2- and T1-weighting. Longer TE measurements are used only to obtain a limited number of sharp (often single) resonance spectra, which are relatively easy to analyze. TEs of 135–144 ms are often used because this results in a spectrum in which the doublet

signal of lactate, which has a J-coupling constant of approximately 7 Hz, is completely inverted.

Results

A key difference between the two SVS pulse sequences is that half of the signal is not used in STEAM by the stimulated echo acquisition, which results in a 50% lower SNR compared to PRESS. A disadvantage of PRESS volume selection has long been the use of two 180 pulses. Because of the limited maximum pulse intensity, the pulse length of a 180 pulse is usually longer than 90 pulses or the pulse shape is tailored to limit its length. Therefore, the presence of these two 180 pulses does not allow for very short TEs, they lead to a less optimal slice selection profile, and their bandwidth is smaller, causing a larger chemical shift (CSD) artifact. This CSD artifact arises from the fact that signals with different chemical shifts experience different (frequency-coded) slice selections and therefore do not originate from exactly the same volume. This effect is amplified at high magnetic field strengths. For these reasons, STEAM is the method of choice for data acquisition with short TE and precise volume selection. However, recently the characteristics of the 180 pulses used in PRESS have been increasingly improved, e.g., by numerical optimization (Schulte et al. 2008) or by replacing each 180 pulses with two adiabatic pulses (Scheenen et al. 2008). These developments, together with the very significant factor of SNR increase compared to STEAM, have made the PRESS sequence currently the most popular SVS sequence for 1H MRS. The main disadvantage of MRSI is the presence of voxel bleeding, i.e., the voxel spectrum can be contaminated with signals originating from neighboring voxels of positive and negative intensity due to the shape of the point spread function associated with the limited matrix size used in MRSI (Brown 1992). The effect of voxel bleeding can be reduced by using special filters before the Fourier transform (FT) in the spatial domain, but this increases the size of the voxels. Typically, SVS is used when precise quantification is required, and MRSI is used to obtain information about spatial distributions.

Conclusions

It has been shown that MRI is not limited to applications in chemistry, but that MRS is also a valuable tool in the clinic. With the current availability of MR scanners with sufficiently high field strengths, such as 3T, combined with optimized pulse sequences and RF, the initially limited sensitivity of in vivo MRS has been greatly improved. This, combined with the unique metabolic information provided by MRS, will ensure that this technique will be routinely used in the clinic in the future.

References:

1. Ardenkjaer-Larsen JH, Fridlund B, Gram A, Hansson G, Hansson L, Lerche MH, Servin R, Taning M, Golman K (2003) [10,000-fold] increase in signal-to-noise ratio in liquid-state NMR. Proc Natl Acad Sci USA 100: 10158–10163
2. Argov Z, lo ¨fberg M, Arnold DL (2000) Insights into muscle diseases obtained by phosphorus magnetic resonance spectroscopy. Muscul Nerv 23: 1316–1334

3. Baslow MH (2002) Evidence for a role of N-acetyl-laspartate as a molecular water pump in myelinated neurons of the central nervous system. An analytical review. Neurochem Int 40: 295–300
4. Bluml S, Moreno A, Hwang JH, Ross BD (2001) 1-(13)C glucose magnetic resonance spectroscopy in pediatric and adult brain diseases. NMR Biomed 14:19–32
5. Bolan PJ, Nelson MT, Yee D, Garwood M (2005) Imaging in breast cancer: magnetic resonance spectroscopy. Breast Cancer Res 7: 149–152
6. Bottomley PA (1987) Spatial localization in in vivo NMR spectroscopy. Ann NY Acad Sci 508: 333-348
7. Brockmann K, Björnstad A, Dechent P, Korenke CG, Smeitink J, Trijbels JM, Athanassopoulos S, Villagran R, Skjeldal OH, Wilicowski E, Frahm J, Hanefeld F (2002) Magnetic resonance spectroscopy of succinate:azone in dystrophic white matter is characteristic of complex II deficiency. Ann Neurol 52:38–46
8. Brown TR (1992) Practical applications of chemical shift imaging. NMR Biomed 5: 238-243 Brown TR, Kincaid BM, Ugurbil K (1982) Three-dimensional imaging of NMR chemical shift. Proc Natl Acad Sci USA 79:3523–3526
9. Sijens PE, Oudkerk M, Reijngoud DJ, et al. 1H MR chemical shift imaging detection of phenylalanine in patients suffering from phenylketonuria (PKU). Eur Radiol. 2004; 14:1895–1900.

Nasriddinov A. Sh.
associate professor
Namangan State Technical University
Maxmudov J. N.
master's student
Namangan State Technical University

TEMPORAL VARIABILITY OF TRAFFIC FLOW INTENSITY AT SIGNALIZED URBAN INTERSECTIONS (CASE STUDY OF NAMANGAN CITY)

Annotation: *This paper investigates the temporal variability of traffic flow intensity at signalized urban intersections using statistical time-series analysis, based on a case study conducted in Namangan city. Real-time traffic volume data were collected at selected intersections during peak and off-peak periods over five consecutive working days. Hourly measurements allowed identifying distinct daily traffic patterns and significant differences between morning and evening peak periods. The results indicate that the highest traffic intensity occurs during the evening peak (17:00–18:00), exceeding the daily average by up to 24%. Saturation levels during peak hours approach critical values (0.92–0.95), leading to queue formation and reduced intersection performance. To analyze intensity fluctuations and determine appropriate signal control parameters, probabilistic modeling and Fourier spectral analysis were applied. The findings demonstrate that adaptive adjustment of traffic signal cycle durations during peak periods can reduce queue lengths by 18–22% and improve intersection capacity. The proposed approach provides a practical basis for optimizing traffic signal control under dynamically changing urban traffic conditions.*

Keywords: *traffic flow intensity, temporal variability, signalized intersection, saturation flow, time-series analysis, traffic signal control, peak hours, queue formation..*

Introduction

Urban traffic flow demonstrates temporal irregularity and varies according to demand, time of the day and network configuration. In rapidly developing cities such as Namangan, the volume of private vehicles is constantly increasing, which leads to higher daily fluctuations and periodic saturation at signal-controlled intersections.

Recent studies show that most urban congestion appears not because of insufficient road capacity, but due to ineffective signal timing under dynamically changing conditions [1]. Therefore, studying the statistical nature of intensity changes is essential for traffic control and transportation planning.

Data and Methods

A field observation was conducted at three signalized intersections of Namangan city (Bobur Street, Afrosiyob Street and Yangiqo‘rg‘on Avenue).

Data collection:

Traffic volume was measured:

- at 5-minute intervals;
- during 5 days (Monday–Friday);
- at 07:00–20:00.

Total collected observations: ≈ 1,500 measurements

Statistical tools

The following techniques were applied:

- descriptive statistics;
- moving average smoothing;
- correlation analysis;
- Fourier spectrum decomposition;
- peak–base comparison;
- saturation degree calculation [4].

Saturation flow was calculated as:

$$x = \frac{q}{s}$$

Where:**q** – hourly traffic intensity, **s** – saturation flow rate.

It should be noted that between the above concepts, with all their significant differences, there is a thin dividing line that manifests itself through the concept of a development period.

The unevenness of the transport flow causes variability in its indicators, such as intensity, speed, density, composition, etc., therefore, the statistical expression of unevenness is the variability of the time series of transport flow characteristics.

The study of variability allows us to solve the following problems:

1) it allows us to put forward hypotheses about the causes of fluctuations in traffic flow;

2) it allows us to predict its value as a factor in traffic flow;

3) it allows us to calculate the necessary reserves, safety reserves, to eliminate the harmful effects of fluctuating levels.

The study and analysis of daily diagrams of traffic intensity distribution in urban conditions made it possible to create a theoretical classification of intensity fluctuations that affect the hourly and daily traffic intensity profile on central city streets and determine the types of temporal irregularities [3].

Results and Discussion.

1. Daily fluctuations

Measurements showed clear peak periods:

Time period	Average intensity (veh/h)
07:00–09:00	1320
13:00–15:00	890
17:00–18:00	1640

Evening peak value was 24% higher than the daily mean.

2. Saturation level

The saturation index reached **0.92–0.95** in peak hours, which indicates a near-saturated state and leads to queue accumulation.

3. Signal cycle evaluation

Simulation showed that extending the green phase by **+8–12 seconds** during peak hours reduces queue length by approximately **18–22%**, which fully corresponds to the recommended values of HCM (Highway Capacity Manual) [5].

4. Fourier spectral analysis

Low-frequency fluctuations (over 60 minutes) dominated, confirming the presence of systematic daily variability rather than random oscillation [2].

An important concept related to the unevenness of the transport flow is the randomly distributed variability - "oscillating interference". Its main feature is the randomness of deviations from the average value, and several other features are distinguished:

If the systematic components of the time series are correctly selected, then the residual component will have the following properties:

1- randomness of the change in values;

2- compliance with the law of normal distribution;

3- equality of the mathematical expectation to zero;

4- independence of the values of the levels from each other.

In the study of random processes, an effective means of determining the amplitudes and frequencies of oscillations that make up the level of a random variable is the Fourier transformation of this quantity function using transport flows.

Conclusion

The study confirms that daily intensity variation at regulated intersections has a significant and statistically measurable impact on traffic performance. Saturation intensifies during peak hours, creating regular congestion if signal plans remain unchanged.

Adaptive traffic signal control considering hourly fluctuations is proven to reduce queue formation and increase intersection throughput. Further studies should include weekly and seasonal analysis with a larger sample of intersections and traffic simulation under alternative control strategies.

References

1. Имомназаров С. К. и др. Участие общественности в обеспечении безопасности движения //Экономика и социум. – 2021. – №. 5-1 (84). – С. 939-942.

2. Абдуганиев Ш. О. У. и др. АНАЛИЗ И ОЦЕНКА ДОРОЖНО-ТРАНСПОРТНЫХ ПРОИСШЕСТВИЙ (ПДД) В ОБЕСПЕЧЕНИИ БЕЗОПАСНОСТИ ДОРОЖНОГО ДВИЖЕНИЯ //Universum: технические науки. – 2023. – №. 2-3 (107). – С. 60-63.

3. Gusikhin O., Filev D., Rychtyckyj N. Intelligent vehicle systems: applications and new trends //Informatics in Control Automation and Robotics: Selected Papers

from the International Conference on Informatics in Control Automation and Robotics 2006. – Berlin, Heidelberg : Springer Berlin Heidelberg, 2008. – С. 3-14.
4. Greenshields B. D. et al. A study of traffic capacity //Highway research board proceedings. – 1935. – Т. 14. – №. 1. – С. 448-477.
5. Швецов В. И., Алиев А. С. Математическое моделирование загрузки транспортных сетей. – 2003.
6. Косолапов А. В. Моделирование дорожного движения. Учебное пособие для студентов специальности 190702 «Организация и безопасность движения» очной формы обучения //Электрон. дан. Кемерово: КузГТУ. – 2012.

Navotova D. I.
dotsenti
geografiya kafedrasi
Shahrisabz davlat pedagogika instituti
Mavlonova S. X.
tabiiy va aniq fanlarni o‘qitish metodikasi (geografiya)
mutaxassisligi 1-kurs magistranti
Shahrisabz davlat pedagogika instituti

QASHQADARYO VILOYATI QISHLOQ XO‘JALIGI RIVOJLANISHINING O‘ZIGA XOS XUSUSIYATLARI

Annotatsiya: *Ushbu maqolada Qashqadaryo viloyatining qishloq xo‘jaligi rivojlanishiga ta’sir etuvchi iqtisodiy-geografik xususiyatlar tahlil qilingan holda, uning tabiiy iqlim sharoitlari, yer resurslari, suv ta’minoti tizimining qishloq xo‘jaligi tarmoqlariga ko‘rsatgan ta’siri natijasida yuzaga kelgan muammolar ham yoritib berilgan. Masalan, g‘allachilik, paxtachilik, sug‘orma dehqonchilik va chorvachilikning iqtisodiy samaradorligi shuningdek salohiyatiga alohida e’tibor berilgan. Bundan tashqari ushbu maqolada statistik ma’lumotlardan foydalangan holda o‘sish dinamikasi tahlil qilingan.*

Kalit so‘zlar*: Qashqadaryo, qishloq xo‘jaligi, don yetishtirish, paxta, chorvachilik, yer resurslari, suv ta’minoti, suv ombori, iqtisodiyot.*

Navotova D. I.
associate professor
department of geography
Shakhrisabz State Pedagogical Institute
Mavlonova S. Kh.
methods of teaching natural and exact sciences (geography)
specialty 1st year master
Shakhrisabz State Pedagogical Institute

DISTINCTIVE FEATURES OF THE AGRICULTURAL DEVELOPMENT OF THE KHASHKHADARYA REGION

Abstract: *This article analyzes the economic and geographical features affecting the agricultural development of the Kashkadarya region, as well as the problems that arise as a result of its impact of natural climatic conditions, land resources, water supply system on agricultural networks. For example, special attention is paid to the cost-effectiveness as well as potential of grain growing, cotton-growing, irrigation, farming and livestock. In addition, this article analyzes the dynamics of growth when using statistical data.*

Keywords*: Kashkadarya, agriculture, agriculture, grain cultivation, cotton, livestock, land resources, water supply, reservoir, economy.*

Qashqadaryo viloyatining relyefi bir muncha murakkab tuzilgan bo‘lib o‘z ichiga tog‘ va tekisliklar, botig‘ va adirlarni oladi. Asosan Qashqadaryo botig‘ida joylashgan bo‘lib, shimoli-sharq va janubi-sharqda Zarafshon hamda Hisor tog‘lari bilan o‘ralgan. Tekislikning katta qismi g‘arbida Qarshi cho‘lidan iborat. U Sandiqli va Qizilqum cho‘llari bilan tutashgan. Viloyat relyefining turli-tumanligi bu yerda tabiiy boyliklarni mavjudligini va turli xil iqlim sharoitining shakllanishini ko‘rsatib beradi. Iqlimi kontinental bo‘lib, yog‘in-sochin miqdori ayniqsa cho‘l mintaqasida juda kam miqdorni tashkil qiladi. Shuning uchun bu yerda dehqonchilikni rivojlantirish uchun irrigatsiya shahobchalarini barpo etish talab qilinadi. Tog‘oldi va tog‘ mintaqasida yillik yog‘in miqdori ancha yuqori bo‘lib ba’zi vaqtlarda 800-900 mm ga ham yetadi. Viloyat hududi Qashqadaryo havzasida joylashgan bo‘lib ba’zi daryolar qo‘shiladi. Xususan, Jinnidaryo, Oqsuv, Tanhozdaryo, Ayoqchidaryo, Qizildaryo va boshqa kichik irmoqlar kelib qo‘shiladi. Hozirgi kunda iqlim quruqlashishi tufayli, yoz boshlanishidan to kech kuzgacha Ayoqchidaryo suv bermaydi. Buning ustiga daryoning quyi qismida suv borgan sari kamayib bir vaqtlar Zarafshon daryosigacha borib yetgan bu daryo hozirgi kunda Qarshi-Koson atrofida batamom tugab qoladi.

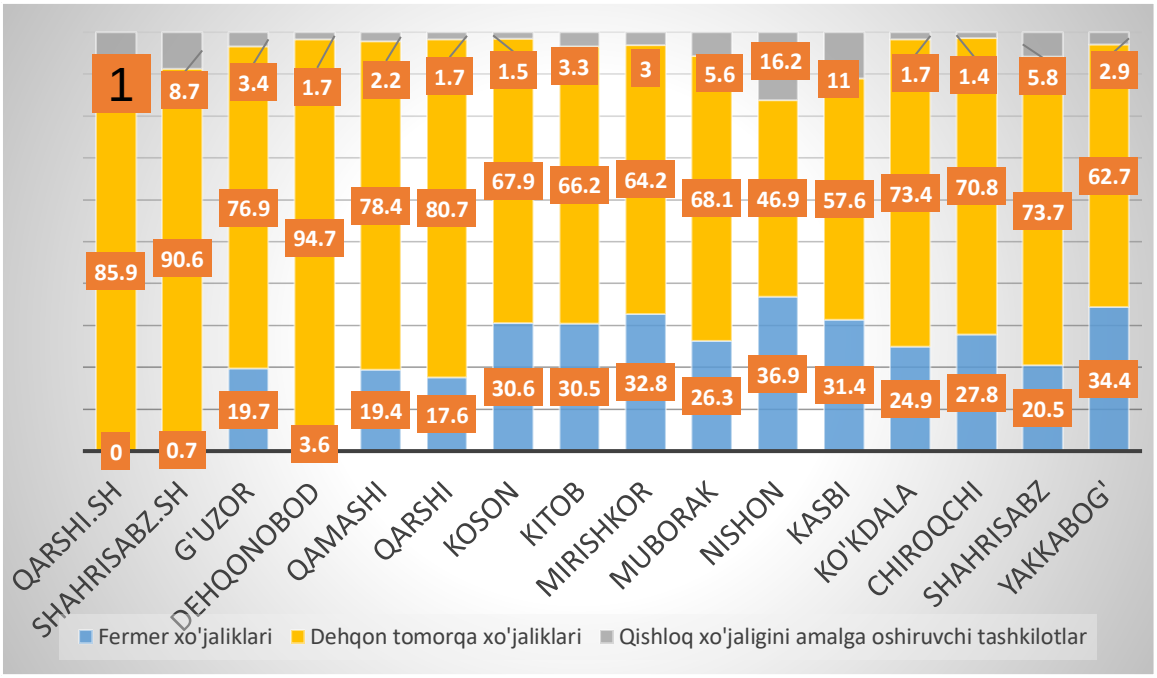
Qashqadaryo viloyatining umumiy maydoni 28,6 ming kv.km bo‘lib, uning yer maydoni 2856,8 gektarni tashkil qiladi, shundan 2143,3 ming gektari qishloq xo‘jaligida foydalaniladigan yerlar bo‘lib, 417,2 ming gektari sug‘oriladigan yerlar hisoblanadi. Shuningdek, 253,2 ming gektar lalmikor yer qishloq xo‘jaligi ekinlari uchun xizmat qiladi. O‘zbekiston Respublikasi prezidenti huzuridagi statistika agentligi ma’lumotlarga ko‘ra respublikamizdagi lalmikor yerlarning 33% Qashqadaryo viloyatiga to‘g‘ri keladi. Qashqadaryo vohasida barcha turdagi antropogen landshaftlar mavjud bo‘lib qadimiy aholi manzilgohlari, obikor va lalmikor dehqonchilik bilan bog‘liq bo‘lgan selitob va agrolandshaftlar keng tarqalgan. Qashqadaryoda sug‘orma dehqonchilikni rivojlantirish maqsadida 70-yillardan boshlab Qarshi dashti keng o‘zlashtirilgan. Hozirgi vaqtga kelib viloyat hududida qator suv inshootlari barpo etilgan. Masalan, Hisorak, Qalqama, Chimqo‘rg‘on, Qamashi suv omborlari mavjud bo‘lib, ular asosan dehqonchilikda foydalaniladi. Xususan, G‘uzor tumanini Pachkamar suv ombori va G‘uzordaryo suv bilan ta’minlaydi. Bundan tashqari, yirik Qarshi magistral kanali viloyat sug‘orma dehqonchiligida katta ahamiyatga ega.

Shuningdek, bu hududda qator zovurlar va to‘planib qolgan oqova, sho‘r suvlardan tashkil topgan tuz ko‘llar ham mavjud. Bunday holatlar ko‘proq Qarshi dashtida vujudga keladi. Bundan tashqari,bu yerdagi mavjud suv omborlari bir tomondan dehqonchilikni rivojlantirish uchun xizmat qilsa, ikkinchi tomondan zovur va su’niy ko‘llar agroekologiyaning buzilishiga sabab bo‘ladi. Shu boisdan ekinlarni intensiv yo‘l bilan sug‘orish usullaridan foydalanish maqsadga muvofiq bo‘ladi.Hozirgi kunda artezian quduqlarning soni oshirilishi natijasida sug‘orma dehqonchilik ham muntazam rivojlanib bormoqda. Viloyatdagi suv havzalarining sanoat, kommunal xo‘jalik, sog‘lomlashtirish va qishloq xo‘jaligi korxonalarining iflos chiqindi va oqova suvlari bilan ifloslanish darajasi ancha yuqori ya’ni chiqindi va suvlarni tozalovchi inshootlar yetarli emas.Shuningdek, bu yerda bor

inshootlar ham yetarli darajada ishlamaydi.Shuning uchun suv havzalarini ifloslanishidan saqlovchi barcha chora-tadbirlarni ko‘rish tavsiya etiladi.

Viloyat agroiqlimiy sharoitlari hudud bo‘yicha teng taqsimlanmaganligi uchun, asosan yuqori qismida, intensiv dehqonchilik, bog‘dorchilik va uzumchilikni rivojlantirish uchun sharoit bor. Cho‘l mintaqasining katta qismidan asosan paxta, g‘alla yetishtirish va chorvachilikda foydalaniladi. Viloyatimizda sug‘orma dehqonchilik, lalmikor yerlardan foydalanishga qaraganda yaxshi rivojlangan. Chunki sug‘oriladigan yerlardan lalmikor yerlarga qaraganda 3-4 barobar ayrim hollarda esa 5-10 barobargacha ko‘p hosil olinishi haqida ma’lumotlar bor. Sug‘orma dehqonchilikda Zarafshon va Amudaryo daryolarining suvidan foydalaniladi. Ulardan oqilona foydalangan holda dehqonchilikni yanada rivojlantirish maqsadga muvofiq bo‘ladi.

Viloyatimiz qishloq xo‘jaligining bosh tarmog‘i dehqonchilik hisoblanib, yalpi mahsulotning katta qismi uning hissasiga to‘g‘ri keladi. Uning asosiy tarmoqlari, paxta, don yetishtirish, meva va uzumchilik, poliz va sabzavot mahsulotlari, xashaki ekinlar hisoblanadi. Bu borada ayniqsa Kitob, Shahrisabz, Yakkabog‘ tumanlari yetakchilik qiladi.



1-rasm. Yetishtirilgan qishloq xo‘jaligi mahsulotlarining hududlar bo‘yicha xo‘jalik toifalari kesimida taqsimlanishi

Manba: *Qashqadaryo viloyati Statistika boshqarmasi ma’lumotlaridan olindi.*

2024-yil yakuniga ko‘ra yetishtirilgan qishloq xo‘jaligi mahsulotlari tarkibidagi fermer xo‘jaliklarining ulushi bo‘yicha eng yuqori ko‘rsatkich Nishon tumaniga (36,9%), dehqon va tomorqa xo‘jaliklarining eng yuqori ulushi Dehqonobod tumaniga (94,7%), qishloq xo‘jaligini amalga oshiruvchi tashkilotlarning eng yuqori ulushi Nishon tumaniga (16,2%) tegishli. Fermer xo‘jalikllarining eng kam ulushi Shahrisabz shahrida (0,7%), dehqon va tomorqa

xo‘jaliklarining eng kam ulushi Nishon tumanida (46,9%), qishloq xo‘jaligini amalga oshiruvchi tashkilotlarida Chiroqchi tumani (1,4%) bilan eng past ko‘rsatkichni qayd etdi (1-rasm).

Qashqadaryo viloyatida eng ko‘p bug‘doy, arpa, makkajo‘xori ekiladi. Chunki lalmikor yerlarning asosiy ekin turi bug‘doy va arpa hisoblanadi. 2024-yil yakuniga ko‘ra viloyatimizda 893,5 ming tonna don yetishtirildi. Qashqadaryo viloyati statistika boshqarmasi ma’lumotlariga ko‘ra, 2024-yil yakuniga ko‘ra Qashqadaryo viloyatida yetishtirilgan dehqonchilik mahsulotlarining hajmi 16168,2 mlrd so‘mni tashkil etgan holda, 2023-yilga nisbatan 102,9 % ni tashkil etganini ko‘rishimiz mumkin. Viloyatda yetishtirilgan dehqonchilik mahsulotlarining ulushi 37,9% ni tashkil etgan.

Ammo so‘ngi 10 yillik ichida suv miqdori sezilarli darajada kamayganligi tufayli viloyatimizning qishloq xo‘jaligidagi iqtisodiy ko‘rsatkichiga biroz salbiy ta’sir ko‘rsatmoqda. Xususan obikor yerlar asta-sekinlik bilan lalmikor yerlarga aylanib boryapti va yildan-yilga yerlarning katta qismi sho‘rlanib yaroqsiz holga kelib qolyapti. Natijada qishloq xo‘jaligi mahsulotlarini yetishtirish bilan bog‘liq muammolar yuzaga kelmoqda, ya’ni viloyatning ba’zi hududlarida yil yakuni bo‘yicha olinishi rejalashtirilgan hosil miqdori suv taqchilligi tufayli yarmiga ham yetmaganligi holatlari kuzatilmoqda. Shuning uchun birinchi navbatda, suvdan tejamkorlik bilan foydalangan holda intensiv sug‘orish usulini ko‘paytirish kerak. Bundan tashqari, paxtani makkajo‘xori bilan almashlab ekish nafaqat paxta hosilini ko‘paytiradi, balki chorvachilik mollari uchun ozuqa bo‘lib ham xizmat qiladi.

Umuman olganda, viloyatda qishloq xo‘jaligining iqtisodiy ko‘rsatkichini ko‘tarish uchun, birinchi navbatda viloyatimiz iqlim sharoitidan kelib chiqqan holda quyidagi taklif va tavsiyalarni berish mumkin:

- tomchilatib sug‘orish va suvni tejovchi texnologiyalarni kengaytirish;
- qurg‘oqchilik va sho‘rlanishga chidamli ekinlarga o‘tish;
- sug‘orish tizimlarini renovatsiya qilish, suv yo‘qotishlarni kamaytirish.
- drenaj va tuproqni melioratsiya qilish orqali unumdorlikni tiklash;
- raqamli agrotexnologiyalarni joriy etish.

Suv tanqisligini sezilarli kamaytirish natijasida tomchilatib sug‘orish, betonlangan kanallar va smart-sug‘orish tizimlari orqali suv sarfi 30–50% gacha tejaladi. Suv manbalari barqarorlashadi, qishloq xo‘jaligi sug‘orish suvi bo‘yicha kamroq inqirozga uchraydi.

Hosildorlikning barqaror va yuqori bo‘lishi Suvning aniq boshqarilishi va ekinlarning iqlimga mos navlari tufayli: paxta hosildorligi 20–40% yuqorilashi, bog‘dorchilikda sifatli meva ulushi ko‘payishi, sabzavot yetishtirishda hosilning yo‘qotilishi kamayishi kutiladi.

Sho‘rlanish darajasining pasayishi natijasida drenajni yaxshilash, yuvish sug‘orishlari, organik o‘g‘itlar qo‘llash natijasida tuproqning biologik faolligi ortadi. Sho‘r yerlarning katta qismi qayta foydalanish uchun yaroqli bo‘ladi.

Tuproq unumdorligining oshishi natijasida organik qoplama (mulchalash), bioo‘g‘itlar va to‘g‘ri agrotadbirlar hisobiga: tuproq namligini ushlash, eroziya va

qotishmalarni kamaytirish, mikroorganizmlar faolligini oshirish mumkin. Bu esa hosilga bevosita foyda beradi.

Iqlim o‘zgarishiga moslashgan agroiqtisodiy tizim natijasida qurg‘oqchilik, issiq, shamol va sovuqlarga bardoshli navlarning ekilishi qishloq xo‘jaligini xavfsizroq qiladi. Farmerlar hosilni nisbatan kafolatlangan holda yetishtira oladilar.

Raqamli texnologiyalar yordamida aniq boshqaruv natijasida Agrodrone, IoT sensorlar yordamida fermer: kasallikni erta aniqlaydi, suvni behuda sarflamaydi, o‘g‘itni aniq va tejamkor beradi. Bu esa tejamkor, samarali va zamonaviy agroishlab chiqarishga olib keladi.

Mahalliy iqtisodiyotning o‘sishi va daromad oshishi natijasida hosildorlikning ortishi, mahsulot ko‘payishi, suv tejalishi, xarajat kamayishi, tuproq yaxshilanishi kabilar barqaror daromad kafolatidir. Natijada viloyatda: fermerlar foydasi oshadi, ish o‘rinlari ko‘payadi, oziq-ovqat xavfsizligi mustahkamlanadi.

Agar yuqoridagi tavsiyalar to‘liq tatbiq qilinsa, Qashqadaryo viloyatining qishloq xo‘jaligi suv tanqisligiga chidamli, yuqori hosildor, ekologik barqaror va iqtisodiy samarali tizimga aylanadi. Bu esa viloyatning uzoq muddatli rivojlanishiga zamin yaratadi.

Foydalanilgan adabiyotlat ro‘yxati

1. Абдуллаев С.И,Назаров М Г Қашқадарё ҳовзасининг атрпоген ландшафтлари ва уларнинг геоэкологик ҳолати.Монография -Қарши,”Ҳасаф НМИУ” -2020.144 б.
2. Аминов Ф.Б. Ер ресурсларидан фойдаланиш самарадорлигини оширишнинг ҳудудий хусусиятлари (Қашқадарё вилояти мисолида) Иқти.фан.ном. … дисс Т.,2003.-167б
3. Ахмадалиевюю.Ю.И Ердан фойдаланишни ҳудудий ташкил этишнинг сосиал-экологик хусусиятлари//Ўзбекистон география жамияти –Т.,2003.23-жилд.-Б.58-59.
4. Fayzullayev M.A.O‘zbekiston qishloq xo‘jaligi geografiyasi [Monograph]./-T”KITOB BILIM YOG”DUSI” MCHJ: 2024.-243 b.
5. Navotova D.I. “Qashqadaryo viloyati qishloq xo‘jaligi rivojlanishining iqtisodiy-geografik xususiyatlari” UZZAMIN, 2023 N 2. T.,2023.
6. Nurxonov N., Xalxadjayev B. “Qishloq xo‘jaligi mahsulotlarini ihslab chiqrish jarayonini iqtisodiy-statistik tahlil qilishning zamonaviy usullari (Qashqadaryo viloyati misolida). Yashil iqtisodiyot va Taraqqiyot, 2024 Vol.2 No.7.2024
7. Navotova D.I. Theoretical and methodological aspects of resources of land resources in agriculture//Academicia: An International Multidisciplinary Research Journal. November, 2022. – P. 40-44
8. Навотова Д.И. Қашқадарё вилояти қишлоқ хўжалиги географияси ва уни карталаштиришнинг баъзи масалалари// Электронное научно-практическое периодическое издание. Экономика и социум. №3 (94), 2022. –721-725 с.
9. Навотова Д.И. Географические особенности использования зарубежного опыта использования земельных ресурсов в хозяйственных хозяйствах//

Электронное научно-практическое периодическое издание. Экономика и социум. №4 (95), 2022. –198-202 с.
10. Navotova D.I. Internal Differences In The Use Of Land Resources In The Agriculture Of Kashkadarya Region// Eurasian Journal of History, Geography and Economics. Volume 16. Belgiya. 2023. P.100-104
11. Навотова Д.И. Ер ресурсларидан қишлоқ хўжалигида фойдаланишни тадқиқ қилишнинг назарий-услубий жиҳатлари// Central Asian Research Journal For Interdisciplinary Studies (CARJIS). Volume 2 | issue 1 | Tashkent,Uzbekistan. 2022. Б. 321-327
12. Navotova D.I. Main principles for determining the efficiency of the use of land resources// Proceedings of International Educators Conference 2023. Italiya. Vol. 2 No. 2 (2023) 25th February, 2023 P. 443-447
13. Navotova D.I. Possibilities of applying world experience in efficient use of irrigated lands of the republic of Uzbekistan// International conference on scientific research in natural and social sciences. Canada conference. Volume 2. Issue 2. February 5th 2023. P. 182-186

UDK: 338.2:330.35

Nazarov D. A.
magistranti
iqtisodiyotda axborot texnologiyalari va tizimlari mutaxassisligi
iqtisodiyot fakulteti
Qoraqalpoq davlat universiteti

MILLIY IQTISODIYOTNI TARTIBGA SOLISHDA DAVLATNING O‘RNI VA MAQSADI

Annotatsiya: *Maqolada davlatning milliy iqtisodiyotga aralashuvidagi usullar, iqtisodiy mexanizmlarning to‘laqonli faoliyat yuritishidagi ahamiyati tadqiq etilgan. Mamlakatning iqtisodiy islohotlari, raqamli boshqaruv va ijtimoiy barqarorlikni ta’minlashdagi muhim roli tahlil qilingan. Shu bilan birga, mamlakatning bozor mexanizmlarini muvofiqlashtirish va iqtisodiy barqarorlikni ta’minlash bo‘yicha amalga oshirilayotgan islohotlari to‘g‘risida tavsiya berilgan.*

Kalit so‘zlar: *Milliy iqtisodiyot, davlat boshqaruvi, bozor mexanizmi, tartibga solish,*

Nazarov D. A.
master’s student
majoring in “information technologies and systems in economics”
faculty of economics
Karakalpak State University

THE ROLE AND OBJECTIVE OF THE STATE IN THE REGULATION OF THE NATIONAL ECONOMY

Annotation*. The article examines the methods of state intervention in the national economy and the significance of economic mechanisms in their full functioning. The country's important role in economic reforms, digital governance, and ensuring social stability is analyzed. At the same time, a recommendation was given on the reforms being carried out in the country to coordinate market mechanisms and ensure economic stability.*

Keywords: *National economy, public administration, market mechanism, regulation.*

Kirish

Milliy iqtisodiyotimiz ulushi hisoblangan bozor iqtisodiyoti zamonaviy sharoitda rivojlanishning eng samarali iqtisodiy tizimi sifatida e’tirof etilgan. Uning asosiy vositalari - talab va taklif bo‘lib, ular asosida resurslar taqsimoti, ishlab chiqarish va iste’mol jarayonlarining o‘z-o‘zidan muvozanatga kelishi

nazariy jihatdan tushuniladi. Lekin, tarixiy va bugungi zamonaviy tajribalar shuni ko‘rsatmoqdaki, bozor o‘zini o‘zi to‘liq boshqara olmaydi. Ayniqsa, ijtimoiy tengsizlik, ekologik muammolar, inqirozlar, tashqi iqtisodiy ta’sirlar sharoitida davlat aralashuvisiz bozor faoliyatini tasavvur qilib bo‘lmaydi.

Bozor iqtisodiyotini tartibga solishda davlat qonunchilik bazasini yaratish va joriy etish, soliq va moliyaviy siyosatni yuritish, infratuzilma faoliyatini ta’minlaydigan institutsional tizimlarni joriy etish orqali faol ishtirok etadi. Xususan, mulk huquqini kafolatlash, shartnomalar erkinligini ta’minlash va raqobat muhitini yaratish - bozordagi adolatli faoliyat qoidalarini belgilaydi. Shu bilan birga, davlat inflyatsiyani jilovlash, bandlikni ta’minlash, ijtimoiy himoya tizimlarini barpo etish orqali makroiqtisodiy barqarorlikni ta’minlaydi.

Mamlakatimizda ham so‘nggi yillarda davlat tomonidan milliy iqtisodiyotni tartibga solish bo‘yicha olib borilayotgan islohotlar muhim ahamiyatga ega. Xususan, 2017-yildan boshlab amalga oshirilayotgan erkin valyuta konvertatsiyasi, yangi soliq kodeksi, xususiylashtirish siyosati va raqamli iqtisodiyotni rivojlantirish kabilar mamlakatning bozor iqtisodiyotini yaxshiroq faoliyat yuritishini ta’minlaydigan tartibga solish vositalari hisoblanadi. Bu islohotlar nafaqat barqaror iqtisodiy o‘sishni, balki erkin bozorning to‘liq shakllanishini ham ta’minlayapti [1].

Adabiyotlar tahlili

Davlat tomonidan bozor iqtisodiyotini tartibga solish hamda iqtisodiy barqarorlikka erishish maqsadlari tahlilini joriy etgan xorijiy va mahalliy iqtisodchilar I.Sergekayev, I.Veretennikova, Sh.Zaynutdinov, R.Nurimbetov, V.Kushlin, D.Keyns, V.Oyken, M.Raxmatov va boshqa olimlarning ilmiy qarashlari hamda olib borgan tadqiqotlari o‘rganildi. Olib borgan izlanishimiz davomida davlat tomonidan iqtisodiyotni tartibga solish tizimi to‘g‘risida ilmiy tadqiqotlar olib borgan olimlar ishlarini o‘rganish natijasida tizimli ravishda iqtisodiy faoliyatni tartibga solish va qo‘llab-quvvatlashning ustuvor yo‘nalishlari tahlil qilindi [3].

Tadqiqot metodologiyasi

Maqolada davlat tomonidan bozor iqtisodiyotini tartibga solishga oid yetakchi xorijiy va mahalliy iqtisodchi olimlarning tadqiqot natijalarini o‘rganish va ma’lumotlarini taqqoslash, iqtisodiy, mantiqiy tahlil qilish kabi usullardan foydalanildi [4].

Tahlil va natijalar

Davlat tomonidan bozorni tartibga solish deganda hukumatning milliy iqtisodiyotga aralashuvi orqali bozordagi vujudga kelgan va vujudga kelishi kutilayotgan kamchiliklarni bartaraf etish, nafaqat iqtisodiy barqarorlikni, balki iqtisodiy o‘sishni ham ta’minlash hamda aholi uchun zarur bo‘lgan maqsadlarga erishish uchun davlat tomonidan bevosita va bilvosita amalga oshiriladigan chora-tadbirlar majmui tushuniladi. Bu jarayonlar davlatning bozorda faoliyat yuritayotgan subyektlar faoliyatiga ta’sir etuvchi boshqaruv, iqtisodiy hamda ijtimoiy-madaniy usullari orqali boshqaruv mexanizmlarini joriy etishni nazarda tutadi.

Davlat tomonidan bozor mexanizmlarini tartibga solishning asosiy maqsadlari milliy iqtisodiyotning barqaror rivojlanishini ta’minlash hamda bozorning o‘z-o‘zini tartibga solish imkoniyatlarini to‘ldirishga qaratilgan. Avvalo, davlat ijtimoiy adolatni ta’minlashga intiladi, chunki bozor iqtisodiyoti sharoitida daromadlar va imkoniyatlar nomutanosibligi kuchayishi mumkin. Shuningdek, iqtisodiy barqarorlikni saqlash, inflyatsiya jarayonlarini jilovlash, bandlikni qo‘llab-quvvatlash va iqtisodiy o‘sishni rag‘batlantirish davlatning eng muhim vazifalaridan biridir. Milliy iqtisodiyotning raqobatbardoshligini oshirish ham ustuvor yo‘nalish bo‘lib, buning orqali mamlakatning xalqaro maydondagi pozitsiyasi mustahkamlanadi.

Davlat bozor mexanizmlarining kamchiliklarini to‘ldirish, bozor yetarlicha tartibga sololmaydigan sohalarda faollik ko‘rsatish, shuningdek ekologiyani muhofaza qilish, atrof-muhit barqarorligini saqlash orqali iqtisodiy rivojlanishni ekologik talablar bilan uyg‘unlashtirishni ham nazarda tutadi. Bundan tashqari, davlat nazorat funksiyasi orqali qonunchilikka rioya etilishini, iqtisodiy subyektlar faoliyatining shaffofligini ta’minlaydi va strategik ahamiyatga ega sohalarni qo‘llab-quvvatlab, ularning uzluksiz ishlashi uchun zarur shart-sharoitlar yaratadi [2].

Bozor iqtisodiyotini tartibga solishda davlat bir qator iqtisodiy va boshqaruv vositalaridan foydalanadi. Jumladan, soliqlar va subsidiyalar orqali korxonalar faoliyatini rag‘batlantiradi yoki cheklaydi, budjet daromadlari barqarorligini ta’minlaydi. Monopoliyaga qarshi choralar bozor raqobatini qo‘llab-quvvatlab, adolatli iqtisodiy muhit yaratishga xizmat qiladi. Shuningdek, monetar siyosat vositalari yordamida davlat pul muomalasini tartibga soladi, kreditlar hajmi, foiz stavkalari va xalq xo‘jaligidagi likvidlik darajasiga ta’sir ko‘rsatadi. Davlat buyurtmalari esa strategik tarmoqlarda ishlab chiqarishni qo‘llab-quvvatlash, mahalliy ishlab chiqaruvchilarni rag‘batlantirish va iqtisodiy o‘sishga turtki beruvchi muhim mexanizmlar sifatida maydonga chiqadi. Shu kabi choralar orqali davlat bozor tizimining samarali faoliyat yuritishini ta’minlaydi va milliy iqtisodiyotning ustuvor yo‘nalishlarda rivojlanishiga ko‘maklashadi [5].

Iqtisodiyotga davlat aralashuvi bir tomondan iqtisodiy va ijtimoiy barqarorlikni ta’minlaydi, infratuzilmani rivojlantirishga xizmat qiladi va tadbirkorlikni rag‘batlantiradi. Boshqa tomondan esa byurokratiyaning vujudga kelishi va bozor erkinligining cheklanishi kabi salbiy oqibatlarga olib kelish ehtimoli mavjudligi bilan izohlanadi. Shu sababli, davlatning iqtisodiy siyosati muvozanatli va strategik yondashuvlarga asoslangan bo‘lishi, bozor subyektlari manfaatlarini o‘zida aks ettirishi kerak. Bozor iqtisodiyotining zamonaviy rivojlanish bosqichida mamlakatning raqobat muhitini shakllantirishdagi roli alohida o‘rin tutadi.

Xususiy mulkning huquqiy himoyasi, korrupsiyaga qarshi kurash va tashqi investitsiyalar uchun ishonchli muhit yaratish - bularning barchasi davlat siyosatining strategik yo‘nalishlaridir. Davlatning ijtimoiy vazifalari esa aholining kam ta’minlangan qatlamlarini qo‘llab-quvvatlash, sog‘liqni saqlash, ta’lim tizimini rivojlantirish, pensiya ta’minoti hamda ijtimoiy sug‘urta tizimlarini isloh

qilish orqali namoyon bo‘ladi. Shu bilan birga, global iqtisodiy tizimda O‘zbekiston davlatining yaxlit siyosati ham muhim ahamiyatga ega. Xalqaro tashkilotlar, mintaqaviy sheriklik, savdo kelishuvlari orqali mamlakat iqtisodiy aloqalarni kengaytirmoqda.

Bu jarayonda davlatning tashqi siyosati, iqtisodiy diplomatiya va investitsiya muhiti yaratuvchisi sifatidagi faoliyati muhim ahamiyat kasb etmoqda. O‘zbekistonda amalga oshirilgan "Harakatlar strategiyasi" hamda "Yangi O‘zbekiston - 2030" dasturi asosida mamlakat iqtisodiyotni tartibga solishda samarali vositalar - soliq islohotlari, kredit tizimini erkinlashtirish, byurokratik to‘siqlarni kamaytirish va xorijiy investitsiyalar uchun ochiq muhit yaratish kabi iqtisodiy islohotlar amalga oshirilmoqda.

Xususan, 2023 yil yakunlariga ko‘ra, xorijiy mablag‘lar hajmi 11 milliard AQSH dollaridan oshgan bo‘lib, bu davlat tomonidan amalga oshirilayotgan iqtisodiy siyosat natijasida shakllangan barqaror investitsiya muhitining ifodasidir. Davlat, ayni paytda, bozor mexanizmlarining to‘liq va adolatli ishlashini ta’minlash maqsadida, narxlarni erkinlashtirish bilan birga, strategik sohalarda o‘z nazoratini saqlab qolmoqda. Energetika, transport va oziq-ovqat xavfsizligi kabi sohalarda davlatning ishtiroki aholining ijtimoiy himoyasini kafolatlashda muhim ahamiyat kasb etadiShu bilan birga,

O‘zbekiston hukumati raqamli iqtisodiyotni rivojlantirish orqali davlat boshqaruvini optimallashtirish, shaffoflikni oshirish va korrupsiyani kamaytirish bo‘yicha yuqori natijalarga erishmoqda. Elektron xizmatlar tizimi va raqamli soliq monitoringi bunga yorqin misol bo‘la oladi. Boshqa sohalarda bo‘lgani kabi mamlakatimizda sanoat sohasida ham ijobiy o‘sish kuzatilib, sanoat ishlab chiqarish hajmi o‘tgan yilga nisbatan 6,8 foizga oshgan. Qurilish sohasi esa yildan-yilga jadallashib, 2024 yilda 8,8 foizlik o‘sish sur’atiga erishgan.

Milliy iqtisodiyotning asosiy tarmoqlaridan biri xizmatlar sohasining umumiy hajmi esa 7,7 foizga o‘sib, iqtisodiy faollikni kuchaytiruvchi asosiy omillardan biri bo‘lib xizmat qilmoqda. 2024 yilda kichik biznesning YAIMdagi ulushi 51,2 foizdan 54,3 foizgacha oshib, iqtisodiy hayotdagi roli yanada mustahkamlangan. Xizmatlar sohasidagi o‘sish ichki iste’molning oshishi va texnologik xizmatlar ko‘lamining kengayishi bilan bog‘liq bo‘ldi. Qurilishdagi yuqori o‘sishga asoslanib infratuzilma loyihalari va ko‘p qavatli uylar qurilishi bilan ta’minlandi. Sanoat sohasida qo‘shilgan qiymati yuqori bo‘lgan mahsulotlar ishlab chiqarish hajmi kengayishi kuzatilyapti. Bu esa aholi jon boshiga real daromadlari o‘sishiga, pirovardida, ichki talabni rag‘batlantirishda asosiy rol o‘ynadi [6].

Xulosa va taklifklar

Bozor iqtisodiyoti sharoitida davlatning milliy iqtisodiyotni tartibga solishdagi roli juda muhim bo‘lib, jahon tajribasidan ma’lumki, biron-bir iqtisodiy tizim davlat aralashuvisiz o‘zini o‘zi boshqara olmaydi. Davlat o‘z iqtisodiy siyosati orqali mamlakatdagi iqtisodiy barqarorlik, adolatli ijtimoiy himoya va sog‘lom raqobat kafolati sifatida muntazam faoliyat yuritadi. Rivojlangan mamlakatlar tajribasi shuni ko‘rsatadiki, davlat va bozor munosabatida bog‘liqlik

mavjud bo‘lsa, jamiyatning har tomonlama yuksalishiga erishishiga keng imkoniyat yaratiladi. Ya’ni, bozor iqtisodiyoti faqat davlatning tartibga solib qo‘yishi va qo‘llab-quvvatlashi bilan barqaror rivojlanadi.

Davlat boshqaruvi va bozor mexanizmlari bir-biriga zid emas, balki ular bir-birini to‘ldiruvchi tizimlardir. Hatto bozordagi erkinlikni ta’minlashda davlatning aralashuvi zarur holatlardan biri. Shu bilan birga, mamlakat kelajakda kutilayotgan iqtisodiy inqirozlarning oldini olishda ham muhim ahamiyatga ega. Davlat tomonidan amalga oshirilgan islohotlar bozor iqtisodiyotining samaradorligini oshirishga xizmat qilishi bilan birga, kutilayotgan inqirozlarga tayyor bo‘lishni ta’minlaydi.

O‘zbekiston mustaqillikka erishgach, bosqichma-bosqich bozor iqtisodiyotiga o‘tish jarayonini boshlagan bo‘lib, bu yo‘lda davlat zarur rol - iqtisodiyotni tartibga soluvchi asosiy institut sifatida faoliyat yuritmoqda. Bozor iqtisodiyoti sharoitida davlat faqat iqtisodiy muvozanatni saqlash, shu bilan birga ijtimoiy himoya, raqamli transformatsiya va ishbilarmonlik muhitini yaxshilash orqali umumiy taraqqiyotga yo‘l ochmoqda. Yuqorida bildirilgan fikrlardan kelib chiqib, milliy iqtisodiyotning yanada faol rivojlanishi, barqaror iqtisodiy taraqqiyotga erishish uchun bizning nuqtai nazarimizdan, davlat tomonidan iqtisodiyotni tartibga solish doirasida amalga oshirilayotgan islohotlarda quyidagi sohalarga ustuvorlik berilishi maqsadga muvofiq:

1. Raqamli iqtisodiyotni rivojlantirish: Raqamli infratuzilmani kengaytirish va elektron xizmatlar sifati va ko‘lamini muntazam ravishda takomillashtirib borish.

2. Atrof-muhitni muhofaza qilish: Yashil iqtisodiyotga asoslangan tadbirkorlik faoliyatini doimiy qo‘llab-quvvatlab borish.

Foydalanilgan adabiyotlar ro‘yxati:

1. И.Сергеев, И.Веретенникова Экономика организаций (предприятий)Изд.: Кнорус, 2010 г. 670 с.
2. Ш.Зайнутдинов, Р.Нуримбетов Ресурсная база и потенциал производство Узбекистана: использования и эффективность (региональный аспект). Бюллетень науки и практики 2017. No10 (23) стр. 207-217.
3. С. Капканщикова «Государственное регулирование экономики. (Аспирантура, Бакалавриат, Магистратура). Учебное пособие.» Изд.: Литрес. 2024 г., 548 с.
4. Кушлин В.И. Государственное регулирование рыночной экономики: Учебник. Изд. 3-е, доп. и перераб. – М.: «РАГС», 2014. – 616 с.
5. Кейнс Д.М. Общая теория занятости, процента и денег. М.: «ЭКСМО», 2009, - 153 с.
6. В.Ойкен Основные принципы экономической политики Прогресс, Универс 1995 г. 496 с.

Ne'matov N. I.
assistant
Samarkand State Medical University
Jabborov I. J.
student
Samarkand State Medical University
Ro'ziyev A. X.
student
Samarkand State Medical University
Komekov S. K.
student
Samarkand State Medical University
Abdullayev A. A.
student
Samarkand State Medical University

THE ROLE OF VIRTUAL REALITY IN REHABILITATION: CLINICAL EXPERIENCES AND RESULTS

Abstract: *Virtual reality (VR) technologies are increasingly being integrated into modern rehabilitation programs as innovative tools that enhance therapeutic effectiveness, patient engagement, and clinical outcomes. VR-based rehabilitation allows patients to interact with immersive environments that stimulate motor, cognitive, and sensory functions in a controlled and customizable setting. This article examines the role of VR in rehabilitation by analyzing clinical experiences, therapeutic mechanisms, and patient outcomes reported in recent studies. The findings indicate that VR not only improves functional recovery in neurological, orthopedic, and cognitive disorders but also increases patient motivation and adherence to therapy, ultimately contributing to more efficient and personalized rehabilitation processes.*

Keywords: *Virtual reality, rehabilitation, motor recovery, neurological disorders, clinical therapy, immersive environment, patient engagement, digital rehabilitation tools.*

Introduction

In recent years, virtual reality technology has become one of the most promising innovations in the field of medical rehabilitation. As healthcare systems strive to adopt more effective, patient-centered, and technology-driven therapeutic methods, VR presents an opportunity to enhance traditional rehabilitation approaches through immersive simulations and interactive digital environments. Unlike conventional therapy, VR allows patients to perform repetitive, task-oriented exercises in engaging settings that stimulate both motor and cognitive functions. These environments can be adapted to the patient's specific condition,

progress, and therapeutic goals, thereby supporting a more individualized approach to rehabilitation.

Clinical researchers have identified VR as a powerful tool for enhancing neuroplasticity, improving motor coordination, and facilitating cognitive rehabilitation, especially in patients recovering from stroke, traumatic brain injury, or musculoskeletal impairments. Additionally, VR reduces psychological barriers to therapy by making rehabilitation enjoyable, reducing anxiety, and increasing treatment adherence. With advancements in sensor technologies, motion capture systems, and haptic feedback, VR platforms provide real-time performance analysis and allow clinicians to monitor patient progress with greater accuracy. This article explores the therapeutic role of VR, clinical outcomes documented in current research, and its implications for future rehabilitation practices.

Discussion

Evidence from clinical practice demonstrates that VR-based rehabilitation significantly contributes to functional recovery across various patient groups. In neurological rehabilitation, VR has shown notable effectiveness in improving upper-limb coordination, balance, gait, and cognitive performance among stroke survivors. Immersive simulations help activate neural circuits responsible for motor learning, promoting faster and more consistent improvements compared to traditional exercises. Furthermore, interactive VR environments enhance patient engagement by transforming rehabilitation into a rewarding and motivating process.

Orthopedic rehabilitation has also benefited from VR technologies. Patients recovering from fractures, joint surgeries, or ligament injuries demonstrate improved range of motion, reduced recovery time, and greater adherence to exercise routines when VR is incorporated into their therapy. The ability to simulate controlled, low-risk physical activities helps patients gradually rebuild strength and mobility without fear of reinjury.

Another important application of VR lies in pain management. Studies suggest that immersive VR can reduce perceived pain levels during therapy by diverting attention away from discomfort, making physically demanding exercises more tolerable and effective. Cognitive rehabilitation programs using VR have improved memory, attention, spatial orientation, and problem-solving abilities in individuals with traumatic brain injuries and age-related cognitive decline.

Despite its advantages, VR integration also faces challenges. These include high equipment costs, the need for trained personnel, limited content diversity, and potential side effects such as motion sickness. Additionally, some patients may require time to adapt to immersive environments. Nevertheless, continuous technological advancements and increasing clinical acceptance are accelerating the adoption of VR-based rehabilitation across medical institutions.

Conclusion

Virtual reality has proven to be a transformative innovation in the field of medical rehabilitation, offering unique advantages that extend beyond the capabilities of conventional therapy. By providing immersive, interactive, and

adaptable environments, VR allows patients to engage in task-specific exercises that stimulate motor, sensory, and cognitive functions in a safe and controlled setting. This approach not only accelerates functional recovery but also enhances patient motivation, adherence, and satisfaction, which are critical determinants of successful rehabilitation outcomes.

Clinical studies have consistently demonstrated that VR-based rehabilitation is particularly effective for neurological disorders, including post-stroke recovery, traumatic brain injury, and neurodegenerative conditions. The technology promotes neuroplasticity by engaging neural circuits through repetitive, goal-directed activities, thereby supporting faster and more sustainable improvements in motor coordination, balance, gait, and cognitive functions. In orthopedic rehabilitation, VR enables patients to perform movements in low-risk, simulated environments, reducing the likelihood of reinjury and facilitating faster restoration of strength and range of motion. Furthermore, VR has shown efficacy in pain management, as immersive environments can distract patients from discomfort and increase tolerance for physically demanding exercises.

Beyond direct clinical benefits, VR contributes to a more personalized and data-driven approach to rehabilitation. Motion tracking, performance analytics, and real-time feedback enable clinicians to monitor patient progress accurately, adjust therapeutic protocols promptly, and tailor exercises to individual needs. This precision fosters more efficient therapy, optimizes resource utilization, and strengthens the evidence base for rehabilitation practices. Moreover, VR platforms can be adapted for remote or home-based rehabilitation, expanding access to care for patients in rural or underserved areas, and providing continuity of therapy outside traditional clinical settings.

Despite its many advantages, VR integration in rehabilitation presents certain challenges, including equipment costs, the need for specialized training, potential motion-related side effects, and limitations in content diversity. Addressing these challenges requires institutional support, professional development, and ongoing research to refine therapeutic applications, improve user experience, and ensure long-term patient safety.

In conclusion, virtual reality represents a paradigm shift in rehabilitation by combining technological innovation with clinical expertise to enhance patient outcomes, engagement, and therapy effectiveness. As VR technology continues to advance, incorporating features such as artificial intelligence, haptic feedback, and adaptive learning algorithms, its role in rehabilitation will expand further, enabling fully personalized, evidence-based, and patient-centered care. Embracing VR as a core component of rehabilitation programs promises to redefine the standards of clinical practice, increase accessibility to high-quality therapy, and improve the overall quality of life for patients across diverse medical conditions.

References:

1. Laver, K., George, S., Thomas, S., Deutsch, J. E., & Crotty, M. (2015). Virtual reality for stroke rehabilitation. Cochrane Database of Systematic Reviews, 2015(2), CD008349.

2. Howard, M. C. (2017). A meta-analysis and systematic literature review of virtual reality rehabilitation programs. Computers in Human Behavior, 70, 317–327.
3. Aminov, A., Rogers, J. M., Middleton, S., Caeyenberghs, K., & Wilson, P. H. (2018). What do randomized controlled trials say about virtual rehabilitation in stroke? A systematic literature review and meta-analysis. Frontiers in Neurology, 9, 1049.
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne'matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne'matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Ne'matov N. I.
assistant
Samarkand State Medical University
Ne'matova Z. R.
student
Samarkand State Medical University
Rabbimqulov Sh. B.
student
Samarkand State Medical University
Tolibjonova D. B.
student
Samarkand State Medical University
Arziyeva U. S.
student
Samarkand State Medical University

THE ROLE OF ELECTRONIC HEALTH RECORDS IN IMPROVING CLINICAL WORKFLOW

Abstract: *Electronic Health Records (EHRs) have become a cornerstone of modern healthcare systems, providing a digital platform for the storage, retrieval, and management of patient health information. This article examines the role of EHRs in enhancing clinical workflow by improving data accessibility, streamlining communication among healthcare professionals, reducing medical errors, and supporting evidence-based decision-making. The study highlights key benefits, challenges, and strategies for successful EHR implementation, emphasizing how optimized clinical workflows contribute to improved patient outcomes, operational efficiency, and healthcare quality.*

Keywords: *Electronic Health Records, clinical workflow, healthcare informatics, patient safety, operational efficiency*

Introduction

The healthcare sector faces increasing demands for efficiency, accuracy, and patient-centered care. Traditional paper-based systems have significant limitations, including fragmented data storage, delayed information retrieval, and increased risk of errors. The introduction of Electronic Health Records (EHRs) has revolutionized the management of patient information by providing a centralized, digital repository that integrates clinical, administrative, and laboratory data.

EHRs are designed to improve the quality of care by enhancing the accessibility and accuracy of patient information. By providing clinicians with real-time access to comprehensive patient histories, laboratory results, imaging studies, and medication records, EHRs enable faster and more informed decision-making. Additionally, EHRs facilitate coordinated care by supporting

communication among multidisciplinary teams, reducing duplication of tests, and streamlining clinical documentation processes.

Beyond individual patient care, EHRs contribute to system-level improvements. The integration of analytics and reporting tools within EHR platforms allows healthcare organizations to monitor workflow efficiency, identify bottlenecks, and optimize resource allocation. Furthermore, EHRs support adherence to clinical guidelines and evidence-based practices, reducing variability in care delivery and promoting patient safety.

Despite their transformative potential, EHR implementation is not without challenges. System interoperability, data standardization, user training, and resistance to change are critical factors that influence the effectiveness of EHR adoption. Addressing these challenges is essential to fully realize the benefits of EHRs in improving clinical workflow and achieving sustainable healthcare outcomes.

Discussion

EHRs play a pivotal role in optimizing clinical workflows by enabling streamlined data entry, retrieval, and communication. Clinicians can access patient records instantly across departments, reducing delays in diagnosis and treatment. Automated alerts, reminders, and clinical decision support tools embedded within EHRs enhance adherence to protocols and reduce the likelihood of errors, such as drug interactions or missed laboratory tests.

Coordination of care is significantly improved through EHR-enabled communication channels. Physicians, nurses, and allied health professionals can share updates and collaborate in real time, ensuring that patient management is cohesive and timely. EHRs also facilitate remote monitoring and telemedicine, allowing clinicians to track patient progress outside the hospital setting, which is particularly valuable for chronic disease management.

Operational efficiency is another key advantage of EHR systems. Analytics derived from EHR data can identify workflow inefficiencies, predict patient admission trends, and optimize staffing requirements. Administrative tasks, such as billing, coding, and reporting, are streamlined, freeing clinicians to focus more on patient care. The integration of EHRs with other digital tools, including laboratory information systems and imaging platforms, further reduces redundancy and enhances data integrity.

However, challenges remain. Interoperability between different EHR systems is limited in many healthcare networks, leading to fragmented patient information. Data entry can be time-consuming, and inadequate training may reduce system usability. Privacy and security concerns are paramount, as sensitive patient data must be protected against unauthorized access and breaches. Addressing these barriers requires comprehensive planning, robust IT infrastructure, and ongoing staff education.

Conclusion

Electronic Health Records (EHRs) have emerged as a cornerstone of modern healthcare, fundamentally transforming clinical workflows by enabling

the seamless integration, storage, and retrieval of patient information. Their impact extends beyond mere digitization of medical records, influencing clinical decision-making, care coordination, operational efficiency, and overall healthcare quality. By providing real-time access to comprehensive patient data—including medical history, laboratory results, imaging studies, and medication records—EHRs empower clinicians to make timely, informed, and evidence-based decisions, thereby reducing diagnostic errors and improving patient safety.

In addition to enhancing individual patient care, EHRs facilitate collaboration across multidisciplinary healthcare teams. The ability to share updates, clinical notes, and test results instantaneously improves communication, reduces duplication of procedures, and supports continuity of care. Embedded clinical decision support tools, automated alerts, and reminders further guide clinicians in adhering to evidence-based guidelines, ensuring consistent and high-quality care delivery.

From an operational perspective, EHRs provide healthcare organizations with actionable insights through integrated analytics and reporting functionalities. Workflow bottlenecks, resource allocation inefficiencies, and patient flow challenges can be identified and addressed, optimizing both staff performance and institutional productivity. Administrative tasks such as billing, coding, and regulatory reporting are streamlined, freeing clinicians to focus more on direct patient care. Moreover, the integration of EHRs with telemedicine platforms, wearable devices, and remote monitoring systems extends clinical reach and facilitates proactive management of chronic conditions.

Despite these significant advantages, the full potential of EHRs can only be realized if challenges such as system interoperability, data standardization, user training, and cybersecurity are adequately addressed. Comprehensive implementation strategies, ongoing education for clinical staff, and robust IT infrastructure are essential to maximize the benefits of EHRs. Attention to ethical and legal considerations, including patient privacy and data security, is critical to maintaining trust and compliance with healthcare regulations.

In conclusion, EHRs play a pivotal role in improving clinical workflow, enhancing patient safety, and supporting high-quality, efficient, and patient-centered care. They serve as an essential platform for evidence-based medicine, care coordination, and data-driven operational management. As healthcare systems continue to evolve toward digital transformation, the strategic adoption and optimization of EHRs will remain central to achieving sustainable improvements in clinical workflow and overall healthcare outcomes. The ongoing refinement and integration of EHR technologies hold promise for further advancing precision medicine, population health management, and healthcare innovation on a global scale.

References:

1. Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems. Risk Management and Healthcare Policy, 4, 47–55. https://doi.org/10.2147/RMHP.S12985

2. Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., Ferris, T., … & Blumenthal, D. (2009). Use of electronic health records in U.S. hospitals. New England Journal of Medicine, 360(16), 1628–1638. https://doi.org/10.1056/NEJMsa0900592
3. Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. Health Affairs, 30(3), 464–471. https://doi.org/10.1377/hlthaff.2011.0178
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne'matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne'matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Ne'matov N. I.
assistant
Samarkand State Medical University
O'ktamova M. I.
student
Samarkand State Medical University
Shodiyeva F. R.
student
Samarkand State Medical University
Ergasheva G. Z.
student
Samarkand State Medical University
Ergasheva N. A.
student
Samarkand State Medical University

AI-BASED CLINICAL DECISION SUPPORT SYSTEMS

Abstract: *Artificial Intelligence (AI)-based Clinical Decision Support Systems (CDSS) have emerged as transformative tools in modern healthcare by enhancing clinical decision-making through data-driven insights. By integrating machine learning algorithms, natural language processing, and predictive analytics, AI-based CDSS assist healthcare professionals in diagnosis, treatment planning, and patient management. This article examines the fundamental principles, applications, benefits, and challenges of AI-driven clinical decision support systems. The study highlights their role in improving diagnostic accuracy, reducing clinical errors, and supporting personalized medicine while emphasizing the importance of transparency, data quality, and ethical considerations in clinical implementation.*

Keywords: *Artificial intelligence, clinical decision support systems, machine learning, healthcare informatics, medical decision-making*

Introduction

Clinical decision-making in healthcare is inherently complex, requiring clinicians to synthesize large volumes of heterogeneous information, including patient histories, diagnostic test results, medical imaging, clinical guidelines, and evolving scientific evidence. The increasing prevalence of chronic diseases, aging populations, and multimorbidity has further intensified this complexity, placing significant cognitive and time burdens on healthcare professionals. Traditional approaches to clinical decision-making, which rely heavily on clinician experience and manual interpretation of data, are often insufficient to fully address these challenges in fast-paced clinical environments.

Clinical Decision Support Systems (CDSS) were initially developed to assist healthcare professionals by providing rule-based recommendations derived

from clinical guidelines and expert knowledge. While these systems demonstrated early promise, their effectiveness was limited by rigid logic structures, lack of adaptability, and inability to process unstructured or high-dimensional data. As a result, conventional CDSS often struggled to accommodate patient-specific variability and the dynamic nature of modern medical practice.

The rapid digitalization of healthcare and the widespread adoption of Electronic Health Records (EHRs), medical imaging systems, wearable devices, and remote monitoring technologies have generated unprecedented volumes of clinical data. This data-rich environment has created new opportunities for leveraging Artificial Intelligence (AI) techniques to enhance clinical decision support. AI-based CDSS employ machine learning, deep learning, natural language processing, and predictive analytics to extract meaningful patterns from complex datasets and generate actionable clinical insights.

AI-driven Clinical Decision Support Systems differ fundamentally from traditional rule-based systems by their ability to learn from data, adapt to new clinical evidence, and continuously improve performance over time. These systems can analyze structured and unstructured data sources simultaneously, enabling more accurate diagnosis, risk stratification, and treatment recommendations. By integrating real-time data analysis with clinical workflows, AI-based CDSS support proactive and personalized healthcare delivery.

Despite their transformative potential, the adoption of AI-based CDSS raises important technical, ethical, and organizational challenges. Issues related to data quality, model interpretability, clinical validation, and integration into existing healthcare infrastructures remain critical barriers. Moreover, ensuring clinician trust, patient safety, and regulatory compliance is essential for the responsible implementation of AI-driven decision support technologies. Understanding these challenges is crucial for maximizing the clinical value of AI-based CDSS and guiding their effective deployment in healthcare systems.

Discussion

AI-based Clinical Decision Support Systems are widely applied across various medical domains, including diagnostics, treatment optimization, and disease risk prediction. In diagnostic processes, AI models assist clinicians by detecting early signs of diseases such as cancer, cardiovascular disorders, and neurological conditions. Machine learning algorithms can identify complex patterns within large datasets that may not be easily recognized by human analysis alone.

In treatment planning, AI-driven CDSS support personalized medicine by recommending therapies based on patient-specific characteristics, medical history, and predicted treatment responses. These systems also enhance clinical workflow efficiency by prioritizing high-risk patients, reducing redundant tests, and supporting timely clinical interventions. Furthermore, AI-based CDSS contribute to population health management by analyzing trends and predicting disease outbreaks or hospital readmission risks.

Despite their advantages, the integration of AI-based CDSS into clinical practice presents several challenges. Data quality, system interoperability, and algorithm interpretability remain significant concerns. Clinicians must trust and understand AI-generated recommendations to effectively incorporate them into decision-making processes. Ethical issues, including patient data privacy, algorithmic bias, and accountability for clinical outcomes, also require careful consideration and regulatory oversight.

Conclusion

AI-based Clinical Decision Support Systems represent a significant advancement in healthcare decision-making by enabling intelligent, data-driven, and personalized clinical care. By augmenting clinician expertise with predictive insights and real-time analytics, these systems improve diagnostic accuracy, enhance treatment effectiveness, and support efficient healthcare delivery. However, the successful adoption of AI-driven CDSS depends on high-quality data, transparent and explainable algorithms, and seamless integration into clinical workflows.

In conclusion, AI-based CDSS have the potential to transform healthcare systems by improving patient safety, clinical outcomes, and operational efficiency. Future research should focus on developing explainable AI models, establishing standardized evaluation frameworks, and addressing ethical and legal challenges. With appropriate governance and interdisciplinary collaboration, AI-based Clinical Decision Support Systems will play a central role in shaping the future of intelligent and patient-centered healthcare.

References:

1. XAI-Based clinical decision support systems: A systematic review. Applied Sciences, 14(15), 6638. https://doi.org/10.3390/app14156638. MDPI
2. A meta-analysis of explainable AI in clinical decision support systems: methods, applications, and usability challenges. Healthcare, 13(17), 2154. MDPI
3. Sanchez, R. (2024). AI-powered clinical decision support systems for precision medicine: developing AI-powered systems to provide clinicians with decision support tailored to individual patient characteristics. Journal of Bioinformatics and Artificial Intelligence, 4(2).
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.

7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Ne'matov N. I.
assistant
Samarkand State Medical University
Rahmatullayeva N. P.
student
Samarkand State Medical University
Abjabborova Sh. F.
student
Samarkand State Medical University
Shirinbekov D. G.
student
Samarkand State Medical University
Fayzullayev O. A.
student
Samarkand State Medical University

PREDICTIVE ANALYTICS IN HEALTHCARE DECISION-MAKING

Abstract: *Predictive analytics has become a critical component of modern healthcare decision-making by enabling data-driven predictions of clinical outcomes, disease progression, and patient risks. By leveraging historical and real-time healthcare data, predictive models support clinicians and healthcare administrators in making informed, proactive, and personalized decisions. This article explores the role of predictive analytics in healthcare, its key methodologies, practical applications, and associated challenges. The study highlights how predictive analytics enhances diagnostic accuracy, optimizes treatment strategies, and improves resource allocation while emphasizing the importance of ethical considerations and data quality in clinical implementation.*

Keywords: *Predictive analytics, healthcare decision-making, machine learning, clinical prediction, data-driven medicine*

Introduction

Healthcare systems worldwide are facing increasing pressure due to growing patient populations, complex diseases, and limited resources. Traditional decision-making approaches, which rely primarily on clinician experience and retrospective analysis, are often insufficient to address these challenges effectively. In this context, predictive analytics has emerged as a transformative approach that enables the anticipation of clinical events and supports evidence-based healthcare decisions.

Predictive analytics in healthcare involves the use of statistical techniques, machine learning algorithms, and data mining methods to analyze large volumes of medical data and predict future outcomes. These predictions can relate to disease onset, hospital readmissions, treatment responses, and patient survival

rates. By identifying high-risk patients early, healthcare providers can intervene proactively, reducing complications and improving overall care quality.

The increasing adoption of electronic health records (EHRs), wearable devices, and medical imaging technologies has significantly expanded the availability of healthcare data. This data-rich environment provides an ideal foundation for predictive analytics, allowing healthcare organizations to move from reactive care to preventive and personalized medicine. As a result, predictive analytics is becoming a cornerstone of strategic and clinical decision-making in modern healthcare systems.

Discussion

Predictive analytics plays a vital role in enhancing healthcare decision-making across clinical and administrative domains. In clinical practice, predictive models assist physicians in diagnosing diseases at early stages, stratifying patient risks, and selecting optimal treatment plans. For example, predictive algorithms can estimate the likelihood of cardiovascular events, detect early signs of cancer, or predict complications in intensive care units.

From an operational perspective, predictive analytics supports hospital management by optimizing resource allocation, reducing patient wait times, and forecasting healthcare demand. Predictive models can identify patients at risk of readmission, enabling targeted follow-up care and cost reduction. Additionally, predictive analytics contributes to population health management by identifying trends and risk factors within large patient groups.

Despite its benefits, the implementation of predictive analytics in healthcare presents significant challenges. Data quality, interoperability, and model interpretability remain major concerns. Healthcare professionals must trust and understand predictive models before integrating them into clinical workflows. Furthermore, ethical issues such as patient privacy, algorithmic bias, and accountability require careful consideration to ensure responsible use of predictive technologies.

Conclusion

Predictive analytics is increasingly becoming a cornerstone of effective healthcare decision-making by enabling the transition from reactive treatment models to proactive and preventive care strategies. By analyzing large-scale clinical, administrative, and real-time patient data, predictive models can anticipate health risks, disease progression, and treatment outcomes with a level of accuracy that significantly enhances clinical judgment. This capability allows healthcare professionals to intervene at earlier stages of disease, reduce avoidable complications, and improve overall patient outcomes.

The application of predictive analytics not only supports clinical decision-making but also contributes substantially to healthcare system efficiency. Through accurate forecasting of hospital admissions, resource utilization, and patient readmission risks, healthcare organizations can optimize operational planning and reduce unnecessary costs. Moreover, predictive insights facilitate personalized medicine by enabling tailored treatment plans based on individual risk profiles,

genetic information, and behavioral data, thereby improving the quality and effectiveness of care delivery.

Despite these advantages, the successful implementation of predictive analytics in healthcare depends on addressing several critical challenges. Data quality, interoperability between healthcare information systems, and model transparency remain essential factors for reliable deployment. Clinicians must be able to interpret and trust predictive outputs, which underscores the importance of explainable and clinically validated models. Furthermore, ethical considerations—including patient privacy, data security, algorithmic bias, and accountability—must be carefully managed to ensure responsible and equitable use of predictive technologies.

In conclusion, predictive analytics represents a powerful enabler of intelligent, data-driven healthcare systems. Its long-term impact will depend on interdisciplinary collaboration among healthcare professionals, data scientists, and policymakers, as well as the development of robust regulatory and ethical frameworks. Future research should focus on enhancing model interpretability, integrating multi-source healthcare data, and evaluating real-world clinical effectiveness. By addressing these challenges, predictive analytics can play a central role in advancing sustainable, patient-centered, and value-based healthcare decision-making.

References:

1. Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. Nature Medicine, 25(1), 44–56.
2. Beam, A. L., & Kohane, I. S. (2018). Big data and machine learning in health care. JAMA, 319(13), 1317–1318.
3. Rajkomar, A., Dean, J., & Kohane, I. (2019). Machine learning in medicine. The New England Journal of Medicine, 380(14), 1347–1358.
4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne'matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne'matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Ne'matov N. I.
assistant
Samarkand State Medical University
Yo'ldoshev J. Sh.
student
Samarkand State Medical University
Abduvaitov Sh. V.
student
Samarkand State Medical University
Akramqulov T. A.
student
Samarkand State Medical University
Baxitova A. N.
student
Samarkand State Medical University

DIGITAL TRANSFORMATION OF HEALTHCARE INSTITUTIONS

Abstract: *Digital transformation in healthcare institutions refers to the integration of advanced technologies, data analytics, and digital solutions to improve patient care, operational efficiency, and healthcare outcomes. This article examines the key aspects of digital transformation, including electronic health records (EHRs), telemedicine, big data analytics, artificial intelligence (AI), and wearable health technologies. The discussion highlights benefits such as enhanced clinical workflows, patient-centered care, data-driven decision-making, and predictive analytics. Challenges related to system interoperability, data security, staff training, and financial constraints are also explored. Strategies to successfully implement digital transformation and future directions for healthcare innovation are discussed.*

Keywords: *Digital transformation, healthcare institutions, electronic health records, telemedicine, artificial intelligence, big data analytics, patient-centered care*

Introduction

Healthcare institutions worldwide are experiencing a rapid shift toward digital technologies that aim to enhance patient care, streamline clinical workflows, and optimize operational efficiency. Digital transformation in healthcare involves the adoption of tools such as electronic health records (EHRs), telemedicine platforms, big data analytics, artificial intelligence (AI), and wearable monitoring devices. These technologies enable healthcare providers to deliver personalized, evidence-based, and efficient care while addressing the growing demands of modern healthcare systems.

The rise of digital health technologies has been driven by several factors, including increasing patient expectations, the need for cost reduction, regulatory incentives, and the availability of advanced computing and data storage

capabilities. EHRs provide centralized and structured access to patient information, improving communication among care teams and supporting accurate clinical decision-making. Telemedicine expands healthcare access to remote and underserved populations, while big data and AI enable predictive analytics, early disease detection, and optimized treatment planning.

Despite the advantages, the process of digital transformation in healthcare is complex. It requires integration of heterogeneous systems, alignment of workflows, staff training, and robust security measures to protect patient data. The successful implementation of digital initiatives demands a strategic approach that balances technological innovation with clinical, operational, and regulatory considerations.

Discussion

Digital transformation significantly impacts clinical workflows and patient care delivery. EHRs streamline documentation, reduce errors, and enable real-time access to patient data across multiple departments. Clinical decision support systems (CDSS) integrated within EHRs assist healthcare professionals in making evidence-based decisions, reducing variability in treatment and enhancing patient safety. Predictive analytics derived from big data allows identification of high-risk patients, enabling preventive interventions and early diagnosis of chronic conditions.

Telemedicine and remote patient monitoring have become essential components of digital healthcare, particularly for managing chronic diseases and providing access to care in rural or underserved areas. These platforms allow virtual consultations, continuous health tracking, and timely adjustments to treatment plans, thereby improving patient engagement and satisfaction. Wearable devices and mobile health applications contribute to real-time monitoring of vital signs, physical activity, and medication adherence, generating valuable data that supports personalized healthcare interventions.

Data-driven decision-making is enhanced by AI and machine learning algorithms, which can analyze large volumes of clinical and operational data to identify patterns, predict outcomes, and optimize resource allocation. Hospital administrators can leverage analytics to improve staffing efficiency, reduce operational bottlenecks, and plan capacity effectively. Additionally, integrated digital platforms facilitate interoperability, enabling seamless information exchange between laboratories, pharmacies, imaging centers, and external care providers.

Challenges to digital transformation include technological integration, cybersecurity risks, financial investment, and resistance to change. Legacy systems may not be compatible with modern digital tools, requiring substantial infrastructure upgrades. Data security and privacy remain critical concerns, as healthcare institutions must comply with HIPAA, GDPR, and other local regulations. Adequate training and change management strategies are necessary to ensure that staff can effectively utilize new technologies. Financial constraints,

particularly for smaller institutions, may limit the adoption of digital solutions, underscoring the need for scalable and cost-effective technologies.

Despite these obstacles, successful digital transformation leads to improved patient outcomes, operational efficiency, and patient satisfaction. It fosters a patient-centered approach by enabling personalized care, proactive interventions, and continuous monitoring. Healthcare institutions that effectively implement digital initiatives are better positioned to meet the demands of modern healthcare delivery, support evidence-based practice, and adapt to evolving technological advancements.

Conclusion

Digital transformation of healthcare institutions represents a fundamental shift in the delivery and management of healthcare services. By integrating advanced technologies such as EHRs, telemedicine, AI, big data analytics, and wearable devices, healthcare organizations can improve clinical workflows, enhance patient care, and optimize operational efficiency. Real-time access to patient information, predictive analytics, and evidence-based decision-making empower clinicians to provide safer, more personalized, and timely care.

The successful implementation of digital transformation requires addressing challenges including interoperability, cybersecurity, financial investment, staff training, and resistance to change. Strategic planning, adoption of standardized protocols, and stakeholder engagement are essential to maximize the benefits of digital initiatives. Ultimately, digital transformation not only enhances the quality and efficiency of healthcare services but also facilitates innovation, supports patient-centered care, and positions institutions to meet future healthcare challenges.

Healthcare institutions embracing digital transformation are better equipped to deliver high-quality, efficient, and accessible care. Continuous technological innovation, combined with organizational readiness and policy support, will ensure that digital transformation remains a driving force in advancing healthcare systems globally.

References:

1. Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: promise and potential. Health Information Science and Systems, 2(1), 3. https://doi.org/10.1186/2047-2501-2-3

2. Kvedar, J., Coye, M. J., & Everett, W. (2014). Connected health: a review of technologies and strategies to improve patient care with telemedicine and telehealth. Health Affairs, 33(2), 194–199. https://doi.org/10.1377/hlthaff.2013.0992

3. Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. Health Affairs, 30(3), 464–471. https://doi.org/10.1377/hlthaff.2011.0178

4. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT

TEXNOLOGIYALARINING O’RNI. Академические исследования в современной науке, 1(19), 37-38.
5. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
6. Ne’matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
7. Ne’matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
8. Ne’matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.

Nizomov M. A.
talabasi
stomotologiya fakulteti
Samarqand davlat tibbiyot universiteti
Jabborov T. U.
talabasi
stomotologiya fakulteti
Samarqand davlat tibbiyot universiteti
G'ofurov T. B.
pediatriua fakulteti farmatsiya yo'nalishi
Toshkent davlat tibbiyot universiteti Termiz filiali
Ilmiy rahbar: Qodirov B. G.
assistenti
tibbiy kimyo kafedrasi
Samarqand davlat tibbiyot universiteti
Samarkand, Uzbekistan

ISMOLOQ EFEMER O'SIMLIGINING INSON ORGANIZMIGA TIBBIY NUQTAI NAZARDAN FOYDALI EKANLIGI

Annotatsiya: *Ushbu maqolada ismoloq efemer o'simligining (Spinacia oleracea L.) biologik, kimyoviy va farmakologik xususiyatlari, shuningdek uning inson organizmiga foydali ta'siri haqida ma'lumotlar keltirilgan. Ismoloqning tarkibidagi vitaminlar, mineral tuzlar, flavonoidlar va antioksidant birikmalar organizmda modda almashinuvini me'yorlashtirish, immunitetni kuchaytirish hamda yurak-qon tomir tizimi faoliyatini yaxshilashda muhim ahamiyat kasb etadi.*

Kalit so'zlar: *ismoloq, efemer o'simliklar, vitaminlar, antioksidantlar, tibbiy xususiyatlar, biofaol modda.*

Nizomov M. A.
student
faculty of dentistry
Samarkand State Medical University
Jabborov T. U.
student
faculty of dentistry
Samarkand State Medical University
Gofurov T. B.
faculty of pediatrics, pharmacy program
Tashkent State Medical University, Termez Branch
Scientific Supervisor: Qodirov B. G.
assistant
department of medical chemistry
Samarkand State Medical University
Samarkand, Uzbekistan

MEDICAL BENEFITS OF THE EPHEMERAL PLANT SPINACH FOR THE HUMAN BODY

Abstract: *This article presents information on the biological, chemical, and pharmacological properties of the ephemeral plant spinach (Spinacia oleracea L.), as well as its beneficial effects on the human body. The vitamins, mineral salts, flavonoids, and antioxidant compounds contained in spinach play an important role in regulating metabolic processes, strengthening the immune system, and improving the functioning of the cardiovascular system.*

Keywords*: spinach, ephemeral plants, vitamins, antioxidants, medicinal properties, bioactive compounds.*

Kirish

Ismoloq (*Spinacia oleracea L.*) - Amarantlar (Amaranthaceae) oilasiga mansub bir yillik efemer o‘simlik bo‘lib, qadim zamonlardan buyon oziq-ovqat va davolash vositasi sifatida inson hayotida muhim o‘rin tutadi. Efemer o‘simliklar qisqa vegetatsiya davriga ega bo‘lib, o‘z hayot siklini erta bahorda yoki kuzning dastlabki oylarida yakunlaydi. Bu xususiyat ismoloqqa tabiiy sharoitlarda tez o‘sish va boy kimyoviy tarkibni shakllantirish imkonini beradi. O‘zbekiston florasida ismoloq tabiiy va madaniy holda keng tarqalgan. Tibbiyot sohasida ismoloqning tarkibiy elementlari - askorbin kislotasi (vitamin C), karotin, foliy kislotasi, temir, magniy va kaliy kabi moddalarning mavjudligi bilan qadrlanadi. So‘nggi yillarda olib borilgan fitokimyoviy tadqiqotlar ismoloq ekstraktlarining antioksidant, yallig‘lanishga qarshi, gepatoprotektor va gemopoetik xususiyatlarini aniqlab bergan.

1. Ismoloq efemer o‘simligining morfologik va biokimyoviy tavsifi

Ismoloq past bo‘yli, sershox, ko‘p bargli o‘simlik bo‘lib, barglari yumaloq yoki cho‘ziq shaklda, sersuv va ozuqaviy qiymatga ega. O‘simlik asosan bahor oylarida qisqa muddatda pishib, efemer o‘simliklar guruhiga kiradi.

Kimyoviy tarkibi bo‘yicha ismoloq barglari quyidagi moddalarga boy:

-Vitaminlar: A, B_1, B_2, B_6, C, E, K, PP, foliy kislotasi;

-Minerallar: temir, kalsiy, kaliy, magniy, rux, marganes, fosfor;

-Biofaol modda va antioksidantlar: flavonoidlar, lutein, zeaksantin, beta-karotin, fenol birikmalar.

Mazkur komponentlar ismoloqning farmakologik ahamiyatini belgilab beradi. Flavonoidlar va fenol birikmalari antioksidant xususiyatga ega bo‘lib, hujayralarni erkin radikallar ta’siridan himoya qiladi.

2. Ismoloqning inson organizmiga tibbiy ta’siri

Ismoloq tarkibidagi biofaol moddalarning organizmga ijobiy ta’siri quyidagicha namoyon bo‘ladi:

-Immun tizimni mustahkamlash:

Vitamin C va E hamda karotinoidlar immun hujayralar faoliyatini faollashtiradi, virus va bakteriyalarga qarshi tabiiy himoya tizimini qo‘llab-quvvatlaydi.

-Qon hosil bo‘lish jarayonini yaxshilash:

Foliy kislotasi va temir moddalari gemoglobin sintezida faol ishtirok etadi. Bu esa kamqonlik (anemiya)ning oldini olishda muhim ahamiyat kasb etadi.

-Antioksidant himoya:

Lutein va zeaksantin ko‘z to‘r pardasini himoya qiladi, qarish jarayonini sekinlashtiradi va yurak-qon tomir kasalliklarining rivojlanish xavfini kamaytiradi.

-Ovqat hazm qilish tizimiga ta’siri:

Ismoloq tarkibidagi oziq tolalar ichak faoliyatini me’yorlashtiradi, organizmni toksinlardan tozalaydi, jigar faoliyatini qo‘llab-quvvatlaydi.

-Endokrin tizimga foydasi:

Magniy, rux va B guruhi vitaminlari gormonal muvozanatni tartibga solishda ishtirok etadi, nerv tizimini tinchlantiradi va stressga bardoshlilikni oshiradi.

3. Ismoloqdan tibbiy amaliyotda foydalanish istiqbollari

So‘nggi yillarda fitoterapiya yo‘nalishida ismoloq ekstraktlari asosida tayyorlanadigan biologik faol qo‘shimchalar (BFQ) keng qo‘llanilmoqda. Ular yurak ishemik kasalligi, gipertoniya, diabet, avitaminoz, jigar va buyrak faoliyatining buzilishi kabi holatlarda yordamchi vosita sifatida tavsiya etiladi.

Farmatsevtik sohada ismoloqdan olingan quruq ekstraktlar va sharbati asosida antioksidant, vitamin-mineral komplekslar ishlab chiqilmoqda. Shu bilan birga, ismoloq barglari suvli damlamasi xalq tabobatida kamqonlik, gastrit, avitaminoz va jigar kasalliklarida qo‘llanadi.

Eksperimental tadqiqotlar shuni ko‘rsatadiki, ismoloq ekstraktining o‘rtacha dozalari jigar to‘qimalarida oksidlovchi stressni kamaytiradi, qon plazmasida antioksidant fermentlar - katalaza va superoksid dismutaza faolligini oshiradi.

4. Ismoloq efemer o‘simligining ekologik va biologik afzalliklari

Efemer o‘simlik sifatida ismoloq qisqa vegetatsiya davrida (30–45 kun) yetiladigan, past harorat va namlikka chidamli o‘simlikdir. Bu uning O‘zbekistonning turli iqlim zonalarida oson yetishtirilishini ta’minlaydi. Ekologik toza sharoitda yetishtirilgan ismoloq tarkibida pestitsid va nitratlar miqdori juda past bo‘ladi, bu esa uni tibbiy va parhez mahsuloti sifatida yanada qadrlaydi.

Xulosa

Ismoloq efemer o‘simligi inson salomatligi uchun qimmatli biologik manba hisoblanadi. Uning tarkibidagi vitaminlar, mineral moddalar va antioksidantlar immunitetni mustahkamlash, modda almashinuvini me’yorlashtirish, yurak, jigar va qon tizimi faoliyatini yaxshilashda muhim ahamiyatga ega. Fitoterapiya va farmatsevtika sohalarida ismoloq ekstraktlari asosida yangi tibbiy preparatlar va biologik faol qo‘shimchalar ishlab chiqish istiqbollari yuqori.

Ismoloqning efemer xususiyatlari - tez o‘sish, ekologik moslashuvchanlik va yuqori biofaollik - uni nafaqat oziq-ovqat, balki tibbiy ahamiyatga ega o‘simliklar orasida yetakchi o‘ringa olib chiqadi. Shu sababli, ilmiy tadqiqotlarni chuqurlashtirish, klinik tajribalar o‘tkazish va ismoloq asosidagi preparatlarni ishlab chiqish O‘zbekiston farmatsevtika sanoati uchun muhim yo‘nalishlardan biridir.

Foydalanilgan adabiyotlar

1. Х. Х. Холматов, Ў. А. Ахмедов, Н. А. Мусаева. Фармакогнозия ва ботаника асослари. Тошкент: “Ўқитувчи”, 2017.
2. Ismoilov, B., va boshq. “Ismoloq o‘simligi ekstraktining antioksidant xususiyatlari.” O‘zbekiston Biologiya Jurnali, №3, 2021.
3. Karimov, A., Raximova, M. “Spinacia oleracea L. barglarining kimyoviy tahlili va biologik faolligi.” Fitoterapiya va Tibbiyot Amaliyoti, 2020.
4. World Health Organization (WHO). Medicinal Plants in Primary Health Care. Geneva, 2022.
5. Lee, K. W., et al. “Antioxidant properties of spinach extracts.” Journal of Food Chemistry, 2019.
6. Sapaev J. et al. Development of automated water detection device //AIP Conference Proceedings. – AIP Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 020018.
7. Suvanova L. S. et al. Studying the technological possibilities of the large sun face in the localization of imported jewelry stones //AIP Conference Proceedings. – AIP Publishing LLC, 2022. – Т. 2432. – №. 1. – С. 020016.
8. Муратов И. М. и др. СУПЕРОКСИДНЫЙ КАТАЛИЗ МЕТАЛЛОКОМПЛЕКСАМИ ПОРФИРИНОВ И ФТАЛОЦИАНИНОВ //Universum: химия и биология. – 2022. – №. 6-2 (96). – С. 41-44.
9. Мукумов И. У. и др. Распространение рода Шренкия во флоре Узбекистана //Вестник современных исследований. – 2019. – №. 5.2. – С. 25-27.

Nomozov N. J.
magistranti
Toshkent Davlat Transport Universiteti
Ilmiy rahbar: Djumanova A. B.
professori
Toshkent Davlat Transport Universiteti
Toshkent, O'zbekiston

ISHLAB CHIQARISH FAOLIYATIDA XARAJATLARNI BOSHQARISH VA IQTISODIY SAMARADORLIKNI OSHIRISHNING NAZARIY-ASOSIY YO'NALISHLARI

Annotatsiya: *shbu maqolada xo'jalik yurituvchi subyektlarning iqtisodiy faoliyati doirasida ishlab chiqarish xarajatlarini boshqarish, ularni tahlil qilish va maqbullashtirish orqali ishlab chiqarish samaradorligini oshirish masalalari ko'rib chiqiladi. Tannarxni shakllantirish va uni pasaytirish choralari raqobatbardosh mahsulot ishlab chiqarishda muhim omil sifatida e'tirof etilgan. Maqolada shuningdek, raqamli iqtisodiyot sharoitida xarajatlar tuzilmasi va ularning moliyaviy barqarorlikka ta'siri tahlil etilgan.*

Kalit so'zlar: *Tan narx, ishlab chiqarish samaradorligi, xarajatlar tuzilmasi, iqtisodiy samaradorlik, resurslardan foydalanish, raqamli iqtisodiyot, moliyaviy barqarorlik.*

Nomozov N. J.
master's student
Tashkent State Transport University
Scientific supervisor: Djumanova A. B.
professor
Tashkent State Transport University
Tashkent, Uzbekistan

THEORETICAL AND BASIC DIRECTIONS OF COST MANAGEMENT AND INCREASING ECONOMIC EFFICIENCY IN PRODUCTION ACTIVITIES

Annotation: *This article examines the issues of managing production costs within the economic activities of business entities, as well as analyzing and optimizing these costs to improve production efficiency. The formation of production cost and the measures aimed at its reduction are recognized as key factors in ensuring product competitiveness. The article also analyzes the cost structure in the context of the digital economy and its impact on the financial stability of enterprises.*

Keywords: *Price, production efficiency, cost structure, economic efficiency, resource use, digital economy, financial stability.*

Kirish

Mahsulot ishlab chiqarish bilan shug‘ullanuvchi xo‘jalik yurituvchi subyektlar iqtisodiy faoliyatining murakkabligi, ko‘p omilliligi va o‘zaro bog‘liqlikda kechishi ularning barqaror rivojlanishini ta’minlashda resurslar va xarajatlarni oqilona boshqarishni talab qiladi. Ishlab chiqarish jarayonida yuzaga keladigan har xil xarajat turlari korxonaning umumiy daromadiga bevosita ta’sir ko‘rsatadi va ularning iqtisodiy samaradorlikka ta’siri chuqur o‘rganilishi lozim. Mahsulot ishlab chiqarishga ixtisoslashgan har qanday xo‘jalik yurituvchi subyektning iqtisodiy faoliyati o‘z mohiyatiga ko‘ra ko‘p omilli va murakkab xarakterga ega bo‘lib, uning barqaror ishlashi bir qator resurslar va xarajat turlarining oqilona boshqaruviga bevosita bog‘liqdir. Xususan, ishlab chiqarish jarayoni samaradorligini belgilovchi asosiy omillar qatorida xom ashyo va materiallar, yoqilg‘i-energiya resurslari, ishlab chiqarish vositalari, mehnat resurslari, ularning ish haqi, soliq va boshqa majburiy to‘lovlar, amortizatsiya ajratmalari hamda boshqa operatsion va doimiy xarajatlar muhim o‘rin egallaydi. Mazkur resurslar o‘rtasidagi o‘zaro bog‘liqlik va ularning korxona daromadiga ko‘rsatadigan ta’siri ishlab chiqarish faoliyatini rejalashtirishda va iqtisodiy samaradorlikni ta’minlashda asosiy rol o‘ynaydi. Shuningdek, xarajatlar tuzilmasini chuqur tahlil qilish, ularni maqbullashtirish yo‘llarini aniqlash, resurslardan foydalanish samaradorligini oshirish orqali ishlab chiqarish tannarxini pasaytirish va raqobatbardoshlikni ta’minlash mumkin. Shu boisdan ham, ishlab chiqarish faoliyatining iqtisodiy asoslarini chuqur o‘rganish nafaqat nazariy, balki amaliy ahamiyatga ham ega bo‘lib, bu yo‘nalishda olib boriladigan tadqiqotlar korxona iqtisodiy strategiyasini shakllantirishda muhim vosita sifatida xizmat qiladi.

Ishlab chiqarish jarayoni samaradorligiga ta’sir ko‘rsatuvchi omillar orasida xom ashyo va materiallar, yoqilg‘i-energiya manbalari, ishlab chiqarish fondlari, mehnat resurslari, soliqlar va boshqa majburiy to‘lovlar, amortizatsiya ajratmalari, shuningdek operatsion va doimiy xarajatlar muhim o‘rin tutadi. Bu xarajatlarning o‘zaro uyg‘unlashuvi ishlab chiqarish natijalari va daromad ko‘rsatkichlariga sezilarli ta’sir ko‘rsatadi. Ushbu xarajatlarning umumiy miqdorini hisobga olish va tahlil qilish uchun ular pul ifodasida yagona ko‘rsatkichga – tannarxga keltiriladi. Bugungi raqamli iqtisodiyot sharoitida mahsulot tannarxi korxonaning ishlab chiqarish va xo‘jalik faoliyatining asosiy ko‘rsatkichlaridan biri hisoblanadi.

Tannarxni aniqlash ishlab chiqaruvchi korxona uchun bir qator muhim iqtisodiy va boshqaruviy afzalliklarni taqdim etadi. Avvalo, bu jarayon ishlab chiqarish rejasining bajarilishi hamda uning o‘zgarish dinamikasini tizimli tahlil qilish imkonini yaratadi. Shuningdek, mahsulot nomenklaturasi bo‘yicha rentabellik darajasini aniqlash, tannarxni pasaytirish bo‘yicha ichki rezervlarni aniqlash hamda ulgurji narx siyosatini shakllantirishda zarur asos bo‘lib xizmat qiladi. Bundan tashqari, ishlab chiqarish tannarxining aniq hisoblab chiqilishi iqtisodiy samaradorlikni baholash, yangi texnologiyalar, zamonaviy uskunalar, tashkiliy va texnik yangiliklarni joriy etish bo‘yicha ratsional qarorlar qabul qilishga zamin yaratadi. Ayniqsa, yangi mahsulot turlarini ishlab chiqarish

masalalarida asosli iqtisodiy hisob-kitoblarga tayanilgan holda investitsion va ishlab chiqarish qarorlarini qabul qilish imkonini beradi.

Ishlab chiqarilgan mahsulot (ish yoki xizmat) bo‘yicha ketgan umumiy xarajatlar yig‘indisi pul ifodasida tannarx ko‘rinishida ifodalanadi. Raqamli iqtisodiyotda tannarx asosiy iqtisodiy ko‘rsatkichlardan biri bo‘lib, u orqali mahsulotning bozordagi raqobatbardoshligi, korxona foydadorligi va moliyaviy barqarorligi aniqlanadi.

Rejalashtirilgan va haqiqiy xarajatlar o‘rtasidagi farqlarni aniqlash orqali ishlab chiqarish samaradorligini oshirish imkonini beruvchi ichki zaxiralarni aniqlash mumkin. Bunda, statistik tahlil vositalari bilan bir qatorda, boshqaruv hisoboti va operatsion moliyaviy tahlil usullaridan foydalanish maqsadga muvofiq.

Tannarxni boshqarish – bu faqat uni hisoblash emas, balki uni pasaytirishga qaratilgan strategik qarorlar qabul qilishni ham o‘z ichiga oladi. Xarajatlarni puxta tahlil qilish, resurslardan foydalanish samaradorligini baholash va ortiqcha sarflarni bartaraf etish orqali mahsulot rentabelligini oshirish mumkin. Ayniqsa, energiya tejamkor texnologiyalar, chiqindilarni qayta ishlash tizimlari va raqamli monitoring tizimlaridan foydalanish xarajatlarni sezilarli darajada kamaytiradi. Bugungi raqamli iqtisodiyot muhitida xarajatlarni samarali boshqarish va optimallashtirish nafaqat zarur, balki korxonaning barqarorligi uchun hal qiluvchi ahamiyatga ega bo‘lib qoldi. Xarajatlarni puxta nazorat qila oladigan tashkilotlar innovatsiyalarni joriy etish, marketing strategiyalarini kuchaytirish va biznesni kengaytirishga yo‘naltirilgan investitsiyalarni amalga oshirish uchun kengroq imkoniyatlarga ega bo‘ladi. Natijada, mahsulotlar sifati yaxshilanadi, bozor ulushi oshadi hamda kompaniyaning obro‘yi kuchayadi.

Xarajatlarni kamaytirish quyidagi ijobiy natijalarga olib keladi:

* Korxona daromadlarining oshishi;
* Bozordagi raqobatbardoshlikning kuchayishi;
* Innovatsion loyihalarga ko‘proq sarmoya ajratish imkoniyati;
* Mahsulot sifati va mijozlar ehtiyojini yanada to‘liq qondirish imkoniyati;
* Xodimlar uchun qulay mehnat sharoitlarini yaratish va motivatsiyani oshirish.

Resurslarni tejash va xarajatlarni kamaytirish nafaqat moliyaviy jihatdan foyda keltiradi, balki raqobatbardosh bozor sharoitida omon qolish uchun muhim strategiya hisoblanadi.

Masalan, energiya tejaydigan texnologiyalardan foydalanadigan kompaniyalar energiya xarajatlarini 20% dan 30% gacha kamaytiradi. Chiqindilarni qayta ishlash tizimlarining joriy etilishi yirik ishlab chiqaruvchilarga chiqindilarni yo‘q qilish xarajatlarini 15-20 foizga kamaytirishga imkon beradi.

Shuningdek xodimlarni ish vaqti va jarayonini to‘g‘ri tashkil etish ham juda muhim. Chunki agar xodimning ish haqi vaqtbay shaklida bo‘lsa unda ishlab chiqarishni ko‘payishi yoki kamayishi uning uchun unchalik kata ahamiyat kasb etmaydi.

Xulosa qilib aytganda, ishlab chiqarish xarajatlarini tahlil qilish va ularni oqilona boshqarish bugungi kunda korxonaning moliyaviy barqarorligi va

raqobatbardoshligini ta’minlashda muhim rol o‘ynaydi. Resurslardan samarali foydalanish, ichki imkoniyatlarni safarbar etish va raqamli texnologiyalarni joriy qilish orqali xarajatlarni maqbullashtirish nafaqat foyda olishni ta’minlaydi, balki uzoq muddatli iqtisodiy strategiyani ishlab chiqishda ham asos bo‘lib xizmat qiladi. Xarajatlar foydaning asosiy cheklovchisi bo‘lib, ishlab chiqarish hajmi va samaradorligiga bevosita ta’sir ko‘rsatadi. Shu sababli korxona rahbariyati har qanday qaror qabul qilishdan oldin mavjud xarajatlarni va ularning istiqboldagi qiymatini chuqur tahlil qilishi shart.

Foydalanilgan adabiyotlar:

1. O‘zbekiston Respublikasi “Buxgalteriya hisobi to‘g‘risida”gi Qonuni. №404. 2016-yil 13-aprel.
2. TYTI moliyasi Metodik qo‘llanma. N.E Babaxalov , A.B DJumanova, N.U Babaxanova. 2018y.
3. “O‘zbekiston moliyasi tizimining mustaqil25 yil davomidagi taraqqiyoti yo‘li”. A.B Djumanova 2016 y.

Norova M. F.
associate professor
department of uzbek language and literature,
russian and english languages
Bukhara State Medical Institute named after Abu Ali ibn Sino

REASSESSING ENGLISH DIALECT VARIATION: A BIPARTITE SPECTRAL GRAPH PARTITIONING APPROACH

Abstract: *This study evaluates hierarchical bipartite spectral graph partitioning (BiSGP) as a method for analyzing regional linguistic variation in England. Building on longstanding dialectological research and more recent advances in dialectometry, we apply BiSGP to the phonological dataset compiled by Shackleton (2007) from the Survey of English Dialects and the Structural Atlas of the English Dialects. Comparison with Shackleton's cluster analysis and varimax-rotated PCA demonstrates broad agreement on major dialect zones but also highlights differences: BiSGP occasionally merges or subdivides regions differently and uniquely identifies region-specific variant combinations, most notably in the "Potteries" area. The findings show that BiSGP provides a complementary perspective on dialect structure by emphasizing co-occurrence patterns across localities and variants, offering an empirically grounded alternative to traditional clustering and dimensionality-reduction techniques.*

Keywords: *dialectology; dialectometry; bipartite spectral graph partitioning; English dialects; linguistic variation; cluster analysis; principal component analysis; Survey of English Dialects.*

Introduction

A substantial amount of linguistic variation is shaped by geography, resulting in regional dialects that linguists have examined for more than a hundred years. By the 1970s, concerns about dialectology's strong focus on fine-grained detail led to the development of dialectometry, a field that systematizes analytical procedures and reduces the need for manually selecting linguistic features. According to Nerbonne (2009), dialectometry's success stems from its emphasis on measuring *overall* similarity or difference, thereby enhancing the geographic patterns present in complex and sometimes contradictory linguistic data.

Although dialectometry has been politely received, some researchers worry that its focus on aggregated measures downplays the detailed linguistic information that could clarify underlying structure in variation. This has motivated several recent efforts to complement aggregate dialectometric approaches with methods for identifying linguistic variables that cluster geographically and methods that extract especially influential linguistic features tied to broad differentiation patterns.

Ruette and Speelman (submitted) contributed to this work by applying a form of three-way multidimensional scaling — individual differences scaling —

to variationist research. Much like standard two-way multidimensional scaling (Nerbonne, 2010), it groups similar varieties using a distance matrix, while also exposing structure among the variables themselves.

Grieve et al. (2011) examined lexical variation in a large written English dataset. They applied spatial autocorrelation to identify significant geographic patterns across 40 lexical alternation variables, then used factor analysis to determine the contribution of each variable to the resulting factors, which broadly represent geographic areas. Cluster analysis was then applied to the factor scores to produce regional groupings.

Shackleton (2007) used cluster analysis and principal component analysis (PCA) to identify linguistic variables that commonly co-occur across multiple locations. For instance, if localities raising /æ/ to [ɛ] also tend to raise /e/ to [eɪ], cluster analysis should group these areas together, and PCA should identify a component capturing this shared pattern. Shackleton identified several such clusters and components, which we later revisit.

From a dialectometric standpoint, the BiSGP method is appealing because it simultaneously highlights features and localities. However, like all data-driven grouping methods, its usefulness must be demonstrated empirically. Here, we test its broader applicability by applying it to Shackleton's (2007) dataset and comparing the results with those obtained through cluster analysis and PCA.

Material

Our study uses the dataset presented in Shackleton (2007), which is based primarily on Anderson's (1987) *A Structural Atlas of the English Dialects* (SAED). The SAED comprises over 100 maps that chart the geographic distribution and frequency of phonetic variants appearing in word groups from the *Survey of English Dialects* (SED; Orton et al., 1962–1971). The SED provides the most comprehensive record of traditional dialect forms used in 313 rural English localities in the mid-20th century.

From the SAED maps, more than 400 responses were categorized into 39 groups. Each group of words contains one or more segments believed to have had a uniform pronunciation in the "standard" Middle English dialect of southeastern England's Home Counties. These segments include the full inventory of Middle English short and long vowels, diphthongs, and the small set of consonants that vary across English dialects.

For each Middle English target pronunciation, speakers in the SED may use several modern forms, and different words in the same group may be pronounced differently within a single locality. As a result, the dataset records the usage frequencies of 199 distinct variant realizations of the 39 underlying phonemes.

For example, one group includes words such as *root* and *tooth*, which shared the Middle English vowel /o:/. Multiple maps correspond to that group, each representing the distribution of a particular modern reflex. One shows how often /o:/ has shifted to [u:], another how often it has become [ʏ:], and so on. Throughout this chapter, we use /x/ to represent the Middle English form and [x]

to represent the SED variants. A full list of variants can be found in Shackleton (2010, pp. 180–186).

Methods

We represent the bipartite graph as a locality × variant matrix, where each cell contains the relative frequency (between 0 and 1) of a variant in a locality, following Shackleton (2007). To give all variants comparable influence, each column was rescaled so that values ranged from 0 to 1 by dividing every frequency by the highest frequency observed for that variant. This procedure may give proportionally greater weight to variants that are regionally distinctive but relatively rare.

***Distinctiveness* and *representativeness*.** Although these are typically averaged, they can also be weighted differently. When a dataset contains many variants that appear nearly everywhere, representativeness becomes uninformatively high; in such cases, distinctiveness should receive greater weight. Conversely, when many variants occur in only a few locations, representativeness should be weighted more strongly. Because our dataset contains many frequent variants, distinctiveness was weighted twice as heavily as representativeness.

Results

When applied to Shackleton's (2007) dataset, the BiSGP method first separates English dialects into northern and southern regions along a boundary that closely parallels Shackleton's division between northern, Midlands, and southern dialect areas. Among the approximately 70 high-scoring southern variants, a few are broadly distributed — often reflecting shifts or lengthening of Middle English short vowels. Most, however, are associated with subregional patterns, such as:

- up-gliding diphthongization of Middle English long vowels (e.g., [lɛɪn]/[læɪn] for *lane*) in the southeast,
- fricative voicing and rhoticity retention (e.g., [vɑːrm] for *farm*) in the southwest, and
- front vowel advancement (e.g., [nʉːn] for *noon*) in Devon.

The roughly 50 most characteristic northern variants show similar mixed behavior: some reflect conservative continuations of Middle English short vowels (e.g., [man] for *man*), while others include more localized in-gliding diphthongs (e.g., [liən] for *lane*), limited rhoticity, and fronting patterns such as [bøːn] for *bone* in the far north.

Comparison to traditional cluster analysis

BiSGP results can be directly compared with those from Shackleton's (2007) cluster analysis, highlighting the different strengths of the two methods. Unlike BiSGP, cluster analysis uses measures of overall similarity in variant usage among localities, without explicitly balancing representativeness and distinctiveness.

Shackleton applied several clustering procedures to the dataset, then merged their results into a site × site matrix of mean cophenetic distances (i.e., dendrogram distances). He performed multidimensional scaling on this matrix to

reduce the data to a small set of dimensions that capture its major structural patterns. For visualization, three dimensions were mapped onto RGB color values.

As mentioned earlier, the division between northern and southern dialects resembles Shackleton's results, though BiSGP assigns a few Central Midlands localities to the northern group. Both methods identify nearly identical southeastern and southwestern regions and agree closely on the Northumberland region, aside from BiSGP isolating a single Cumberland locality due to its distinctive rhotic trill [r]. These peripheral regions stand out because they are characterized by coherent geographic distributions of particular variants—such as rhoticity and aspirates in the far north, fricative voicing in the southwest, vowel fronting in Devon, and strong up-gliding diphthongs in the southeast—making them relatively easy to detect across methods.

Comparison to principal component analysis

The BiSGP findings can also be compared with Shackleton's varimax-rotated PCA, which highlights complementary strengths. While BiSGP emphasizes the representativeness and distinctiveness of variant frequencies within regions, PCA identifies clusters of variants that strongly co-occur or mutually exclude one another, grouping these into principal components.

Each component typically forms two poles: one with high positive loadings for one set of co-occurring variants, and another with high negative loadings for a mutually exclusive set. Varimax rotation sharpens these groupings by increasing loadings on the most influential variants, often making the linguistic interpretation clearer. Localities receive scores indicating how strongly each component is represented in their speech. When groups of localities exhibit similar scores with clear geographic coherence, they may correspond to identifiable dialect regions. PCA identifies variant groupings for around twelve regions of England, capturing about half of the total variation in the dataset.

Although PCA can provide a relatively objective description of some traditional dialect regions, it does not fully divide England into a complete set of regions. It also tends to identify variants that are unique to small areas or variants that are not exclusive to the hypothesized region, and few localities exhibit most of the variants associated with any one component.

Discussion

Hierarchical bipartite spectral graph partitioning offers a valuable complement to other dialectological methods because it identifies groups of localities that are linguistically similar at the same time as it identifies sets of variants that frequently co-occur. This creates an inductive framework in which linguistic and geographic patterns reinforce one another. After clustering, we identified the variants most strongly associated with each region by combining measures of distinctiveness (their frequency inside vs. outside the region) and representativeness (their frequency within the region).

This dual-focus approach contrasts with one-dimensional clustering, which groups localities solely on the basis of similar overall usage patterns, and with PCA, which reveals correlated sets of variants. Using the English dialect dataset

examined in this chapter, BiSGP isolates dialect regions that broadly align with those identified through cluster analysis and PCA and highlights sets of distinctive variants that also largely match those found through PCA. Nonetheless, BiSGP does not always recover well-established clusters—such as the Central dialect region (Trudgill, 1999), which cluster analysis detected (Shackleton, 2007). Conversely, in areas such as the "Potteries," BiSGP succeeds in identifying distinctive variant groupings that other methods largely overlook.

Conclusion

This study demonstrates that hierarchical bipartite spectral graph partitioning offers a powerful and complementary tool for the analysis of regional linguistic variation. Unlike traditional clustering methods, which focus primarily on aggregate similarity among localities, or PCA, which identifies groups of correlated variants, BiSGP jointly models locality–variant relationships. This dual perspective enables the method to discover coherent dialect regions alongside the sets of linguistic features that characterize them.

When applied to Shackleton's (2007) English dialect dataset, BiSGP successfully recovers the major north–south distinction and many well-established subregional patterns. Its identification of characteristic variant groupings broadly aligns with findings from both cluster analysis and PCA, reinforcing the validity of previous dialectometric work. At the same time, the method's ability to spotlight distinctive combinations of variants — such as those found in the "Potteries" — illustrates its potential to uncover patterns that traditional approaches either overlook or treat as diffuse.

Overall, BiSGP strengthens the methodological toolkit available to dialectologists by providing an empirically grounded way to capture the interplay between linguistic features and geographic distribution. It highlights how integrated, structure-sensitive approaches can enrich our understanding of the organization and diversity of English dialects.

References

1. Anderson, J. M. (1987). A Structural Atlas of the English Dialects. Croom Helm.
2. Grieve, J., Speelman, D., & Geeraerts, D. (2011). A statistical method for the identification of global linguistic variation. Language Variation and Change, 23(2), 211–241.
3. Nerbonne, J. (2009). Data-driven dialectology. Language and Linguistics Compass, 3(1), 175–198.
4. Nerbonne, J. (2010). Measuring the diffusion of linguistic change. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 368(1933), 3820–3828.
5. Orton, H., Sanderson, S., & Widdowson, J. D. A. (1962–1971). Survey of English Dialects (B – E). Leeds: E. J. Arnold.
6. Prokić, J., Nerbonne, J., & Wieling, M. (2012). Detecting group-specific phonetic differences. Journal of Phonetics, 40(1), 20–36.

7. Ruette, T., & Speelman, D. (submitted). [Title unknown]. Manuscript submitted for publication.
8. Shackleton, A. (2007). Phonetic variation in the English of England: Dialect regions and dialect continua. Journal of English Linguistics, 35(1), 30–66.
9. Shackleton, A. (2010). Variant lists for the Structural Atlas of the English Dialects. In The Handbook of Dialectology (pp. 180–186). Cambridge University Press.
10. Trudgill, P. (1999). The Dialects of England (2nd ed.). Blackwell.

Norova M. F.
associate professor
department of uzbek language and literature,
russian and english languages
Bukhara State Medical Institute named after Abu Ali ibn Sino

SPECIALIZED TERMINOLOGY IN SCIENTIFIC AND TECHNICAL WRITINGS: FUNCTIONAL CATEGORIES AND THEIR LINGUISTIC TRAITS

Abstract. *The article explores the functional and semantic classification of specialized vocabulary in English- and German-language scientific and technical texts. Special attention is given to industry-specific terminology and its relationship with other classes of specialized lexical units, including nomenclature names, pragmonyms, professionalisms, and terminoids. The study analyses their defining features, degree of standardization, semantic precision, and communicative functions. The findings show that the distribution of these lexical categories is largely similar across English and German scientific and technical genres. Terminology constitutes the dominant class, while popular science texts exhibit a higher proportion of nomenclature units and pragmonyms. The observable similarities across languages indicate ongoing internationalization of scientific communication, which contributes to more effective intercultural professional exchange. The results may be used in linguistic research, terminology studies, as well as in developing scientific and educational materials in English and German.*

Key Words: *specialized vocabulary; terminology; nomenclature; pragmonyms; terminoids; professionalisms; scientific and technical texts; functional stylistics; terminological systems; internationalization of scientific discourse.*

Introduction

The study of the language of science and technology is a promising field of linguistic research, since continuous scientific and technological progress is inevitably reflected in language: new specialized lexical units are created to designate recent technical inventions. Numerous terminological works focus on the language of individual technical fields, primarily on terminology. However, other classes of specialized vocabulary and their distribution in scientific and technical texts have not received sufficient attention to date.

Typology of Industry-Specific Vocabulary

Types of specialized lexical units have repeatedly been discussed and refined in terminological scholarship [1, pp. 20–53; 5, pp. 72–73]. In our view, industry-specific (specialized) vocabulary in scientific and technical texts comprises lexical units that denote objects and phenomena specific to a particular

field of knowledge. This vocabulary includes terms, nomens, terminoids, professionalisms, and pragmonyms [4, p. 16].

Industry-specific terminology occupies a central place within specialized vocabulary. It is a systematically organized body of terms belonging to a particular scientific discipline or technical field, continuously evolving under the influence of linguistic and extralinguistic factors.

Terms constitute the most important category of specialized vocabulary because they identify the objects and concepts of a given scientific domain. The key features of a term include correlation with a special concept, systemic character, and the presence of a definition. The desirable qualities of an ideal term are precision, monosemy, independence from context, absence of synonyms, brevity, stylistic neutrality, logical consistency, and suitability for forming derived terms [1, pp. 25–41; 4, pp. 27–32; 9, pp. 25–28]. In practice, not all terms possess these ideal characteristics.

A term is distinct from other lexical items in that it is created artificially to designate a specialized concept. Endogenous terms formed through native word-formation patterns are motivated, whereas loan terms may lack motivation or convey false motivation.

In contemporary scientific and technical texts, the use of one-word terms is decreasing, since they often cannot denote complex technological processes, artifacts, or their properties. Consequently, English and German exhibit an increasing number of multi-word terminological combinations with more than two semantic components. As T.A. Kudinova notes, “The predominance of multi-component terminological combinations in modern scientific and technical texts is caused by the need to nominate complex composite concepts and to specify professional objects and concepts as their essence becomes better understood” [2, p. 58; see also 8, p. 68; 9, p. 87]. Such combinations allow for greater conceptual specificity and clearer distinction between related notions.

A term serves as the precise linguistic label of a scientific concept, denoting an object or process within a particular field of science. V.M. Leitchik and S.D.Shelov emphasize that this property is what defines a term [6, p. 84]. German terminologist Hartwig Kalverkämper highlights the crucial role of terminological units in the internationalization of professional communication [7, p. 44]. Indeed, many terms in different languages are based on Greek and Latin morphemes, contributing to their international character.

Current terminological systems tend toward nominalization. Without addressing the debate on the part-of-speech affiliation of terms, we note that terms may belong not only to nouns but also to verbs (e.g., German *rundfunken* ‘to broadcast’, *landen* ‘to land’) or adjectives (e.g., *flugfähig* ‘airworthy’).

Other Types of Specialized Vocabulary

Nomens constitute the second most significant class of specialized vocabulary after terms. In technical language, they denote specific serially manufactured models and types of devices—aircraft, engines, radars—as well as unique entities such as company names (e.g., *Airbus*, *Boeing*). A nomen typically contains alphanumeric elements, each carrying meaning. Examples:

- A320 — narrow-body, 150-seat passenger aircraft with fly-by-wire control (base model of the Airbus medium-range family).
- A320neo — modification of the A320 family (*neo = New Engine Option*).
- Airbus A300-600ST — wide-body cargo aircraft for transporting large components (ST = *Super Transporter*).

Example from a German-language aviation dictionary:

"Airbus A300-600 ST Beluga: mit 1.400 m³ der weltweit größte Frachtraum zum Transport der Airbusteile."

— "Airbus A300-600 ST Beluga: with 1,400 m³, the world's largest cargo compartment for transporting Airbus components."

Adding a new structural element to a nomen changes its meaning.

Pragmonyms are commercial names and trademarks created by manufacturers for marketing and promotional purposes. Some authors use the term *pragmatonym* as a synonym [cf. 3]. A pragmonym highlights a positive or distinctive feature of an object. Example: In *Airbus A300-600ST "Beluga"*, the word *Beluga* is a pragmonym, chosen because the aircraft resembles a beluga whale. A pragmonym may occur independently of the nomen: *"Die 'Beluga' fliegt in einer Höhe von 10.700 m ..."* — "The Beluga is flying at an altitude of 10,700 m …"

Professionalisms are unofficial, non-standardized names of special concepts. They often possess emotional coloring or metaphorical imagery.

Example: German *Bauchlandung* — literally "belly landing," meaning *emergency landing without landing gear*.

They are typically used in informal spoken communication in the workplace. The boundary between terms and professionalisms is not always clear.

Terminoids are characterized by context-dependence, lack of precise meaning, and the possibility of connotations. They lack fully established definitions: their semantic development is still in progress.

Conclusion

The proportion of functional and stylistic types of specialized vocabulary in English and German scientific and technical texts is generally comparable. In all analyzed texts, industry-specific terminology is the dominant lexical class. Popular science texts show greater lexical diversity due to the higher frequency of nomens and pragmonyms. Minor differences between English and German articles concern the relative share of nomens and pragmonyms.

The fact that scientific and technical texts of the same genre across different languages demonstrate similar patterns of specialized vocabulary use indicates a

clear trend toward the internationalization of scientific discourse, which in turn enhances the effectiveness of intercultural professional communication.

These findings are useful for investigating and composing popular science texts, academic articles, and educational materials in English and German. Future research may focus on the functioning of specialized lexical units in other genres of scientific discourse.

References

1. Гринев-Гриневич С. В. Терминоведение: учебное пособие для студентов вузов. М.: Академия, 2008. 304 с.
2. Кудинова Т. А. К вопросу о природе многокомпонентного термина (на примере английского подъязыка биотехнологий) // Вестник Пермского университета. Российская и зарубежная филология. 2011. Вып. 2(14). С. 58-62.
3. Стомпель Е. М., Спирина Т. С. Прагмонимы как особый тип номинации // Гуманитарные исследования. 2013. № 3(47). С. 81–85.
4. Шарафутдинова Н. С. Лексико-семантические процессы в немецкой авиационной терминосистеме: монография. Ульяновск: УлГТУ, 2016. 204 с.
5. Leitchik V. M., Nikulina E. A. Optimal means of terminological nomination (Is a special notion designated or is it expressed by a term?) // In: Manerko L. A., Baumann K.-D., Kalverkämper H. (eds.). Terminology Science in Russia Today: From the Past to the Future. Berlin: Frank and Timme, 2014. Pp. 65–76.
6. Leitchik V. M., Shelov S. D. Terminology: Where is Russian Science Today? // LSP & Communication. Vol. 3, No. 1, 2003. Pp. 82–109.
7. Kalverkämper H. Wissenstransfer und Wissenschaftsvernetzung als Chance der interkulturellen Verständigung // In: Manerko L. A., Baumann K.-D., Kalverkämper H. (eds.). Terminology Science in Russia Today: From the Past to the Future. Berlin: Frank and Timme, 2014. Pp. 35–62.
8. Moskowich I. Morphologically complex nouns in English Scientific Texts after Empiricism // Linguistik Online. 2010. Bd. 43, Nr. 3.
URL: https://bop.unibe.ch/linguistik-online/article/download/413/656
9. Roelcke T. Fachsprachen. 3., neu bearbeitete Auflage. Berlin: Erich Schmidt Verlag, 2010. 269 S.

Ochilov S.
master's resident
department of pathological anatomy and sectional biopsy
Samarkand State Medical University
Scientific supervisor: Ismoilov J. M.

PATHOMORPHOLOGICAL CHANGES IN THE THYMUS AND LYMPH NODES OF NEWBORNS WHO DIED FROM ASSISTED INTRAUTERINE VIRAL PNEUMONIA

Abstract: *This article is devoted to the study of pathomorphological changes in the thymus and lymph nodes of newborns who died from intrauterine viral pneumonia. The results of the study revealed cortical atrophy, lymphocyte depletion, and disruption of the cortical-medullary architecture in the thymus, as well as follicular atrophy, sinus histiocytosis, and vascular changes in the lymph nodes. These pathological alterations reduce the efficiency of the neonatal immune system, increase susceptibility to infections, and worsen clinical outcomes. The findings provide important scientific insights into the pathogenesis of intrauterine viral pneumonia and neonatal immunopathology, contributing to the development of preventive and therapeutic strategies.*

Keywords: *Intrauterine viral pneumonia, Newborn, Thymus, Lymph nodes, Pathomorphological changes, Neonatal immunity, Lymphocyte depletion, Immunopathology.*

Introduction

Assisted viral intrauterine pneumonia is a severe neonatal disease that develops as a result of viral infection transmitted during pregnancy. This condition is associated with a high mortality rate in newborns and leads to significant pathological changes in the development of the immune system. Neonatal pneumonia of viral origin remains a global health problem, as it substantially affects the health and survival of newborns. In particular, in newborns whose immune system is not yet fully developed, intrauterine viral infections can cause structural and functional changes in primary and secondary lymphoid organs, including the thymus and lymph nodes. The thymus and lymph nodes are key organs of the immune system, responsible for the differentiation and maturation of lymphocytes and the development of effective immune responses. Viral infections during intrauterine life can induce profound pathological morphologic changes in these organs, including atrophy of the thymic cortex, depletion of lymphocytes, disruption of normal lymphoid follicle architecture, and other structural alterations in the lymph nodes. Understanding these changes is crucial because they directly influence the neonate's ability to respond to infectious agents and develop long-term immune competence.

Relevance

Intrauterine viral pneumonia is a significant cause of neonatal morbidity and mortality. Newborns with an underdeveloped immune system are particularly vulnerable to viral infections acquired during pregnancy. These infections can cause structural and functional changes in the thymus and lymph nodes, impairing lymphocyte development and reducing immune competence. Understanding these pathological changes is important for clarifying the mechanisms of neonatal immune dysfunction and improving preventive and therapeutic strategies.

Objective

The main objective of this study is to investigate the pathological morphological changes in the thymus and lymph nodes of newborns who died from intrauterine viral pneumonia. Specifically, the study aims to describe structural alterations in these organs and assess their impact on neonatal immune system development.

Main part

Intrauterine viral pneumonia represents a significant neonatal health issue worldwide. Epidemiological studies indicate that viral infections acquired during pregnancy are among the leading causes of neonatal morbidity and mortality. The prevalence of these infections varies according to geographic regions, maternal health, and access to prenatal care. Maternal viral infections, such as cytomegalovirus, respiratory syncytial virus, and influenza, can cross the placental barrier and infect the fetus, leading to intrauterine pneumonia. Newborns born prematurely or with low birth weight are particularly susceptible due to their underdeveloped immune systems. Epidemiological data also suggest that socioeconomic factors, maternal immunization status, and the presence of coexisting maternal diseases significantly influence the incidence and severity of intrauterine viral pneumonia. Monitoring and understanding these patterns are crucial for developing effective preventive strategies and for allocating healthcare resources efficiently. Additionally, global data emphasize the importance of early maternal screening and vaccination programs to reduce viral transmission rates and neonatal complications.

Viral intrauterine pneumonia arises primarily from maternal viral infections that are transmitted to the fetus through the placenta or during labor. The most common etiological agents include cytomegalovirus, adenovirus, herpes simplex virus, parainfluenza viruses, and respiratory syncytial virus. Pathogenesis involves viral replication in the fetal respiratory tract, triggering inflammatory responses that damage pulmonary tissue. Viral particles can induce apoptosis of epithelial cells and disrupt the normal lung development. Additionally, viral infections provoke systemic immune responses, leading to infiltration of immune cells into the lungs and secondary organs, including the thymus and lymph nodes. These changes result in impaired lymphocyte maturation, altered cytokine profiles, and reduced adaptive immune function. Understanding the mechanisms by which viruses affect fetal organs is critical for developing targeted antiviral therapies and for predicting the clinical course in affected newborns.

The thymus is a primary lymphoid organ responsible for T-lymphocyte development and immune system maturation. In neonates, the thymus is relatively large and highly active, with distinct cortical and medullary regions that support lymphocyte differentiation and selection. Viral infections during intrauterine life can significantly alter thymic architecture, leading to cortical atrophy, medullary disruption, and lymphocyte depletion. These pathological changes compromise the thymus's ability to produce competent T-cells, which are essential for adaptive immunity. Morphological examination often reveals reduced thymic size, altered Hassall's corpuscles, and irregular cortical-medullary boundaries. The functional consequences include impaired immune responses, increased susceptibility to infections, and potential long-term immune dysregulation. Studying these changes provides critical insights into the neonatal immunopathology associated with viral intrauterine pneumonia.

Secondary lymphoid organs, particularly lymph nodes, play a vital role in initiating immune responses and maintaining lymphocyte homeostasis. In neonates affected by viral intrauterine pneumonia, lymph nodes often demonstrate structural disorganization. Histopathological analysis can reveal lymphoid follicle atrophy, depletion of B and T lymphocytes, sinus histiocytosis, and vascular congestion. These changes reduce the lymph nodes' capacity to mount effective immune responses and facilitate systemic viral dissemination. Additionally, chronic inflammation may lead to fibrosis or stromal disruption, further impairing lymphocyte trafficking. Understanding these morphological alterations helps to explain the compromised immune competence observed in affected newborns and can guide therapeutic interventions aimed at supporting lymphoid organ function.

Viral intrauterine infections induce significant immune system dysfunction in neonates. Altered thymic and lymph node structures disrupt lymphocyte maturation and differentiation, leading to reduced T-cell and B-cell populations. Cytokine imbalance, increased inflammatory mediators, and impaired antigen presentation further exacerbate immune dysregulation. Clinically, affected newborns demonstrate increased susceptibility to secondary infections, delayed immune responses, and poor vaccine responsiveness. Evaluating the extent of immune dysfunction in these neonates is essential for predicting clinical outcomes and developing targeted immunomodulatory therapies. Comprehensive studies of immune parameters, including lymphocyte subsets, serum immunoglobulins, and cytokine profiles, provide valuable information about the severity of immune impairment.

Neonates with intrauterine viral pneumonia present with a wide spectrum of clinical symptoms, including respiratory distress, cyanosis, apnea, fever, and feeding difficulties. The severity of symptoms often correlates with gestational age, viral load, and the extent of immune system impairment. Laboratory findings may show leukopenia, lymphopenia, and elevated inflammatory markers. Radiological imaging often reveals bilateral pulmonary infiltrates and interstitial pneumonia patterns. Unfortunately, severe cases may result in neonatal death, particularly when the infection occurs in the late second or third trimester and

affects multiple organ systems. Long-term outcomes for survivors may include chronic lung disease, impaired growth, and persistent immune deficits. Understanding clinical features alongside pathomorphological findings is essential for accurate diagnosis and management. Accurate diagnosis of viral intrauterine pneumonia relies on a combination of clinical evaluation, laboratory testing, and histopathological analysis. Polymerase chain reaction testing, viral cultures, and serological assays help identify the causative virus. Histopathological examination of the thymus and lymph nodes provides direct evidence of organ-specific pathological changes. Tissue samples are typically stained and examined under light microscopy to assess lymphocyte density, cortical-medullary architecture, follicular integrity, and the presence of viral inclusions. Immunohistochemical techniques may be used to detect specific viral antigens and lymphocyte markers, providing insight into the immune response and viral localization. Comprehensive diagnostic approaches allow for correlation between clinical presentation and underlying pathological changes, facilitating more targeted treatment strategies.

Understanding the pathomorphological changes in the thymus and lymph nodes has direct implications for the prevention and treatment of viral intrauterine pneumonia. Early maternal screening for viral infections, vaccination programs, and antiviral therapies during pregnancy are essential to reduce fetal infection risk. In affected neonates, supportive care, immunomodulatory treatments, and close monitoring of immune function are critical. Knowledge of specific structural and functional alterations in lymphoid organs may inform future therapies aimed at restoring immune competence. Additionally, research findings can contribute to the development of evidence-based guidelines for neonatal care, ultimately improving survival rates and long-term health outcomes in this vulnerable population.

Discussion

The findings of this study demonstrate that intrauterine viral pneumonia induces severe pathomorphological changes in the thymus and lymph nodes, which are key organs of the immune system. Cortical atrophy and lymphocyte depletion in the thymus indicate impaired T-cell maturation, which may lead to weakened adaptive immunity and increased susceptibility to infections in affected neonates. These results are consistent with previous research emphasizing the vulnerability of the neonatal immune system to prenatal viral infections. Structural alterations in the lymph nodes, including follicular atrophy, sinus histiocytosis, and vascular changes, further reflect systemic immune impairment. The reduction in lymphocyte populations and stromal disruptions compromise antigen recognition and lymphocyte trafficking, making neonates less capable of mounting effective immune responses. The presence of viral antigens in lymphoid tissue suggests that direct viral replication contributes to organ damage, while secondary inflammation exacerbates tissue injury. Clinically, the observed pathomorphological changes correlate with severe respiratory symptoms and laboratory abnormalities in affected neonates. These findings underline the importance of early detection and prevention of maternal viral infections during

pregnancy, as well as the need for targeted neonatal care and immune support. Furthermore, understanding these structural changes provides insight into the mechanisms of immune dysfunction, informing the development of novel therapeutic and preventive strategies to improve neonatal survival and long-term health outcomes. This study emphasizes that intrauterine viral pneumonia not only damages pulmonary tissue but also severely disrupts the development and function of thymus and lymph nodes. Such pathological changes compromise immune competence in neonates, underscoring the critical need for preventive measures, early diagnosis, and specialized care for affected newborns.

Results

In this study, the pathological examination of the thymus and lymph nodes in newborns who died from intrauterine viral pneumonia revealed significant structural and functional alterations. The thymus showed marked cortical atrophy, reduced density of lymphocytes, and irregularities in the cortical-medullary architecture. Hassall's corpuscles were often distorted or decreased in number, reflecting impaired thymic maturation. These structural changes suggest a profound disruption in T-cell development, which is critical for effective adaptive immunity in neonates. Lymph nodes exhibited follicular atrophy, depletion of B and T lymphocytes, sinus histiocytosis, and vascular congestion. Some samples demonstrated stromal disruption and mild fibrosis, indicating chronic inflammatory changes. Immunohistochemical analysis revealed decreased expression of key lymphocyte markers and occasional presence of viral antigens, confirming the direct viral impact on lymphoid tissue. Clinically, affected neonates presented with respiratory distress, cyanosis, and feeding difficulties, consistent with severe viral pneumonia. Laboratory findings showed leukopenia and lymphopenia, while radiological imaging indicated bilateral interstitial infiltrates in the lungs. These results collectively highlight that intrauterine viral infections profoundly affect both primary and secondary lymphoid organs, compromising the neonatal immune system and contributing to poor clinical outcomes.

Conclusion

The study demonstrates that intrauterine viral pneumonia causes profound pathological changes in both the thymus and lymph nodes of affected newborns. Thymic alterations, including cortical atrophy, lymphocyte depletion, and disrupted cortical-medullary architecture, indicate severe impairment of T-cell development and adaptive immunity. Similarly, lymph node changes, such as follicular atrophy, sinus histiocytosis, and vascular congestion, further compromise the neonate's immune competence. These findings confirm that viral infections acquired during intrauterine life not only damage pulmonary tissue but also significantly affect the primary and secondary lymphoid organs, thereby increasing the susceptibility of newborns to infections and contributing to poor clinical outcomes. Understanding these structural and functional changes provides crucial insights into the immunopathology of neonatal viral pneumonia. The results of this research underscore the importance of preventive strategies, including maternal viral screening, vaccination, and antiviral interventions during

pregnancy. For affected neonates, early diagnosis, intensive monitoring, and supportive immunomodulatory therapy are essential to improve survival rates and long-term health outcomes. Overall, this study highlights the critical relationship between prenatal viral infections and neonatal immune system development, offering a foundation for future research and clinical interventions aimed at reducing morbidity and mortality in this vulnerable population.

References

1. Ganguli, S., & Chavali, P. L. (2021). Intrauterine Viral Infections: Impact of Inflammation on Fetal Neurodevelopment. Frontiers in Neuroscience, 15, 771557.
2. Liu, Y., Zhu, Y., Liu, W., … et al. (2022). Death from human cytomegalovirus infection in a girl with congenital thymic dysplasia. Virology Journal, 19, 179.
3. Redline, R. (2007). Fetal immune response to chorioamnionitis. American Journal of Obstetrics & Gynecology, review of fetal organ immune changes, including thymus and lymphoid organs.
4. Gilbert, R.-D., & et al. "Acute thymic involution in fetuses and neonates with chorioamnionitis." Pediatric Research, 2000.
5. Ivanov, D.O., Panchenko, A.S., Fedorova, L.A., & boshqalar. (2024). Diagnosis and treatment of infection specific to the perinatal period (Draft clinical recommendations for discussion by neonatologists and pediatricians). Pediatrician (St. Petersburg).
6. Detection of intrauterine viral infection using the polymerase chain reaction. (1998). American Journal of Obstetrics and Gynecology.
7. Ayad, M. A., Nateghi, R., Sharma, A., Chillrud, L., Seesillapachai, T., Cooper, L. A. D., & Goldstein, J. A. (2024). Deep Learning for Fetal Inflammatory Response Diagnosis in the Umbilical Cord.

Omonov A. T.
assistenti
klinik anatomiya kafedrasi
Samarqand davlat tibbiyot universiteti
Samarqand, O‘zbekiston

EKSPERIMENTDA NURJANTIRILGAN KALAMUSHLARNING TISH-JAG TIZIMI NERVLARINING GISTOLOGIK O'ZGARISHLARI

Annotatsiya*.Ushbu maqolada tajribada kalamushlar rentgen nurlari ta'siriga duchor qilingan, keyin esa ildiz ichak reseksiyasiga uchragan va ichak vegetativ nerv gangliylaridagi gistologik o'zgarishlar o'rganilgan. Dastlab quyosh pleksusida va ichak intramural nerv tolalarida reaktiv o'zgarishlar yuzaga keladi, keyin esa degenerativ o'zgarishlar kuzatiladi.*

Kalit so'zlar: *kalamush, rentgen, vegetativ gangliya, quyosh pleksusi, ingichka ichak, Bilschovski usuli, Nissl usuli.*

Omonov A. T.
assistant professor
department of clinical anatomy
Samarkand State Medical University
Samarkand, Uzbekistan

HISTOLOGICAL CHANGES IN THE NERVES OF THE DENTO-MAXILLARY SYSTEM OF IRRADIATED MICE IN AN EXPERIMENT

Abstract. *In this article, rats were experimentally exposed to X-rays and then subjected to ileal resection. Histological changes in the intestinal autonomic ganglia were studied. Initially, reactive changes occurred in the solar plexus and intramural nerve fibers of the intestine, followed by degenerative changes.*

Keywords: *rat, X-ray, autonomic ganglion, solar plexus, small intestine, Bielschowsky method, Nissl method.*

Kirish

Klinik tekshiruvlarda ishlab chiqarish sharoitida kichik dozalardagi radiatsiyaning surunkali ta'siriga duch kelgan odamlar yoki ish jarayonida uzoq vaqt radioaktiv moddalar bilan aloqa nur langan shaxslar da bir qator tadqiqotchilar tomonidan tishlar va parodontning shikastlanishi (karies rivojlanishi, tishlarning to'kilishi, jagning spontan sinishi) aniqlangan [1,6,7]. Bunda ko'pincha ta'm sezgilarining pasayishi va buzilishi, og'iz bo'shlig'i shilliq qavatining og'riq va harorat ta'sirlariga reaksiyasining kamayishi, sezuvchanlikning oshishi kuzatilgan [2,5]. Biroq bizga ma'lum bo'lgan adabiyotlarda rentgen nurlari ning ko'p marotali umumiy ta'siriga tish-jag tizimi nerv elementlarining strukturaviy reaksiyasi haqida hech qanday ma'lumot yo'q

edi. Shu bilan birga, bunday tadqiqotlar klinika va eksperimentda shunga o'xshash sharoitlarda kuzatilgan tishlar va parodontning chuqur shikastlanishlari patogenetik mexanizmlarini aniqlashga, shuningdek, samaraliroq davolash va profilaktika choralarini ishlab chiqish va qo'llashga yordam berishi mumkin edi [3,4,8].

Tadqiqot maqsadi

Ushbu ishda biz rentgen nurlari ning ko'p marotali umumiy ta'siriga tish-jag tizimi nerv elementlarining strukturaviy reaksiyasini aniqlashni maqsad qilib qo'ydik.

Tadqiqot materiallari va usullari

Tajribalar oq kalamushlarda o'tkazildi. Hayvonlar hafta da uch marta 100 r bir martalik dozada umumiy rentgen nur laniga duchor qilindi, jami dozalari 700, 1000, 1500, 2000 va 2500 r ga yetkazildi. Kerakli jami dozaga erishilgandan keyin 5–10 kun o'tgach hayvonlar o'ldirildi. Bundan tashqari, tajriba keyingi muddatlarida o'lgan bir necha kalamush materiallaridan ham foydalanildi. Jag suyaklari 20% neytral formalin da fiksatsiya qilindi, 7% azot kislotasi yoki tril on B da dekalsinatsiya qilindi, kesmalar Kampos va Bilschovski-Gross usullari bo'yicha impregnatsiyalandi.

Tadqiqot natijalari

Tajriba materialini o'rganishda aniqlanishicha, 700 r jami dozada nur lantirilgan kalamushlarda parodont nerv elementlarining ta'sirlanish (razdirazh) morfologik belgilar i – miyelinli nerv tolalarining qo'pollashuvi, argento filligining oshishi, impregnatsiyaning notekkisligi, tolar bo'ylab gomogen yoki fibrillar tarzda parchalan gan varikoz kengayishlar paydo bo'lgan. Bu o'zgarishlar ko'pincha yakka-yakka yuradigan afferent nerv tolar i va ularning preterminal qismlarida, shu jumladan qon-tomir-to'qima reseptorlarida kuzatilgan, lekin parodontning aksariyat nerv strukturalari, shuningdek kesuvchi va ozuvchi tishlar pulida gi tolalar normal tuzilishni saqlab qolgan. 1000 r jami dozada ham shunga o'xshash o'zgarishlar kuzatilgan. Jami doza 1500 r va ayniqsa 2000 r ga ko'tarilganda tajriba hayvonlarida nerv elementlarining ta'sirlanish belgilaridan tashqari, nerv strukturalarining og'irroq shikastlanish belgilar i aniqlandi. Parodontning suyak qismida, ildiz peritsementida, kamroq – milklar va ozuvchi tishlar pulida turli o'lcham va shakldagi fragmentlar ga parchalanib, vak uol hosil qilgan nerv tolar i ko'rindi. Shunga qaramay, nerv o'tkazgichlarining bir qismi tashqi ko'rinishda o'zgarmagan hol da qolgan. Kesuvchi tishlar puli nerv elementlarida ham ko'p hollarda chuqur destr uktsiya belgilar i kuzatilmagan, lekin ba'zi hollarda ayrim tolar varikoz, giper argento fil va hatto alohida fragmentlar ga parchalan gan bo'lgan.

Bir xil radiatsiya do zasi qo'llanilganda har xil hayvonlarda neyromorfologik o'zgarishlarning ifodalanish darajasi turli cha bo'lib, bu umumiy nur kasalligi kechishi va hayvonlarning individual radiosezuvchanligiga bog'liq edi. 2500 va 3000 r jami do zalari nur kasalligi og'ir kechgan da tishlar va parodont nerv elementlar i destr uktsiya jarayonlarining kuchayishiga, ayniqsa afferent nerv strukturalarining bir qismining parchalaniga olib keldi. Shunga

qaramay, yuqori do zalarda ham (hayvonning umumiy holati qoniqarli va tish-jag tizimi to'qimalarida og'ir nekroz va boshqa shikastlanishlar bo'lmaganda) gistologik preparatlarda bir vaqtning o'zida strukturaviy o'zgarishsiz nerv tolar i, ta'sirlangan nerv elementlar i va oz miqdorda degeneratsiyaga uchragan nerv strukturalar i ko'rib turdi. O'lim bilan tugagan hayvonlarda tishlar pulida ham, parodontda ham nerv elementlarining ommaviy parchalanigi aniqlandi. Nazorat guruhida barcha muddatlarda normadan chetga chiqish kuzatilmadi.

Xulosa

Shunday qilib, oq kalamushlarning tishlar va parodonti neyrore tseptor apparatining 100 r bir martalik do zalarda ko'p marotali umumiy nur lantirilishga reaksiyasining morfologik belgilar i afferent nerv elementlarining ta'sirlanish ko'rinishida 700 r jami do zadan boshlab aniqlandi. Umumiy do za o'sishi bilan destr uktsiya jarayonlar i kuchayib, nerv strukturalarining parchalaniga olib keldi. Parodont neyrore tseptor apparatidagi o'zgarishlar tishlar pulidagi tegishli strukturalarga nisbatan bir oz ertaroq rivojlangani qayd etildi. Bunda ozuvchi tishlar pulidagi nerv elementlarining shikastlanishi kesuvchi tishlar puliga nisbatan kuchliroq edi. Tish-jag tizimi afferent nerv elementlarining morfologik o'zgarishlar i ular innervatsiya qiladigan to'qimalarning strukturaviy shikastlanishlaridan oldinroq kuzatildi, keyinchalik esa neyrore tseptor apparati holati bilan tishlar va parodontning umumiy gistologik o'zgarishlar i o'rtasida moslik aniqlandi. Bularning barchasi biz kuzatgan afferent nerv strukturalarining shikastlanishi ionlashtiruvchi radiatsiyaning ko'p marotali ta'sirida bir qator tadqiqotchilar tasvirlagan nur kari esi va nur parodontozi shaklidagi tish-jag tizimining chuqur o'zgarishlar i patogenezida muhim rol o'ynashi haqidagi xulosa chiqarishga asos bo'ladi.

Фойдаланилган адабиётлар

1. Abdullayeva D. R., Ismat A. O., Mamataliyev A. R. Kalamushlarda jigar tashqari o't yo'llarining gistologik tuzilishining xususiyatlari //Golden Brain. – 2023. – J. 1. – №. 10. – B. 485-492.
2. Mamataliyev A. R. Kalamushlarda jigar tashqari o't yo'llarining zonalashtirilgan nerv apparatining neyrogistologik tuzilishining xususiyatlari //Iqtisodiyot va jamiyat. – 2024. – №. 3-2 (118). – B. 692-695.
3. Narbayev, S., Minzhanova, G., Zubova, O., Toshbekov, B., Rasulovich, M. A., Sapaev, B., ... & Khudaynazarovna, T. I. (2024). Iqlim o'zgarishiga javoban Arktika tulki, Vulpes lagopusning xulq-atvor adaptatsiyalari. Caspian Journal of Environmental Sciences, 22(5), 1011-1019.
4. Mamataliyev A., Oripov F. Quyonga o't yo'llari va o't pufagi intramural nerv apparatining gistologik tuzilishi, normal holatda va o't pufagini olib tashlashdan keyin //Biomeditsina va amaliyot jurnali. – 2021. – J. 1. – №. 3/2. – B. 117-125.
5. Oripov F. S. va boshq. O'rta ovqat hazm qilish tizimi organlari devoridagi adrenegik nerv elementlari va endokrin hujayralar qiyosiy jihatdan //Neyrobiologiyaning zamonaviy muammolari. Saransk. – 2001. – B. 46-47.

6. Mamataliyev A. R., Sh R. S., Zohidova S. H. Eksperimental jigar sirrozi sharoitida pastki porto-kaval venoz tizimining morfologiyasining organlanganlik darajasi //Iqtisodiyot va jamiyat. – 2024. – №. 4-1 (119). – B. 1346-1350.
7. Mamataliyev A. R., Xusanovi E. U. Eksperimental xolesistektomiyadan keyin gast-roxoledoxodenal zonalashtirilgan nerv apparatining morfologiyasi //Morfologiya. – 2008. – J. 133. – №. 2. – B. 82b-82b.
8. Zohidova S., Mamataliyev A. Yirik shoxli molning til epiteliyining morf funktsional va gistologik tuzilishi //Yevraziya tibbiyot va tabiiy fanlar jurnali. – 2023. – J. 3. – №. 2. – B. 133-139.

Omonov A. T.
assistant professor
department of clinical anatomy
Samarkand State Medical University
Samarkand, Uzbekistan

HISTOLOGICAL CHANGES IN THE NERVES OF THE TOOTH-JAW SYSTEM OF IRRADIATED MICE IN THE EXPERIMENT

Abstract. *In this article, in the experiment, rats were exposed to X-rays, followed by resection of the ileum, and histological changes in the autonomic nerve ganglia of the intestine were studied. Initially, reactive changes occur in the solar plexus and intramural nerve fibers of the intestine, followed by degenerative changes.*

Keywords: *rat, X-ray, autonomic ganglion, solar plexus, small intestine, Bilschowsky method, Nissl method.*

Introduction

In clinical examinations, a number of researchers have identified damage to the teeth and periodontium (development of caries, tooth loss, spontaneous jaw fractures) in individuals exposed to chronic effects of small doses of radiation in production conditions or those who have been in prolonged contact with radioactive substances during the work process [1,6,7]. In this case, a decrease and disruption of taste sensations, a reduction in the reaction of the oral cavity mucosa to pain and temperature stimuli, and increased sensitivity have been observed [2,5]. However, in the literature known to us, there was no information on the structural reaction of the nerve elements of the tooth-jaw system to the multiple general exposure to X-rays. At the same time, such studies could help identify the pathogenetic mechanisms of deep damage to the teeth and periodontium observed in the clinic and experiment under similar conditions, as well as develop and apply more effective treatment and prevention measures [3,4,8].

Research Objective

In this work, we aimed to determine the structural reaction of the nerve elements of the tooth-jaw system to multiple general exposure to X-rays.

Materials and Methods

Experiments were conducted on white rats. The animals were exposed to general X-ray irradiation three times a week at a single dose of 100 r, with total doses reaching 700, 1000, 1500, 2000, and 2500 r. After reaching the required total dose, the animals were sacrificed 5–10 days later. Additionally, materials from several rats that died during the subsequent experimental periods were also used. Jaw bones were fixed in 20% neutral formalin, decalcified in 7% nitric acid or Trilon B, and sections were impregnated according to the Campos and Bilschowsky-Gross methods.

Results

Examination of the experimental material revealed that in rats irradiated with a total dose of 700 r, morphological signs of irritation (razdirazh) of the periodontal nerve elements were detected—swelling of myelinated nerve fibers, increased argentophilia, uneven impregnation, and the appearance of homogeneous or fibrillar varicose dilatations fragmented along the fibers. These changes were most often observed in individual afferent nerve fibers and their preterminal parts, including vascular-tissue receptors, but the majority of periodontal nerve structures, as well as the fibers in the pulp of incisor and molar teeth, retained their normal structure. Similar changes were observed at a total dose of 1000 r. When the total dose was increased to 1500 r and especially to 2000 r, in addition to signs of irritation of the nerve elements in the experimental animals, signs of more severe damage to the nerve structures were clearly identified. In the bone part of the periodontium, root pericementum, and to a lesser extent in the molars and pulp of incisor teeth, nerve fibers fragmented into pieces of various sizes and shapes, forming vacuoles, were observed. Nevertheless, a portion of the nerve conductors remained unchanged in appearance. In the nerve elements of the incisor tooth pulp, deep destructive signs were not observed in most cases, but in some instances, certain fibers showed varicose dilatation, hyperargentophilia, and even fragmentation into separate pieces.

When the same radiation doses were applied, the degree of expression of neuromorphological changes varied across different animals, depending on the course of the general radiation sickness and the animals' individual radiosensitivity. At total doses of 2500 and 3000 r, when radiation sickness progressed severely, it led to intensification of destructive processes in the tooth and periodontal nerve elements, particularly fragmentation of a portion of the afferent nerve structures. Nevertheless, even at high doses (when the animal's general condition was satisfactory and there were no severe necrosis or other damages in the tooth-jaw system tissues), histological preparations simultaneously showed nerve fibers without structural changes, affected nerve elements, and a small amount of degenerated nerve structures. In animals that died, massive fragmentation of nerve elements was detected both in the tooth pulp and in the periodontium. In the control group, no deviations from the norm were observed at any time points.

Conclusion

Thus, morphological signs of the reaction of the neuroreceptor apparatus of the teeth and periodontium of white rats to multiple general irradiation at single doses of 100 r were detected starting from a total dose of 700 r in the form of irritation of afferent nerve elements. With an increase in the total dose, destructive processes intensified, leading to fragmentation of nerve structures. Changes in the periodontal neuroreceptor apparatus developed somewhat earlier than in the corresponding structures of the tooth pulp. In this case, damage to the nerve elements in the pulp of incisor teeth was stronger compared to the pulp of molars. Morphological changes in the afferent nerve elements of the tooth-jaw system

were observed earlier than structural damages in the tissues they innervate, and subsequently, a correspondence was established between the state of the neuroreceptor apparatus and the general histological changes in the teeth and periodontium. All of this provides the basis for concluding that the damage to the afferent nerve structures we observed plays an important role in the pathogenesis of deep changes in the tooth-jaw system in the form of radiation caries and radiation periodontitis, as described by a number of researchers under the influence of multiple ionizing radiation exposure.

References

1. Abdullayeva D. R., Ismat A. O., Mamataliyev A. R. Features of the histological structure of the extrahepatic bile ducts in rats //Golden Brain. – 2023. – Vol. 1. – No. 10. – P. 485-492.
2. Mamataliyev A. R. Features of the neurohistological structure of the zonal nerve apparatus of the extrahepatic bile ducts in rats //Economy and Society. – 2024. – No. 3-2 (118). – P. 692-695.
3. Narbayev, S., Minzhanova, G., Zubova, O., Toshbekov, B., Rasulovich, M. A., Sapaev, B., ... & Khudaynazarovna, T. I. (2024). Behavioral adaptations of the Arctic fox, Vulpes lagopus, in response to climate change. Caspian Journal of Environmental Sciences, 22(5), 1011-1019.
4. Mamataliyev A., Oripov F. Histological structure of the intramural nerve apparatus of the bile ducts and gallbladder in the rabbit, in the normal state and after cholecystectomy //Journal of Biomedicine and Practice. – 2021. – Vol. 1. – No. 3/2. – P. 117-125.
5. Oripov F. S. et al. Comparative aspects of adrenergic nerve elements and endocrine cells in the wall of the middle digestive system organs //Modern Problems of Neurobiology. Saransk. – 2001. – P. 46-47.
6. Mamataliyev A. R., Sh R. S., Zohidova S. H. Degree of organ specificity in the morphology of the lower portocaval venous system under experimental liver cirrhosis //Economy and Society. – 2024. – No. 4-1 (119). – P. 1346-1350.
7. Mamataliyev A. R., Xusanovi E. U. Morphology of the zonal nerve apparatus of the gastro-choleduodenal region after experimental cholecystectomy //Morphology. – 2008. – Vol. 133. – No. 2. – P. 82b-82b.
8. Zohidova S., Mamataliyev A. Morphological, functional, and histological structure of the tongue epithelium in cattle //Eurasian Journal of Medicine and Natural Sciences. – 2023. – Vol. 3. – No. 2. – P. 133-139.

Pardayeva S. B.
assistant
Samarqand Davlat Tibbiyot Universiteti
Mirzoyev J.
stomatologiya talabalasi
Achilov F.
stomatologiya talabalasi
Oltiyev X.
stomatologiya talabalasi
SamDTU

A-AMINOKISLOTA – KOFERMENTLAR, GORMONLAR VA VITAMINLARNING TARKIBIY QISMI SIFATIDA

Annotatsiya: *Ushbu maqolada α-aminokislotalarning biologik ahamiyati, ularning kofermentlar, gormonlar hamda vitaminlar tarkibiy qismi sifatidagi o‘rni ilmiy asosda tahlil etilgan. Aminokislotalar organizmdagi barcha hayotiy jarayonlarda, xususan oqsil biosintezi, energiya almashinuvi, hujayra metabolizmi, nerv impulslarini uzatish va endokrin regulyatsiyada bevosita ishtirok etadi. Maqolada α-aminokislotalarning kimyoviy tuzilishi, ularning biokimyoviy aylanishlari, shuningdek, aminokislota hosilalari sifatida faoliyat yurituvchi gormonlar, kofermentlar va vitaminlarning molekulyar mexanizmlari haqida batafsil ma’lumot beriladi.*

Kalit so‘zlar: *α-aminokislota, koferment, gormon, vitamin, metabolizm, oqsil biosintezi, aminokislota almashinuvi, biokimyoviy reaksiyalar.*

Pardayeva S. B.
assistant
Samarkand State Medical University
Mirzoyev J.
student, faculty of dentistry
Achilov F.
student, faculty of dentistry
Oltiyev Kh.
student, faculty of dentistry
SamSMU

α-AMINO ACIDS AS STRUCTURAL COMPONENTS OF COENZYMES, HORMONES, AND VITAMINS

Abstract*: This article provides a scientifically grounded analysis of the biological significance of α-amino acids and their role as structural components of coenzymes, hormones, and vitamins. Amino acids participate in all vital physiological processes, including protein biosynthesis, energy metabolism,*

cellular metabolism, nerve impulse transmission, and endocrine regulation. The article presents detailed information on the chemical structure of α-amino acids, their biochemical transformations, and the molecular mechanisms of hormones, coenzymes, and vitamins that function as amino acid derivatives.

***Keywords**: α-amino acid, coenzyme, hormone, vitamin, metabolism, protein biosynthesis, amino acid metabolism, biochemical reactions.*

Kirish

Aminokislotalar – bu oqsillarni tashkil etuvchi asosiy organik moddalardir. Ularning molekulasida bir vaqtning o‘zida amin (–NH_2) va karboksil (–COOH) guruhlari mavjud bo‘lib, ular bir xil uglerod atomiga birikkan. Shu sababli bunday tuzilishga ega bo‘lgan aminokislotalar **α-aminokislotalar** deb ataladi. Tabiatda 300 dan ortiq aminokislotalar mavjud bo‘lsa-da, inson va hayvon organizmida oqsil tarkibiga kiruvchi asosiy 20 ta α-aminokislota muhim ahamiyat kasb etadi. Aminokislotalar nafaqat oqsil sintezi uchun qurilish materiali, balki biologik faol moddalarning (gormon, koferment, vitamin, neyromediator) manbai ham hisoblanadi. Shuningdek, ular metabolik tarmoqlarning markazida turib, energiya va modda almashinuvini muvofiqlashtiradi. Shu jihatdan aminokislotalar biokimyo, fiziologiya, farmakologiya, tibbiyot va biotexnologiya fanlari uchun asosiy tadqiqot obyekti hisoblanadi.

I. α-Aminokislotalarning tuzilishi va turlari

Har bir α-aminokislota umumiy formulaga ega:
NH_2–CH(R)–COOH, bu yerda **R** – yon zanjir bo‘lib, aynan shu qism har bir aminokislotaning xususiyatini belgilaydi.

Aminokislotalar kimyoviy xossalariga ko‘ra:

- gidrofob (masalan, valin, leysin, izoleyin, fenilalanin);
- gidrofil (serin, treonin, asparagin, glutamin);
- zaryadlangan (lizin, arginin, glutamat, aspartat) turlarga bo‘linadi.

Shuningdek, ular asosiy, kislotali va neytral tabiatga ega bo‘lishi mumkin. Organizm ba’zi aminokislotalarni o‘zi sintezlay oladi (endogen), boshqalarini esa faqat ovqat orqali oladi (ekzogen). Ekozen aminokislotalar – lizin, leysin, treonin, metionin, fenilalanin, triptofan, valin, izoleyin va gistidin kabi hayot uchun zarur moddalardir.

II. Aminokislotalarning metabolik roli

Aminokislotalarning biologik faoliyati ularning metabolizmdagi o‘rni bilan belgilanadi. Ular quyidagi jarayonlarda ishtirok etadi:

1. Oqsil biosintezi – ribosomalarda translatsiya jarayonida aminokislotalar ketma-ket bog‘lanib, oqsil zanjirini hosil qiladi.
2. Transaminatsiya – amin guruhining ketokislotalarga ko‘chishi orqali yangi aminokislotalar hosil bo‘ladi (piridoksalfosfat kofermenti ishtirokida).
3. Deaminatsiya – amin guruhining ajralishi natijasida ammiak hosil bo‘ladi, u keyinchalik mochevina siklida zararsizlantiriladi.

4. Dekarboksilanish – karboksil guruhining ajralishi orqali aminokislotalardan biologik faol aminlar (masalan, serotonin, adrenalin, dopamin) hosil bo‘ladi.

Shunday qilib, aminokislotalar oddiy qurilish birikmasi emas, balki organizmda ko‘plab metabolik jarayonlarning markazida turadi.

III. Aminokislotalar va kofermentlar

Kofermentlar — fermentlarning faol markazida joylashgan, kichik molekulali organik moddalardir. Ular ferment bilan birgalikda substratni o‘zgartirish, energiya va atomlarni ko‘chirishda ishtirok etadi.

Ko‘plab kofermentlar aminokislotalar asosida hosil bo‘lgan yoki ularning tarkibiy qismini tashkil etadi:

- Koenzim A (CoA) — pantoten kislotasi va sistein aminokislotasidan hosil bo‘lgan murakkab birikma. U yog‘ kislotalari oksidlanishi, Krebs sikli va asetilgruppa ko‘chirish reaksiyalarida ishtirok etadi.
- Piridoksalfosfat (PLP) — vitamin B_6 hosilasi bo‘lib, aminokislotalarning transaminatsiya, dekarboksilanish va dezaminatsiya reaksiyalarida asosiy koferment hisoblanadi.
- S-adenozilmetionin (SAM) — metionin aminokislotasidan sintezlanadi va ko‘plab biosintez reaksiyalarida metillovchi agent sifatida xizmat qiladi.
- Glutation (GSH) — glisin, sistein va glutamatdan tashkil topgan tripeptid bo‘lib, u hujayrada antioksidant himoya tizimining muhim elementi hisoblanadi.

Shunday qilib, aminokislotalar kofermentlar uchun strukturaviy va funksional asos bo‘lib xizmat qiladi.

IV. Aminokislotalar va gormonlar biosintezi

Ko‘plab gormonlar to‘g‘ridan-to‘g‘ri aminokislotalardan hosil bo‘ladi yoki ularning hosilalaridir.

- Tirozin – qalqonsimon bez gormonlari tiroksin (T_4) va triiodtironin (T_3), shuningdek buyrak usti bezlari tomonidan ishlab chiqariladigan adrenalin va noradrenalin uchun manba.
- Triptofan – serotonin va melatonin gormonlarining dastlabki manbai.
- Gistidin – gistamin hosil bo‘lishida ishtirok etadi, u immun va yallig‘lanish jarayonlarida mediator sifatida faol.
- Glysin, asparagin va glutamat — nerv tizimida neyromediator sifatida ishlaydi.

Shuningdek, ko‘plab oqsil tabiatli gormonlar (masalan, insulin, glukagon, oksitotsin, vazopressin) ham aminokislotalar zanjiridan tashkil topgan polipeptidlardir.

Demak, aminokislotalar endokrin tizim faoliyatida ham bevosita ishtirok etadi, gormonlar orqali butun organizm fiziologiyasini boshqarishda muhim rol o‘ynaydi.

V. Aminokislotalarning vitaminlar bilan o‘zaro bog‘liqligi

Vitaminlar – organizmda koferment sifatida faoliyat yurituvchi past molekulyar og‘irlikdagi organik moddalardir. Ularning ko‘pchiligi aminokislotalar bilan bevosita bog‘liq.

• Vitamin PP (niatsin, nikotinamid) – triptofandan sintezlanadi; u $NAD^+/NADP^+$ kofermentlarining tarkibiy qismi sifatida oksidlanish-qaytarilish reaksiyalarini boshqaradi.

• Vitamin B_6 (piridoksin) – aminokislotalarning transaminatsiya va dekarboksilanish reaksiyalarida zarur.

• Folatlar va vitamin B_{12} – metionin aylanishi va DNK sintezida aminokislotalar bilan bevosita bog‘liq.

• Biotin (vitamin H) – karboksilazalar tarkibida bo‘lib, aminokislotalarning karboksillanishida qatnashadi.

Shuningdek, aminokislotalarning o‘zlari ham ayrim vitaminlar uchun transport yoki reaksiya markazi sifatida xizmat qiladi. Bu esa vitaminlar va aminokislotalarning bir-biriga uzviy bog‘liqligini ko‘rsatadi.

VI. α-Aminokislotalarning amaliy ahamiyati

Aminokislotalar tibbiyot, farmakologiya, oziq-ovqat sanoati va sport biokimyosida keng qo‘llanadi:

• Tibbiyotda – jigar kasalliklari, nerv buzilishlari, mushak distrofiyasi va stress holatlarini davolashda ishlatiladi.

• Farmakologiyada – aminokislotalar asosida tayyorlangan dorilar (glutamin, metionin, arginin, triptofan) organizmni tiklashga yordam beradi.

• Sport tibbiyotida – mushak massasini oshirish va tiklanish jarayonlarini tezlashtirish uchun BCAA (valin, leysin, izoleyin) komplekslari qo‘llaniladi.

• Oziq-ovqat sanoatida – aminokislotalar (masalan, glutamat natriy) ta’m kuchaytiruvchi va biologik faol qo‘shimchalar sifatida ishlatiladi.

Xulosa

α-aminokislotalar tirik organizmlarning hayotiy faoliyatida eng muhim molekulyar komponentlardan biridir. Ular nafaqat oqsil zanjirlarining qurilish materiali, balki kofermentlar, gormonlar va vitaminlarning tarkibiy qismi sifatida ham beqiyos ahamiyat kasb etadi. Har bir aminokislota o‘zining noyob tuzilishi va kimyoviy faoliyati bilan metabolik tizimlarning muvozanatini ta’minlaydi. Aminokislotalarning kofermentlar tarkibida katalitik vazifani, gormonlarda regulyator rolni, vitaminlarda esa energetik va koenzimlik faoliyatni bajarishi ularning universalligini namoyon etadi. Shu sababli aminokislotalarni chuqur o‘rganish biokimyo, tibbiyot va biologiya fanlarining kelajakdagi rivojida muhim ilmiy yo‘nalishlardan biri bo‘lib qoladi.

Foydalanilgan adabiyotlar ro‘yxati

1. Vozhehova, R., Borovyk, V., & Ubaydullaev, J. (2025). Inheritance of yield and fiber length in hybrids cotton of the first generation F1. In BIO Web of Conferences (Vol. 151, p. 04001). EDP Sciences.

2. Xayrullayeva, D. M., Davronova, M. P., Xalimov, B. J., & Ubaydullaev, J. N. (2024). Kolloid eritmalarning tibbiyotdagi ahamiyati va qonning krioskopiya usulida muzlash haroratini aniqlash. Eurasian Journal of Medical and Natural Sciences, 4(4-1), 272-276.

3. Ubaidullaev, J. N., Vakhin, A. V., Katnov, V. E., Trubistina, S. A., & Mukhamadiev, N. K. (2023). Assessments of Chemical Composition and

Properties High-Viscosity Oil Based on Elemental. Central Asian Journal of Medical and Natural Science, 4(5), 332-339.
4. Холмуродов, Т. А., Мирзаев, О. О., & Убайдуллаев, Ж. Н. (2023). КАТАЛИТИЧЕСКОЕ ОБЛАГОРАЖИВАНИЕ ТЯЖЕЛОЙ НЕФТИ В ПРИСУТСТВИИ ПОВЕРХНОСТНО-АКТИВНЫХ ВЕЩЕСТВ. In Добыча, подготовка, транспорт нефти и газа (pp. 62-63).
5. Хусанов, Э. С., Убайдуллаев, Ж. Н., Ходжаёрова, Г. Р., & Элибоев, И. А. (2019). Реакционная способность несимметрично-замещений природных порфиринов с нитратами меди (II), цинка (II) и кадмия (II) кислород содержащих органических растворителей. Вопросы науки и образования, (12 (59)), 13-18.
6. Kholmurodova, D. K., & Khudoykulov, Z. I. (2023). Use of Waste in the National Economy. Texas Journal of Multidisciplinary Studies, 25, 160-162.
7. Амирова, П. Ж., & Худойқулов, Ж. (2025). естественные и синтетические наркотики: польза и вред. Research Focus, 4(1), 148-152.
8. Холмуродова, Д. К., Исломов, Л. Б., & Худойкулов, Ж. И. (2023). Эффективное использование сырья. ijodkor o'qituvchi, 3(33), 277-281.
9. Икромова, Ш. А., & Худойқулов, Ж. И. (2024). ЭЛЕКТРОХИМИЧЕСКОЕ ЛЕЧЕНИЕ И МЕТОДЫ ДИАГНОСТИКИ. Research Focus, 3(11), 146-150.
10. Zoyirova, S. J., Samadova, M. A., & Xudoyqulov, J. I. (2025). CHILONJIYDA O ‘SIMLIGINING DORIVOR XUSUSIYATLARI. Экономика и социум, (7-1 (134)), 341-343.
11. Икромова, Ш. А., & Худойқулов, Ж. И. (2025). ПОЛЬЗА АНТИОКСИДАНТОВ В ЖИЗНИ ЧЕЛОВЕКА И МЕДИЦИНЕ. Экономика и социум, (4-1 (131)), 1361-1365.
12. Inom o’g’li, X. J. (2025). BIOLOGIK FAOL KOMPLEKS BIRIKMALAR. Лучшие интеллектуальные исследования, 38(1), 319-325.

Pathidinova U. C.
stajyor o‘qituvchi
Namangan davlat texnika universiteti

OG‘IR BETONNI KORROZIYADAN HIMOYA VOSITALARI YORDAMIDA HIMOYALASH

Annotatsiya: *Og‘ir betonni korroziyaga chidamliligini oshirishda mahalliy sanoat chiqindilaridan (“Himoya vositasi”) foydalanish, qo‘llash usuli, ishlatilgan avtomobil moyi yordamida himoyalashda olingan natijalar keltirilgan.*
Kalit so‘zlar: *Og‘ir beton, beton korroziyasi, sanoat chiqindilari, himoya vositasi*

Pathidinova U. C.
trainee teacher
Namangan State Technical University

MEANS AND METHODS OF PROTECTING HEAVY CONCRETE FROM CORROSION

Annotation*: The use of local industrial waste (‘Protective agent’) to improve the corrosion resistance of heavy concrete, the method of its application, and the results obtained from protecting the concrete using used motor oil are presented.”*
Keywords*: heavy concrete, concrete corrosion, industrial waste, protective agent.*

Og‘ir beton zamonaviy qurilish va sanoat inshootlarida xususan, turar-joy binolari, suv osti konstruksiyalari, ko‘priklar, atom elektr stansiyalari va boshqa konstruksiyalarda keng qo‘llaniladi. Ushbu konstruksiyalar uzoq muddatli ishlashda turli korroziyaviy omillarga – suv, atmosfera, kimyoviy eritmalar va gidrotexnik sharoitlarga duch keladi. Natijada betonning mustahkamligi pasayadi, xizmat muddati qisqaradi va ta’mirlash xarajatlari sezilarli darajada oshadi. Shu bois, og‘ir betonning korroziyaga chidamliligini oshirish bugungi qurilish amaliyoti va iqtisodiy jihatdan dolzarb masala hisoblanadi.

Mahalliy sanoat chiqindilarining beton tarkibida samarali ishlatilishi nafaqat qurilish materiallarining sifatini yaxshilash, balki iqtisodiy va ekologik foyda keltiradi. O‘zbekiston va boshqa mintaqalarda sement, metallurgiya va termik elektr stansiyalardan kelib chiqqan chiqindilar ko‘p miqdorda mavjud, ammo ularning qayta ishlanishi cheklangan. Ushbu chiqindilarni beton tarkibiga qo‘shish orqali resurslar tejaladi, chiqindilarni tashlash bilan bog‘liq muammolar kamayadi va atrof-muhitni himoya qilishga hissa qo‘shiladi. Shu bilan birga, betonning korroziyaga chidamliligi oshiriladi va konstruksiyalarning xizmat muddati uzaytiriladi.

O‘zbekiston sharoitida issiqlik elektr stansiyalari (IES), metallurgiya va sement zavodlaridan chiqadigan kul-shlak, chang, metall qoldiqlari katta hajmda to‘planadi. So‘nggi yillarda mahalliy olimlar bu chiqindilardan foydalanish imkoniyatlarini o‘rganmoqdalar:

Angren va Novo-Angren IES kul-shlaklari – SiO_2 (45–55%) va Al_2O_3 (15–20%) miqdori yuqori bo‘lgani uchun pozzolanik faollikka ega.

Bekobod metallurgiya zavodi shlaklari – CaO va Fe_2O_3 boyligi sababli beton tarkibida gidravlik qo‘shimcha sifatida ishlatiladi.

Ohangaron sement changlari – sement ishlab chiqarish chiqindilari bo‘lib, ularni 10–15% miqdorda qo‘shish betonning mustahkamligini pasaytirmasdan, korroziyabardoshligini 1,3 barobar oshiradi (Rasulov A., 2023).

Mahalliy tadqiqotlar shuni ko‘rsatadiki, chiqindilarning optimal miqdori sement massasining **15–25%** oralig‘ida bo‘lib, bundan ortiq qo‘shilganda betonning mexanik xossalari pasayadi.

Ishlatilgan avtomobil moylarining ta’siri

Avtomobil moylari – bu mineral yoki sintetik asosdagi yog‘li moddalar bo‘lib, tarkibida Fe, Pb, Zn, Ca oksidlarining izlari mavjud. Ular sement pastasida mikroemulsiya qatlamlari hosil qilib, suv o‘tishini cheklaydi.

Tadqiqotlar (Ismoilov, 2021; Khan et al., 2018) shuni ko‘rsatadiki:

Ishlatilgan motor moyi betonning suv o‘tkazuvchanligini 20–35% ga kamaytiradi,

Gidratatsiya jarayonini sekinlashtiradi, ammo yakuniy bosqichda zichroq struktura hosil qiladi,

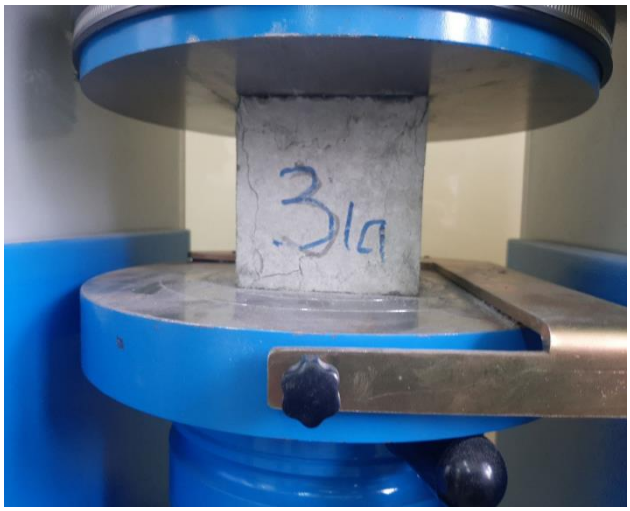
Korroziyaga chidamlilik, ayniqsa xlorid muhitida, 1,4–1,6 barobar oshadi.

Ammo moylar miqdori 3–5% dan oshirilsa, gidratatsiya susayadi va mustahkamlik pasayadi.

Betonni himoyalash bo‘yicha Namangan Davlat Texnika Universitetining Qurilish fakultetida “Og‘ir betonning korroziyaga chidamliligini oshirishda mahalliy sanoat chiqindilaridan foydalanish” mavzusi bo‘yicha ilmiy izlanishlar olib borilmoqda. Og‘ir betonning korroziyaga chidamliligini oshirishda birinch himoya vositasidan himoya qatlami sifatida foydalanish bo‘yicha tajriba sinovlari o‘tkazildi (1-rasm).




1-a-rasm. Sinov namunalari



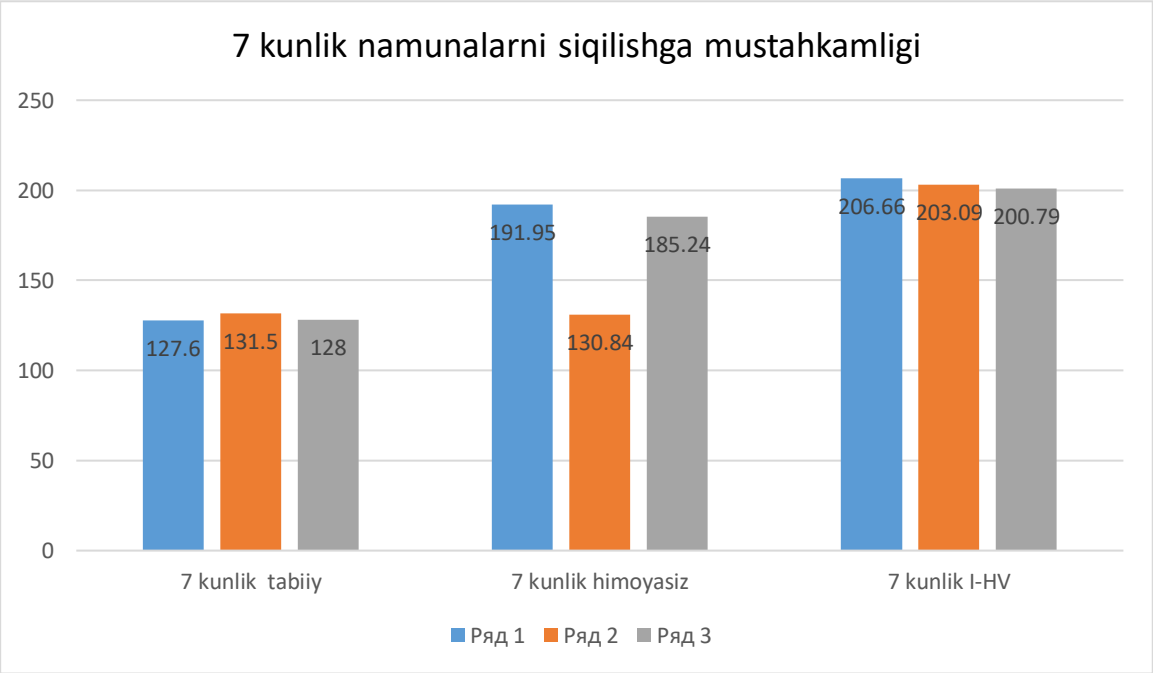


1-b-rasm. Namunalarni sinov jarayoni.

Izlanishlar 7, 14, 21 va 28 kunlik beton kub namunalarni ochiq havo muhitida, himoyasiz va birinchi himoya vositasi bilan himoyalangan holda 3 oy hamda 12 oy davomida agressiv muhitda saqlab namunalarni siqilishga bo‘lgan mustahkamliklari tekshirildi. Sinov natijalari 1-jadvalda keltirilgan.

1-jadval

t.r	namuna	Namu-na raqami	Himoya-siz ochiq xavoda	Agressiv muxit himoya-siz	Agressiv muxit I-himoya vositasi	% da I-himoya vositasiga nisbatan
1	7 kunlik 3 oy	1	127.6	191.95	206.66	75
		2	131.5	130.84	203.09	
		3	128.00	185.24	200.79	
2	14 kunlik 3 oy	1	133.6	215.29	210.66	53
		2	157.4	215.33	219.38	
		3	166.1	201.64	216.38	
3	21 kunlik 3 oy	1	138.9	219.38	263.96	101
		2	144.7	216.91	247.16	
		3	149.7	176.84	228.57	
4	28 kunlik 3 oy	1	176.86	217.75	210.23	20
		2	155.96	178.77	214.41	
		3	170.50	207.60	187.72	
5	28kunlik 12 oy	1	179.7	185.72	177.84	20
		2	173.1	182.58	174.16	
		3	192.0	217.22	212.35	



Tekshirish natijalariga ko‘ra 1-HV bilan ishlov berilgan namunalarda korroziyaga chidamlilik ortganligi aniqlandi.

Xulosa

Ilmiy nuqtai nazardan, og‘ir betonning korroziyaga chidamliligini oshirish va mahalliy sanoat chiqindilarini samarali qo‘llash bo‘yicha mavjud tadqiqotlar yetarlicha emas. Ko‘plab xorijiy tajribalar mavjud bo‘lsa-da, mahalliy sharoit va chiqindilarning kimyoviy tarkibi yetarlicha o‘rganilmagan. Shu sababli, ushbu

tadqiqot ilmiy yangilikka ega bo‘lib, mahalliy sanoat chiqindilaridan himoya vositasi sifatida foydalanishga amaliy tavsiyalar berishga xizmat qiladi.

Foydalayilgan adabiyotlar:

1. Акимов Г. В. Основы учения о коррозии и защите металлов.-М.: Металлургиздат, 1946.-465 с.
2. Акимова К. М. О роли кислорода в процессе коррозии стальной арматуры в бетоне в присутствии хлоридов // Защита металлов.- 1977.- №2.- С. 191-193.
3. Акимова К. М., Иванов Ф.М. К вопросу о влиянии хлоридов на коррозию арматуры в железобетоне.- ЖПХ.- №2.- 1971.-С. 371-375.
4. Александровский С.В. Долговечность наружных ограждающих конструкций.- НИИСФ, НИИЖБ.- 2004.- 273 с.

Payazov Sh. N.
assistent
Samarqand davlat tibbiyot universiteti
Samarqand, Uzbekistan

QORIN BO‘SHLIG‘I A’ZOLARI ENDOKRIN TIZIMINING O‘SIMLIKLARNI KIMYOVIY HIMOYA VOSITALARI TA’SIRIDAGI MORFOLOGIK O‘ZGARISHLARI

Annatotsiya: *O‘simliklarni kimyoviy himoya vositalarining odam organizmiga, xususan rivojlanayotgan xomilaga va emizik yoshidagi bolalar organizmiga salbiy ta’siri dolzarb muammolardan xisoblanadi. O‘simliklarni kimyoviy himoya vositalarining organizm endokrin tizimiga ta’siri yetarli o‘rganilmaganligi inobatga olinib, qishloq xo‘jaligida keng qo‘llaniladigan ayrim zaxarli ximikatlar (insektitsidlar, gerbitsidlar, fungitsid va bakteritsidlar) ning xazm a’zolariga ta’siri o‘rganildi.*

Kalit so‘zlar: *kimyoviy himoya vositalari, fungitsid, ximikat, vakuola, endokrin, nerv oxirlari, zaxarlanish.*

Payazov Sh. N.
assistant
Samarkand State Medical University
Samarkand, Uzbekistan

MORPHOLOGICAL CHANGES IN THE ORGANS OF THE ENDOCRINE SYSTEM UNDER THE INFLUENCE OF CHEMICAL PLANT PROTECTION PRODUCTS

Abstract: *The negative impact of chemical plant protection products on the human body, particularly on the developing fetus and the body of infants, is one of the pressing problems today. Given that the effect of chemical plant protection products on the endocrine system of the body has been insufficiently studied, the influence of some widely used toxic chemicals in agriculture (insecticides, herbicides, fungicides, and bactericides) on the organs of the digestive system was investigated.*

Keywords: *chemical plant protection products, fungicide, chemical, endocrine system, nerve endings, poisoning.*

Mavzuning dolzarbligi

Agrar soxada o‘simliklarni kimyoviy himoya qilish maqsadida qo‘llanilayotgan kimyoviy himoya moddalari biosferaning tarkibiy qismiga kirib borishi oqibatida, insoniyatni ularning salbiy ta’sirlaridan butunlay himoya qilishning imkoniyati yo‘q. Shu tufayli mazkur soxada ilmiy tadqiqotlarinig asosiy yo‘nalishi o‘simliklar kimyoviy himoya moddalrining organizmga ta’sir

mexanizmlarini o‘rganish, ularning zararli ta’sirining oldini olishga qaratilishi mavzuning dolzarbligini ta’kidlaydi.

Tadqiqot maqsadi va vazifalari

Xazm qilish tizimi a’zolari nerv va endokrin apparatlarining prenatal va ilk postnatal davrlarda pestitsidlar ta’siridagi reaktiv o‘zgarishlarini o‘rganish.

Tadqiqot materiali va usullari

Tadqiqotlar uchun material sifatida gerbitsidlar bilan zaxarlangan tajriba xayvonlari xazm nayining xar xil qismlaridan olingan bo‘lakchalar ishlatildi. Zaxarlash gerbitsidlarning 5 dok dozasi suvda eritilib, zond yordamida me’daga yuborish usuli bilan o‘tkazildi. Tajribalar quyon, it va mushuklarda o‘tkazilib, ikki yo‘nalishda olib borildi. Birinchidan, eksperimental zaxarlangan hayvonlar hazm qilish tizimi a’zolari o’rganildi. Ikkinchidan esa, xomiladorlikning har xil muddatlarida pesticidlar ta’sir ettirilgan hayvonlar xomilalari hazm nayi a’zolarining nerv va endokrin apparatlari o’rganildi. Me’da, o’t xaltasi va o’t yo’llari, ingichka ichak o’rganildi. Material 12% neytrallashtirilgan formalinda, Buen eritmasida fiksaciya qilindi. Adrenergik va xolinergik nerv elementlarini va monoamin tutuvchi endokrin hujayralarni (EC, ECL) o’rganish uchun fiksaciya qilinmagan materialdan kriostatda olingan kesmalar ishlatildi. A’zolarning nerv apparati Bilshovskiy-Gross, Kampos va Rasskazova, uslubi bo’yicha, endokrin hujayralar esa Grimelius va Masson-Gamperl uslublarida aniqlandi. Fiksaciya qilinmagan materialdan olingan kesmalarga glioksil kislotasining eritmasi bilan ishlov berildi va adrenergik nerv strukturalari va flyuorescentciyalanuvchi endokrin hujayralar LYUMAM-I2 lyuminescent mikroskopida FS 1-4 va FS 1-6 filtrlari yordamida o’rganildi. Ularning tarqalish zichligi 256 katakchali okulyar to’ri yordamida aniqlandi. Raqamlarga Moncevichyute-Erengene uslubi bo’yicha statistik ishlov berildi.

Tadqiqot natijalari va ularning tahlili

Xazm nayining o‘rta qismida, ayniqsa o‘t yo‘llari, o‘t xaltasi devori, o‘n ikki barmoq va ingichka ichakda eng katta intramural nerv tugunlari borligi va nerv xujayralarining eng zich joylashganligi kuzatildi. Xazm a’zolari devorida adrenerik va xolinergik nerv elementlari xar xil zichlikda tarqalgan. A’zolarga adrenergik nerv tolalari ularni qon bilan ta’minlovchi magistral arteriyalar bo‘ylab keladi. Xazm a’zolaring shilliq pardasi epiteliysi tarkibida ko‘p miqdorda ochiq va yopiq tipdagi endokrin xujayralar mavjud.

Gerbitsidlar organizmga yuborilgan dastlabki davrda (3-5 kun) xazm a’zolari nerv va endokrin apparatlarida kuchli reaktiv o‘zgarishlar kuzatildi. Nerv tutamlari tarkibida giperimpregnatsiyalangan va varikozlashgan nerv tolalari uchraydi. Zaxarlanish muddati oshishi bilan (7-10 kun) nerv elementlarida degenerativ o‘zgarishlar kuzatildi, nerv tolalari fragmentatsiyasi, mumifikatsiyasi yuz berdi, sitoplazmasida vakuolalar paydo bo‘ldi. Sinaptik ner oxirlari degenerativ o‘zgarishlarga uchraydi. Presinaptik tolalar fragmentatsiyalanadi, sinaptik nerv oxiri undan uzilib qolishi natijasidadeformatsiyaga uchraydi, neyrofibrillyar ko‘rinishi yo‘qoladi. Prefibrillyar bo‘shliq kengayadi.

Diffuz endokrin tizimi xujayralarida ekstruziya bloki kuzatildi. Gerbitsidlar ta’sirida ularda sekret ajralishi keskin to‘xtadi, keyin esa, birdaniga ajaralishi kuzatildi. Tajriba muddati oshishi bilan endokrin xujayralarning nisbiy miqdori keskin kamaydi.Ularda degeneratsiya xolati ko‘rinadi. Xujayra bazal qismlarida o‘simtasimon bo‘rtmalar paydo bo‘ladi, sitoplazmasida vakuolalar aniqlandi.

Xomiladorlik paytida gerbitsidlar bilan zaxarlangan quyonlarning xomilalarini o‘rganish bo‘yicha quyidagilar aniqlandi. Xomilalarning xazm a’zolarining nerv va endokrin apparatlarining reaktiv va degenerativ o‘zgarishlari ona organizmi orvali unga o‘tgan gerbitsid ta’sirida yuz berishi nazorat guruxidagi quyonlar xomilalari xazm a’zolari nerv va endokrin apparatlarining tuzilishi bilan taqqoslash natijasida to‘liq aniqlandi. Ularning xazm a’zolari nerv va endokrin apparatlarining o‘zgarish darajasi ona quyonni zaxarlash muddatiga mos kelishi buni yana bir karra tasdiqlaydi.

Xulosalar

1. O‘simliklarni kimyoviy himoya qiluvchi moddalar oranizm boshqaruvchi tizimlariga (nerv, endokrin) ta’siri zaxarlanishning dastlabki davrida reaktiv va beshinchi sutkadan boshlab degenerativ ta’sirga ega. 2. O‘simliklarni kimyoviy himoya qiluvchi moddalar bilan xomilador xayvonlar zaxarlanganda ular xomilaning rivojlanishiga, nerv va endokrin apparatlarining shakllanishiga salbiy ta’sir ko‘rsatadi. 3. Ichki a’zolar nerv va endokrin apparatlarining gerbitsidlar ta’siridagi o‘zgarishlarning darajasi zaxarlanish muddatiga to‘g‘ri proporsional ravishda og‘irlashbboradi.

Адабиётлар

1. Паязов Ш. Н. Сравнение морфометрических показателей печени белых безпородных крыс под воздействием противовоспалительных средств парацетамола и аспирина в норме и при полипрагмазии //экономика и социум. – 2024. – №. 11-1 (126). – с. 1280-1285.
2. Паязов Ш. Н. Особенности функционирования печени при ревматоидном артрите //экономика и социум. – 2024. – №. 11-1 (126). – с. 1045-1049.
3. Паязов Ш. Н. Гистологическая структура печени белых безпородных крыс //экономика и социум. – 2024. – №. 11-1 (126). – с. 1286-1290.
4. Паязов Ш. Н. Исследование морфометрических показателей печени белых безпородных крыс под воздействием противовоспалительных средств парацетамола, аспирина и ибупрофена при полипрогмазии //экономика и социум. – 2024. – №. 11-1 (126). – с. 1275-1279.
5. Щицкова В.Н., Ракитский А.П. Гигиена и токсикология пестицидов на современном этапе., гигиена и санитария. 1996. выпуск 4. с.33-35.
6. Искандаров Т.И. Патоморфоз основных интоксикаций фосфорорганическими ядохимикатами на фоне современной терапии. медицинский журнал узбекистана -1990-№5. с.30-32.
7. Пузырев А.А., Иванова В.Ф., Маймулов В.В. Адаптация организма к дейтсвию экологических факторов, на клеточном и субклеточном уровнях.
8. Ss Usanov, Teshaev Sh Zh (2022) ,
Study of morphological changes in the liver of white unbored rats under the

influence of 3 different anti-inflammatory preparations , barqarorlik va yetakchi tadqiqotlar onlayn ilmiy jurnali , 2(1) , (129-132)
9. Ss Usanov, Sh J Teshaev, Ba Sanoev (2022) , morphological and morphometric parameters of the liver of white nonbored rats in normal , oriental renaissance: innovative, educational, natural and social sciences, 2(1) , (75-81)
10. Usanov Sanat Sadinovich (2021), characteristic of the morphometric parameters of the liver in polypragmasia, the american journal of medical sciences and pharmaceutical research, 3(10) , (28-32)

Qambarova M. X.
katta o`qituvchi
mustaqil tadqiqotchi
Andijon qishloq xo`jaligi va agrotexnologiyalar instituti
O‘zbekiston

TUT KO`CHATLARIDAGI ASOSIY DOMINANT TUR ZARARKUNANDALARINING RIVOJLANISHI

Annotatsiya: *Maqolada Andijon viloyati sharoitida tut ko‘chatlari zararkunandalarining asosiy dominant turlari rivojlanishiga ob-havo sharoitining ta’sirini 2021-2023 yillar kesimida olib borilgan tadqiqotlar natijalari tahlili yoritilgan.*

Kalit so`zlar: *Entomofag insecta qattiq qanotlilar (Coleoptera) turkum buzoqbosh qo_ng_izlar (Melolontheane), fenologiya birlamchi zararlanish, mavsumiy dinamika, zararkunanda*

Qambarova M. X.
senior lecturer
independent researcher
Andijan Institute of Agriculture and Agrotechnologies
Uzbekistan

DEVELOPMENT OF MAJOR DOMINANT PEST SPECIES IN MULBERRY SEEDLINGS

Abstract: *The article describes the analysis of the results of the research conducted in the period of 2021-2023 on the influence of weather conditions on the development of the main dominant species of pests of mulberry seedlings in the conditions of Andijan region.*

Keywords: *Entomophage insecta hard-winged (Coleoptera) family Melolontheane, phenology primary infestation, seasonal dynamics, pest*

Andijon viloyati sharoitida uchraydigan zararkunandalarning tut ko‘chatlariga turlicha zarar yetkazadi. Shu sababli 2021-2023 yillar davomida ularning ichidan dominant turlarini aniqlash bo‘yicha Andijon viloyatining Paxtaobod tumani “Muxammadqodir Baxor” hamda “Abdug‘ani –Ziyoiddin” fermer xo‘jaliklarida va Marhamat tumani “Ipak-ko‘chat klasteri“da parvarishlanayotgan tut ko‘chatzorlarida tadqiqotlar olib borildi.

Tadqiqotlardan ma’lum bo‘ldiki, tut ko‘chatlarining yer ostki qismini Hasharotlar (*Insecta*) sinfiga mansub Qattiq qanotlilar *(Coleoptera)* turkumi Buzoqbosh qo‘ng‘izlar (*Melolontheane*) oilasiga mansub Mart buzoq boshisi (*Melonotha afflicta Ball*) kuchli zararlaydi. Tut ko‘chatlarining yer ustki qismini Tangacha qanotlilar yoki Kapalaklar (*Lepidoptera*) turkumi, Parvonalar

(*Pyralidae*) oilasiga mansub Tut parvonasi (*Glyphodes pyloalis Walker*), Teng qanotlilar – (Homoptera) turkumi, Bitlar (Aphididae) oilasiga mansub Akatsiya biti (*Aphis medicaginis Koch*.) uchrash darajasi yuqori ekanligi aniqlanib, ushbu zararkunandalarni dominant deb belgilandi. (3.7-jadvalga qarang).

Asosiy tadqiqotlarimiz dominant zararkunanda turlarning bioekologiyasi, rivojlanish hususiyatlarini o‘rganib, ularga qarshi uyg‘unlashgan kurash choralarini ishlab chiqish maqsadida olib borildi.

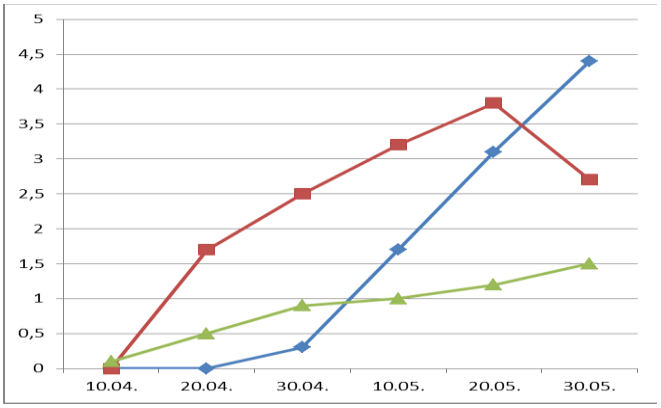
Andijon viloyatidagi deyarli barcha tut ko‘chatzorlarida Mart buzoqboshi, Tut parvonasi va Akatsiya biti yuqori darajada zarar keltirib, bu zararkunandalar ta’sirida tut ko‘chatlari rivojlanishdan orqada qolishi, barg sifatining yomonlashuviga ta’siri ko‘rsatayotganligi ilmiy tadqiqotlarimiz tahlili natijasida aniqlandi.

1 – jadval

Andijon viloyati sharoitida tut ko‘chatlari zararkunandalarining uchrashi, dominant turlarning zararlash darajasi (Andijon viloyati 2021-2023 yy.)

№	Zararkunandalarning nomi	Uchrashi
1.	Tut parvonasi (*Glyphodes pyloalis* Walker).	+ + +
2.	Kuzgi tunlam (*Agrotis segetum Den. et Schiff*)	++
3.	Undov tunlami (*A. exlamationis L.*)	+
4.	May buzoqboshi (*Melolontha hypocastani*)	+
5.	Mart buzoq boshisi (*Melonotha afflicta Ball*)	+++
6.	O‘rgimchakkana (*Tetranychus urticae Koch*.).	++
7.	Tamaki tripsi (*Thrips tabaci Lind*.)	+
8.	Komstok qurti (*Pseudococcus komstocki* Kuw.).	+
9	Kichik ko‘k sikada (*Empoasca meridian* Zachv)	++
10.	Tut odimchisi (*Apocheima cinerarius* Yersch.)	++
11.	Akatsiya biti (*Aphis medicaginis Koch*.).	+ + +

+ + + - juda ko‘p uchraydi, + + - o‘rtacha uchraydi, + - kam uchraydi. qisman qayd etildi.



1-rasm. Tut ko‘chatlaridagi dominant zararkunandalarning zarari. (ballar hisobida)

2021-2023 yilning aprel-may oylari mobaynida olib borilgan ilmiy tadqiqotlarimizda tut ko‘chatlari agrobiotsenozidagi Mart buzoq boshisi (*Melonotha afflicta Ball*), Tut parvonasi (*Glyphodes pyloalis* Walker) va Akatsiya biti (*Aphis medicaginis Koch*.)ning zarari barglarda ballar hisobida aniqlandi hamda taqqoslandi.

Foydalanilgan adabiyotlar

1. Xo‘jayev Sh.T. Agrotoksikologiya asoslari hamda tadqiqot o‘tkazish qoidalari. – Toshkent:«Navro`z»,, 2018. – 143 b.
2. Xo‘jayev Sh.T. Insektitsid, akaritsid, biologik faol moddalar va fungitsidlarni sinash bo‘yicha uslubiy ko‘rsatmalar (II-nashr). – Toshkent: MChJ Ko'hinur, 2004. – 104 b.
3. Xo‘jayev Sh.T. O‘simliklarni zararkunandalardan uyg‘unlashgan himoya qilish, hamda agrotoksikologiya asoslari. – Toshkent: “Navro‘z”, 2014.- 350 b.
4. Xo‘jayev Sh.T., Ochilov R.O. Tut daraxti zararkunandalari va ularga qarshi ilmiy asoslangan kurash choralari. –Toshkent: «Ruta-Print» QK, 2006. – 15 b.
5. Nosirova Z.G‘., Qambarova M.X., Norqizilov L.O. Tutning so‘ruvchi zararkunandalariga qarshi kimyoviy usulning samaradorligi // Agrokimyo himoya va o‘simliklar karantini. 2023. № 4, B. 8-9.

Qarabayeva D. J.
katta o'qituvchisi
botanika kafedrasi
Termiz davlat universiteti
Abdinazarov A. F.
talabasi
Termiz davlat universiteti

SURXONDARYO VILOYATI SHEROBOD TUMANIDA TARQALGAN SALVIA L. TURLARINING BIOEKOLOGIK XUSUSIYATLARI

Annotatsiya: *Ushbu ilmiy maqola Surxondaryo viloyati Sherobod tumani hududida tarqalgan Salvia L. turkumi vakillarining ekologik guruhlanishi, tarqalish geografiyasi va bioekologik xususiyatlarini o'rganishga bag'ishlangan. Tadqiqot natijasida tuman hududida 9 ta Salvia turi qayd etilib, ularning tarqalish areali, ekologik talablari va fitotsenotik bog'liqliklari aniqlangan.*

Kalit so'zlar: *Salvia L., tarqalish geografiyasi, ekologik guruhlanish, vertikal mintaqalashtirish, dorivor o'simliklar, Sherobod tumani, fitotsenoz.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
Abdinazarov A. F.
student
Termez State University

BIOECOLOGICAL CHARACTERISTICS OF *SALVIA* L. SPECIES DISTRIBUTED IN SHEROBOD DISTRICT OF SURKHANDARYA REGION

Annotation: *This scientific article is devoted to the study of the ecological grouping, distribution geography and bioecological characteristics of representatives of the Salvia L. genus, distributed in the territory of Sherabad district of Surkhandarya region. As a result of the study, 9 Salvia species were recorded in the district, and their distribution area, ecological requirements and phytocenotic relationships were determined.*

Keywords: *Salvia L., distribution geography, ecological grouping, vertical zoning, medicinal plants, Sherabad district, phytocenosis.*

Pomir-Oloy tog' tizmasining janubi-g'arbiy tarmog'i hisoblangan Ko'hitang tizmasining sharqiy yon bag'rida joylashgan Surxondaryo viloyati Sherobod tumani o'zining murakkab relyefi (o'rtacha suvayirg'ich balandligi 3137 m), keskin

kontinental iqlimi va noyob geografik chegaralari (shimolda Tangidara soyi, sharqda qishloqlar yoysi, janubda Xo'jaikon tuz koni) bilan ajralib turadi [6]. Bu tabiiy xususiyatlar tumanda boy va o'ziga xos o'simlik dunyosining, xususan, dorivor ahamiyatga ega bo'lgan turlarning rivojlanishi uchun qulay sharoit yaratadi. Sherobod tumani florasini o'rganishga bo'lgan qiziqish uzoq tarixga ega. S.A. Nevskiy [3], K.Sh. Tojibaev [4], F.O. Xasanov [5], A.J. Ibragimov [6] va O.T. Turginov [7] kabi bir qator taniqli botanik olimlar tomonidan olib borilgan izlanishlar va terilgan boy gerbariy kolleksiyalar mahalliy florani o'rganishning muhim bosqichlaridir. Biroq, mavjud ma'lumotlar ko'pincha fragmentar xarakterga ega bo'lib, flora tarkibini yaxlit va tizimli tasvirlash imkonini bermaydi. Bu bo'shliq, ayniqsa, Lamiaceae Juss. oilasining eng yirik va farmakologik jihatdan eng qimmatli turlaridan biri hisoblangan *Salvia* L. turkumiga oid bo'lganida sezilardi. O‘rta Osiyo va O‘zbekiston florasida keng tarqalgan ushbu turkum vakillarining Sherobod tumani hududidagi aniq tarkibi, ekologik talablari va tarqalish qonuniyatlari to'liq o'rganilmagan holda qolgan.

O‘zbekiston Fanlar Akademiyasining Markaziy gerbariyi (TASH) fondi va so'nggi yillardagi dala tadqiqotlari ma'lumotlarini tahli qilish shuni ko'rsatdiki, Sherobod tumani hududida *Salvia* L. turkumiga mansub kamida 9 ta tur: *S. bucharica* Popov., *S. lilacinocaerulea* Nevski., *S. macrosiphon* Boiss., *S. serawschanica* Regel., *S. spinosa* L., *S. virgata* Jasq., *S. ariana* Hedge., *S. sclarea* L. va *S. scrophulariifolia* Bunge yashash mintaqasiga ega. Shu bois, mazkur hududda *Salvia* turlarining bioekologik xususiyatlari va tarqalishini chuqur o'rganish, nafaqat mahalliy floraning tarkibiy qismini aniqlash, balki ularning genofondini muhofaza qilish, dorivor xomashyo sifatida potentsialini baholash va mintaqaviy bioxilma-xillikni saqlash strategiyalarini ishlab chiqish uchun dolzarb ahamiyat kasb etadi.

***Salvia bucharica* Popov – Buxoro marmaragi.** Balandligi 30-50 sm uzunlikda o‘sadigan ko‘p yillik o‘simlik. Ildizi qalin, yog’ochsimon, to‘q jigarrang yoki kulrang bo‘lib, poyasi och jigarrang yoki sariq. Poyasi bo‘ylab uzun va qisqa tuklar rivojlangan. Barglari poya va novdalarda bir tekis taqsimlangan bo‘lib, uzunligi 3-6 sm, kengligi 1,5-2,5 sm. Uchki qismi, ellips shaklida, yon qismlari esa kichikroq va cho‘zilgan. Barglar cheti mayda tishli, yuqori tomonida deyarli tuksiz, pastki qismida esa qisqa tuklar mavjud. O‘rta va yuqori novdalar tuxumsimon shaklda, o‘tkir va yashil rangda, yuqoriga qaragan qisqa tuklar bilan qoplangan. Kosachasi och pushti rangda, yuqori labi butun va pastki labi ikki bo‘lakka bo‘lingan, ellips shaklida va chuqur kesilgan. Gultoj pushti rangda bo‘lib, uzunligi 3-3,3 sm, kosachadan 2-2,5 baravar uzunroq. Mevasi qora jigarrang, silliq va sharsimon shaklda, uzunligi 3-4 mm, kengligi 2,5-3 mm. May-iyunda gullab iyun-iyulda meva beradi. 800-2200 metr balandlikdagi tog;ning o‘rta qismida nam tuproqlarda o‘sadi. Afg’oniston, Pokiston, O‘rta Osiyo (Tojikiston, Turkmaniston, O‘zbekistonda)da keng tarqalgan.

***Salvia lilacinocaerulea* Nevski – Havorang marmarak.** Balandligi 30-55 sm uzunlikdagi ko‘p yillik o‘simlik. Poyasi to‘g’ri, ikki baravar shoxlangan. Poyasida uzun va qisqa tuklar mavjud, gullashda ayniqsa zichroq. Barglari juda

ko‘p, cho‘zinchoq yoki biroz tuxumsimon, uzunligi 3,5-7 sm, kengligi 1-3 sm, chuqur kesilgan, tuxumsimon yoki uchburchaksimon bo‘lib, chetida to‘mtoq tishlar bor. Barglarning ikki tomoni tuklar bilan qoplangan, poyasi bilan bir xil tuklar mavjud. To‘pgul shoxlari asosida joylashgan, 2-3 gulli soxta halqasimon. Gulbanddagi gullar kosachaga teng uzunlikda bo‘lib, oq tuklar bilan qoplangan. Kosacha 16-18 mm uzunlikda. Gultoj och binafsha-ko‘k rangda, uzunligi 4-4,5 sm, kosachadan 1,5 marta uzunroq, lablari kalta va deyarli bir xil shaklda.Yong’oqlari ellipssimon, och sariq rangda, uzunligi 4 mm, kengligi 2,5-3 mm. Iyun-iyulda gullab, iyuldan avgustgacha meva beradi. 1000-2500 (3000) metr balandlikdagi qoyali, shag’alli yon bag’irlari va toshlar orasida o‘sadi. O‘rta Osiyo (Turkmaniston, O‘zbekistonda)da tarqalgan endem tur.

***Salvia macrosiphon* Boiss – Yirikbargli marmarak. Balandligi** 30-50 sm bo‘lgan ko‘p yillik o‘simlik. Poyalari tekis, deyarli yerga yaqin joylashgan, uzun, tuklar bilan qoplangan. Barglari tuxumsimon yoki cho‘zinchoq shaklda, uzunligi 5,5-14 sm, eni 3-8 sm, chetida o‘tkir tishlar mavjud. Poyasi kichikroq, qattiq, to‘pgul shoxlari qo‘sh tikanli. To‘pguli piramidal shaklda yoyilgan, 4-10 ta soxta halqasimon tuzilishga ega. To‘pgulning yuqori qismi bo‘sh, ya'ni urug’ bermaydi. Gulbanddagi gullar kichik, 1-2 mm uzunlikda, 2-4 gulli. Gultoji oq rangda, uzunligi 2,5-3 sm, gultojning nayi kosadan ancha chiqib turadi. Yuqori lab tekis va biroz egilgan, pastki lab keng, chashkasimon botiq va biroz tishli. May-iyun oylarida gullab, iyun-iyul oylarida meva beradi.

***Salvia serawschanica* Regel. – Zarafshon marmaragi.** Balandligi 15-30 sm bo‘lgan ko‘p yillik o‘simlik. Yog’ochlashgan ildizga ega. Barglari cho‘zinchoq ellipssimon yoki ellipssimon shaklda, uzunligi 5-8 sm, eni 1,5-3 sm. O‘rta barglari kichikroq, qisqa bandli va oq tukli. To‘pgul shoxlari ostidagi barglari binafsharang, keng tuxumsimon. Kosachasi naysimon, 16-20 mm uzunlikda, tomirlar bo‘ylab tuklar bilan qoplangan. Ichki qismi qisqa tukli, yuqori labida 2 ta tish bo‘lib, pastki labda 2 ta chuqurroq tishli qismlar mavjud. Gultoj binafsharang, uzunligi 2-3 sm. May-iyun oylarida gullab, iyun-iyul oylarida meva beradi. 2300-2500 m balandlikdagi quruq kanallar, shag’allar, qoyalar, gipsli va toshloq tog’ yon bag’irlarida o‘sadi. O‘rta Osiyo (Tojikiston, Turkmaniston, O‘zbekiston)da tarqalgan endem tur.

Xulosa o‘rnida shuni aytish mumkinki, Surxondaryo viloyati Sherobod tumanida tarqalgan *Salvia* L. turkumiga mansub turlar dorivorlik xususiyatining yuqoriligi va ekologik moslashuvchanligi bilan ajralib turadi. Ularning Sherobod tumani tabiiy florasini shakllantirishdagi o‘rni muhim bo‘lib, bu turkumga mansub turlarni chuqur o‘rganish bioxilma-xillikni saqlash va dorivor resurslardan oqilona foydalanish nuqtai nazaridan dolzarbdir. Ayniqsa, ushbu turlarning tuman hududidagi populyatsiyalarining aniq o‘rganilishi ularning genofondini saqlash, tabiatni muhofaza qilish va ilmiy-amaliy loyihalarni yo‘lga qo‘yish uchun muhim asos bo‘lib xizmat qiladi. Tadqiqot natijalari *Salvia* turkumiga mansub turlarni seleksiya qilish, dorivor xomashyo sifatida yetishtirish va farmatsevtika sanoatida qo‘llash imkoniyatlarini kengaytirishga zamin yaratadi.

Foydalanilgan adabiyotlar

1. Определитель растений Средней Азии. Т.5. Ташкент Фан, 1974.
2. Тожибаев К.Ш., Бешко Н.Ю., Попов В.А. Ботанико-географическое районирование Узбекистана // Ботанический журнал, т. 101, вып. 10, 2016. – С. 1105-1132.
3. Хасанов Ф.О. Краткий очерк растительности Кугитанга // Тез. докл. юбил. науч. конф. молодых ученых и спец-тов посев 60-летию ЛКСМ Узб-на, 1985. – С. 167-168.
4. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
5. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.
6. Yuldasheva Z. K., Karabaeva D. J. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qarabayeva D. J.
katta o'qituvchisi
botanika kafedrasi
Termiz davlat universiteti
To'yev Q. H.
talabasi
Termiz davlat universiteti

SURXONDARYO VILOYATI SHEROBOD TUMANINING TABIIY FLORASIDA ***SALVIA*** L. TURKUMI TURLARINING TARQALISHI

Annotatsiya: *Maqolada Surxondaryo viloyati Sherobod tumani hududida tarqalgan Salvia L. turkumiga mansub o'simliklarning bioekologik xususiyatlari va geografik tarqalishi tahli qilingan. Tadqiqot davomida hududda 9 ta Salvia turi aniqlandi. Ushbu turlarning tarqalishi, o'sish sharoitlari, fenologik rivojlanishi va ekologik talablari o'rganildi. Tadqiqot natijalari hudud bioxilma-xilligini saqlash, dorivor o'simliklar resurslarini muhofaza qilish va ulardan oqilona foydalanish yo'llarini ishlab chiqish uchun ilmiy asos yaratadi.*

Kalit so'zlar: *Salvia L., G'ulomg'oya, bioekologiya, geografik tarqalish, Sherobod tumani, dorivor o'simliklar.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
To'yev Q. H.
student
Termez State University

DISTRIBUTION OF SPECIES OF THE GENUS *SALVIA* L. IN THE NATURAL FLORA OF SHEROBOD DISTRICT, SURKHANDARYA REGION

Annotation: *The article analyzes the bioecological characteristics and geographical distribution of plants belonging to the genus Salvia L., distributed in the territory of Sherabad district of Surkhandarya region. During the study, 9 species of Salvia were identified in the region. The distribution, growth conditions, phenological development and ecological requirements of these species were studied. The results of the study create a scientific basis for preserving the biodiversity of the region, protecting medicinal plant resources and developing ways to use them rationally.*

Keywords: *Salvia L, Gulomgoya, bioecology, geographical distribution, Sherabad district, medicinal plants.*

Har qanday mintaqaning tabiiy boyligi va ekologik barqarorligini baholashda uning o'simliklar olami, xususan dorivor turlar xilma-xilligi asosiy ko'rsatkich hisoblanadi. Surxondaryo viloyati Sherobod tumani – Ko'hitang tizmasining sharqiy nishabida, 3137 m gacha bo'lgan balandliklarda joylashgan, shimol, sharq va janubdan aniq tabiiy chegaralar (suv havzasi, qishloqlar, kon) bilan ajralgan muhim biogeografik hududdir [6]. Bunday izolyatsiya va murakkab orografik sharoitlar endemik va noyob turlarning, shu jumladan qadrdan dorivor o'simliklarning rivojlanishiga imkon yaratadi.Hudud florasining o‘rganilganlik darajasi haqida gap ketganda, Nevskiy [3], Tojibaev [4], Xasanov [5], Ibragimov [6] va Turginov [7] kabi olimlarning qimmatli ishlariga qaramay, ma'lumotlar to'plami parchalangan va izlanishlar ma'lum bir lokalliklar bilan cheklanganligini tan olish lozim. Bu holat, ilmiy asosda boshqariladigan tabiatni muhofaza qilish, barqaror foydalanish va farmatsevtika sanoati uchun xomashyo bazasini kengaytirish kabi zamonaviy talablarni qondirishga to'sqinlik qiladi. Aynan shu muammo doirasida *Salvia* L. turkumining o‘rni alohida e'tiborga molikdir, chunki bu turkum nafaqat Lamiaceae oilasining turli jihatdan eng boy vakili, balki butun dunyo bo‘yicha an'anaviy va zamonaviy tibbiyotda eng ko‘p qo‘llaniladigan dorivor o‘simliklar qatoriga kiradi. Sherobod tumani hududi bo‘yicha amalga oshirilgan so‘nggi tahliylar va TASH gerbariy fondidagi ma'lumotlar ushbu mintaqada *Salvia* L.ning 9 ta turi (*S. bucharica, S. lilacinocaerulea, S. macrosiphon, S. serawschanica, S. spinosa, S. virgata, S. ariana, S. sclarea, S. scrophulariifolia*) mavjudligini aniq ko‘rsatdi. Biroq, bu turlarning mintaqaviy florasini shakllantirishdagi o‘rni, ularning o‘sish sharoitlari, populyatsion tuzilishi va tarqalishining ekologik qonuniyatlari o‘rganilmagan. Demak, mazkur tadqiqotning maqsadi Sherobod tumani hududida tarqalgan *Salvia* L. turkumi turlarining bioekologik xususiyatlari va geografik tarqalishini o‘rganish, ularning mahalliy o‘simlik qoplamidagi o‘rnini aniqlash va ularni muhofaza qilish bo‘yicha asosli tavsiyalar ishlab chiqishdan iborat.

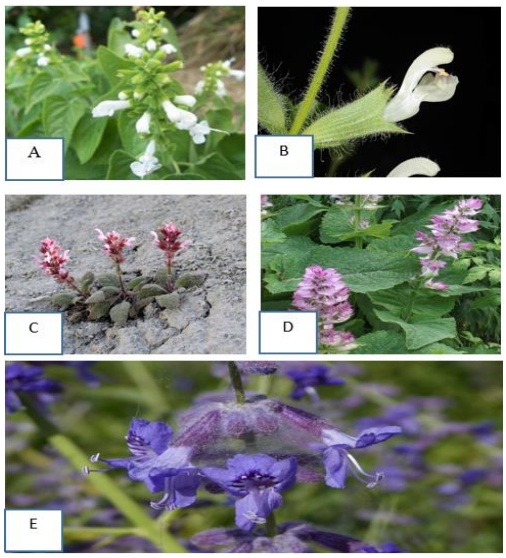
***Salvia spinosa* L. – Tikanli marmarak.** Balandligi 20-60 sm bo‘lgan ko‘p yillik o‘simlik. Poyasi to‘g’ri, keng segmentli, deyarli ko‘p shoxlari tarmoqlanib ketgan. Pastki qismida tuklar va bezlar mavjud. Asosiy barglar tuxumsimon yoki keng ellipssimon shaklda bo‘lib, uzunligi 6–16 sm, eni 2,5–11 sm. Barglar chetida tishlar mavjud. Pastki barglar kichikroq va kamroq tuklangan. To‘pgul shoxlari keng piramidal shaklida, 5–7 soxta halqasimon va 6 gulli gulbandlardan tashkil topgan. Kosachasi konussimon, uzunligi 15–20 mm. Gultoji oq, uzunligi 2–2,5 sm, yuqori lab biroz egilgan, pastki lab esa cho‘zinchoq va tishli. Yong’oqlar trigonal shaklida, uzunligi 2,5 mm, yashil-kulrang. May oyida gullaydi, iyun oyida meva beradi. 800-1000 m balandlikdagi mayda tuproqli, shag’alli, toshli tog’ yon bag’irlarida o‘sadi. Sharqiy O‘rta Yer dengizi, Eron, Misr, O‘rta Osiyo (Qozog’iston, Qirg’iziston, Tojikiston, Turkmaniston, O‘zbekiston)da tarqalgan.

***Salvia ariana* Hedge. – Ariya marmaragi.** Balandligi 30 sm gacha bo‘lgan ko‘p yillik o‘simlik. Poyasi tekis, o‘rtacha 15–40 sm uzunlikda bo‘lib, uzun bo‘lmagan, tuklar bilan qoplangan. Barglari asosan cho‘zinchoq, ovalsimon shaklda, 3–12,5 sm uzunlikda va 2–7 sm kenglikda, zich tuklar bilan qoplangan.

Gulbarglar pushti-binafsharang, membranali, keng ovalsimon shaklda, uzunligi 1,5–2,2 sm va kengligi 1,4–2,7 sm. Kosacha naysimon shaklda, uzunligi 18–22 mm. Gultojbarg pushti yoki och binafsharang, uzunligi 24–30 mm, yuqori labi egilgan, biroz o‘roqsimon. Urug’lar trigonal shaklda, silliq, uzunligi 3,5 mm va kengligi 2,5 mm. May-iyun oylarida gullab, iyun-iyul oylarida meva beradi. 500-2900 m balandlikdagi qoyali, shag’alli tog’ yon bag’irlarida, qoyalarda, ohaktoshli joylarda o‘sadi. Afg’oniston, O‘rta Osiyo (Tojikiston, Turkmaniston, O‘zbekiston)da keng tarqalgan.

***Salvia sclarea* L. – Muskat marmaragi.** Bo‘yi 20-120 sm balandlikda bo‘lgan ko‘p yillik o‘simlik. Poyasi to‘g’ri, oddiy, eng pastki bo‘g’imlar zich, qalin, ko‘p tuklar bilan qoplangan, tepasida esa uzun poyali bezlar mavjud. Pastki va o‘rta poya barglari tuxumsimon yoki tuxumsimon-cho‘zinchoq, yuraksimon yoki o‘tmas, chetlari tishli, qirralari bo‘ylab qalin tuklar bilan qoplangan.

***Salvia scrophulariifolia* Bunge. – Muxallisbargli marmaragi.** Bo‘yi 1 metrgacha yetuvchi yarim buta. Barglari tuxumsimon shaklda, uzunligi 4–7 sm, eni 1,4–3,5 sm, chetlari tishsimon. Gullari ko‘plab bo‘lib, deyarli o‘simtasimon yoki 1 mm gacha uzunlikdagi tukli gulbandlarda joylashgan. Gullash davrida gullar nisbatan cho‘kib turadi. Kosacha naysimon-qo‘ng’iroqsimon, uzunligi 5–6 (7) mm, binafsha rangli, zich tuklar bilan qoplangan. Yuqori lab uzunligi 1,3 mm, eni 2,5–3 mm. Pastki lab uzunligi 1–1,3 mm, kengligi 2,4 mm. Gultoj binafsha yoki oq rangli, uzunligi 13–16 mm, kosachadan ikki baravar uzun. Mevasi – yong’oqcha, ovalsimon, uzunligi 2 mm, kengligi 1 mm, silliq, jigarrang. Iyun-iyulda gullab, iyul-avgustda meva beradi. 800–2700 m balandlikdagi qumli, gilli va shag’alli cho‘l hududlari, qoldiq past tog’lar, toshli va mayda tuproqli tog’ yon bag’irlari hamda dalalarda uchraydi. O‘rta Osiyoda (Qozog’iston, Qirg’iziston, Tojikiston, O‘zbekiston)da tarqalgan endemik tur hisoblanadi.



1-rasm. Surxon davlat qo‘riqxonasi hududida tarqalgan *Salvia* L. turkumining turlari
A. *S. virgata* Jacq.; **B**. *S. spinosa* L **C.** *Sariana* Hedge **D.** *S. sclarea* **E. I**. *S. scrophulariifolia* Bunge.

Salvia virgata Jacq. – Momiq tukli marmarak. Balandligi 50-100 sm bo‘lgan ko‘p yillik o‘simlik. To‘pgul zichroq, qisqa, tagida qalinlashgan va pastga yo‘naltirilgan tuklar bilan qoplangan.

Xulosa o‘rnida shuni aytish mumkinki, Surxondaryo viloyati Sherobod tumani tabiiy florasida *Salvia* L. turkumiga mansub turlar dorivorlik xususiyatining yuqoriligi va ekologik moslashuvchanligi bilan ajralib turadi. Ularning Sherobod tumani florasini shakllantirishdagi o‘rni muhim bo‘lib, bu turkumga mansub turlarni chuqur o‘rganish bioxilma-xillikni saqlash va dorivor resurslardan oqilona foydalanish nuqtai nazaridan dolzarbdir. Ayniqsa, *Salvia* turkumi turlarining tuman hududidagi populyatsiyalarining o‘rganilishi ularning genofondini saqlash, tabiatni muhofaza qilish va ilmiy-amaliy loyihalarni yo‘lga qo‘yish uchun muhim asos bo‘lib xizmat qiladi. Tadqiqot natijalari *Salvia* turkumiga mansub turlarni seleksiya qilish, dorivor xomashyo sifatida yetishtirish va farmatsevtika sanoatida qo‘llash imkoniyatlarini kengaytirishga zamin yaratadi.

Foydalanilgan adabiyotlar

1. Определитель растений Средней Азии. Т.5. Ташкент Фан, 1974.
2. Тожибаев К.Ш., Бешко Н.Ю., Попов В.А. Ботанико-географическое районирование Узбекистана // Ботанический журнал, т. 101, вып. 10, 2016. – С. 1105-1132.
3. Хасанов Ф.О. Краткий очерк растительности Кугитанга // Тез. докл. юбил. науч. конф. молодых ученых и спец-тов посев 60-летию ЛКСМ Узб-на, 1985. – С. 167-168.
4. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
5. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.

Qobilov A., PhD
dotsent
“raqamli iqtisodiyot” kafedrasi
“raqamli iqtisodiyot va axborot texnologiyalari” fakulteti
TDIU
Bekberganov A. U.
iqtisodiyotda axborot texnologiyalari va tizimlari magistranti
Toshkent davlat iqtisodiyot universiteti
O’zbekiston

KOMPANIYALARNING BIZNES JARAYONLARIGA RAQAMLI TEXNOLOGIYALARNI QO‘LLASH

Annotatsiya: *Ushbu maqolada kompaniyalarning biznes jarayonlarini samarali boshqarish va raqamli texnologiyalar yordamida takomillashtirish yo‘llari tahlil qilingan. Raqamli texnologiyalarni qo‘llash natijasida kompaniyalar jarayonlarni avtomatlashtirish, mijozlar bilan samarali muloqot qilish va raqobatdoshligini oshirish imkoniga ega bo‘ladilar. Ushbu sohada amalga oshirilayotgan yangiliklar va texnologik yondashuvlar muhim o‘rinni egallaydi. Shuningdek, maqolada O‘zbekiston Respublikasi Prezidenti tomonidan raqamli iqtisodiyotni rivojlantirish bo'yicha qabul qilingan qarorlar asosida davlat ko'magining ahamiyati ham ko'rsatilgan. Kompaniyalar uchun raqamli texnologiyalarni tadbiq etish va ularning samaradorlikka ta’siri tadqiq etilgan.*

Kalit so‘zlar: *raqamli texnologiyalar, biznes jarayonlari, avtomatlashtirish, mijozlar bilan muloqot, raqobatdoshlik*

Kobilov A., PhD,
associate professor
department of “digital economy”
faculty of “digital economy and information technologies”
Tashkent State University of Economics
Bekberganov A. U.
master’s student
faculty of master’s studies
Tashkent State University of Economics
Uzbekistan

APPLICATION OF DIGITAL TECHNOLOGIES IN THE BUSINESS PROCESSES OF COMPANIES

Abstract: *This article analyzes ways to improve the management of companies' business processes through the application of digital technologies. By employing digital tools, companies can automate processes, effectively interact with customers, and increase their competitiveness. Innovations and technological*

approaches are essential in this domain. Additionally, the article highlights the significance of state support as outlined in the resolutions issued by the President of Uzbekistan on digital economy development. The application of digital technologies and their impact on companies' efficiency are examined.

Keywords: *digital technologies, business processes, automation, customer interaction, competitiveness.*

Kirish

Raqamli texnologiyalar bugungi kunda kompaniyalar uchun muhim o‘rinni egallab, ularning jarayonlarni optimallashtirish va samaradorlikni oshirish imkoniyatlarini kengaytirmoqda. O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyevning raqamli iqtisodiyotni rivojlantirishga oid qarorlari va farmonlari orqali kompaniyalarga raqamli texnologiyalarni qo‘llash, ular yordamida jarayonlarni avtomatlashtirish va modernizatsiya qilish imkoniyatlari yaratilmoqda. Jumladan, “2020-2030 yillarda O‘zbekiston Respublikasini rivojlantirish strategiyasi” (PQ-6079) doirasida, raqamlashtirishni rivojlantirishga keng yo‘l ochilib, raqamli texnologiyalardan foydalangan holda iqtisodiyotning barcha sohalarida samaradorlikni oshirish masalalari ko‘tarilgan. Bu esa kompaniyalarga raqamli texnologiyalarni qo‘llash orqali xizmat ko'rsatish tezligini oshirish, qo‘shimcha xarajatlarni kamaytirish va mijozlarga ko'rsatilayotgan xizmatlarning sifatini yaxshilash imkonini beradi. Shu bilan birga, mamlakatda biznes sohasida yangi texnologiyalardan foydalanishni rag‘batlantirish ham nazarda tutilgan. Raqamli texnologiyalarni joriy etish va ular yordamida yangi strategiyalar ishlab chiqish orqali kompaniyalar innovatsion rivojlanishga hissa qo‘shmoqdalar.

Adabiyotlar tahlili

Raqamli texnologiyalarni kompaniyalarning biznes jarayonlariga qo‘llash masalasi ko‘plab tadqiqotlarda tahlil qilingan. Oxirgi yillarda olib borilgan tadqiqotlar bu texnologiyalarning samaradorlik va raqobatdoshlikni oshirishdagi ahamiyatini qayd etadi. Kompaniyalarning biznes jarayonlariga raqamli texnologiyalarni joriy etish borasidagi ilmiy adabiyotlar tahlili shuni ko‘rsatadiki, zamonaviy tashkilotlarning raqobatbardoshligini ta’minlashda raqamli transformatsiya hal qiluvchi omilga aylanmoqda. Tadqiqotlarda asosan jarayonlarni avtomatlashtirish, ma’lumotlarga asoslangan boshqaruv, korxona resurslarini integratsiyalash va sun’iy intellektdan foydalanish masalalari o‘rganilgan. T. Davenport (2018) o‘zining “Artificial Intelligence in Business” nomli asarida sun’iy intellekt integratsiyasi jarayonlarni optimallashtirish, mijozlarga xizmat ko‘rsatish tezligi va aniqligini oshirishda muhim rol o‘ynashini ta’kidlaydi. Muallif real kompaniyalar misolida AI asosidagi raqamlashtirish operatsion xarajatlarni 20–25% gacha kamaytirishini ilmiy asosda ko‘rsatadi (Davenport, 2018, pp. 54–63). Bu xulosalar biznes jarayonlarida algoritmik boshqaruvning muhimligini tasdiqlaydi. Ayrim mahalliy tadqiqotchilar fikricha, raqamli transformatsiya orqali samaradorlikka erishish bu – resurslarni boshqarishni raqamlashtirish, yangi innovatsiyalarni joriy etish va kompaniyalar

boshqaruvini zamonga mos o‘zgartirish demakdir. Islomjon Nurmukhammadovning (2023) O‘zbekiston sharoitida sanoat korxonalarida ERP tizimlaridan foydalanish bo‘yicha ilmiy maqolasida, raqamli tizimlarning ishlab chiqarish, logistika va buxgalteriya jarayonlaridagi samaradorlik darajasi o‘rganilgan. Tadqiqot natijalariga ko‘ra, ERP tizimlarini joriy etgan korxonalarda resurslarni boshqarish aniqligi oshgan, mahsulot tannarxi kamaygan va moliyaviy nazorat kuchaygan (Nurmukhammadov, 2023, pp. 5–7). Bu ma’lumotlar raqamli transformatsiya O’zbekiston korxonalarida ham amaliy natija berayotganini tasdiqlaydi.

Tadqiqot metodlari

Dunyo miqyosida kompaniyalar biznes jarayonlarida zamonaviy texnologiyalarni qo‘llashning samaradorligini o‘rganish uchun, ushbu sohada olingan ma'lumotlarni tahlil qilishda ilmiy abstraktsiyalash, tahlil (analitik) metod, mantiqiy fikrlash, korelatsion va regressiya tahlil usullari va ma'lumotlarni guruhlash va taqqoslash usullari orqali texnologiyalarning turli biznes jarayonlariga ta'siri ko‘rib chiqildi.

Tahlil va natijalar

Raqamli texnologiyalarni joriy etish kompaniyalarga biznes jarayonlarini avtomatlashtirish va optimallashtirishda katta imkoniyatlar yaratadi. Bugungi kunda kompaniyalar zamonaviy dasturiy ta'minot va uskunalar yordamida xarajatlarni kamaytirish, mahsulot sifatini oshirish va resurslardan samarali foydalanish kabi maqsadlarga erishmoqda. Ushbu jarayonlarda texnologiyalar yirik ma'lumotlarni tahlil qilish imkonini beradi, bu esa kompaniyalarga real vaqt rejimida qaror qabul qilishni osonlashtiradi. Zamonaviy texnologiyalarni biznes jarayonlariga joriy etish korxonalar uchun bir qator ustunliklarni yaratadi. Misol uchun, ERP tizimlari korxonaning moliyaviy, logistika, ishlab chiqarish, sotib olish va kadrlar bo‘limlarida barcha jarayonlarni yagona platforma orqali boshqarish imkonini beradi. Nurmukhammadov (2023) tadqiqoti shuni ko‘rsatadiki, ERP tizimlari sanoat korxonalarida resurslardan foydalanish samaradorligini 15–20 foizga oshiradi, inson omiliga bog‘liq xatoliklarni kamaytiradi va real vaqt rejimida monitoring imkoniyatini yaratadi. Avvalambor, bu jarayonlarning inson omiliga bog‘liq xatoliklardan holi bo‘lishini ta’minlaydi. Masalan, moliyaviy va kadrlar boshqaruvi sohasida kompaniyalar avtomatlashtirilgan tizimlar orqali noto‘g‘ri hisob-kitoblardan saqlanishi mumkin. Bundan tashqari, xizmat ko‘rsatish sohasida avtomatlashtirishning joriy qilinishi mijozlarga xizmat ko‘rsatish tezligi va sifati yuqori darajada bo‘lishini ta'minlaydi.

Bugungi kunda raqamli transformatsiya butun dunyo bo'ylab kompaniyalar biznes jarayonlarini tubdan o'zgartirmoqda, samaradorlikni oshirish va raqobatbardoshlikni kuchaytirishda asosiy omilga aylanmoqda. McKinsey kompaniyasining so'nggi tahliliga ko'ra, dunyodagi yirik kompaniyalarning 89 foizi raqamli va sun’iy intellekt texnologiyalarini joriy qilish jarayonida bo'lib, ular bu orqali kutilgan daromadlarning faqat 31 foizini va xarajatlarni kamaytirish bo‘yicha 25 foizni amalga oshirayotganini aniqlagan. Bu raqamlar raqamli

o'zgarishlardan to'liq foyda olish uchun strategik muvofiqlik va doimiy takomillashtirish zarurligini ko'rsatadi.[11]

Deloitte kompaniyasining 2023-yilgi hisobotida esa, raqamli strategiyani samarali amalga oshirish Fortune 500 kompaniyalari uchun qo'shimcha 1,25 trillion AQSh dollari miqdorida bozor kapitallashuvi yaratish imkoniyatini beradi, deb taxmin qilinadi. Biroq, bunday qiymat faqat raqamli strategiyalarni aniq biznes maqsadlari bilan uyg'unlashtirilganda erishilishi mumkin, aks holda, bu noto'g'ri yondashuv kompaniya qiymatining sezilarli darajada kamayishiga olib kelishi mumkin. [12] Gartner kompaniyasi tahliliga ko'ra, kompaniyalarning taxminan 56 foizi o'rtacha yoki yuqori darajadagi raqamli yetuklikka ega bo'lib, bu ularning raqamli texnologiyalarni asosiy jarayonlarga muvaffaqiyatli integratsiya qilganligini ko'rsatadi. Raqamli yetakchilar esa bozor talablariga tezroq moslashish va daromadlarni oshirishda sezilarli ustunlikka ega. Bu ko'rsatkichlar shuni anglatadiki, raqamlashtirish zamonaviy biznes muhiti uchun majburiy talab bo'lib, nafaqat samaradorlikni oshirish, balki xarajatlarni qisqartirish va mijozlarga yanada sifatli xizmat ko'rsatish imkonini beradi. Umuman olganda, kompaniyalarning biznes jarayonlariga raqamli texnologiyalarni qo‘llashi zamonaviy bozor muhitida muvaffaqiyatga erishishning zaruriy shartiga aylanmoqda. Shu sababli, kompaniyalar raqamlashtirish jarayonlarini rivojlantirish va yangi texnologiyalardan foydalanishni kengaytirishga e'tibor qaratishlari kerak.

Xulosa

Raqamli texnologiyalarni kompaniyalarning biznes jarayonlariga tatbiq etish zamonaviy biznes muhitida muvaffaqiyatga erishishning muhim omiliga aylanmoqda. Ushbu tadqiqot natijalariga ko‘ra, raqamli texnologiyalar jarayonlarni avtomatlashtirish, mijozlar bilan samarali muloqot qilish va resurslardan tejamkorlik bilan foydalanishda kompaniyalarga katta yordam beradi. ERP kabi tizimlar moliyaviy va kadrlar boshqaruvi kabi operatsiyalarni markazlashtirish orqali operatsion samaradorlikni oshiradi va inson omilidan kelib chiqadigan xatoliklarni kamaytiradi. McKinsey va Deloitte kabi nufuzli tadqiqotlar shuni ko'rsatmoqdaki, raqamli texnologiyalarning muvaffaqiyatli qo'llanilishi kompaniyalar uchun qo'shimcha daromad manbalarini yaratishi va xarajatlarni sezilarli darajada kamaytirishi mumkin. Biroq, bu jarayonning samaradorligi raqamlashtirish strategiyalarini aniq biznes maqsadlari bilan moslashtirishga bog'liq.

O‘zbekiston Respublikasi Prezidentining raqamli iqtisodiyotni rivojlantirish bo‘yicha qarorlari mamlakat kompaniyalariga raqamli transformatsiya yo‘nalishida muhim imkoniyatlar yaratmoqda. Bu esa milliy iqtisodiyotning barcha sohalarida samaradorlikni oshirish va raqobatbardoshlikni kuchaytirish uchun keng yo‘l ochib beradi.

[11] https://www.mckinsey.com/featured-insights/themes/how-top-performing-companies-approach-digital-transformation

[12] https://www.deloitte.com/global/en/about/press-room/new-deloitte-report-finds-digital-transformation.html

Umuman olganda, kompaniyalar raqamli texnologiyalarni keng miqyosda qo‘llash orqali tezkor qaror qabul qilish, xizmat sifatini oshirish va bozor o‘zgarishlariga moslashish imkoniyatiga ega bo‘ladilar. Shu sababli, raqamlashtirish jarayonlarini yanada chuqurlashtirish va bu borada yangi innovatsion yondashuvlarni tadbiq etish kompaniyalar uchun muvaffaqiyatning asosiy shartiga aylanmoqda.

Foydalanilgan adabiyotlar:

1. Kuchkarov.T. – Professor, Tashkent State University of Economics - https://dgeconomy.tsue.uz/index.php/dgeco/issue/view/12
2. Cambridge University Press - Business Model Innovation A Blueprint for Strategic Change , 2022 y. pp. 80 – 110.
3. Tomas Haffenden - "Digital Transformation: How to Organize Your Enterprise for the Digital Era", 2023 y.
4. Ruben Sigala - "The Alignment Effect: How to Get Real Business Value Out of Technology"; 2023 y.
5. Manel Koumas, Paul-Eric Dossou, Jean-Yves Didie - Digital Transformation of Small and Medium Sized Enterprises Production Manufacturing. 2023 y. - https://www.scirp.org/journal/paperinformation?paperid=113938;
6. Кулагин.Б., Мефферт.Ю. Digital@Scale: Handbook on Business Digitalization / Vladimir Kulagin, Alexander Sukharevsky, Jurgen Meffert. Moscow: Intellectual Literature, 2019. — 293 c.ISBN 978-5-6042320- 7-1;
7. Electronic journal "Digital Economy and Information Technologies" - Issue No. 1, 2024 [13];
8. https://fxssi.com/https://stat.uz/uz/rasmiy-statistika/small-business-and-entrepreneurship-2

Qoraboeva D. J.
faculty of natural sciences
Termez State University
Termez, Uzbekistan

EFFECT OF BIOSTIMULANTS AND MICROFERTILIZERS ON GROWTH, YIELD COMPONENTS, AND SEED PRODUCTIVITY OF SUNFLOWER (HELIANTHUS ANNUUS L.) UNDER IRRIGATED SOIL CONDITIONS

Annotation: *biostimulants, microfertilizers and growth substances contained in the immunostimulant have been found to have a positive effect on the growth, development and formation of seeds in the basket of sunflower of the local Dilbar variety, on the weight of 1000 seeds and on the yield. The use of MERS microfertilizer made it possible to increase the productivity of one plant by 362.9-430.4 grams, the use of Fitovak immunostimulant by 288.1-388.0 grams, and the use of Biodux biostimulant by 107.7-287.7 grams.*

Keywords: *sunflower, biostimulant, standard, immunostimulant, microfertilizer, norm, yield, growth, development.*

Introduction

Sunflower (Helianthus annuus L.) is one of the most important oilseed crops, and its productivity largely depends on soil fertility and the efficiency of applied agrotechnical practices. In regions characterized by irrigated but eroded soils with low organic matter content, plant growth and yield formation are often constrained by insufficient nutrient availability and weakened physiological activity of crops. Under such conditions, the use of biofertilizers, microfertilizers, and biostimulants is considered a promising approach to improve plant development and stabilize yield.

Materials and methods

As a repeated crop, field experiments were conducted at the Thin Fiber Cotton Research Institute. The experimental field is an irrigated grassland barren soil with a reddish color barren soil that has undergone severe erosion. Soil total nitrogen is 0.4%, phosphorus is 0.6%, potassium is up to 1.5-2%, mobile phosphorus is 15-20 mg/kg, mobile nitrogen is 3-5 mg/kg, mobile potassium is 150-200 mg. /kg around. The amount of biohumus in the soil of the studied experimental area is 0.5-0.6% in the layers and decreases towards the lower layers. Methods of conducting field experiments (UzPITI 2007y), "Metodika polevogo opyta" (B. Dospekhov, 1985y) were used in the research. Field experiments were systematically arranged as simple, 4 replicates, 8 variants. The area of the field unit taken into account is 24 m^2 in each option. The number of counted plants is 20. In the experiment, seeds of the Dilbar variety of sunflower were treated with "UZGUMI" biofertilizer 0.6 l/t, Fitovak 200 ml/t, Bioduks 2.0 ml/t and MERS 0.1% - 3.0 ml/t, then 7-8 leaves in the formation phase, biofertilizer "UZGUMI"

was used at the rate of 0.4 l/ha, Fitovak immunostimulator 300 ml/ha, Biodux 2.0 ml/ha, and MERS 0.1% - 0.5 l/ha.

Research results

Several doses of microfertilizers and biostimulants were applied to the Dilbar variety of sunflower, and the effects on field germination of seeds, the transition of sunflower phases, the height of the plant, the number of leaves, the size of baskets, the number and weight of seeds were studied.

One basket develops in oilseed sunflower, in the experiment, the formed complete seeds in one basket were counted in the experimental plants and the following were found. In the control variant, the total number of complete seeds in one basket was 956.6 units. It was determined that UzGUMI produced 298.0 more seeds on average compared to the control. The variant using MERS microfertilizer at 2.0 ml/t yielded an average of 1387.0 seeds from one basket, and it was distinguished by the production of more seeds than all the variants studied in the experiment. The use of biostimulants, especially MERS microfertilizer and Fitovak immunostimulant (1344.6 units), was found to have a positive effect on the increase in the number of seeds in the basket. The amount of seeds in one basket was 430.4 more than the control, and 132.4 more than the UzGUMI standard in the case of MERS microfertilizer 2.0 ml/t. Among the options that used biostimulants, the option that formed the least seeds was observed in the option that used Biodux biostimulant at the rate of 1.0 ml/t (1064.3 units). In this variant, compared to the control, 107.7 seeds were formed and UzGUMI formed 190.3.7 seeds less than the standard.

	Consumption rate ml,l/t (factor V)	**Productivity of one plant, gram**	**1000 seed weight, grams**
Sample	-	94,8	87.9
UZGUMI (benchmark)	0,6l/t	112,9	97.5
Microbiofertilizer MERS	2,0 l/t	144,2	107,5
	3,0 l/t	140,9	95,6
	4,0 l/t	124,9	89,4
Biostimulant Biodux	1,0 ml/t	119,6	106,3
	2,0 ml/t	119,0	104,6
	3,0 ml/t	131,0	93,8
Иммуностимулятор Фитовак	200 ml/t	143,6	99,6
	300 ml/t	126,0	100,5
	400 ml/t	126,0	91,3

Table 1. The effect of biostimulants on the productivity of one plant and the weight of 1000 seeds.

It was found that the productivity of one plant was positively affected by the use of biostimulants in different rates, especially when MERS microfertilizer was used from biostimulants, a high yield was achieved. This microfertilizer is applied at the rate of 2.0 ml/ton of seed and 144.2 grams, 3.0 ml/t during the growing season. 140.9 grams and 4.0 ml/t when used. 124.9 grams were obtained when used. This means an additional yield of 49.4, 46.1 and 30.1 grams per plant, respectively, compared to the control. 31.3, 28.0 and 12.0 grams of additional yield was obtained in comparison with UzGUMI standard.

Discussion

It was found that the growth substances contained in various biostimulants have a positive effect on the growth, development and yield of the local sunflower variety Dilbar.

It led to an increase in the number of seeds in one basket, and the application of microfertilizer, immunostimulator and biostimulants depending on the type had a positive effect on the increase in the number of seeds in the basket, compared to the control, the number of seeds in one basket increased from 42.4 to 107.7, and these seeds were distinguished by the formation of more seeds and the fact that these seeds were large and whole. stood up Based on this, it was proved that the weight of 1000 seeds is higher than 100.5-107.5 grams.

References

1. Варшавская В.Б. Стимулирование прорастания семян сахарной свёклы регуляторами роста и другими физиологически активными веществами / Физиология семян: формирование, прорастание, прикладные аспекты. – Душанбе, 1990. – С. 311–314.
2. Нурматов Ш.Н., Азизов Т.Б., Турсунов Л., Анарбоев И.У., ва бошқалар //Мойли экинлардан юқори ҳосил етиштириш агротехнологияси бўйича тавсиялар. Тошкент. 2012. Туро-Иқбол нашриёти – 56–57 б
3. Мельников Н.Н. Пестициды и регуляторы роста растений / М.: Химия, 1995. – 576 с.
4. Петриченко В.Н. Влияние регуляторов роста растений и микроэлементов на урожайность подсолнечника и масличность семян / Аграр. Россия. – 2010. – №4. – С. 24– 26.
5. Пономаренко С.П. Регуляторы роста растений // – К.: 2003. – 319 с.
6. Сонин К.Е. Влияние препарата фуролан на формирование качества семян трёх сортов подсолнечника // Пищевая технология. – 2010. – №1. – С. 13–15.
7. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
8. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.
9. Халиков Б.М.,Абдуалимов Ш ва бошқалар“УЗГУМИ” биоўғитидан фойдаланиш бўйича деҳқон ва фермер хўжаликларига тавсиялар. Тошкент, 2013, 4 б.

10. Z F Yuldasheva, D J Karabayeva. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qoraboeva D. J.
faculty of natural sciences
Termez State University
Xudoyberdieva M.
talabasi
TerDU
Termez, Uzbekistan

OPTIMIZATION OF BIOSTIMULANT APPLICATION RATES FOR IMPROVING SUNFLOWER GROWTH AND YIELD FORMATION

Annotation: *Microfertilizers, biostimulants, microfertilizers and growth substances contained in the immunostimulant have been found to have a positive effect on the growth of the local Dilbar variety, on the weight of 1000 seeds and on the yield. The use of MERS microfertilizer made it possible to increase the productivity of one plant by 362.9-430.4 grams, the use of Fitovak immunostimulant by 288.1-388.0 grams, and the use of Biodux biostimulant by 107.7-287.7 grams.*

Keywords: *biostimulant, sunflower, standard, immunostimulant, microfertilizer, norm, yield, growth, development.*

Introduction

Sunflower (Helianthus annuus L.) is one of the most important oilseed crops, and increasing its productivity and seed quality remains a priority of modern agriculture. Among advanced technologies of sunflower cultivation, the rational use of mineral fertilizers plays a key role, as plant nutrition is one of the main factors determining growth, yield, and oil content. Timely and balanced application of mineral fertilizers in accordance with the physiological needs of sunflower makes it possible to achieve high and stable yields with improved quality parameters.

The level of study of the problem

One of the advanced technologies of sunflower cultivation is the use of mineral fertilizers, which is one of the main factors of increasing productivity. It is important to nutrition the sunflower in time according to its demand, therefore, it is possible to obtain a high-quality and high yield if the amount and duration of the mineral fertilizer applied to it are determined [2].

Plant growth regulators cannot replace mineral fertilizers, but complement them in the plant nutrition system, increase the coefficient of use of soil and fertilizers. "UZGUMI" biofertilizer is applied mainly before planting seeds and is sprayed when sunflowers form 3-5 leaves. In this case, the yield increases by 0.22-0.31 t/ha and the oil content by 0.3-0.5%. [7]

It is necessary to use the latest scientific achievements and apply the innovative technologies of our advanced farms in order to achieve high

productivity in sunflower cultivation and obtain a large amount of income and profit from it [1].

Under the influence of plant regulators, it increases the effectiveness of pesticides applied to seeds and during the growing season. Some growth regulators reduce white and gray rot diseases of sunflower, and sugar beet diseases by 30-50% or more [3,8].

Employees of the Institute of Agroresurc of Ukraine (Ponomarenko SP, 2003] note that for the agricultural producer growth regulators are no less valuable than mineral fertilizers and plant protection products. A new direction of improving sunflower production technology is the development of a system of effective use of modern plant growth regulators that control individual stages of plant growth and development to activate their immunity and, as a result, increase the yield and quality of sunflower seeds. (Sonin K.E., 2010; Petrichenko V.N., 2010). Therefore, the development of technology for the use of biostimulants that regulate growth and increase immunity is of the utmost importance. [4,5,6].

Research results

Several doses of microfertilizers and biostimulants were applied to the Dilbar variety of sunflower, and the effects on field germination of seeds, the transition of sunflower phases, the height of the plant, the number of leaves, the size of baskets, the number and weight of seeds were studied. According to experiments, the height of the stem of the local Dilbar variety of sunflower is about 2 meters because it is planted in irrigated land. In the experiment, the height of the Dilbar variety grew to an average height of 161.7 sm in the control variant, it was found that the use of biostimulants had a positive effect on the plants, and the height of the plant grew from an average of 179.0 sm to 213.8 sm in these variants. (Figure 1)

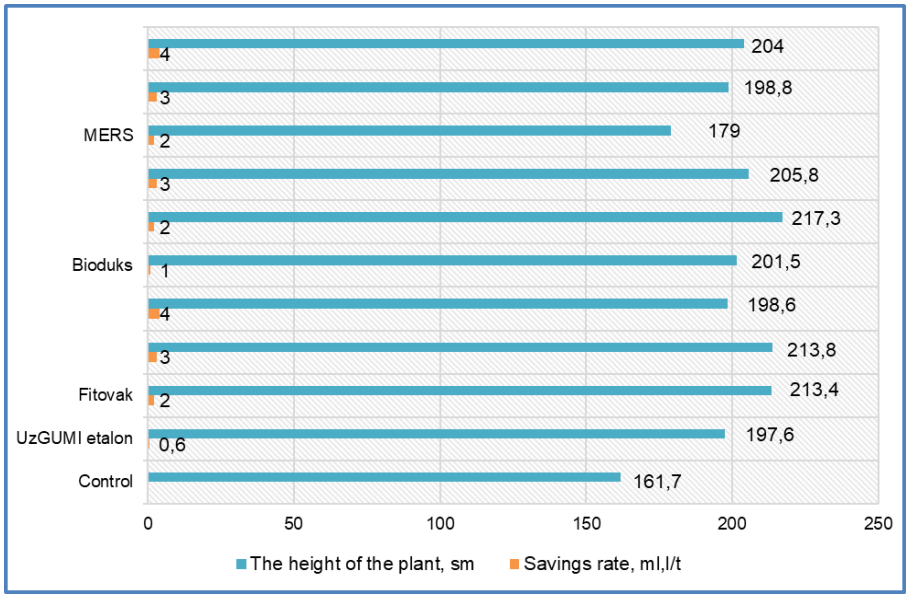


Figure 1. Effect of biostimulants on stem height of sunflower, grain

When UzGUMI biostimulant was applied to sunflower seeds at 0.6 l/ton, the average height of the plant was 197.6 sm, and the biostimulant had a positive effect on the growth of the plant stem, making it 35.9 sm taller than the control option. In the variant where Fitovak immunostimulant was applied to the seed in the amount of 300 ml/ton, the height of the plant was found to be 213.8 sm, and it was 52.1 sm higher than the control and 16.2 sm higher than the standard UzGUMI. In the variant where Fitovak immunostimulant was used in the amount of 200 ml/ton per seed, it was observed that the height of the plant grew at the same height (213.4 sm) as in the variant where the quantity of 300 ml/ton was used in the seed, but increasing the rate of the immunostimulant to 400 ml/ton per seed showed a decrease in the effect on the growth of the plant stem, and the stem height increased by 15.2 sm compared to the second option and 14.8 sm compared to the first option. The use of Fitovak immunostimulant made it possible to increase the height of stems by 51.7 sm compared to the first option, 52.1 compared to the second option, and 36.9 sm compared to the third option compared to the control option. 39.8 sm higher than the control and 3.7 sm higher than the UzGUMI standard in the case of applying Biodux biostimulant at 1.0 ml/ton of seeds, 55.6 sm higher than the control and 19.7 sm higher than the UzGUMI standard in the case of applying 2.0 ml/ton of seeds /ton of seed was found to be 44.1 sm higher than the control and 8.2 sm higher than the UzGUMI benchmark. It was found that the height of the plant was 204.0 sm in the variant where MERS microfertilizer was applied at 4.0 ml/ton, and the stems grew shorter (198.9 and 179.0 sm) when the application rate of microfertilizer was reduced.

Discussion

If increasing the rate of MERS microfertilizer led to the growth of plant stem, it was found that in Bioduks and Fitovak biostimulants, on the contrary, increasing the rate of biostimulants had a negative effect on the growth of plant height.

References

1. Варшавская В.Б. Стимулирование прорастания семян сахарной свёклы регуляторами роста и другими физиологически активными веществами / Физиология семян: формирование, прорастание, прикладные аспекты. – Душанбе, 1990. – С. 311–314.
2. Нурматов Ш.Н., Азизов Т.Б., Турсунов Л., Анарбоев И.У., ва бошқалар //Мойли экинлардан юқори ҳосил етиштириш агротехнологияси бўйича тавсиялар. Тошкент. 2012. Туро-Иқбол нашриёти – 56–57 б
3. Мельников Н.Н. Пестициды и регуляторы роста растений / М.: Химия, 1995. – 576 с.
4. Петриченко В.Н. Влияние регуляторов роста растений и микроэлементов на урожайность подсолнечника и масличность семян / Аграр. Россия. – 2010. – №4. – С. 24– 26.
5. Пономаренко С.П. Регуляторы роста растений // – К.: 2003. – 319 с.
6. Сонин К.Е. Влияние препарата фуролан на формирование качества семян трёх сортов подсолнечника // Пищевая технология. – 2010. – №1. – С. 13–15.

7. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
8. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.
9. Халиков Б.М.,Абдуалимов Ш ва бошқалар“УЗГУМИ” биоўғитидан фойдаланиш бўйича деҳқон ва фермер хўжаликларига тавсиялар. Тошкент, 2013, 4 б.
10. Z F Yuldasheva, D J Karabayeva. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qarabayeva D. J.
katta oqituvchisi
botanika kafedrasi
Termiz davlat universiteti
Qayumova F. N.
talabasi
Termiz Davlat univertiteti

ODAM ORGANIZMIDA YASHOVCHI FOYDALI MIKROORGANIZMLARNING SALOMATLIKDAGI ROLI

Annotatsiya: *Ushbu maqolada odam organizmida yashovchi foydali mikroorganizmlarning turlari va ularning inson salomatligidagi roli o‘rganilgan. Odam tanasidagi mikrobiota ichak, teri, shilliq qavatlar va og‘iz bo‘shlig‘ida joylashib, ovqat hazm qilish, vitaminlar sintezi, immunitet tizimini mustahkamlash va patogen mikroorganizmlardan himoya qilish kabi vazifalarni bajaradi. Tadqiqot nazariy yo‘nalishda olib borilgan bo‘lib, zamonaviy ilmiy adabiyotlar tahlili asosida foydali mikroorganizmlarning biologik va tibbiy ahamiyati batafsil o‘rganildi. Natijalar shuni ko‘rsatadiki, ichak mikroflorasining asosiy qismini Lactobacillus va Bifidobacterium bakteriyalari tashkil etadi va ular organizmning normal faoliyatini ta’minlashda muhim rol o‘ynaydi. Foydali mikroflora sonining kamayishi disbakterioz, immunitetning pasayishi va turli kasalliklar rivojlanishiga olib kelishi mumkin. Shu sababli sog‘lom ovqatlanish va antibiotiklardan ehtiyotkorlik bilan foydalanish orqali mikroflorani saqlash zarur. Ushbu maqola odam organizmida yashovchi foydali mikroorganizmlarning ahamiyatini nazariy jihatdan yoritib, sog‘lom turmush tarzini shakllantirish va kasalliklarning oldini olishga ilmiy asos yaratadi.*

Kalit so‘zlar: *mikrobiota, mikroflora, ichak bakteriyalari, Lactobacillus, Bifidobacterium, immunitet, salomatlik.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
Qayumova F. N.
student
Termez State University

THE ROLE OF BENEFICIAL MICROORGANISMS LIVING IN THE HUMAN BODY IN HEALTH

Annotation: *This article examines the types of beneficial microorganisms living in the human body and their role in human health. Human microbiota is located in the gut, skin, mucous membranes, and oral cavity, performing functions*

such as digestion, vitamin synthesis, strengthening the immune system, and protecting against pathogenic microorganisms. The study was conducted theoretically, based on a review of modern scientific literature, highlighting the biological and medical significance of beneficial microorganisms. The results show that Lactobacillus and Bifidobacterium bacteria make up the main part of the gut microbiota and play an essential role in maintaining normal body functions. A decrease in beneficial microorganisms can lead to dysbiosis, weakened immunity, and the development of various diseases. Therefore, maintaining a healthy microbiota through proper nutrition and careful use of antibiotics is necessary. This article theoretically highlights the importance of beneficial microorganisms in the human body and provides a scientific basis for promoting a healthy lifestyle and preventing diseases.

Keywords: *microbiota, microflora, gut bacteria, Lactobacillus, Bifidobacterium, immunity, health.*

Inson organizmi murakkab biologik tizim bo‘lib, unda ko‘plab mikroorganizmlar yashaydi. Ushbu mikroorganizmlar majmuasi normal mikroflora yoki mikrobiota deb ataladi [1]. Foydali mikroorganizmlar organizm bilan simbioz holatda yashaydi va uning hayotiy jarayonlariga ijobiy ta’sir ko‘rsatadi. Tadqiqot mavzusi odam organizmida yashovchi foydali mikroorganizmlar va ularning salomatlikdagi o‘rni, ularning biologik va immunologik ahamiyatini o‘rganishga qaratilgan [2].

Mavzuning ahamiyati shundaki, mikrobiota tarkibining buzilishi disbakterioz, ovqat hazm qilish kasalliklari, immunitet pasayishi va turli kasalliklarning rivojlanishiga olib kelishi mumkin [3]. Shu sababli foydali mikroorganizmlarning roli va ularni qo‘llab-quvvatlash usullarini o‘rganish dolzarb ilmiy masala hisoblanadi.

Ilgari olib borilgan tadqiqotlarda ko‘plab olimlar mikrobiotani o‘rganib, uning biologik va tibbiy ahamiyatini ta’kidlaganlar. Xususan, I. Mechnikov va L. Paster ichak mikroflorasining inson salomatligiga foydasi va kasalliklarni oldini olishdagi rolini tadqiq qilgan [4]. Zamonaviy ilmiy manbalarda esa Lactobacillus va Bifidobacterium bakteriyalarining ovqat hazm qilish jarayoni, vitaminlar sintezi va immunitet bilan bog‘liqligi keng yoritilgan [5].

Mazkur tadqiqotning maqsadi odam organizmida yashovchi foydali mikroorganizmlarning turlarini va ularning asosiy funksiyalarini yoritishdan iborat.

Adabiyotlar tahlili

Inson mikrobiotasining tarkibi murakkab va turlicha bo‘lib, uning asosiy qismi ichaklarda joylashadi. Tadqiqotlar shuni ko‘rsatadiki, ichak mikroflorasining 60–70 % qismini foydali bakteriyalar tashkil etadi [1,3]. Ushbu bakteriyalar ovqat hazm qilish, vitaminlar sintezi va immunitet tizimini faollashtirishda ishtirok etadi [2]. Bu boradagi ilk tadqiqotlarni L. Paster va I. Mechnikov ishlarida uchratishimiz mumkin. Ularning ishlarida foydali mikroorganizmlarning kasalliklarni oldini olishdagi ahamiyati ko‘rsatib o‘tilgan

[4]. Zamonaviy tadqiqotlarda esa Lactobacillus va Bifidobacterium shtammlarining biologik faoliyati, shuningdek, antibiotiklardan uzoq muddat foydalanish natijasida mikrofloraning buzilishi ko‘rsatib o‘tilgan [5]. Shuningdek, teri va shilliq qavatlarda yashovchi mikroorganizmlar tashqi muhitdan kiruvchi patogenlarga qarshi tabiiy himoya vazifasini bajaradi [3]. Tadqiqotlar shuni tasdiqladiki, mikrobiota muvozanatini saqlash inson salomatligining asosiy omillaridan biridir [1,2].

Adabiyotlar tahliliga ko‘ra: Inson organizmida yashovchi mikroorganizmlarning umumiy soni 10^{13}–10^{14} ni tashkil etadi [1,5]. Ularning 60–70 % ichaklarda joylashgan. Ichak mikroflorasining asosiy qismini Lactobacillus va Bifidobacterium tashkil etadi [3,5]. Ichak bakteriyalari immun tizimi bilan bog‘liq bo‘lib, vitaminlar sintezida faol ishtirok etadi: B guruhi vitaminlari – 30–40 %, K vitamini – 50 % gacha sintez qilinadi [2]. Teri va shilliq qavatlarda foydali mikroorganizmlar umumiy mikrobiotaning 20 % ni tashkil qiladi [1,3]. Mikroflora muvozanati buzilganda ichak kasalliklari rivojlanish ehtimoli 2–3 barobar oshadi [4].

Xulosa

Xulosa o‘rnida shuni aytish lozimki, odam organizmida yashovchi foydali mikroorganizmlar inson salomatligida juda muhim rol o‘ynaydi. Tadqiqotlar natijalari shuni ko‘rsatadiki, ichak mikroflorasining asosiy qismini Lactobacillus va Bifidobacterium bakteriyalari tashkil etadi, ular ovqat hazm qilish, vitaminlar sintezi va immunitet tizimini qo‘llab-quvvatlashda faol ishtirok etadi. Foydali mikroorganizmlarning normal faoliyati patogen mikroorganizmlarning rivojlanishini cheklashga va turli kasalliklarning oldini olishga yordam beradi.

Maqolada keltirilgan tahlillar shuni tasdiqladiki, ichak va boshqa mikrofloralarning muvozanati buzilganda disbakterioz, allergiya va surunkali yallig‘lanish kabi salomatlik muammolari paydo bo‘lishi mumkin. Shu sababli, sog‘lom ovqatlanish va antibiotiklardan ehtiyotkorlik bilan foydalanish foydali mikroflorani saqlash va rag‘batlantirish uchun muhimdir.

Umuman olganda, foydali mikroorganizmlar inson organizmida nafaqat biologik, balki tibbiy va profilaktik jihatdan ham katta ahamiyatga ega. Ularning faoliyatiga salbiy ta’sir ko’rsatmaslik orqali inson salomatligini mustahkamlash, kasalliklarning oldini olish va umumiy hayot sifatini yaxshilash mumkin.

Foydalanilgan adabiyotlar

1. Tortora GJ, Funke BR, Case CL. Microbiology: An Introduction. 15th ed. Pearson; 2020.
2. Jawetz E, Melnick JL, Adelberg EA. Medical Microbiology. 28th ed. McGraw-Hill; 2019.
3. Madumarov T. Mikrobiologiya. Toshkent: Fan; 2021.
4. O‘zbekiston Respublikasi Biologiya darsliklari. Toshkent: 2022.
5. Zheng J, et al. Gut microbiota in health and disease. Nat Rev Microbiol. 2020;18:125–140.

6. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
7. Yuldasheva Z. K., Karabaeva D. J. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qarabayeva D. J.
katta oqituvchisi
botanika kafedrasi
Termiz davlat universiteti
Ibragimov F. A.
talabasi
Termiz Davlat univertiteti

BOYSUN BOTANIKA-GEOGRAFIK MINTAQASIDA UCHRAYDIGAN CAREX L. TURLARINING EKOLOGIYASI

Annotatsiya: *Cyperaceae L. (hiloldoshlar) oilasiga mansub Carex L. turkumi dunyodagi eng yirik kosmopolit turkumlardan biri bo‘lib, yer yuzida 2328 [12] ta turi mavjud. Ularning 81[1] tasi O‘rta Osiyoda, 43[2] tasi O‘zbekistonda, 21 tasi Surxondaryo viloyatida uchraydi. Tadqiqot natijalariga ko‘ra, Boysun botaniko-geografik hududida Carex L. turkumining 7 ta tabiiy turi aniqlangan. Ushbu turlar morfologik va ekologik belgilari bilan bir-biridan farq qiladi hamda o‘ziga xos fitotsenotik va biogeografik ahamiyatga ega. Ularning ayrimlari tog‘-vodiy o‘tloqlarida, soy bo‘ylarida va nam joylarda o‘sadi, bu esa Carex L turkumining yuqori ekologik moslashuvchanligini ko‘rsatadi. Tadqiqot Carex L. turkumining Boysun mintaqasidagi biologik xilma-xilligi va ularning subgenera bo‘yicha tarqalishini ilmiy asosda yoritib beramiz.*

Kalit so‘zlar: *Cerex L., Cyperaceae, turkum, Boysun mintaqasi, oila, flora, tog’, adir, turkum, tur, botanak geografik mintaqa, qo‘riqxona, qorabosh.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
Ibragimov F. A.
student
Termez State University

ECOLOGY OF *CAREX* L. SPECIES OCCURRING IN THE BOYSUN BOTANICAL-GEOGRAPHICAL REGION

Annotation: *The genus Carex L. of the family Cyperaceae L. (sedges) is one of the largest cosmopolitan genera in the world, comprising 2328 [12] species. Of these, 81 [1] species occur in Central Asia, 43 [2] species in Uzbekistan, and 21 species in the Surkhandarya region. According to the research results, 7 natural species of the genus Carex L. were identified in the territory of the Boysun botanical-geographical region. These species differ from each other by their morphological and ecological characteristics and have distinctive phytocenotic and biogeographical significance. Some of them grow in mountain-valley*

meadows, along streams, and in moist areas, which indicates the high ecological adaptability of the genus Carex L. The study scientifically elucidates the biological diversity of the genus Carex L. in the Boysun region and their distribution according to subgenera.

Keywords: *Carex L., Cyperaceae, genus, Boysun region, family, flora, mountain, foothill, genus, species, botanical-geographical region, reserve, sedge.*

Kirish

Boysun botanik-geografik mintaqasi o'zining unikal biogeografik sharoiti va boy floristik tarkibi bilan ajralib turadi [4]. Hudud florasini o'rganish bo'yicha S.A. Nevskiy [5] va F.O. Xasanov [6] kabi olimlar tomonidan olib borilgan tadqiqotlar asosiy ma'lumot manbai hisoblanadi. Biroq, mavjud ma'lumotlar fragmentar xarakterda bo'lib, mintaqa florasi haqida to'liq tasavvur bermaydi. Hududda Cyperaceae oilasiga mansub *Carex* L. (Qorabosh) turkumining 7 ta turi tarqalganligi aniqlandi. Ushbu turlarning tog'-vodiy o'tloqlari, soy bo'ylari va nam mikrohabitatlardagi tarqalishi ularning ekologik moslashuvchanligidan dalolat beradi. Ammo, ularning ekologik talablari, turli ekotoplardagi tarqalish qonuniyatlari va ekologik indikatorlik xususiyatlari to'liq o'rganilmagan. Shu sababli, mazkur tadqiqot Boysun botanik-geografik mintaqasida uchraydigan *Carex* L. turlarining ekologiyasini o'rganishga, ularning ekologik xususiyatlari, tarqalish areallari va lokal ekotizimlarga ta'sirini aniqlashga qaratilgan.

Carex serotina **Ten.** (Kechki qorabosh) Nam maysazorlarda, daryo va soy bo‘ylarida, buloq botqoqlarida, to‘qaylarda, sharshara yon bag‘irlarida, tog‘ oldi, past va o‘rta tog‘ zonalarida, kamdan-kam hollarda tog‘ oldi tekisliklarda uchraydi. Qoplovchi qopqoq shakli va rangi bo‘yicha ikkala tur ham farq qilmaydi. V. I. Krechetovich C. philocrena ni C. serotina dan qisqa ikki tishli tumshuqlari va cho‘ziq-tuxumsimon, o‘tkir, och-jigarrang qoplovchi qopqog‘i bilan farqlagan. Mening kuzatishlarim bo‘yicha, tumshuqlar ikkala turi uchun ham bo‘lingan va qisqa ikki tishli bo‘lib, qoplovchi qopqoqlari odatda to‘mtoq, juda kamdan-kam hollarda (ham C. serotina, ham C. philocrena) o‘tkir va uchli. May-iyunda gulaydi, iyun-avgustda mevasi pishib yetiladi. Bu turkum turlari chorvachilikda qimmatbaho yem-xashak manbai va xo‘jalikda xashakbop o‘simlik sifatida katta ahamiyatga ega hisoblanadi. O‘rta Osiyo hududida keng tarqalgan.

Carex orbicularis **Boott.** (Yumaloq qorabosh) Yorqin yashil o‘simlik, 10–20 sm balandlikda, o‘rmalovchi ildizpoyasi bilan, siyrak g‘aramchalar hosil qiladi. Poyalar uch qirrali, qo‘pol. Barglari yassi, 3–5 mm kenglikda, tez o‘tkirlashgan, deyarli poyaga teng; pastki po‘choqlari kashtan tusida, bargsiz. Boshoqlar soni 3–4 ta, zich joylashgan; yuqorigi boshoq erkak, cho‘ziq, 2 sm gacha uzunlikda, qo‘ng‘ir rangdagi qoplovchi po‘choqlar bilan; qolganlari urg‘ochi, cho‘ziq, zich, 0,6–1,5 sm uzunlikda, kuchsiz ifodalangan bandlarda. Quyi qoplovchi barg junon shaklida, boshoqdan qisqaroq. Qoplovchi po‘choqlar tuxumsimon, to‘mtoqlashgan, qora-qo‘ng‘ir, mevalardan deyarli ikki baravar qisqaroq. Mevalar keng tuxumsimon, deyarli dumaloq, 2,5–3 mm uzunlikda, ikki yoqlama bo‘rtma,

yuqorisi qora-qo‘ng‘ir, tomirsiz, tepasi yumaloq, qisqa, silliq, silindrsimon tumshug‘li. Iyun-iyulda gulaydi, iyul-sentyabrda mevasi pishib yetiladi. Botqoqlik va nam o‘tloqlarda, botqoqlik qirg‘oqlarida, suv havzalari bo‘ylarida, toshloqlarda, buloq yonlarida, botqoqlangan, ko‘pincha qirg‘oqdagi tolzorlar, qayinzorlar va terakzorlar orasida; ba'zan toshloq so‘qmoqlarda va ariq bo‘ylarida; asosan tog‘larning o‘rta va yuqori belbog‘larida keng tarqalgan, ko‘pincha mustaqil o‘tloq-botqoq assotsiatsiyalarini hosil qiladi, kamdan-kam hollarda tog‘larning pastki belbog‘larida va tog‘ etaklarida, juda kam hollarda tog‘oldi tekisligida uchraydi. Bu turkum turlari chorvachilikda qimmatbaho yem-xashak manbai va xo‘jalikda xashakbop o‘simlik sifatida katta ahamiyatga ega hisoblanad**i.** Deyarli butun O‘rta Osiyo tog‘larida uchraydi.

***Carex popovii* V.I.Krecz.** (Popov qoraboshi) Sizovg‘ich-yashil o‘simlik, balandligi 15–35 sm, qisqa o‘rmalovchi ildizpoyasi bilan, siyrak g‘aramchalar hosil qiladi. Poyalar uch qirrali, yuqoridan qo‘pol, biroz egilgan; pastki qismida binafsha-qo‘ng‘ir, bargsiz po‘choqlar bilan qoplangan. Barglari yassi, 1,5–3 mm kenglikda, poyadan qisqaroq. Boshoqlar soni (2)-3–5 ta; yuqorigi boshoq ginekandrik, qolganlari urg‘ochi, pastki qismida tarqalgan, pastki boshoqlar bandda joylashgan, cho‘ziq yoki cho‘ziq-tuxumsimon, uzunligi 0,8–1,7 sm, kengligi 3–5 mm, to‘mtoqlashgan.

Xulosa

Boysun botanik-geografik mintaqasida uchraydigan *Carex* L. turlarining ekologiyasi ularning yuqori moslashuvchanligi va ekologik plastikligi bilan ajralib turadi. Tadqiqot shuni ko‘rsatdiki, bu turlar mintaqaning murakkab geomorfologik tuzilishi va o‘zgaruvchan iqlimiy sharoitlariga samarali moslashgan.*Carex* turlari asosan nam o‘tloqlar, soy bo‘ylari va tog‘ etaklarida tarqalgan bo‘lib, xerofit (*C. songorica, C. physodes*) va gidrofit (*C. orbicularis, C. melanastachya*) sharoitlarga moslashish qobiliyati ularning ekologik valentligini ko‘rsatadi. Turlarning turli ekotoplardagi tarqalishi ularning ekologik talablari va moslashish strategiyalarini aks ettiradi. *Carex* L. turlarining ekologik ahamiyati ularning fitotsenozlarning barqarorligini ta'minlashdagi roli, tuproq va namlik rejimini tartibga solishdagi ishtiroki va biologik xilma-xillikni saqlashdagi o‘rni bilan belgilanadi. Ushbu turlar mintaqaning ekologik muvozanatini saqlashda muhim indikator va stabilizator rolini o‘ynaydi.

Foydalanilgan adabiyotlar

1. Определитель растений Средней Азии. Т.5. Ташкент Фан, 1974.
2. Тожибаев К.Ш., Бешко Н.Ю., Попов В.А. Ботанико-географическое районирование Узбекистана // Ботанический журнал, т. 101, вып. 10, 2016. – С. 1105-1132.
3. Хасанов Ф.О. Краткий очерк растительности Кугитанга // Тез. докл. юбил. науч. конф. молодых ученых и спец-тов посев 60-летию ЛКСМ Узб-на, 1985. – С. 167-168.
4. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160

5. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.
6. Yuldasheva Z. K., Karabaeva D. J. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qarabayeva D. J.
katta oqituvchisi
botanika kafedrasi
Termiz davlat universiteti
Rustamova F. I.
talabasi
Termiz Davlat univertiteti

BOYSUN HUDUDI FLORASIDA CAREX L. TURKUMINING BIOEKOLOGIK MOSLASHUVCHANLIGI VA EKOLOGIK AHAMIYATI

Annotatsiya: *Maqolada Boysun botaniko-geografik hududi florasida tarqalgan Carex L. (Qorabosh) turkumi vakillarining bioekologik moslashuvchanligi va ekologik ahamiyati tahli qilinadi. Tadqiqot natijalariga ko‘ra, hududda Carex L. turkumiga mansub 7 ta tabiiy tur aniqlandi. Ushbu turlarning morfologik tuzilishi, o‘sish shakli-sharoiti, fenologik rivojlanishi va fitotsenotik bog‘liqliklari o‘rganilib, ularning tog‘-vodiy o‘tloqlari, soy bo‘ylari va nam mikrohabitatlarga moslashish strategiyalari ochib berildi. Turlarning yuqori ekologik plastikligi va turli abiotik omillarga nisbatan moslashuvchanligi ularning ekologik muhim ahamiyatini belgilab beradi.*

Kalit so‘zlar: *Carex L., Qorabosh, bioekologik moslashuvchanlik, ekologik ahamiyat, Boysun hududi, fitotsenoz, ekotizim barqarorligi, biologik xilma-xillik.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
Rustamova F. I.
student
Termez State University

BIOECOLOGICAL ADAPTABILITY AND ECOLOGICAL SIGNIFICANCE OF THE GENUS *CAREX* L. IN THE FLORA OF THE BOYSUN AREA

Annotation: *Abstract: The article analyzes the bioecological adaptability and ecological significance of representatives of the Carex L. (Qarabash) genus, distributed in the flora of the Boysun botanical-geographical region. According to the results of the study, 7 natural species belonging to the Carex L. genus were identified in the region.*

Keywords: *Carex L., Sedge, bioecological plasticity, ecological significance, Boysun region, phytocenosis, ecosystem stability, biological diversity.*

Kirish

Boysun botanik-geografik hududi yuqori taksonomik xilma-xilligi, kamyob, endem va relikt turlarga boyligi bilan ajralib turadi [4]. Hudud florasini o‘rganish bo‘yicha S.A. Nevskiy [5] va F.O. Xasanov [6] tomonidan olib borilgan tadqiqotlar asosiy ma’lumot manbai hisoblanadi. Biroq, mavjud ma’lumotlar fragmentar xarakterda bo‘lib, hudud florasi haqida to‘liq tasavvur bermaydi.

Carex songorica **Kar. & Kir.** (Jo'ng'or qorabosh) Sero-yashil o‘simlik, bo‘yi 30—70 sm, ildizpoyalari uzun poyalar hosil qiladi. Poyasi uchburchak, yuqorisi qo‘pol, tagida esa g‘isht-qizil, bir oz yaltiroq barg qinlari bilan qoplangan. Barglari qattiq, yassi, 2—3 mm kenglikda, ko‘proq tez uchli, poyadan kalta. Boshoqlari 3—4 ta, pastdagilari bir oz siyrak joylashgan; yuqorigi 1—2 tasi erkak, bir-biriga yaqin, tor-to‘qmoqsimon, 2—3 sm uzunlikda, cho‘ziq, uchi bir oz o‘tkir emas, sarg‘ish-jigarrang qinbarglar bilan; qolganlari urg‘ochi, silindrsimon, 2—4 sm uzunlikda va 5—6 mm kenglikda, siyrak, ayniqsa pastki qismi, pastdagisi qisqa bandli. Pastki qinbarg bargi qisqa qinga ega, plastinkasi esa gultojidan uzun. Qinbarglari tuxumsimon, qo‘pol tikanli, jigarrang, o‘rtasi biroz ochroq, xaltachalardan kalta. Xaltachalari tuxumsimon yoki keng-tuxumsimon, deyarli yumaloq, po‘stloqsimon, 3—4 mm uzunlikda, to‘q sariq yoki jigarrang-jigarrang, yaltiroq, nozik, bo‘rtib chiqqan tomirli, biroz tez torayib, kalta, silliq, zaif ikki tishli tumshuq bilan tugaydi. Apreldan iyungacha; Mevalanish davri: iyundan avgustgacha. Nam va botqoqli, ko‘pincha sho‘rxok va sho‘rtobli o‘tloqlarda, o‘tli botqoqlarda, sazo-botqoqlarda, botqoqlangan butazorlar, tugaylar ichida, daryo vodiylari va daralar tubida, shag‘alliklarda, buloqlar yonida va ariq bo‘ylarida, tekisliklardan (asosan tog‘ etaklaridan) tortib tog‘larning yuqori belbog‘igacha. Songor qoraboshining asosiy ahamiyati — ekotizim barqarorligini ta’minlash, tuproqni mustahkamlash va chorvachilik yaylovi sifatida foydalanish. Ildiz tizimi zich bo‘lgani uchun tuproq eroziyasini kamaytiradi. Toshkent, Farg‘ona, Samarqand va Buxoro viloyatlarida tarqalga. Umumiy tarqalishi: O‘rta Osiyo, Kavkaz, G‘arbiy Sibir, Eron, Afg‘oniston, Shimoli-g‘arbiy Mongoliya, Kulja.

Carex turkestanica **Regel.** (Turkiston qoraboshi) Kulrang-yashil o‘simlik, bo‘yi 15–30 sm, ildizi sudraluvchi va bir buta shaklida to‘p bo‘lib o‘sadi. Poyasi tik, deyarli butun uzunligi bo‘ylab g‘adir-budir, keyinchalik silliq bo‘ladi. Barglari yassi, qattiq, eni 2–3,5 mm, uchlari uchburchak shaklda o‘tkir, quriganda kuchli bukiladi. Pastki qizg‘ish-jigarrang po‘choqlari bo‘linib ketadi. 3–5 dona boshoq, yuqoridagilarning 1–2 tasi erkak, tayoqchasimon-lanset shaklida, uzunligi 1–2,5 sm, qirralari parda shaklidagi o‘tkir po‘stloq bilan qoplangan. Qolganlari urg‘ochi, cho‘ziq, uzunligi 1–2 sm, siyrak joylashgan, qisqa sopli. Pastki gullarga yaqin barg po‘choq shaklida, plastinkasi guldastadan qisqaroq. Gulli po‘stloqlar cho‘ziq tuxumsimon shaklda, uzunroq uchi o‘tkir, yengil tomirli, qirralari oq parda shaklida. Ko‘pincha urug‘ po‘stloqlaridan uzunroq. Urug‘ po‘stloqlari teskari tuxumsimon shaklda, terisimon, bo‘rtma uchburchakli, zang-jigarrang. Dastlab biroz g‘adir-budir, keyinchalik silliq va yaltiroq, tomirsiz. Tezda silindrsimon shaklga torayadi, yuqorisi qiyshaygan, ikki tishli va parda bilan o‘ralgan uchga ega. Aprel martda gulaydi, mart iyulda mevasi pishib yetiladi. Quruq tog‘li

toshloq yonbag‘irlarda, 3000 metr balandlikkacha o‘sadi. Dalalarda, yarim cho‘llarda, mayda tuproqli va toshloq yonbag‘irlarda, archazorlarda, itmoringzorlar va boshqa daraxt-butazorlarida, subalp o‘tloqlarida, ba’zan qoyalar, qulagan joylar va ariqlar bo‘yida, tog‘ etaklaridan o‘rtacha, kamdan-kam hollarda esa tog‘larning yuqori qismlarigacha uchraydi. Bu turkum turlari chorvachilikda qimmatbaho yem-xashak manbai va xo‘jalikda xashakbop o‘simlik sifatida katta ahamiyatga ega hisoblanadi. Turkiya, Livan, Isroil, Iroq, Ozarbayjon, Qozog‘iston, Turkmaniston, O‘zbekiston, Xitoy, Afg‘oniston hududlarida tarqalgan.

***Carex pachystylis* J.Gay.** (Yo‘g‘on ustunchali qorabosh) Yashil o‘simlik, balandligi 7–30 sm. Yupqa va sudraluvchi ildizpoyali. Poyasi uch qirrasi noaniq, silliq, asosida qora-jigarrang yoki kashtan rangli eski barg qinlarining bo‘laklari bilan qoplangan.Barglari yumshoq, yassi yoki yarim o‘ralgan, kengligi 1–2 mm, poyadan qisqaroq, biroz jingalak va dag‘al. To‘p gul to‘plamlari 4–6 ta, zich romb shaklida yoki uchburchak-tuxumsimon boshoq hosil qiladi, uzunligi 0,8–2 sm. Gultojbarglari tuxumsimon, to‘liq zang-jigarrang yoki kashtan rang, o‘tkir, va deyarli tuxumchalar bilan teng uzunlikda. Urug‘chilari: tuxumsimon, shishmagan, yupqa po‘stloqli, uzunligi 4–4,5 mm, zang-jigarrang yoki kashtan rang, deyarli tomirsiz, burilgan va ikki tishli tumshug‘i bor. Fevral-aprelda gulaydi, mart-iyunda mevasi pishib yetiladi. Bu o'simlik tuproqli, qumoq va qumli (o‘sgan qumlarda) yarim cho‘llarda, quruq mayda tuproqli yonbag‘irlarda, lyossli tepaliklarda, archa o‘rmonlarida, shuningdek, bo‘sh yer maydonlarida, tog‘ etaklari va oldi tekisliklaridan (keng tarqalgan va mustaqil assotsiatsiyalar hosil qiladigan joylarda) tog‘larning o‘rta va yuqori mintaqalarigacha uchraydi. Bu turkum turlari chorvachilikda qimmatbaho yem-xashak manbai va xo‘jalikda xashakbop o‘simlik sifatida katta ahamiyatga ega hisoblanadi. Pomir-Oloy tog‘ tizmalari —, Samarqand tog‘lari, Turkiston, Nurota, Zarafshon, Hisor, Janubiy Tojikistonning past tog‘larida tarqalgan.

***Carex diluta* M. Bieb.** (Yorqin qorabosh) Kulrang-yashil o‘simlik bo‘lib, bo‘yi 30–120 sm, ildizi zich butalar shaklida tarqalgan. Poyalari uchburchak shaklda, silliq. Barglari yassi, eni 2–6 mm, ingichka uchlanadi, poya uzunligidan qisqaroq. Boshoqlari 3–8 ta, pastga qarab joylashgan; yuqoridagilari 1–2 tasi erkak, uzunligi 1,5–5 sm, uzunasiga tuxumsimon, bo‘yi tevaraklari rang-barang va qizg‘ish, qolganlari urg‘ochi, cho‘zilgan va silindrsimon, uzunligi 0,8–4 sm, eni 5–7 mm, zich joylashgan, pastki qismlari esa uzunroq sopli. Pastki gullarga yaqin barg po‘choq shaklida, plastinkasi guldastadan qisqaroq bo‘lgan. Gulli po‘stloqlar tuxumsimon shaklda, chiqib turgan, qattiq tishli shoxli, jigar rangli, orqa tomoni yashil rangda va urug‘ po‘stloqlaridan qisqaroq bo‘lgan. Urug‘ po‘stloqlari tuxumsimon, eliptik yoki cho‘zilgan-eliptik, ingichka terili, uchburchak shaklda qotib ketgan, uzunligi 3–4 mm, kulrang-yashil va zang rangli nuqtalar bilan, qiyshiq tomirlar bilan, asta-sekinlik bilan yumshoq va tekis, konus shaklida, yuqori qismi o‘tkir tishli bo‘lgan. Aoprel-martda gulaydi, mart-iyulda mevasi pishib yetiladi. Nam va botqoqlangan, odatda sho‘rxok o‘tloqlarda, daryo va soylar bo‘yida, buloq chiqadigan joylarda, ariqlar, pastqamliklar va

botqoqliklarda, tekisliklardan tog‘larning o‘rta qismigacha uchraydi. Bu turkum turlari chorvachilikda qimmatbaho yem-xashak manbai va xo‘jalikda xashakbop o‘simlik sifatida katta ahamiyatga ega hisoblanadi. O‘rta Osiyoning barcha davlatlarida keng tarqalgan.

Foydalanilgan adabiyotlar

1. Определитель растений Средней Азии. Т.5. Ташкент Фан, 1974.
2. Тожибаев К.Ш., Бешко Н.Ю., Попов В.А. Ботанико-географическое районирование Узбекистана // Ботанический журнал, т. 101, вып. 10, 2016. – С. 1105-1132.
3. Хасанов Ф.О. Краткий очерк растительности Кугитанга // Тез. докл. юбил. науч. конф. молодых ученых и спец-тов посев 60-летию ЛКСМ Узб-на, 1985. – С. 167-168.
4. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /“International Journal on Integrated Education” 2020. 157-160
5. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.

Qarabayeva D. J.
katta oqituvchisi
botanika kafedrasi
Termiz davlat universiteti
Primova Y.
talabasi
Termiz davlat universiteti

SURXONDARYO VILOYATI SHEROBOD TUMANIDA TARQALGAN AMARANTHACEAE JUSS. OILASIGA MANSUB DORIVOR O‘SIMLIKLARNING BIOEKOLOGIYASI VA TARQALISHI

Annotatsiya: *Maqolada Surxondaryo viloyati Sherobod tumanida tarqalgan Amaranthaceae Juss. oilasiga mansub dorivor o'simliklarning bioekologik xususiyatlari va geografik tarqalishi tahli qilingan. Tadqiqot davomida tuman hududida ushbu oilaga mansub 10 ta tur aniqlandi, ulardan 5 tasi aniq dorivorlik xususiyatiga ega ekanligi aniqlangan.*

Kalit so'zlar: *Amaranthaceae Juss., dorivor o'simliklar, bioekologiya, geografik tarqalish, Sherobod tumani, sho'rlangan tuproq, halofitlar, dorivorlik.*

Karabayeva D. J.
senior lecturer
department of botany
Termez State University
Primova Y.
student
Termez State University

BIOECOLOGY AND DISTRIBUTION OF MEDICINAL PLANTS BELONGING TO THE FAMILY AMARANTHACEAE JUSS. IN SHEROBOD DISTRICT OF SURKHANDARYA REGION

Abstract: *The article analyzes the bioecological features and geographical distribution of medicinal plants of the Amaranthaceae Juss. family distributed in the Sherabad district of Surkhandarya region. During the study, 10 species of this family were identified in the district territory, 5 of which have pronounced medicinal properties.*

Keywords: *Amaranthaceae Juss., medicinal plants, bioecology, geographical distribution, Sherabad district, saline soil, halophytes, medicinal properties.*

Kirish

Surxondaryo viloyati Sherobod tumani Ko‘hitang tizmasining sharqiy yon bag‘rida joylashgan bo‘lib, murakkab geomorfologik tuzilishga ega [6]. Hudud

florasini o‘rganish bo‘yicha S.A. Nevskiy [3], K.Sh. Tojibaev [4], F.O. Xasanov [5], A.J. Ibragimov [6] kabi olimlar tadqiqotlar olib borgan. Ammo, mavjud ma’lumotlar to‘liq emas. So‘nggi tadqiqotlar Sherobod tumanida Amaranthaceae Juss. oilasiga mansub 5 ta dorivor tur (*Atriplex moneta, A. tatarica, Ceratocarpus utriculosus, Chenopodium botrys, C. foliosum*) aniqlandi. Bu turlar sho‘rlangan tuproqlarda yaxshi o'sadi va qurg'oqchilikka chidamlidir. Mazkur tadqiqot Sherobod tumanida tarqalgan Amaranthaceae oilasi dorivor o'simliklarining bioekologik xususiyatlari va tarqalishini o‘rganishga, ularning mahalliy floradagi o‘rnini aniqlashga qaratilgan.

***Atriplex moneta* Bunge. - Tangamevali olabuta.** Bir yillik o‘simlik bo‘lib, balandligi 30–100 sm gacha yetadi. Poyasi tikkasiga o‘sadi, ba’zan shoxlanadi. Barglari navbat bilan joylashgan, yirik, tishli va tangasimon (lotincha moneta - "tanga" degani) shaklga ega, bu nom ham aynan barg shakliga ishora qiladi. Gullari ikki jinsli yoki bir jinsli bo‘lib, ko‘p hollarda yashil rangda va mayda bo‘ladi. Gullash muddati yoz oylari (iyun–avgust oralig’i). Asosan Markaziy Osiyo (jumladan O‘zbekiston), Qozog’iston, Rossiyaning janubiy hududlari va qurg’oqchil iqlimli hududlarda uchraydi. Tuzli va sho‘rxok tuproqlarda yaxshi o‘sadi, shuningdek, yarim cho‘l va cho‘l hududlariga moslashgan. Ba’zi xalq tabobatida ichki tozalovchi va shamollashga qarshi vosita sifatida ishlatilgan. Ammo bu o‘simlikning dorivor xususiyatlari to‘liq ilmiy o‘rganilmagan, ehtiyotkorlik bilan foydalanish tavsiya etiladi.

***Atriplex tatarica* L. - Tatar olabutasi.** Bu bir yillik o‘tsimon o‘simlik 20 dan 80 sm gacha balandlikda o‘sadi. Poyasi to‘g’ri, ko‘p hollarda shoxlangan, sarg’ish-yashil rangda bo‘ladi. Barglari oddiy, navbatma-navbat joylashgan, shakli uchburchaksimon yoki tuxumsimon, chetlari silliq yoki ozgina tishli. Gullari mayda, yashil rangda bo‘lib, o‘simlikning yuqori qismida to‘pgul holida joylashgan. Gullash davri — iyuldan sentabrgacha. Yevropa, Markaziy va G’arbiy Osiyo, Rossiyaning janubiy qismlari, shuningdek, O‘zbekiston cho‘l va yarim cho‘l hududlarida keng tarqalgan. Asosan sho‘rxok va qumli yerlarda, yo‘l bo‘ylarida, sug’orilmaydigan dalalarda o‘sadi. Ilmiy manbalarda bu o‘simlikning kuchli dorivor xususiyatlari haqida aniq ma’lumotlar kam. Biroq ayrim mintaqalarda xalq tabobatida siydik haydovchi yoki ichki tozalovchi vosita sifatida cheklangan hollarda ishlatilgan. Ilmiy jihatdan hali to‘liq o‘rganilmagan.

***Ceratocarpus utriculosus* Bluket. - Xaltalar ebelek.** Bu bir yillik, past bo‘yli, ko‘p shoxlangan o‘t o‘simlik bo‘lib, odatda 10–30 sm gacha balandlikda o‘sadi. Butasimon shakl hosil qiladi. Barglari ingichka, cho‘ziq yoki ipga o‘xshash, sershox ko‘rinishda joylashadi. Gullari juda mayda, yakka yoki to‘pgullarda joylashgan, yashil yoki sarg’ish-yashil rangda bo‘lib, gullash davri yoz oylari — iyul–avgust oralig’i. Asosan Markaziy Osiyo, xususan O‘zbekiston, Qozog’iston, Tojikiston va Turkmanistonning yarim cho‘l hududlarida uchraydi. Quruq, sho‘rxok va qumloq tuproqlarda yaxshi o‘sadi. Hozircha ilmiy adabiyotlarda aniq dorivor xususiyatlari haqida ishonchli ma’lumotlar yo‘q. Ammo o‘zbek xalq tabobatida bu o‘simlik ayrim yurak va ovqat hazm qilish

tizimi bilan bog'liq muammolarda cheklangan hollarda ishlatilgan degan rivoyatlar bor.

***Chenopodium botrys* L. - Xushbo'y sho'ra.** Bir yillik o't o'simligi, odatda 20–80 sm balandlikda o'sadi. Poyasi tikkasiga o'sadi, sershox. Barglari chuqur tilimlangan, qirrali, bezdor tuklar bilan qoplangan. Ezilganda yoqimli xushbo'y (kamfora yoki balzamga o'xshash) hid tarqatadi. Gullari mayda, yashil rangda, shoxlarning uchida yoki barg qo'ltig'ida to'pgul shaklida joylashadi. Gullash davri iyul-sentabr oylariga to'gri keladi. Yevropa, O'rta Osiyo, Kavkaz, Eron, Hindiston va Shimoliy Afrika hududlarida uchraydi. O'zbekistonning tog' etaklari va past tog'li zonalarida, yovvoyi holda o'sadi. Xalq tabobatida nafas yo'llari kasalliklari (bronxit, yo'tal), shamollash va astma kabi kasalliklarda ishlatilgan. Tarkibida efir moyi va flavonoidlar bo'ladi. Shuning uchun yallig'lanishga qarshi va antiseptik ta'sir ko'rsatadi. Harorat tushiruvchi, balg'am ko'chiruvchi va tinchlantiruvchi xususiyatga ega. Ba'zi mamlakatlarda choy sifatida ham ichiladi (kichik dozada).

Xulosa. Sherobod tumanida tarqalgan Amaranthaceae Juss. oilasiga mansub dorivor o'simliklar yuqori ekologik moslashuvchanlik, morfologik xilma-xillik va qimmatli biologik xususiyatlarga ega. Tadqiqot davomida o'rganilgan *Atriplex moneta, A. tatarica, Ceratocarpus utriculosus, Chenopodium botrys, C. foliosum* turlari og'ir ekologik sharoitlarga moslashgan va inson salomatligi uchun muhim biologik faol moddalarga boy. Ushbu turlar Sherobod tumanida bioxilma-xillikni saqlash, ekologik barqarorlikni ta'minlash va bioresurs sifatida oqilona foydalanishda muhim rol o'ynaydi. Turlarning sho'rlangan tuproqlarda o'sishi va qurg'oqchilikka chidamliligi ularni mintaqaning noqulay sharoitlariga moslashgan qimmatli turlariga aylantiradi.

Foydalanilgan adabiyotlar

1. Определитель растений Средней Азии. Т.5. Ташкент Фан, 1974.
2. Флора Узбекистана том 1. Издательство "Маънавият" Ташкент 1955.
3. Невиский. К.Ш., Бешко Н.Ю., Попов В.А. Ботаник географическое невский С.А. Материалы к флоре Кугитангтау и его предгорий. В кн. Флора и систематика высших растений – М., Л.: Изд. АН СССР, 1937– С.
4. Тожибаев К.Ш., Бешко Н.Ю., Попов В.А. Ботанико-географическое районирование Узбекистана // Ботанический журнал, т. 101, вып. 10, 2016. – С. 1105-1132.
5. Хасанов Ф.О. Краткий очерк растительности Кугитанга // Тез. докл. юбил. науч. конф. молодых ученых и спец-тов посев 60-летию ЛКСМ Узб-на, 1985. – С. 167-168.
6. Ибрагимов Акрам Жавлиевич. Сурхон Давлат Қўриқхонасининг Флораси (Кўҳитанг Тизмаси), Дис канд. биол. наук., Тошкент-2010.
7. Yuldasheva Z. K., Karabaeva D. J The effect of a biostimulator on the growth, development and yie ld of oily sunflower /"International Journal on Integrated Education" 2020. 157-160
8. Yuldasheva Z. K., Karabaeva D. J. Effect of biostimulator on the vegetation period of oily sunflower / «International journal for innovative engineering and management research» 2020. 122-125.

9. Z.K.Yuldasheva, D J Karabayeva. The effect of different doses of different biostimulants on the yield of oily sunflower// IOP Conference Series: Earth and Environmental Science- 1142(2023) 012097

Qudratillayev R. Z.
assistent
Andijon qishloq xo‘jaligi va agrotexnologiyalar insituti

KARANTIN ZARARKUNANDA SITRUS OQQANOTI (DIALEURODES CITRI ASHM.) NING BIOLOGIK XUSUSIYATLARI VA ZARARI

Annotatsiya: *ushbu maqolada hozirgi kunda sitrus mevalarda uchrab zarar keltirayotgan kararntin zararkunanda sitrus oqqanoti (Dialeurodes citri Ashm.) ning biologik xususiyatlari va zarari haqida ma‘lumot keltirilgan.*

Kalit so‘zlar: *kararntin, zararkunanda, sitrus oqqanoti, zarar, himoya qilish.*

Qudratillayev R. Z.
Assistant
Andijan Institute of Agriculture and Agrotechnologies

BIOLOGICAL CHARACTERISTICS AND DAMAGE CAUSED BY THE QUARANTINE PEST — CITRUS WHITEFLY (DIALEURODES CITRI ASHM)

Annotation: *the article presents information about the biological characteristics and harmfulness of the quarantine pest of the citrus whitefly (Dialeurodes citri Ashm.), which causes damage to citrus fruits.*

Key words: *quarantine, pest, citrus whitefly, harm, protection.*

Xozirgi kunda mevachilik O‘zbekistonning asosiy eksport mahsuloti bo‘lib, bog‘bon fermerlar zimmasiga meva etishtirishda uning hosildorligini keskin ko‘tarish, mahsulot sifatini yaxshilash, quruq meva tayyorlash hajmini oshirish, aholini hamda qayta ishlash sanoatini xomashyo bilan to‘liq ta'minlab, yuqori sifatli mahsulotni chetga chiqarish yuklatiladi. Mevachilikni yanada rivojlantirish uchun parvarishlash agrotexnikasini doimo takomillashtirib, zamonaviy texnika va texnologiyalarga moslab borish bilan bir qatorda mevali bog‘larda uchrovchi zararkunanda, kasallik va begona o‘tlardan himoya qilish talab etiladi. [5]. Qishloq xo‘jalik mahsulotlari etishtirishda fitomonitoring bazalarini yaratish va joriy etish muhim ahamiyatga ega. Fitomonitoringning asosiy vazifalaridan biri ekinlarning holatini bilish va tahlil qilish, rivojlanish kechikishlarining sabablarini aniqlashdir.

Respublika hududini chet mamlakatlardan kirib kelib, xalq xo‘jaligiga katta iqtisodiy zarar etkazishi mumkin bo‘lgan karantindagi va boshqa xavfli zararkunandalardan, o‘simlik kasalliklari va begona o‘tlardan muhofaza etish, ularni vaqtida aniqlash, yoyilishiga yo‘l qo‘ymaslik hamda yo‘q qilish, shuningdek respublikaning bu zararkunanda, kasallik va begona o‘tlardan xoli mintaqalariga kirib borishining oldini olish, qishloq xo‘jalik mahsulotlari va boshqa o‘simlik mahsulotlarini etishtirish, tayyorlash, tashish, saqlash, qayta

ishlash, realizatsiya qilish va ulardan foydalanishda o‘simliklar karantiniga oid qoidalar va tadbirlargarioya etilishi hamda ularning amalga oshirilishi ustidan davlat nazoratini olib borish hisoblanadi.

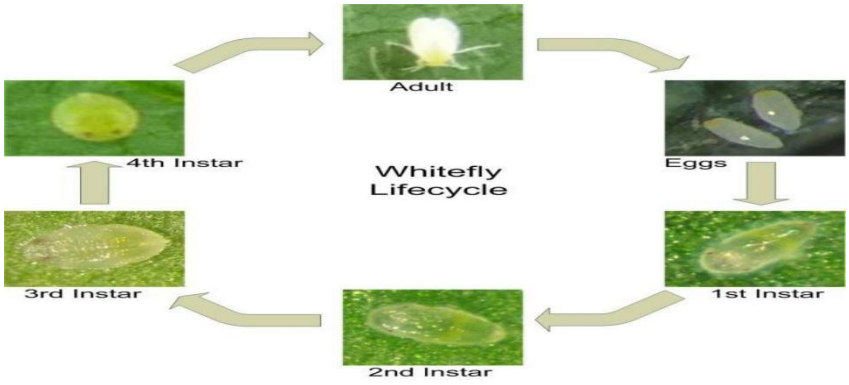
O‘zbekiston Respublikasida qayd etilgan ichki karantin zararkunanda hasharotlarga tsitrus oqqanoti (Dialeurodes citri Ashm.), sharq mevaxo‘ri (Grapholitha molesta Busck.), Kolorado qo‘ng‘izi (Leptinotarsa decemlineata Say.), tsitrus inli kuyasi (Phyllocnistis citrella Stain.), komstok qurti (Pseudococcus comstocki Kuw.) va Kaliforniya qalqondori (Quadraspidiotus perniciosus C.) hasharotlari kiradi. Respublikamiz sharoitida limonga sitrus inli kuyasi va sitrus oqqanotlari ko‘proq zarar etkazadi.

Sitrus oqqanoti - Homoptera, tengqanotlilar turkumi, - Aleyrodidae, aleyrodidlar oilasiga mansub hasharot. Bu zararkunanda asosan lichinkalik davrida sitrus o‘simliklarni so‘rib zarar etkazadi. Sitrus oqqanoti asosan sitrus o‘simliklaridan limon, mandarin, apelsin va boshqa o‘simliklarda rivojlanadi. Shu bilan bir qatorda choy, xurmo, shilvi nastarin, dafna, jasmin, kamfara, gardeniya, ligustrum kabi o‘simliklarga ham katta zarar etkazadi. U faqat daraxtlarning barglarida rivojlanadi shu sababli qish mavsumida barglarini to‘kadigan daraxtlar butalar qishda oqqanotdan tozalanib turadi. Lichinkalarning barglarni so‘rib zararlashi natijasida barglar kuchsizlanadi va o‘simliklarning hosildorligi pasayadi. Oqqanotning shirin ajratmalarida zamburug‘lar rivojlanadi. Bu esa fotosintezning susayishiga olib keladi, mahsulotning tovar ko‘rinishi yo‘qoladi, hosildorlik 50 foizgacha pasayadi.

Vatani Janubi-SHarqiy Osiyo (Xitoy, Hindiston) mamlakatlari hisoblanadi. Hozirgi kunda tropik va subtropik iqlimli mamlakatlarda keng tarqalgan. Hindiston, Vetnam, Janubiy Xitoy, Afg‘oniston, Yaponiya, Filippin orollari, Seylon va ko‘pgina MDH davlatlarida uchraydi. 1942 yildan AQSH, Argentina, Braziliya, CHili, Gavayi orollari, Yevropa, O‘rta er dengizi sohillariga tarqala boshlagan. Bugungi kunda ushbu hasharot O‘zbekistonning barcha hududlariga tarqalib ulgurgan.

Voyaga etgan hasharotning uzunligi 1,6-2 mm. Tuxumi 0,24-0,32 mm, ellipssimon, sarg‘ish rangda. Birinchi yoshdagi lichinkalari (brodyajka) 0,21-0,34mm och sarg‘ish, ovalsimon, tana, chetida kalta tukchalari bor. Ikkinchi yoshdagi lichinkasi 0,57-0,67mm, uchinchi yoshdagi 0,91-1,7 mm, to‘rtinchi yoshdagi yumaloq och jigar rangli. Ba’zan to‘rtinchi yoshdagi lichinkalarni pupariyalar deb ataladi. Sitrus oqqanoti lichinka fazasida qishlaydi. Issiqxonlarda dekabr oyidan to‘rtinchi yoshdagi lichinkalar paydo bo‘ladi va aprel oyining oxirida hamma lichinkalar shu yoshga etadi (1-rasm). May oyida voyaga etgan hasharotlar keyin tuxum qo‘yishini boshlaydi. Bahorgi uchish vaqti 3-4 haftaga cho‘ziladi. Urg‘ochi tuxumini bittadan yoki to‘p-to‘p qilib bargning orqa qismiga 125 tagacha (60-170) qo‘yadi. Iqlim sharoiti qulay bo‘lsa, 225 tagacha tuxum qo‘yishi mumkin. Embrional rivojlanish 10-15 kunga cho‘ziladi. Lichinka tuxumdan 18- 20°C ga etgach paydo bo‘ladi va bir necha soat o‘tganda bargga joylashadi. Yozda rivojlanishi bir oygacha cho‘ziladi. Bizning respublikamizda 5

avlod berib rivojlanadi. Oqqanot rivojlanishi uchun havo namligi 80-85% bo‘lishi lozim.



1-rasm. Sitrus oqqanoti - Dialeurodes citri Ashm. Rivojlanish va hayot sikli.

Zamonaviy dehqonchilik yuritish sharoitlarida o‘simliklarni zararkunandalar, kasalliklar va begona o‘tlardan himoya qilish stratigiyasini yaratish qishloq xo‘jalik mahsulotlarini etishtirishning muhim omili hisoblanadi. Zararli organizmlar bilan kurashishning faol usullaridan biri bu kimyoviy usuldir. [4] Zararlanish markaziga birinchi ishlov berish bahorda, yozning boshida imagoning birinchi avlodida o‘tkaziladi. Bunda maxsus tavsiyanomalarda keltirilgan kimyoviy vositalardan foydalaniladi. Ikkinchi ishlov lichinkalarning birinchi avlodi ko‘plab chiqadigan vaqtda o‘tkaziladi. Uchinchi ishlov birinchi va ikkinchi avlod lichinkalariga qarshi o‘tkaziladi. Oqqanot bilan kuchli ko‘chatlarda to‘rtinchi ishlov sentyabrning birinchi yarmidan mevalarga rang kirgungacha amalga oshiriladi. Mevalarni terib olishdan 20-25 kun oldin ishlov berish to‘xtatiladi. Purkash ishlari lichinkalarning ikkinchi avlodiga va daraxtlardagi qora dog‘lardan tozalash uchun amalga oshiriladi. Kuz-qish oylarida sitrus o‘simliklari ildizlari yopiq holatda fumigatsiya qilinadi. Zararlanish markazi tugatilgandan so‘ng qurigan shoxlar kesib tashlanadi va zararlangan joylarning o‘zida yoqib yuboriladi. Sitrus oq qanotini tarqalishining oldini olish uchun quyidagi choralarni amalga oshirish lozim:

1. Ko‘chatlar va qalamchalar zararlangan joydan olib kelinsa ―brommetil‖ fumigant vositasi bilan zararsizlantirish;
2. Zararlangan hududlardan ko‘chat va qalamchalarni tashishni ta‘qiqlash;
3. Zararlangan xududlarda O‘zbekistonda ruxsat etilgan so‘ruvchi hasharotlarga yaxshi ta‘sir qiladigan kimyoviy preparatlardan foydalanish.
4. Issiqxonalarda agrotexnik tadbirlarni o‘z vaqtida amalga oshirish.

Foydalanilgan adabiyotlar

1. Х.З.Абдуллаева, З.А.Якубова, А.М.Темиров, О.Ш.Абдуллаев, Защита лимона от цитрусовой минуруюшей моли / XXXXI международная научнопрактическая конференция «Наука в современном мире» (20 апреля 2019г.) с-60-63

2. X.Z.Abdullayeva G‘o‘zani zararkunandalardan himoya qilishda axborot kommunikatsion tizimlarini qo_llash imkoniyatlari / Science and innovation. – 2023. – T. 2. – №. Special Issue 3. – 664-667
3. Х.З.Абдуллаева Ўсимликларнинг ҳимоя воситаларига бўлган талабини режалаштириш меъѐрлари / Xorazm Ma‘mun akademiyasi axborotnomasi –5/1-2022, 158-160 4.X.Z.Abdullayeva, L.T. Ro_ziyev Mevali bog_lardagi karantin begona o_t – zarpechak (Cuscuta L.) va qarshi kurash samaradorligi / International Scientific journal, Volume 1 Issue 6 UIF-2022: 8.2 | ISSN: 2181-3337
4. О.А.Сулаймонов, М.Т.Арсланов, Ш.К.Алиев., И.Р.Саидов, О.Т.Усвалиев, Х.З.Абдуллаева Ўсимликлар карантини зараркунандалари тарқалишининг олдини олиш ва назорат ўтказиш тартиби / ўқув қўлланма Тошкент 2021. ―Ҳаѐт‖ нашриѐти 322 бет. 6.Kh.Yahyaev, Kh.Abdulleva, G.Musaeva, Mz. Rahimov. Methods for selecting significant factors in forecasting and zoning territories / European Chemical Bulletin 12 (7), 2164-2176

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Ishmuratov D. I.
student
Samarkand Institute of Economics and Service

MECHANISMS FOR ENSURING INFORMATION SECURITY IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SERVICES

Annotation. *This article is devoted to studying the technical, organizational, and legal mechanisms for ensuring information security in information and communication technology (ICT) services. The article analyzes the core principles of security—confidentiality, integrity, and availability—as well as real threats, cyberattacks, and protection strategies against them.*

Keywords: *information and communication technologies, ICT services, information security, data protection, cybersecurity, digital transformation, technological infrastructure, digital culture.*

Introduction

Today, information and communication technologies (ICT) have become an integral part of social development and the management system. With the expansion of digitalization, the daily activities of government agencies, educational institutions, banking and financial systems, the healthcare sector, and business entities can no longer be imagined without ICT services.

The primary purpose of ICT services is to increase the efficiency of information exchange, optimize organizational processes, and improve the management of large-scale economic and social activities.

However, as ICT services expand, the associated risks are also sharply increasing. In particular, cyberattacks, the illegal dissemination of personal data, information theft, the misuse of artificial intelligence for harmful purposes, and the disruption of state information systems have become some of the major challenges of the modern world. Ensuring the security of such ICT services has direct strategic importance for national, economic, political, and social stability.

The deepening of digital transformation processes is significantly increasing the demand for ICT services. However, along with this process, threats related to information protection—such as cyberattacks, malware, and the leakage of personal data—are becoming more intensive.

Therefore, the improvement of information security mechanisms in ICT services is becoming an urgent and essential task.

MAIN PART. THEORETICAL FOUNDATIONS OF INFORMATION SECURITY IN ICT SERVICES

Information security is based on **three core principles**, commonly known as the CIA triad:

1. **Confidentiality**
2. **Integrity**
3. **Availability**

Confidentiality

The principle of confidentiality ensures that information is accessed only by authorized individuals by restricting unauthorized access. At the core of this principle lie access control mechanisms, processes for identification and authentication, encryption methods, and strict definition of access levels.

Maintaining confidentiality helps organizations prevent data leakage caused by internal and external threats, ensuring the constant protection of users' personal information, financial records, and operational resources.

Integrity

The integrity principle protects the accuracy, correctness, and immutability of information. This means that data must not be altered without authorization during transmission or storage.

To support this principle, cryptographic hash functions, digital signatures, transaction verification mechanisms, logging systems, and audit tools are utilized.

Ensuring integrity is critically important for government institutions, the banking sector, healthcare organizations, and many other fields, as even minor inaccuracies in data can significantly affect decision-making processes.

Availability

The principle of availability ensures that information resources, services, and systems are continuously accessible when needed. System availability requires resilience against attacks, technical failures, power outages, or overloads.

To ensure availability, data backups, disaster recovery plans, load balancing, DDoS protection mechanisms, and high-reliability server infrastructure are implemented.

Guaranteeing availability ensures the continuity of economic, social, and governmental services and creates a reliable service environment for users.

The three principles described above are summarized in:

Table 1.

Core Principles of Information Security

Principle	Description
Confidentiality	Ensuring that information is accessible only to authorized users.
Integrity	Ensuring that information is accurate, unaltered, and protected from unauthorized modification.
Availability	Ensuring continuous and timely access to systems and data when needed.

CONSEQUENCES OF VIOLATING THESE PRINCIPLES, PRACTICAL EXAMPLES, AND COMPARATIVE ANALYSIS

1. Confidentiality Violation

When confidentiality is compromised, information falls into the hands of unauthorized individuals. This leads not only to the exposure of personal data but also to fraud, financial losses, and a decline in trust during service delivery.

In corporate environments, a breach of confidentiality may result in the leakage of trade secrets, unlawful use of information by competitors, and severe damage to brand reputation.

Practical examples:

- Large-scale leakage of social network user data due to unencrypted password storage.
- Personal data from government registries being exposed online.

2. Integrity Violation

Integrity breaches cause the loss of data accuracy and reliability. This is particularly dangerous for sectors such as banking, healthcare, transportation management, and government registries.

Even a tiny unauthorized modification can result in incorrect decisions, distorted financial balances, or disruption of operational processes.

Practical examples:

- Unauthorized alterations to transaction records in a bank database, causing customer account balances to display incorrectly.
- Illegal modification of medical test results leading to an incorrect diagnosis.

3. Availability Violation

When availability is compromised, information resources become temporarily or permanently inaccessible. This leads to service outages, economic damage, slower government operations, and the inability of citizens to access essential services.

Practical examples:

- A DDoS attack on an online payment system causing banking services to remain unavailable for several hours.
- Failure of internal systems due to lack of backups after a server malfunction.

Threats to ICT Services

As ICT services expand, the threats targeting them grow in complexity and scale. These threats affect not only organizational infrastructure but also critical sectors such as government administration, banking and finance, education, and healthcare.

CYBERATTACKS

Cyberattacks in the digital space are increasing annually. According to Cybersecurity Ventures, cybercrime caused **9.5 trillion USD** in global losses in 2024. Such attacks pose a serious threat to the continuity of ICT services.

Most Common Attacks

- **DDoS attacks** – disrupting services by overwhelming networks. The largest DDoS attack recorded in 2023 reached **71 million requests per second**.
- **Phishing** – deceiving users into revealing confidential data. Phishing attacks in the manufacturing sector increased by **76%** over the last three years.
- **Malware** – ransomware, spyware, and trojans that encrypt or steal data.

INSIDER THREATS

Internal threats are often overlooked but remain highly dangerous. According to IBM Security, **21%** of all data breaches are linked to insider activity.

Types:

- **Unintentional errors** – mistakes by untrained employees, misconfigurations, accidental data deletion.
- **Intentional harm** – disgruntled employees leaking passwords, stealing data, or exploiting excessive privileges.

These threats significantly endanger databases, servers, and e-government platforms.

WEAK INFRASTRUCTURE AND DELAYED UPDATES

Outdated servers, unsupported operating systems, and irregular updates increase vulnerability. Microsoft's 2024 report states that **57%** of successful cyberattacks occurred because patches were not applied on time.

SOCIAL ENGINEERING

Even with strong technical protection, the human factor remains the weakest link. Through social engineering:

- fake calls (tech support scams),
- identity impersonation,
- manipulative emails,

users unknowingly compromise the system. According to the 2023 Verizon Data Report, **74%** of breaches involved human error.

Information Security Strategies

As digital services become central to social and economic life, developing strong information security strategies has become a priority. Modern threats go beyond viruses and hacking—they include employee errors, misconfigurations, cloud failures, and even global infrastructure disruptions.

Therefore, ensuring security is not a one-time measure but a continuous and comprehensive process.

1. Multi-Layer Security Architecture

Relying on a single security tool is a serious risk.

Verizon's 2023 analysis found that **62%** of breaches occurred because attackers bypassed multiple protection layers.

Thus, networks, servers, applications, user devices, and data must each have their own dedicated protection mechanisms.

2. Strengthening Cryptographic and Authentication Systems

Advanced encryption algorithms, mandatory two-factor authentication (2FA), and biometric identification significantly improve confidentiality and integrity. According to Microsoft, 2FA prevents **up to 99%** of automated attacks targeting user accounts.

3. Improving Employee Cyber Hygiene

Globally, **35–40%** of cyber incidents occur due to employee negligence. Regular training, phishing detection exercises, and strict password policies become essential components of a strong security system.

4. Enhancing Monitoring and Incident Response

Real-time log monitoring, AI-based anomaly detection, and rapid-response teams reduce attack damage significantly.

IBM Security reports that organizations with incident-response systems reduce breach costs by **about 30%**.

All strategies must work together as an integrated system. The future resilience of organizations depends on how consistently and continuously these approaches are implemented.

Table 2

Mechanisms for Ensuring Information Security

Mechanism Type	Basic Description	Expanded Notes
Technical mechanisms	Encryption algorithms, firewalls, antivirus systems, network monitoring, access control, DDoS protection, backup and recovery systems.	Zero Trust architecture, SIEM, IDS/IPS, MFA, cloud security scanners, key management systems (KMS), EDR/XDR.
Organizational mechanisms	Security policies, employee training, emergency preparedness plans.	Internal policies, risk management, employee certification (Security+, CEH, CHFI), audits, password policy, RBAC, SOC establishment.
Legal mechanisms	ICT laws of Uzbekistan, ISO/IEC 27001, cybersecurity regulations.	Uzbekistan's Cybersecurity Concept, GDPR, NIST SP 800-53, Data Protection Agreements (DPA), formal privacy policies, certification requirements.

Conclusion

Ensuring information security in ICT services requires a combination of technical, organizational, and legal mechanisms. Security is effective not just through protective tools but through comprehensive management and monitoring frameworks. Research confirms that ICT services form the backbone of modern socio-economic systems, and their stability is crucial for government operations, business processes, and societal safety.

The core security principles—confidentiality, integrity, and availability—remain central components. Growing threats demand advanced approaches: multi-layer security architecture, cryptographic technologies, employee cyber hygiene, and improved monitoring and incident response systems.

Ultimately, maintaining information security in ICT services depends on systematic, continuous, and strategic management rather than isolated tools. The efficiency of digital transformation, organizational resilience, and protection against cyber risks are all determined by how well these approaches are implemented.

References

1. Boronov, B., & Mukhammadiev, Z. (2025). Ways to Expand the Information Volume of Accounting for Capital Investments in Economic Entities. Advanced Economics and Pedagogical Technologies, 2(2), 444–450. Retrieved from https://inlibrary.uz/index.php/aept/article/view/80274
2. Rajaboev, Sh. Sh. Digitalization and the Green Sector in Sustainable Development. BBK 65.05 P 78, p. 596.
3. Boronov, B., & Salomov, Sh. (2025). Organizational and Legal Aspects of the Development of Non-State Educational Organizations. Economic Development and Analysis, 3(2), 268–274. Retrieved from https://inlibrary.uz/index.php/eitt/article/view/80115
4. Rajaboev, S. S. Technologies of Using Multimedia Tools in Teaching Economic Sciences. Spanish Journal of Innovation and Integrity.
5. Boronov, B. F., Akhmedov, M. A., & Khudaynazarova, D. G. (2024). Issues of Reflecting Revenues and Expenses in the Statement of Other Comprehensive Income in Enterprises. Economics and Society, 3-2(118), 547–556.
6. Boronov, B. F., & Mustafayev, A. F. (2024). Organizational Issues of Developing Non-State Educational Services. Economics and Society, 5-2(120), 926–929.
7. Rajaboev, Sh. Sh. (2022). The Role of Information Technologies in Technological Entrepreneurship. BBK 65.29 ya43 T384, p. 54.

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Isroilov A. A.
student
Samarkand Institute of Economics and Service

THE ROLE AND IMPORTANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN BANKS

Annotation: *This article describes the role and importance of information and communication technologies (ICT) services in modern banking systems. Types of software used in bank information complexes, their functional capabilities, security mechanisms, and operating technologies are deeply analyzed.*

Keywords: *Information and communication technologies (ICT), bank information systems, software, information security, data processing, automation of banking operations, remote banking services, electronic payment systems.*

Introduction

Information and communication technologies (ICT) today play an important role in all fields, particularly in the finance and banking sector. The effective operation of banking systems depends on many factors, and one of their most essential components is advanced information systems and software. Modern banks widely use ICT solutions to provide their services quickly, safely, and with high quality. This, in turn, expands opportunities for remote interaction with customers, automates electronic payment and settlement systems, and ensures reliable data storage.

Bank information complexes are important infrastructure that not only automate daily operations but also help make strategic decisions, analyze financial processes, and implement digital transformation. Modern software and technologies provide banks with high efficiency, stable operation, and data security. At the same time, they enable offering customers convenient and fast services, which increases competitiveness.

However, there are several major challenges in the introduction and use of ICT services in banks:

1. **Cybersecurity threats** – the need to protect information systems from hacking attacks and data theft.
2. **Adaptation to technological updates** – frequent software updates and the issue of training bank employees to use new systems.
3. **Financial costs** – implementing advanced information systems and providing technical maintenance requires high expenses.

4. **Data integration** – difficulty in combining different software products and coordinating data flow.

5. **Regulatory and normative requirements** – bank information systems and software must comply with local and international legal requirements.

6. **Development of technical infrastructure** – problems ensuring stable operation of servers, network infrastructure, and other technical devices.

The article provides a detailed analysis of the role of ICT services in the banking sector, types of software used in bank information complexes, and their operating technologies. In addition, the advantages of technological solutions and software products used in modern banks, their integration, and effective operating mechanisms are described. The research results help form scientific-practical recommendations for the effective use of information technologies in banking systems.

The growing role of ICT services in the banking sector and the strategic importance of bank information complexes in the conditions of the digital economy are also emphasized. This topic is relevant today not only for scientific research but also for practical banking activities.

Main part

Information and communication technology services are one of the main pillars of the modern banking system. ICT services enable banks to carry out transactions in real-time, provide customers with mobile and internet banking services, ensure data security, and automate internal processes. Their implementation increases the efficiency of banking activities, improves service quality, and strengthens competitiveness.

Bank information complexes are important infrastructure that integrate all financial, technological, and management processes into a single system. These complexes perform such tasks as customer account management, automatic execution of payment orders, management of credit portfolios, risk analysis, preparation of various reports, and monitoring the security of banking operations. The complexes usually operate based on software modules, and each module serves a separate function.

Principles of Bank Information Systems and ICT Services

Principle Name	Description
Continuity	Ensuring the uninterrupted, continuous operation of the system, with services available to customers 24/7.
Security	Protecting data, encrypting it, managing access rights, and applying measures against attacks.
Speed	Processing transactions in real-time and carrying out banking operations without delays.
Reliability	Error-free and stable operation of software, and accuracy of results.
Flexibility	The ability to add new functions, modernize the system, and enable integration.
Modularity	Building the system based on modules, with each module serving a separate function.
Transparency	Automation of internal bank processes and the ability to monitor them.
Integration	Interoperability of systems with other banking applications, payment platforms, APIs, and fintech services.
Data Integrity	Ensuring data remains unchanged, not lost, and stored correctly.
User Convenience	Making interfaces simple and understandable, preventing errors with convenient controls.

Banks use various types of software in their operations. Core Banking System applications centrally manage the bank's main operations. Payment systems such as SWIFT, Uzcard, and Humo help process payments in real time. Security systems include antivirus software, firewalls, DDoS-protection tools, and data-encryption algorithms. Additionally, analytical and management software allows bank leadership to rely on comprehensive data in decision-making processes.

Bank software is based on data-processing technologies. Databases such as Oracle, PostgreSQL, and Microsoft SQL Server allow large volumes of operations to be processed quickly and securely. Cloud technologies are also widely used in modern banking activities. They allow remote management of services, rapid system updates, and increased security. API and integration technologies play an important role in connecting banking services with mobile applications, payment systems, and fintech platforms. Artificial intelligence systems automate customer service, identify fraud, and assist in determining credit scores.

Security requirements in bank information systems hold special importance and include confidentiality, integrity, authentication, access control, backup, and system monitoring. Ensuring these requirements protects banking systems from internal and external threats and increases customer trust.

Threats to Banking Services Posed by Information and Communication Technologies

Information and communication technologies have become the main foundation of banking operations, enabling fast and convenient execution of payments, settlements, lending, customer service, and many other processes. However, along with the widespread use of ICT services, various threats have also increased. These threats may cause interruptions to the banking system, endanger

customer financial security, and damage the bank's reputation. Therefore, ensuring information security is considered one of the most crucial tasks in the banking sector.

One of the most common threats to the banking system is cyberattacks. Hackers attempt to gain unauthorized access to systems, steal customers' personal or financial data, or alter transactions. Such attacks can disrupt the bank's operations or cause major financial losses. DDoS attacks also pose serious danger for banks. During these attacks, a high volume of requests is sent to bank servers, causing systems to malfunction and preventing customers from using internet banking services.

Another major threat to the banking system is phishing and social engineering. These threats aim to deceive customers into handing over their card information or online banking login details. Fake SMS messages, emails, and fraudulent links cause users to unknowingly give their data to criminals, resulting in illegal transfers of funds.

Malicious software (malware) is also highly dangerous for the banking system. Ransomware viruses may block bank servers and demand a payment to restore access. Spyware secretly monitors computer activities and steals user information. Trojan malware can create hidden access points into the system.

Another significant threat is data-base breaches. Since banks store large amounts of confidential information, such a breach can lead to major disasters. Leakage of customer data, illegal use of cards, and loss of bank trust may occur. Network security weaknesses—such as weak passwords, unsecured Wi-Fi networks, and outdated servers—also create opportunities for hackers.

Internal threats also pose serious risks. Irresponsibility or intentional misconduct by employees can cause data leaks or system failures. In many cases, failure to adhere to internal security protocols leads to major problems.

Threats to ICT services do not arise only from human actions. Natural disasters—fires, floods, earthquakes, or power outages—can also negatively affect banking systems. In such cases, data loss or temporary system shutdowns may occur. Therefore, banks implement backup servers, additional power sources, and disaster-recovery centers.

Overall, threats to ICT services in the banking sector are numerous, and each of them plays a crucial role in the continuous operation of the banking system. To reduce these threats, banks must constantly strengthen information-security measures, use modern protection systems, and improve employee qualifications.

Strategies for Ensuring ICT Services in the Banking System

To ensure the safe and uninterrupted operation of information and communication technology (ICT) services in the banking system, several effective strategies are used. First of all, controlling user access rights and applying strong authentication are essential. Two-factor authentication and biometric systems help increase system security. Data encryption and secure transmission through SSL/TLS protocols and AES or RSA algorithms are also key strategies.

Banks use antivirus software, firewalls, IDS/IPS systems, and other cybersecurity tools to protect against malware and attacks. Training employees in information security, establishing password policies, and providing phishing-awareness training strengthen internal security. Backup systems and disaster-recovery centers, along with cloud-storage services, ensure system continuity.

To strengthen network security, protected LAN and Wi-Fi networks, segmentation, and API security are applied. The banking system is constantly monitored, audited, and compliance with security standards is ensured. International and national standards such as ISO/IEC 27001, PCI DSS, and local legislative requirements help maintain high-level information security.These strategies enhance the reliability of banking ICT services, guarantee data security, and ensure uninterrupted customer service.

Conclusion

Information and communication technologies (ICT) play an essential role in the efficient operation of the banking system and the provision of digital financial services. Through ICT services, calculations, payments, lending, customer service, and many other processes are carried out quickly, conveniently, and securely. At the same time, these systems face various threats and risks, including cyberattacks, malware, phishing, insider threats, and technical failures, all of which endanger service continuity and data confidentiality.

To combat these threats, banks use numerous strategies: strong authentication and access control, data encryption, cybersecurity systems, employee training, backup and disaster-recovery mechanisms, network security enhancement, and continuous monitoring and audits. By adhering to international and national security standards, banks keep their systems updated and stable.

Overall, the development of ICT services ensures the digitalization of banking activities, increases service speed and efficiency, and strengthens customer trust. Proper and continuous application of security strategies guarantees system stability, data confidentiality, and uninterrupted operation of the banking sector.

References

1. Баронов, Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». Передовая экономика и педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.

2. Ражабоев Ш. Ш. ЦИФРОВИЗАЦИЯ И ЗЕЛЕНЫЙ СЕКТОР В УСТОЙЧИВОМ РАЗВИТИИ //ББК 65.05 П 78. – С. 596.

3. Боронов, Б., & Саломов, Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115

4. Rajaboev S. S. Technologies of Using Multimedia Tools in Teaching Economic Sciences //Spanish Journal of Innovation and Integrity.

5. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.
6. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
7. Ражабоев Ш. Ш. РОЛЬ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ТЕХНОЛОГИЧЕСКОМ ПРЕДПРИНИМАТЕЛЬСТВЕ //ББК 65.29 я43 Т384. – 2022. – С. 54.

Rajaboyev Sh. Sh.
assistenti
“Axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
Alirizayev A. A.
talabasi
Samarqand iqtisodiyot va servis instituti

ELEKTRON JADVALNING IMKONIYATLARI VA VAZIFALARI

Annotatsiya: *Ushbu maqolada elektron jadvallar — xususan Microsoft Excel va Google Sheets — ning zamonaviy axborot tizimidagi o‘rni, funksional imkoniyatlari, analitik ahamiyati va ulardan foydalanish bo‘yicha keng ko‘lamli ilmiy-amaliy tahlillar keltirilgan.*

Kalit so‘zlar: *Elektron jadvallar, Microsoft Excel, Google Sheets, Data Analysis, Data Cleaning, Power Query, Pivot Table, Pivot Chart, Data Visualization, Charts and Graphs, Statistical Analysis, Automation in Excel.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
Alirizayev A. A.
student
Samarkand Institute of Economics and Service

CAPABILITIES AND FUNCTIONS OF ELECTRONIC SPREADSHEETS

Abstract: *This article presents a comprehensive scientific and practical analysis of electronic spreadsheets — particularly Microsoft Excel and Google Sheets — focusing on their role in modern information systems, functional capabilities, analytical importance, and practical applications.*

Keywords: *Electronic spreadsheets, Microsoft Excel, Google Sheets, Data Analysis, Data Cleaning, Power Query, Pivot Table, Pivot Chart, Data Visualization, Charts and Graphs, Statistical Analysis, Automation in Excel.*

Kirish

Maqolada elektron jadvallarning tuzilishi, ma’lumotlarni qayta ishlash, tozalash, saralash, tahlil qilish, vizualizatsiya qilish, avtomatlashtirish va tashqi manbalar bilan integratsiya qilish jarayonlari batafsil yoritilgan. Shuningdek, Excelning murakkab funksiyalari, Power Query, Pivot Table, statistik modellash, biznes jarayonlaridagi qo‘llanilishi ham batafsil yoritilgan.

Maqola ilmiy-uslubiy yondashuv asosida tuzilgan bo‘lib, unda elektron jadvallar yordamida amalga oshiriladigan jarayonlar bosqichma-bosqich tahlil qilinadi. Tadqiqotdan ko‘zlangan asosiy maqsad — elektron jadvallarni faqat oddiy hisob-kitob dasturi sifatida emas, balki kuchli analitik va boshqaruv vositasi sifatida talqin qilish va ularning zamonaviy imkoniyatlarini kengroq umumlashtirishdir.

So‘nggi o‘n yilliklarda axborot texnologiyalarining keskin rivojlanishi natijasida insoniyat hayotining barcha sohalarida ma’lumotlar hajmi nihoyatda oshdi. Natijada, ma’lumotlarni qayta ishlash, saqlash, tahlil qilish va vizual tarzda taqdim etish bugungi kunda har qachongidan ham muhim vazifaga aylandi. Elektron jadvallar ana shunday murakkab jarayonlarni soddalashtiruvchi, qulay, aniq, avtomatlashtirilgan va ommabop vosita sifatida shakllandi. Microsoft Excel va Google Sheets kabi dasturiy vositalar ma’lumotlar bilan ishlashni mutlaqo yangi bosqichga olib chiqdi.

Kirish qismida elektron jadvallarning kelib chiqish tarixi, dastlabki imkoniyatlari hamda bugungi kunda ular amal qilayotgan keng ekotizim haqida so‘z yuritiladi. Excel dastlab 1985 yilda oddiy hisob-kitoblarni bajarish uchun yaratilgan bo‘lsa-da, vaqt o‘tishi bilan u kuchli analitik platformaga aylandi. Hozirgi kunda Excel sun’iy intellekt yordamida avtomatik tahlil, trendlarni aniqlash, optimallashtirish va prognozlash imkoniyatlarini taqdim etmoqda.

Bugungi zamonaviy dunyoda elektron jadvallar nafaqat ofis xodimlari yoki iqtisodchilar, balki tibbiyot mutaxassislari, ta’lim sohasi xodimlari, muhandislar, statistiklar, IT mutaxassislari, tadqiqotchilar va davlat boshqaruvi vakillari uchun ham asosiy ish quroliga aylangan. Ularning moslashuvchanligi, qulayligi va keng funksionalligi ularni har qanday ko‘lamdagi ma’lumotlarni boshqarishda bebaho dasturga aylantiradi.

Asosiy qism

Elektron jadvallarning tuzilishi va ishlash prinsiplari. Elektron jadvallar ustun, qator va kataklardan tashkil topgan bo‘lib, har bir katak alohida ma’lumot birligini ifodalaydi. Ularning o‘zaro bog‘lanishi orqali murakkab ma’lumotlar tizimi yaratish mumkin. Elektron jadvallar dinamik tuzilishga ega: bir katakdagi o‘zgarish boshqa bog‘langan kataklarda ham avtomatik aks etadi. Bu esa elektron jadvallarni ma’lumotlar bazasiga yaqinlashtiradi.

Tuzilishi sodda bo‘lishiga qaramay, elektron jadvallar orqali millionlab qatorli ma’lumotlar ustida ishlash, ulardan avtomatik hisobotlar olish, tahlil qilish va vizual natija chiqarish imkoniyati mavjud. Zamonaviy Excel katta ma’lumotlar bilan ishlash uchun Power Query, Power Pivot kabi kuchli vositalar bilan boyitilgan.

Funksiyalar yordamida chuqur avtomatlashtirish. Funksiyalar Excelning eng kuchli mexanizmi bo‘lib, ular yordamida murakkab matematik, statistik, mantiqiy, moliyaviy, matn, qidiruv va massiv amallarini bajarish mumkin. Excelning SUM, AVERAGE, MAX, MIN kabi oddiy funksiyalari bilan bir qatorda XLOOKUP, FILTER, SORT, UNIQUE, AGGREGATE, SEQUENCE kabi zamonaviy funksiyalari katta ma’lumotlar ustida ishlashni 10 barobargacha tezlashtiradi.

Murakkab biznes jarayonlarida IFS, SWITCH, LET, LAMBDA funksiyalari yordamida to‘liq avtomatlashtirilgan tizimlar yaratish mumkin. Misol uchun, ombor qoldiqlari monitoringi, sotuvlar prognozi, moliyaviy hisobotlar va audit nazorati kabi jarayonlar Excel funksiyalari orqali avtomatik bajariladi.

Ma’lumotlarni tozalash va qayta ishlash (Data Cleaning). Ma’lumotlarni tahlil qilishdan oldin ularni tozalash jarayoni eng muhim bosqich hisoblanadi. Excelda ma’lumotlarni tozalash uchun Remove Duplicates, Text-to-Columns, Flash Fill, Data Validation, Find & Replace kabi qulay vositalar mavjud. Bundan tashqari, Power Query yordamida katta hajmdagi ma’lumotlarni avtomatik tozalash, normallashtirish va qayta tuzish mumkin.

Data Cleaning jarayoniga quyidagilar kiradi:

- noto‘g‘ri formatlangan qiymatlarni tuzatish;
- keraksiz belgilarni o‘chirish;
- bo‘sh kataklarni aniqlash;
- dublikatsiyalarni tozalash;
- ma’lumotlarni bir necha ustunlarga ajratish;
- keraksiz belgilarni avtomatik almashtirish.

Toza ma’lumot – to‘g‘ri tahlilning poydevori hisoblanadi.

Pivot Table orqali chuqur statistika va analitika. Pivot Table katta ma’lumotlarni guruhlash, taqqoslash, hisoblash, umumlashtirish va vizualizatsiya qilish uchun eng kuchli vosita hisoblanadi. Pivot Table yordamida minglab qatorli ma’lumotlarni bir necha soniyada toifalarga ajratish, foizlar orqali tahlil qilish, segmentlar bo‘yicha solishtirish va dinamik hisobotlar yaratish mumkin.

Pivot Chart yordamida esa interaktiv grafiklar hosil qilish mumkin bo‘lib, bu rahbarlik hisobotlarida keng qo‘llaniladi.

Diagrammalar va grafiklar orqali vizualizatsiya. Vizualizatsiya analitik jarayonlarning ajralmas qismi bo‘lib, grafiklar yordamida ma’lumotlarni ko‘rish va ulardan xulosa chiqarish ancha osonlashadi. Excelda 20 dan ortiq grafik turi mavjud bo‘lib, ularga: ustunli, chiziqli, doiraviy, sathli, gistorgramma, radar, xarita grafiklari kiradi. Grafiklar yordamida trendlarni aniqlash, o‘zgarishlarni kuzatish, taqqoslash, maksimal va minimal qiymatlarni ajratish, statistik xatoliklarni tahlil qilish mumkin.

Biznes jarayonlarida elektron jadvallarning o‘rni. Elektron jadvallar biznes jarayonlarining deyarli barcha bosqichida qo‘llaniladi. Ular yordamida byudjet rejalari tuziladi, xarajatlar nazorat qilinadi, foyda-zarar tahlili amalga oshiriladi, logistika jarayonlari rahbarlik qilinadi, ombor qoldiqlari boshqariladi, marketing kampaniyalari tahlil qilinadi. Ko‘plab kompaniyalar yillik biznes rejalarini Excel orqali shakllantiradi, chunki bu tezkor, qulay va moslashuvchan vositadir.

Tibbiyot, statistika va ilmiy tadqiqotlarda qo‘llanilishi. Tibbiyot sohasida elektron jadvallar yordamida laboratoriya natijalari qayta ishlanadi, statistik modellar yaratiladi, bemor monitoringi amalga oshiriladi. Statistika sohasida esa regressiya, dispersiya tahlili, korelatsiya, trendlarni prognozlash kabi hisob-kitoblar Excel yordamida bajariladi. Ilmiy tadqiqotlarda Excel asosan dastlabki

ma’lumotlarni qayta ishlash, tahlil qilish va grafiklar chiqarishda keng qo‘llaniladi.

Tashqi manbalar va ma’lumotlar bazalari bilan integratsiya. Excel tashqi manbalar bilan integratsiya qilish bo‘yicha juda rivojlangan vositalarga ega. Power Query, SQL Server, MySQL, PostgreSQL, XML, JSON, API manbalari orqali ma’lumotlarni avtomatik yuklash, filtrlash va tahlil qilish mumkin. Bu esa Excelni kichik Business Intelligence tizimiga aylantiradi.

Makroslar va VBA orqali avtomatlashtirish. VBA (Visual Basic for Applications) orqali Excelda istalgan jarayonni avtomatlashtirish mumkin. Masalan: hisobotlarni avtomatik yaratish, jadvalni tozalash, grafiklar chizish, ma’lumot import qilish, eksport qilish jarayonlari inson aralashuvisiz bajariladi. Bu esa minglab soatlik mehnatni tejaydi.

Elektron jadvallarning afzalliklari, cheklovlari va istiqboli. Elektron jadvallar tezkor, aniq, moslashuvchan va funksional imkoniyatlarga ega. Biroq juda katta ma’lumotlar bilan ishlaganda ularning tezligi pasayishi mumkin. Kelajakda Excel sun’iy intellekt yordamida to‘liq aqlli analitik vositaga aylanishi ehtimol qilinmoqda. Excelning AI Formula Assistant, Auto Analyze, Smart Model tizimlari buning yaqqol isbotidir.

Xulosa

Yuqoridagi tahlillardan ko‘rinib turibdiki, elektron jadvallar nafaqat sodda hisoblash vositasi, balki keng funksiyalarga ega bo‘lgan, murakkab tahlil, avtomatlashtirish, ma’lumotlarni boshqarish va integratsiya amallarini bajara oladigan kuchli analitik platformadir. Ularning qulayligi, tezkorligi va universalligi har bir sohada, ayniqsa biznes, statistika, tibbiyot, ilmiy tadqiqotlar va davlat boshqaruvida keng qo‘llanishiga sabab bo‘lmoqda.

Kelajakda elektron jadvallar sun’iy intellekt bilan integratsiyalashgan holda yanada rivojlanadi. Avtomatik tahlil, aqlli hisobotlar, real vaqt rejimida ma’lumotlar oqimini boshqarish, prognoz modellari kabi yangi funksiyalar ularning imkoniyatlarini yanada kengaytiradi. Elektron jadvallarni puxta o‘zlashtirish esa zamonaviy mutaxassis uchun muhim kompetensiyalardan biridir.

Foydalanilgan adabiyotlar

1. Boronov, B. (2020). Improvement of investment accounting in Uzbekistan. Journal of Advanced Research in Dynamical and Control Systems, 12(6), 1069-1079.

2. Rajaboyev, S. (2024). ZAMONAVIY SHAROITDA AXBOROT-KOMMUNIKATSIYA XIZMATLARINI RIVOJLANTIRISHNING ASOSIY O‘ZIGA XOS XUSUSIYATLARI. Iqtisodiy taraqqiyot va tahlil, 2(12), 160–166. https://doi.org/10.60078/2992-877X-2024-vol2-iss12-pp160-166

3. Боронов, Б. (2019). Молиявий активларни халқаро стандартларга мувофиқ тан олиш ва баҳолаш. Экономика и инновационные технологии, (5), 1-11.

4. Rajaboyev, S., & Xamidova , P. (2025). RAQAMLI IQTISODIYOT SHAROITIDA AXBOROT KOMMUNIKATSIYA XIZMATLARIDAN

FOYDALANISH. Iqtisodiy taraqqiyot va tahlil, 3(1), 120–124. https://doi.org/10.60078/2992-877X-2025-vol3-iss1-pp120-124
5. Боронов, Б. Ф. (2019). АКТУАЛЬНЫЕ ВОПРОСЫ УЧЕТА ФИНАНСОВЫХ АКТИВОВ. In БУХГАЛТЕРСКИЙ УЧЕТ: ДОСТИЖЕНИЯ И НАУЧНЫЕ ПЕРСПЕКТИВЫ XXI ВЕКА (pp. 48-52).
6. Ражабоев Ш.Ш., and Амиртошев Д.Ш.. "РАҚАМЛИ ИҚТИСОДИЁТ ВА БАНК ХИЗМАТЛАРИДА БЛОКЧАЙН ТЕХНОЛОГИЯСИНИ ҚЎЛЛАШ" Экономика и социум, no. 4-2 (119), 2024, pp. 853-858.
7. Boronov, B. (2019). THEORETICAL AND CONCEPTUAL BASES OF ACCOUNTING FINANCIAL ASSETS. International Finance and Accounting, 2019(4), 6.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Axrorkulov Sh. Z.

KORXONALARDA AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARI BUXGALTERIYA HISOBINING O‘ZIGA XOS XUSUSIYATLARI

Annotatsiya: *Mazkur ilmiy ish korxonalarda axborot-kommunikatsiya texnologiyalari (AKT) xizmatlaridan foydalanish jarayonida vujudga keladigan buxgalteriya hisobining o‘ziga xos jihatlarini keng yoritadi. AKT infratuzilmasi xarajatlarini tasniflash, dasturiy ta’minotni nomoddiy aktiv sifatida tan olish, bulutli texnologiyalar uchun to‘lovlarni e’tirof etish, IT xizmatlarining amortizatsiya mexanizmi, axborot xavfsizligi xarajatlarining hisobini yuritish hamda korxona raqamlashtirish jarayonida yuzaga keladigan moliyaviy oqibatlar chuqur tahlil qilinadi.*

Kalit so'zlar: *AKT, nomoddiy aktiv, amortizatsiya, server xarajatlari, elektron hujjat aylanishi, IT xizmatlari, buxgalteriya hisobi.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Axrorkulov Sh. Z.

SPECIFIC FEATURES OF ACCOUNTING FOR INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SERVICES IN ENTERPRISES

Abstract: *This scientific work provides an extensive analysis of the specific features of accounting that arise in the process of using information and communication technology (ICT) services in enterprises. It examines the classification of ICT infrastructure costs, the recognition of software as an intangible asset, accounting for cloud technology payments, the amortization mechanism of IT services, the accounting of information security expenses, and the financial implications emerging during the digitalization of enterprises.*

Keywords: *ICT, intangible asset, amortization, server expenses, electronic document management, IT services, accounting.*

Kirish

Raqamli transformatsiya jarayoni butun dunyoda iqtisodiy tizimlar faoliyatini tubdan o‘zgartirmoqda. Bugungi kunda har bir korxona o‘z faoliyatining deyarli barcha bosqichlarida AKT xizmatlaridan foydalanishga majbur bo‘lib qoldi. Zero, AKT tizimlari korxonaning raqobatbardoshligini oshirish, ma’lumot almashinuvi tezligini kuchaytirish, boshqaruv qarorlarini ishlab chiqishni jadallashtirishda asosiy omil sifatida namoyon bo‘lmoqda.

O‘zbekiston korxonalarida ham so‘nggi yillarda raqamlashtirish jarayoniga katta e’tibor berilmoqda: bulutli texnologiyalar, korporativ dasturiy tizimlar, elektron hujjat aylanishi, server infratuzilmasi, tarmoq xavfsizligi yechimlari keng joriy etila boshladi. Ushbu texnologiyalar oxir-oqibat korxona iqtisodiy faoliyatining shaffofligi va samaradorligini oshiradi. Shu bois AKT xizmatlarining buxgalteriya hisobini yuritish o‘ziga xos bo‘lib, uni chuqur tahlil qilish dolzarb masala sanaladi.

Adabiyotlar sharhi

AKT xizmatlarining iqtisodiy mazmuni va ularning buxgalteriya hisobi bo‘yicha turli manbalarda fikrlar mavjud. Masalan, Vasilevska (2009) AKTning strategik rivojlanishdagi o‘rnini batafsil tahlil qilib, uning korxona cheklovlarni yengib o‘tishdagi ahamiyatini ko‘rsatgan. Forrester (1992) texnologik jarayonlarning modellashtirilgan boshqaruv uslublarini ishlab chiqqan bo‘lib, AKT tizimlarining qaror qabul qilishga ta’sirini ilmiy asoslagan.

Salet va Faludi (2000) strategik boshqaruvning zamonaviy yondashuvlarida texnologiyalarning ahamiyatiga e’tibor qaratgan. De Andreis (2019) esa raqamli transformatsiya davrida strategik rejalashtirishni takomillashtirish mexanizmlarini bayon qilgan. Ushbu manbalar AKT xizmatlarining buxgalteriya hisobi korxona strategik menejmenti bilan chambarchas bog‘liqligini ko‘rsatadi.

Shuningdek, xalqaro moliyaviy hisobot standartlari (IFRS)da nomoddiy aktivlar, xizmat ko‘rsatish shartnomalari va amortizatsiya mexanizmlari bo‘yicha berilgan ko‘rsatmalar AKTga alohida yondashuvni talab qiladi. Bu holat milliy buxgalteriya standartlari bilan uyg‘unlikda qo‘llanilishi lozim.

Tadqiqot metodologiyasi

Mazkur tadqiqot sifat va miqdoriy tahlil usullari asosida olib borildi. Quyidagi metodlardan foydalanildi: Taqqoslash, kontent-tahlil, analogiya metodi, statik tahlil, umumlashtirish.

Tahlil va natijalar muhokamasi

Metodologiya tadqiqotning ilmiy asoslangan holda amalga oshirilishiga xizmat qilgani tufayli, olingan natijalar amaliy buxgalteriya amaliyotiga yaqin va real sharoitlarni aks ettiradi. Korxonalarda axborot-kommunikatsiya texnologiyalari xizmatlari tobora keng qo‘llanayotgani sayin, ular bo‘yicha buxgalteriya hisobini to‘g‘ri yuritish masalasi ham dolzarb tus olmoqda. Shu nuqtayi nazardan, tadqiqot AKT xizmatlarini turli toifalarga ajratgan holda, ularning iqtisodiy mohiyati va buxgalteriya hisobida aks ettirish xususiyatlarini tahlil qiladi. Quyida dasturiy ta’minot, bulutli xizmatlar, axborot xavfsizligi tizimlari, AKT infratuzilmasi, xorijdan xarid qilingan xizmatlar bo‘yicha QQS

mexanizmi hamda elektron hujjat aylanishi tizimlari misolida olingan natijalar sharhlanadi.

Birinchi navbatda, dasturiy ta’minotning nomoddiy aktiv sifatida e’tirof etilishi masalasi ko‘rib chiqildi. Amaliyotda korxonalar turli xil dasturiy ta’minotlardan foydalanadi: buxgalteriya dasturlari, ombor va savdo hisobi dasturlari, CRM va ERP tizimlari, dizayn, tahrirlash va ishlab chiqarish jarayoniga xizmat qiluvchi maxsus dasturlar shular jumlasidandir. Agar ushbu dasturlar 1 yildan ortiq muddat foydalanish uchun mo‘ljallangan bo‘lsa, ularni nomoddiy aktiv sifatida tan olish maqsadga muvofiq bo‘ladi. Bu holatda dasturiy ta’minotning qiymati faqat sotib olish narxi bilan cheklanmaydi. Undan tashqari, dastur o‘rnatish va sozlash bo‘yicha xizmatlar, dastur litsenziyasini rasmiylashtirish bilan bog‘liq xarajatlar, zarur bo‘lsa, dasturga kiritilgan dastlabki moslashtirish ishlari ham umumiy boshlang‘ich qiymat tarkibiga kiritilishi lozim. Shunda buxgalteriya hisobi nafaqat dastlabki pul chiqimini, balki korxona uchun kelgusida iqtisodiy foyda keltiradigan barcha komponentlarni mujassam aks ettiradi.

Nomoddiy aktiv sifatida tan olingan dasturiy ta’minot bo‘yicha amortizatsiya hisoblash masalasi ham alohida ahamiyatga ega. Ko‘pincha amaliyotda 3–5 yillik amortizatsiya muddati qabul qilinadi. Bu muddat dasturdan foydalanish intensivligi, texnologik yangilanish tezligi va korxonaning ichki siyosatiga qarab belgilanishi lozim. Masalan, tez-tez yangilanadigan ofis paketlari uchun qisqaroq, 3 yilgacha bo‘lgan muddat maqsadga muvofiq bo‘lishi mumkin. Keng ko‘lamli, korxonaga kompleks boshqaruv funksiyasini beradigan ERP tizimlari uchun esa 5 yilgacha bo‘lgan amortizatsiya davri iqtisodiy mazmunga ko‘proq mos tushishi mumkin. Shuni alohida ta’kidlash kerakki, dasturiy ta’minotni yangilash, texnik qo‘llab-quvvatlash yoki kichik funksional o‘zgartirishlar ko‘pincha davr xarajati sifatida tan olinadi, chunki bu xarajatlar yangi nomoddiy aktivni yaratmaydi, balki mavjud dasturdan foydalanishni davom ettirish imkonini beradi xolos.

Ikkinchi yo‘nalish sifatida bulutli xizmatlar va abonentlik asosida ko‘rsatiladigan dasturiy mahsulotlar tahlil qilindi. Hozirgi kunda Google Workspace, Microsoft 365, AWS, Yandex Cloud kabi platformalardan foydalanish korxona hayotining ajralmas qismiga aylanib bormoqda. Bunday xizmatlar uchun to‘lovlar odatda oylik yoki yillik abonentlik ko‘rinishida, foydalanuvchilar soni yoki ajratilgan saqlash hajmiga qarab shakllanadi. Mazkur to‘lovlarning mohiyati shundan iboratki, korxona dasturiy ta’minotga egalik qilmaydi, balki ma’lum davr davomida undan foydalanish huquqini oladi. Shu sababli bulutli xizmatlar uchun to‘lovlar kelgusida uzoq muddatli iqtisodiy manfaat yaratmaydi, asosan xizmat ko‘rsatish davri bilan chegaralanadi. Tadqiqot natijalariga ko‘ra, bunday to‘lovlarni davr xarajatlari sifatida tan olish, ularni tegishli moddalar bo‘yicha xarajatlar tarkibida aks ettirish buxgalteriya amaliyoti uchun maqbul hisoblanadi. Bu yondashuv korxonaning moliyaviy natijasini realroq aks ettirishga yordam beradi, chunki xarajat va xizmatdan olingan foyda bir davrga to‘g‘ri keladi.

Uchinchi muhim yo‘nalish axborot xavfsizligi tizimlari xarajatlari bilan bog‘liq. Firewall, antivirus, DLP, IDS/IPS, zaxira nusxalash tizimlari kabi vositalar korxonaning ma’lumotlar bazasi va axborot resurslarini himoya qiladi. Tadqiqot axborot xavfsizligi bo‘yicha xarajatlarni ikki asosiy qismga ajratib ko‘rib chiqishni taklif etadi. Birinchisi, dastlabki o‘rnatish, konfiguratsiya qilish, maxsus dasturiy paketlarni xarid qilish bilan bog‘liq xarajatlardir. Agar ushbu tizimlar uzoq muddat davomida foyda keltirishi va korxonaning axborot infratuzilmasining ajralmas qismiga aylansa, ularni nomoddiy aktiv yoki, texnik vositalar bilan bog‘liq bo‘lsa, asosiy vosita sifatida tan olish mumkin. Ikkinchisi esa muntazam texnik xizmat ko‘rsatish, litsenziyani va virus bazalarini yangilab turish, qo‘shimcha texnik yordam kabi muntazam xarajatlardir. Bunday xarajatlar o‘z tabiatiga ko‘ra davr xarajatlari bo‘lib, ular har bir hisobot davrida tegishli xarajat moddalari bo‘yicha aks ettirilishi kerak. Ana shunday yondashuv axborot xavfsizligi bo‘yicha xarajatlar strukturasini aniq ko‘rsatish, bo‘limlar kesimida tahlil qilish va samaradorligini baholash imkonini beradi.

To‘rtinchi yo‘nalish AKT infratuzilmasining moddiy asosini tashkil etuvchi serverlar, kompyuterlar va tarmoq uskunalariga taalluqlidir. Kompyuter texnikasi odatda asosiy vosita sifatida hisobga olinadi, chunki ular bir necha yil davomida korxona ishlab chiqarish, xizmat ko‘rsatish yoki boshqaruv jarayonlarida foydalaniladi. Tadqiqot amaliyotda kompyuterlar, noutbuklar va shunga o‘xshash uskunalar uchun 3–5 yillik amortizatsiya muddatini, serverlar va katta hajmli saqlash tizimlari uchun esa ko‘pincha 5 yillik muddat qo‘llanilishini ko‘rsatdi. Bu tanlov texnik eskirish tezligi, texnologik yangilanish sur’ati hamda korxonaning raqamli strategiyasi bilan uzviy bog‘liq. Agar korxona tez-tez modernizatsiya qilish siyosatini yuritsa, amortizatsiya davrini qisqaroq belgilash, agar uskunalar uzoq muddat foydalanilsa, uni biroz uzaytirish mumkin. Muhimi, tanlangan muddat iqtisodiy mazmunni aks ettirishi va izchil qo‘llanilishi kerak. Bundan tashqari, AKT uskunalarini o‘z vaqtida yangilab borish korxonaning raqamli barqarorligi va axborot xavfsizligi uchun muhim omil ekanligi tadqiqot davomida qayd etildi.

Beshinchi tahlil yo‘nalishi xorijdan xarid qilingan AKT xizmatlari uchun qo‘shilgan qiymat solig‘i mexanizmi bilan bog‘liq. Xorijiy kompaniyalardan dasturiy ta’minotga obuna bo‘lish, bulutli xizmatlardan foydalanish yoki masofaviy texnik yordam olish hollari ko‘payib bormoqda. Bunday vaziyatda teskari hisoblash, ya’ni reverse charge mexanizmini to‘g‘ri qo‘llash buxgalteriya amaliyoti uchun juda muhim. Amaldagi tartibga ko‘ra, rezident korxona xorijdan olingan xizmatlar bo‘yicha 12 foizlik QQSni mustaqil ravishda hisoblab, tegishli hisobotlarda aks ettirishi kerak. Bu jarayonda xizmat qiymati shartnoma yoki hisob-faktura asosida aniqlanadi, undan QQS summasi hisoblanadi va bu summa bir vaqtning o‘zida hisoblangan soliq sifatida majburiyatlarda, hamda ma’lum shartlar bajarilganda, soliqni chegirish huquqi bo‘yicha hisobda aks ettirilishi mumkin. Tadqiqot natijalari shuni ko‘rsatadiki, ko‘plab korxonalarda aynan teskari hisoblash bo‘yicha provodkalar, hisobot davri va hujjatlarni rasmiylashtirishda xatolar uchrab turadi. Shu sababli bu yo‘nalishda buxgalterlar

uchun qo‘shimcha uslubiy ko‘rsatmalar, ichki nazorat tartiblarini ishlab chiqish zarurligi ta’kidlab o‘tildi.

Oltinchi yo‘nalish sifatida elektron hujjat aylanishi va biznes jarayonlarini avtomatlashtirish tizimlari tahlil qilindi. Elektron imzo, elektron hisob-faktura, elektron shartnomalar va boshqa raqamli hujjat turlari buxgalteriya ishlarini sezilarli darajada yengillashtiradi. Tadqiqot shuni ko‘rsatdiki, elektron hujjat aylanishi joriy etilgan korxonalarda bir qator ijobiy natijalar kuzatiladi. Birinchidan, hujjatlarning yo‘qolish ehtimoli keskin kamayadi, chunki barcha ma’lumotlar markazlashtirilgan serverlarda yoki bulutli saqlash tizimlarida saqlanadi. Ikkinchidan, tekshiruv jarayoni soddalashadi: soliq organlari, auditorlar va ichki nazorat bo‘limlari hujjatlarni elektron tarzda tezkor ko‘rib chiqish imkoniga ega bo‘ladi. Uchinchi tomondan, inson omili bilan bog‘liq xatolar soni kamayadi, chunki tizim ko‘plab hisob-kitoblarni avtomatik bajaradi, ma’lumotlarni takror kiritishni qisqartiradi va bir qator mantiqiy nazoratlarni (masalan, summalarni taqqoslash, sanalarni solishtirish) o‘zi bajaradi. To‘rtinchidan, ma’lumotlarni real vaqt rejimida boshqarish imkoniyati paydo bo‘ladi, bu esa qaror qabul qilish jarayonini tezlashtiradi va boshqaruv sifatini oshiradi. Bunday tizimlarni joriy etish bo‘yicha dastlabki xarajatlar dasturiy ta’minot va xizmat xarakteriga qarab nomoddiy aktiv yoki davr xarajati sifatida tan olinadi, keyingi xizmat ko‘rsatish va obuna xarajatlari esa davr xarajatlariga kiritilishi lozim.

Xulosa va takliflar

Tadqiqot natijalari shuni ko‘rsatadiki, AKT xizmatlari zamonaviy korxona faoliyatining ajralmas qismiga aylangan va ularning buxgalteriya hisobini to‘g‘ri tashkil etish korxonaning moliyaviy holatini haqqoniy aks ettirishga bevosita ta’sir ko‘rsatadi. Dasturiy ta’minot, axborot xavfsizligi tizimlari, bulutli xizmatlar, AKT infratuzilmasi va elektron hujjat aylanishi bo‘yicha buxgalteriya yondashuvlari bir-biridan farq qiladi. Shu boisdan korxonalar bu yo‘nalishda yagona, aniq belgilangan ichki hisob siyosatini ishlab chiqishlari zarur. Bunda, ayniqsa, qaysi holatlarda dasturiy ta’minot nomoddiy aktiv sifatida, qaysi holatlarda esa oddiy davr xarajati sifatida tan olinishi bo‘yicha mezonlarni aniq belgilash tavsiya etiladi.

Dasturiy ta’minotni nomoddiy aktiv sifatida tan olish bo‘yicha asosiy mezonlar sifatida foydalanish muddati, kelgusida iqtisodiy foyda keltirish darajasi, korxona jarayonlariga integratsiya darajasi va huquqiy egalik huquqi (litsenziya turi)ni hisobga olish zarur. Agar dastur korxonaga bir necha yil davomida xizmat qilsa va undagi funksiyalar korxona ish faoliyatining markaziy bo‘g‘ini hisoblanadigan bo‘lsa, bunday dasturlarni nomoddiy aktiv sifatida hisobga olish maqsadga muvofiqdir. Aksincha, qisqa muddatli, faqat abonentlik asosida ishlaydigan va korxona tomonidan to‘liq nazorat qilinmaydigan bulutli xizmatlar bo‘yicha xarajatlar davr xarajatlari sifatida tan olinishi kerak. Ushbu yondashuv soliq va moliyaviy hisobotlar o‘rtasida uyg‘unlikni ta’minlaydi, investorlar, kreditorlar va boshqa manfaatdor tomonlar uchun ma’lumotlarning tushunarli bo‘lishini ta’minlaydi.

AKT infratuzilmasi bo‘yicha esa, serverlar, kompyuterlar va tarmoq uskunalarining amortizatsiya muddatlarini belgilashda korxonaning texnik siyosatini, bozordagi texnologik yangilanish sur’atini va uskunalardan foydalanish intensivligini inobatga olish zarur. Aks holda, buxgalteriya hisobida ko‘rsatilgan qoldiq qiymat real holatdan keskin farq qilishi mumkin. Taklif tariqasida, korxonalarga har 2–3 yilda bir marotaba AKT infratuzilmasi bo‘yicha inventarizatsiya o‘tkazish, eskirgan yoki ishlatilmayotgan uskunalarni hisobdan chiqarish, amortizatsiya siyosatini zamonaviy talablarga moslab qayta ko‘rib chiqish tavsiya etiladi.

Yakunda aytish mumkinki, AKT xizmatlari bo‘yicha buxgalteriya hisobini modernizatsiya qilish, milliy me’yoriy-huquqiy bazani xalqaro standartlar bilan uyg‘unlashtirgan holda takomillashtirish, korxonalar uchun ichki metodikalarni ishlab chiqish va amalyotchi buxgalterlarni muntazam tayyorlash zamonaviy raqamli iqtisodiyot sharoitida muhim strategik vazifa hisoblanadi. Shu yo‘nalishda amalga oshiriladigan ishlar korxonalarning moliyaviy shaffofligini oshirish, investorlar ishonchini kuchaytirish va raqobatbardoshligini ta’minlashga xizmat qiladi.

Adabiyotlar

1. Боронов, Б. Ф. (2022). ЁҒ-МОЙ МАҲСУЛОТЛАРИ ИШЛАБ ЧИҚАРИШ ХАРАЖАТЛАРИ ҲИСОБИНИНГ НАЗАРИЙ ВА МЕТОДОЛОГИК АСОСЛАРИНИ ТАКОМИЛЛАШТИРИШ. ISSN 2181-3191 VOLUME 1, ISSUE 7 OCTOBER 2022, 202284.
2. Shodiyevich, R. S., Shodiyevich, R. S., & o’g‘liU. S. B. (2023). ACCOUNTING ISSUES IN THE DIGITAL ECONOMY. CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND COMPUTER SCIENCES, 4(6), 80-84. Retrieved from https://cajmtcs.centralasianstudies.org/index.php/CAJMTCS/article/view/475
3. De Andreis, F. (2019). The Principles behind a Strategic Plan.
4. Ражабоев , Ш., и П. Хамидова. «ИСПОЛЬЗОВАНИЕ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ УСЛУГ В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ». Экономическое развитие и анализ, т. 3, вып. 1, январь 2025 г., сс. 120-4, https://inlibrary.uz/index.php/eitt/article/view/65480
5. Forrester, J.W. (1992). Policies, Decisions and Information Sources for Modeling.
6. Боронов, Б. (2022). МАҲСУЛОТ ТАННАРХИНИ ҲИСОБЛАШДА УМУМИШЛАБ ЧИҚАРИШ ХАРАЖАТЛАРИНИНГ ЎРНИ ВА УЛАРНИНГ ҲИСОБИНИ ТАКОМИЛЛАШТИРИШ. Economics and Innovative Technologies, 10(6), 31-42.
7. Salet, W.; Faludi, A. (2000). Three Approaches to Strategic Planning.
8. Уразов К.Б., and Боронов Б.Ф.. "РЕСПУБЛИКА ОЗИҚ-ОВҚАТ САНОАТИДА ЁҒ-МОЙ МАҲСУЛОТЛАРИНИНГ АҲАМИЯТИ ВА ТУРЛАРИ" Экономика и социум, no. 6-2 (97), 2022, pp. 714-719.
9. Ljiljana Vasilevska (2009). Strategic planning as a regional development mechanism.

10. Shakhboz R. USING MODERN TECHNOLOGIES TO INCREASE THE EFFECTIVENESS OF TEACHING COMPUTER SCIENCE BASED ON DISTANCE EDUCATION //Journal of Advanced Scientific Research (ISSN: 0976-9595). – 2023. – Т. 3. – №. 7.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
Absalamov S. U.
talabasi
Samarqand iqtisodiyot va servis instituti

KORXONANI BOSHQARISHDA AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARINING O'RNI VA AHAMIYATI

Annotatsiya: *Ushbu ishda korxonani boshqarish jarayonida axborot-kommunikatsiya texnologiyalarining tutgan o‘rni va ahamiyati yoritib berilgan. Maqolada AKT vositalari orqali boshqaruv jarayonlarini avtomatlashtirish, tezkor axborot almashinuvi, qaror qabul qilishni optimallashtirish hamda ish samaradorligini oshirish masalalari tahlil qilingan. Shuningdek, zamonaviy dasturiy tizimlar va raqamli texnologiyalarning korxona rivojiga ta’siri ochib berilgan.*

Kalit so’zlar: *Korxona boshqaruvi, axborot-kommunikatsiya texnologiyalari, AKT, raqamli boshqaruv, avtomatlashtirish, axborot tizimlari, elektron boshqaruv, biznes jarayonlarini optimallashtirish, ma’lumotlar bazasi, korporativ tizimlar, ERP tizimi, CRM tizimi.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
Absalamov S. U.
student
Samarkand Institute of Economics and Service

THE ROLE AND IMPORTANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN ENTERPRISE MANAGEMENT

Abstract: *This paper highlights the role and significance of information and communication technologies (ICT) in enterprise management. The article analyzes issues such as automating management processes through ICT tools, ensuring rapid information exchange, optimizing decision-making, and improving operational efficiency. Additionally, it reveals the impact of modern software systems and digital technologies on the development of enterprises.*

Keywords: *enterprise management, information and communication technologies, ICT, digital management, automation, information systems, e-*

management, business process optimization, database, corporate systems, ERP system, CRM system.

Kirish

Bugungi kunda dunyo bo‘ylab barcha sohalarda raqamlashtirish jarayoni jadal sur’atlar bilan rivojlanmoqda. Ayniqsa, korxonalar faoliyatida axborot-kommunikatsiya texnologiyalarining (AKT) o‘rni tobora ortib bormoqda. Bozor iqtisodiyoti sharoitida har bir korxona raqobatbardosh bo‘lishi, tezkor qaror qabul qilishi, resurslardan oqilona foydalanishi va o‘z faoliyatini samarali tashkil qilishi zarur. Bunday talablarni bajarishda zamonaviy axborot tizimlari, dasturiy ta’minotlar va kommunikatsiya texnologiyalari muhim vosita hisoblanadi.

Biroq ko‘plab korxonalarda hali ham boshqaruv ishlarining ayrim qismi eskicha, ya’ni qo‘lda yoki samarasiz usullar orqali amalga oshirilmoqda. Natijada vaqt va mablag‘ yo‘qotilishi, ma’lumotlarning yo‘qolib ketishi, xatoliklarning ko‘payishi, boshqaruvdagi kechikishlar kabi muammolar yuzaga kelmoqda. Ayniqsa, katta hajmdagi ma’lumotlarni qayta ishlashda, hisobotlar tayyorlashda, hujjatlarni yuritishda va ma’lumotlarni saqlashda turli muammolar kuzatilmoqda.

Shuningdek, ayrim korxonalarda zamonaviy texnologiyalar joriy etilgan bo‘lsa-da, xodimlarning axborot texnologiyalaridan foydalanish bo‘yicha bilim va ko‘nikmalari yetarli emas. Bu esa tizimlardan to‘liq va samarali foydalanishga to‘sqinlik qilmoqda. Ba’zi hollarda esa texnik jihozlarning yetishmasligi, internet tezligining pastligi, axborot xavfsizligining to‘liq ta’minlanmaganligi ham boshqaruv jarayoniga salbiy ta’sir ko‘rsatmoqda.

Bundan tashqari, bugungi kunda kiberxavfsizlik masalasi ham dolzarb muammolardan biri hisoblanadi. Korxona faoliyatiga oid muhim ma’lumotlarning ruxsatsiz shaxslarga tarqalib ketishi, tizimlarning buzilishi yoki viruslar orqali zararlanishi katta moddiy va ma’naviy zarar keltirishi mumkin. Shu sababli axborot tizimlarida ma’lumotlarni himoyalash, xavfsizligini ta’minlash dolzarb vazifalardan biri bo‘lib qolmoqda.

Yana bir muhim muammo — bu axborot oqimining haddan tashqari ko‘pligi va ularni tartibga solish muammosidir. Agar axborot to‘g‘ri tizimlashtirilmasa, rahbariyat uchun to‘g‘ri va aniq qaror qabul qilish qiyinlashadi. Bu esa korxona faoliyatining sekinlashishiga, daromadning kamayishiga va rivojlanishning susayishiga olib kelishi mumkin.

Shu sababli korxonani boshqarishda axborot-kommunikatsiya texnologiyalarini keng joriy etish, ularni samarali ishlatish, xodimlarning raqamli savodxonligini oshirish, zamonaviy dasturiy ta’minotdan foydalanish hamda axborot xavfsizligini ta’minlash hozirgi kunning eng dolzarb masalalaridan biri hisoblanadi.

Mazkur mavzu aynan mana shu muammolarni o‘rganishga, ularni tahlil qilishga va yechim topishga qaratilgan bo‘lib, korxonani boshqarishda AKT ning o‘rni va ahamiyatini yoritib berishga xizmat qiladi. Ushbu ishda zamonaviy texnologiyalarning boshqaruv jarayoniga ta’siri, ularning afzalliklari hamda mavjud muammolarni bartaraf etish yo‘llari ko‘rib chiqiladi.

Asosiy qism

Zamonaviy korxonalarda axborot-kommunikatsiya texnologiyalari (AKT) boshqaruv jarayonining ajralmas qismiga aylangan. Ular nafaqat ma’lumotlarni saqlash va uzatish, balki ularni qayta ishlash, tahlil qilish va rahbariyat qarorlarini qabul qilish jarayonini tezlashtirish imkonini beradi. AKT tizimlari korxona bo‘limlari va xodimlarini yagona tizimga birlashtirib, ish jarayonlarini avtomatlashtirish va resurslardan samarali foydalanishni ta’minlaydi.

Axborot-kommunikatsiya texnologiyalari — bu axborotni yig‘ish, saqlash, qayta ishlash va uzatish imkonini beruvchi dasturiy va texnik vositalar majmui hisoblanadi. Ular quyidagi asosiy elementlardan iborat:

- **Dasturiy ta’minot**: ERP, CRM, HRM, DMS kabi boshqaruvtizimlari;
- **Texnik vositalar**: kompyuterlar, serverlar, mobil qurilmalar, tarmoqlar;
- **Kommunikatsiya tarmoqlari**: internet, intranet, bulutli xizmatlar;
- **Axborot xavfsizligi vositalari**: firewall, antivirus dasturlar, shifrlash tizimlari.

Shu bilan, AKT korxonani boshqarishda nafaqat yordamchi vosita, balki markaziy va zaruriy element sifatida ishlatiladi. Ular orqali boshqaruv jarayonlari tezlashadi, xatoliklar kamayadi, resurslardan samarali foydalanish ta’minlanadi va qarorlar aniq va tez qabul qilinadi. Shu sababli zamonaviy korxonalar AKT tizimlarini keng joriy qilishga intiladi.

Korxonani boshqarishda axborot-kommunikatsiya texnologiyalari tamoyillari

1-jadval

Tamoyil nomi	Mazmuni
Avtomatlashtirish	Qo‘lda bajariladigan ishlar avtomatlashtiriladi; ish unumdorligi oshadi va xatoliklar kamayadi
Integratsiya	Turli boshqaruv tizimlari (ERP, CRM, HRM, DMS) bir-biri bilan integratsiyalashgan holda ishlaydi; bo‘limlar aro axborot oqimi uzluksiz bo‘ladi
Axborot xavfsizligi	Ma’lumotlar himoyalangan, ruxsatsiz kirish cheklangan; shaxsiy va korporativ ma’lumotlar maxfiyligi saqlanadi
Foydalanuvchi qulayligi	Xodimlar uchun interfeys tushunarli va ishlatish oson; treninglar va qo‘llanmalar orqali xodimlarni qo‘llab-quvvatlash ta’minlanadi
Moslashuvchanlik	Texnologiya va dasturiy ta’minot korxona ehtiyojiga mos ravishda o‘zgarib turadi; yangiliklarga tez moslashish imkoniyati mavjud
Innovatsion rivojlanish	Texnologiyalarni joriy etish korxona raqobatbardoshligini oshiradi va yangi imkoniyatlar yaratadi
Tezkor va samarali axborot almashuvi	Xodimlar va bo‘limlar o‘rtasida ma’lumotlar tezkor, to‘liq va uzluksiz almashiladi
Markazlashgan ma’lumot bazasi	Barcha bo‘limlar yagona ma’lumotlar bazasidan foydalanadi; qarorlar uchun ma’lumot doimiy, aniq va yangilanib turadi
Ma’lumotlar butunligi	Ma’lumotlarning o‘zgarmasligi, yo‘qolmasligi va to‘g‘ri saqlanishi.
Masofaviy boshqaruv va tarmoqlanish	AKT tizimlari masofadan ishlash imkonini beradi; global va lokal tarmoqlar orqali axborot almashinuvi ta’minlanadi

Korxonada axborot-kommunikatsiya texnologiyalarining turlari va amaliy roli

Zamonaviy korxonalarda axborot-kommunikatsiya texnologiyalari (AKT) boshqaruv jarayonining ajralmas qismiga aylangan. Ular nafaqat ma’lumotlarni saqlash va uzatish, balki ularni qayta ishlash, tahlil qilish va rahbariyat qarorlarini qabul qilish jarayonini tezlashtirish imkonini beradi. AKT tizimlari korxona bo‘limlari va xodimlarini yagona tizimga birlashtirib, ish jarayonlarini avtomatlashtirish va resurslardan samarali foydalanishni ta’minlaydi.

Korxona boshqaruvida AKT bir necha jihatlarda asosiy rol o‘ynaydi:

1. **Boshqaruv jarayonlarini avtomatlashtirish**: moliyaviy hisobotlar, ishlab chiqarish, ombor va kadrlar bo‘limlari ishini avtomatik qilish; xatoliklarni kamaytirish va ish unumdorligini oshirish.

2. **Axborot almashuvini tezlashtirish**: korporativ portal va intranet orqali bo‘limlar va xodimlar o‘rtasida ma’lumotlar tezkor yetkaziladi; tashqi aloqalar ham samarali boshqariladi.

3. **Ma’lumotlarni tahlil qilish va qaror qabul qilishni qo‘llab-quvvatlash**: yig‘ilgan ma’lumotlar tahlil qilinadi, grafik va diagrammalar shaklida vizualizatsiya qilinadi, bu rahbariyatga tez va aniq qaror qabul qilish imkonini beradi.

4. **Resurslarni samarali boshqarish**: HRM tizimlari xodimlarning ish faoliyatini va rag‘batlantirish tizimini avtomatlashtiradi, moddiy va moliyaviy resurslar optimal ishlatiladi.

5. **Axborot xavfsizligi va shaffoflik**: ma’lumotlar himoyalangan, ruxsatsiz kirish oldini oladi va korxona ichidagi boshqaruv jarayoni shaffof bo‘ladi.Shu bilan, AKT korxonani boshqarishda nafaqat yordamchi vosita, balki markaziy va zaruriy element sifatida ishlatiladi. Ular orqali boshqaruv jarayonlari tezlashadi, xatoliklar kamayadi, resurslardan samarali foydalanish ta’minlanadi va qarorlar aniq va tez qabul qilinadi. Shu sababli zamonaviy korxonalar AKT tizimlarini keng joriy qilishga intiladi.

Korporativ portallar va ularning korxona boshqaruvidagi roli:

Korporativ portallar bugungi kunda korxona boshqaruvidagi eng muhim axborot-kommunikatsiya vositalaridan biridir. Ular korxona ichidagi barcha bo‘limlar va xodimlar o‘rtasida samarali muloqot, tezkor axborot almashinuvi va ish jarayonlarini yagona platformada boshqarish imkonini beradi. Portallar nafaqat ma’lumotlarni saqlash va uzatish bilan cheklanib qolmaydi, balki xodimlarning ish faoliyatini kuzatish, topshiriqlarni boshqarish, ichki yangiliklar va bildirishnomalarni yetkazish kabi ko‘plab funksiyalarni ham bajaradi.

Korporativ portalning asosiy afzalligi shundaki, u barcha bo‘limlarni birlashtiradi va rahbariyatga to‘liq axborot oqimini taqdim etadi. Bu rahbariyatga tezkor va aniq qarorlar qabul qilish imkonini beradi, shuningdek, xodimlar o‘rtasida ish jarayonining shaffofligini ta’minlaydi. Shu bilan birga, portal xodimlarni yagona tizimda birlashtiradi, ularning vazifalarini kuzatish va bajarilishini nazorat qilishni osonlashtiradi.

Korporativ portallar yordamida xodimlar o‘z vazifalarini aniq biladi, yangi topshiriqlarni qabul qiladi va bajarilgan ishlar bo‘yicha boshqaruvga tezkor hisobot beradi. Bu nafaqat ish unumdorligini oshiradi, balki xodimlarning ish jarayoniga bo‘lgan mas’uliyatini ham kuchaytiradi. Shu bilan birga, portal orqali ichki yangiliklar, bildirishnomalar va muhim xabarlar tezkor yetkaziladi, bu esa xodimlarning o‘zgarishlardan xabardor bo‘lishini ta’minlaydi

Masofaviy ishlash sharoitida korporativ portallar ayniqsa muhimdir. Ular xodimlarga istalgan joydan korxona resurslariga kirish va ishlash imkonini beradi. Shu tariqa, korxona faoliyati qaysi joyda bo‘lishidan qat’iy nazar uzluksiz davom etadi va rahbariyat doimo ma’lumotlardan xabardor bo‘ladi.Bundan tashqari, korporativ portallar orqali tahliliy va boshqaruv ma’lumotlari yig‘iladi va vizualizatsiya qilinadi, bu rahbariyatga strategik qarorlar qabul qilishda yordam beradi. Portallar ichki jarayonlarni standartlashtiradi, ish jarayonini soddalashtiradi va korxona ichidagi axborot oqimini tartibga soladi.

Shu bilan, korporativ portal korxona boshqaruvida markaziy vosita sifatida xizmat qiladi. U xodimlar va bo‘limlar o‘rtasida uzluksiz aloqa va samarali hamkorlikni ta’minlaydi, rahbariyatning tezkor qaror qabul qilishini qo‘llab-quvvatlaydi va korxona resurslarini optimal ishlatishga yordam beradi. Zamonaviy korxonalarda portallarni keng joriy etish ularning raqobatbardoshligini oshirish, ish jarayonlarini tezlashtirish va boshqaruvning samaradorligini oshirishda muhim ahamiyatga ega.

Xulosa

Korxonani boshqarishda axborot-kommunikatsiya texnologiyalari (AKT) zamonaviy boshqaruv jarayonining ajralmas qismiga aylangan. Ular orqali ma’lumotlarni tezkor qayta ishlash, bo‘limlararo axborot almashuvi va qaror qabul qilish jarayoni samarali tashkil etiladi. Turli AKT tizimlari — ERP, CRM, HRM, DMS va korporativ portallar — o‘z vazifasini bajarish bilan birga, integratsiya orqali korxona faoliyatining barcha jabhalarini birlashtiradi va boshqaruvni optimallashtiradi.Korporativ portallar esa xodimlar o‘rtasida muloqot, ichki axborot almashuvi va masofaviy ishlash imkoniyatini ta’minlaydi. Shu bilan birga, rahbariyatga tezkor va aniq qaror qabul qilish imkonini beradi, resurslarni samarali ishlatishga yordam beradi va ish jarayonini shaffof qiladi.Umuman olganda, AKT va korporativ portallarni joriy etish zamonaviy korxona boshqaruvida samaradorlikni oshirish, raqobatbardoshlikni mustahkamlash va biznes jarayonlarini yanada optimallashtirish imkonini beradi. Zamonaviy korxonalar uchun AKT tizimlari faqat qo‘shimcha vosita emas, balki boshqaruvning markaziy va zaruriy elementi hisoblanadi

Foydalanilgan adabiyotlar ro’yxati.

1. Боронов, Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». Передовая экономика и педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.

2. Ражабоев Ш. Ш. ЦИФРОВИЗАЦИЯ И ЗЕЛЕНЫЙ СЕКТОР В УСТОЙЧИВОМ РАЗВИТИИ //ББК 65.05 П 78. – С. 596.
3. Боронов, Б., & Саломов , Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115
4. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.
5. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
6. Ражабоев Ш. Ш. РОЛЬ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ТЕХНОЛОГИЧЕСКОМ ПРЕДПРИНИМАТЕЛЬСТВЕ //ББК 65.29 я43 Т384. – 2022. – С. 54.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Xolmamatova H. E.
talabasi
Samarqand iqtisodiyot va servis instituti

AXBOROT-KOMMUNIKATSIYA SOHASIDA INNOVATSION XIZMATLARNI JORIY ETISHNING IQTISODIY SAMARASI

Annotatsiya: *Ushbu maqolada axborot-kommunikatsiya texnologiyalari (AKT) sohasida innovatsion xizmatlarni joriy etishning iqtisodiy samarasi har tomonlama tahlil etilgan. Raqamli transformatsiya va axborotlashgan jamiyat sharoitida innovatsion xizmatlar nafaqat texnologik rivojlanishning muhim elementi sifatida, balki iqtisodiy o‘sishning, samaradorlikning va raqobatbardoshlikning kaliti sifatida namoyon bo‘layotgani yoritib berilgan. Tadqiqotda innovatsion xizmatlar turlari, ularning iqtisodiy foydalari, ishlab chiqarish xarajatlarini kamaytirishdagi o‘rni, resurslardan samarali foydalanishga ta’siri va iqtisodiy muhitga olib keladigan ijobiy o‘zgarishlar tahlil qilingan. Bundan tashqari, O‘zbekistonda “Raqamli O‘zbekiston – 2030” strategiyasi doirasida AKT sohasiga kiritilayotgan yangiliklar, innovatsion platformalar va xizmatlar misolida milliy tajriba asosida amaliy natijalar ko‘rsatib o‘tilgan.*

Kalit so’zlar: *Axborot-kommunikatsiya texnologiyalari (AKT), Innovatsion xizmatlar,iqtisodiy samaradorlik,bulutli hisoblash,sun’iy intellect,katta ma’lumotlar (Big Data), IoT (Internet of Things), raqamli iqtisodiyot, raqamli O‘zbekiston, kiberxavfsizlik, elektron tijorat, raqamlashtirish,IT infratuzilma.*

Rajaboev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Kholmamatova H. E.
student
Samarkand Institute of Economics and Service

ECONOMIC EFFECTS OF IMPLEMENTING INNOVATIVE SERVICES IN THE INFORMATION AND COMMUNICATION FIELD

Abstract: *This article comprehensively analyzes the economic impact of introducing innovative services in the field of information and communication technologies (ICT). It is highlighted that in the context of digital transformation and an information society, innovative services are not only an important element of technological development, but also a key to economic growth, efficiency and competitiveness. The study analyzes the types of innovative services, their economic benefits, their role in reducing production costs, their impact on the efficient use of resources and the positive changes they bring to the economic environment. In addition, practical results are shown based on national experience on the example of innovations, innovative platforms and services introduced into the ICT sector in Uzbekistan within the framework of the "Digital Uzbekistan – 2030" strategy.*

Keywords: *Information and Communication Technologies (ICT), Innovative services, economic efficiency, cloud computing, artificial intelligence, big data (Big Data), IoT (Internet of Things), digital economy, digital Uzbekistan, cybersecurity, e-commerce, digitization, IT infrastructure*

Kirish

Axborot-kommunikatsiya texnologiyalari (AKT) zamonaviy iqtisodiyotning asosiy harakatlantiruvchi kuchi sifatida tobora muhim ahamiyat kasb etmoqda. Innovatsion xizmatlar, masalan, sun'iy intellekt, bulutli hisoblash, katta ma'lumotlar tahlili va IoT (Internet of Things) kabi texnologiyalar iqtisodiy rivojlanishga katta ta'sir ko'rsatmoqda. Ushbu maqola AKT sohasida innovatsion xizmatlarni joriy etishning iqtisodiy samarasini tahlil qiladi va ularning iqtisodiyotning turli tarmoqlariga ta'sirini ko'rib chiqadi.

Innovatsion xizmatlarning mohiyati. Innovatsion xizmatlar deb, yangi texnologiyalarga asoslangan, jarayonlarni optimallashtirish, xarajatlarni kamaytirish va samaradorlikni oshirishga xizmat qiluvchi xizmatlarga aytiladi. AKT sohasidagi innovatsiyalar quyidagilarni o'z ichiga oladi: Bulutli hisoblash: Ma'lumotlarni saqlash va qayta ishlashni markazlashtirish. Sun'iy intellekt: Avtomatlashtirish va qaror qabul qilish jarayonlarini yaxshilash. Katta ma'lumotlar (Big Data): Katta hajmdagi ma'lumotlarni tahlil qilish orqali biznes

strategiyalarini optimallashtirish. IoT: Qurilmalar o‘zaro bog‘lanishi orqali real vaqtda ma’lumot almashish. Ushbu xizmatlar iqtisodiyotning turli sohalari, jumladan, ishlab chiqarish, savdo, moliya, sog‘liqni saqlash va ta’limda qo‘llanilmoqda.

Iqtisodiy samaradorlikning asosiy jihatlari. Innovatsion xizmatlarning iqtisodiy samarasi quyidagi yo‘nalishlarda namoyon bo‘ladi: Xarajatlarni kamaytirish. AKT sohasidagi innovatsiyalar korxonalarga operatsion xarajatlarni sezilarli darajada kamaytirish imkonini beradi. Samaradorlikni oshirish. Innovatsion xizmatlar biznes jarayonlarini soddalashtiradi va tezlashadi. Yangi daromad manbalari. Innovatsion xizmatlar yangi biznes modellarini yaratishga yordam beradi. Raqobatbardoshlikni oshirish. AKT innovatsiyalari korxonalarga global bozorda raqobatbardosh bo‘lish imkonini beradi. O‘zbekistonda innovatsion xizmatlarning joriy etilishi, ayniqsa, elektron tijorat, mobil bank xizmatlari va davlat xizmatlarining raqamlashtirilishi kabi sohalarda iqtisodiy samaradorlikni oshirishga yordam bermoqda.

Adabiyotlar sharhi

O‘zbekiston Respublikasi Prezidentining “Raqamli O‘zbekiston – 2030” strategiyasi to‘g‘risidagi qarori (2020). Ushbu hujjat O‘zbekistonda raqamli transformatsiya yo‘nalishidagi asosiy strategik dastur bo‘lib, AKT sohasini rivojlantirish, raqamli iqtisodiyotni shakllantirish va innovatsion xizmatlarni keng joriy etish bo‘yicha muhim maqsad va vazifalarni belgilaydi.

Karimov A.S., Rasulov A.X. “Axborot-kommunikatsiya texnologiyalari” (2021). Mazkur darslikda axborot-kommunikatsiya texnologiyalarining nazariy asoslari, texnik vositalari va ularning iqtisodiyotdagi amaliy qo‘llanilishi yoritilgan. Unda raqamli tizimlarning ishlash tamoyillari va axborot xavfsizligi masalalariga ham e’tibor qaratilgan.

Xolbo‘tayev A.X. “Innovatsion iqtisodiyot asoslari” (2022). Muallif innovatsiyalar iqtisodiy tizimda qanday ishlashini, ularning samaradorlikka ta’sirini va iqtisodiyotdagi raqobatbardoshlikni oshirishdagi rolini tahlil qiladi. Kitobda innovatsion xizmatlar tushunchasi ham yoritilgan.

Qodirov B.B. “Axborot texnologiyalari va iqtisodiy samaradorlik” (2020). Asarda axborot texnologiyalarining ishlab chiqarish va xizmat ko‘rsatish sohalariga qo‘shayotgan iqtisodiy foydasi, xarajatlarni kamaytirishdagi o‘rni va umumiy samaradorlikka ta’siri statistik misollar bilan ko‘rsatilgan.

Mo‘minov A.A., Xudoyberganov S.S. “Innovatsion menejment” (2019). Kitobda innovatsiyalarni boshqarish, ularni amaliyotga tatbiq etish mexanizmlari va innovatsion jarayonlarni strategik rejalashtirish masalalari yoritilgan. Bu asar innovatsion xizmatlarni tizimli yondashuv asosida joriy etish uchun muhim manbadir.

OECD (2022). ***The Digital Transformation of SMEs***. Xalqaro tadqiqot sifatida ushbu nashr kichik va o‘rta biznes subyektlarining raqamli texnologiyalar orqali qanday rivojlanayotgani, raqamli xizmatlar ularning samaradorligiga qanday ta’sir ko‘rsatayotgani haqida qimmatli ma’lumotlar beradi. Bu manba global tajriba va taqqoslash uchun muhim ahamiyatga ega.

World Bank (2023). ***Information and. Communication.Technology (ICT) Sector Brief*****. –** **www.worldbank.org**. Mazkur hisobotda Jahon banki tomonidan axborot-kommunikatsiya texnologiyalari sohasining global miqyosdagi ahamiyati, rivojlanayotgan davlatlar uchun imkoniyatlari va AKT infratuzilmasini rivojlantirish bo‘yicha tavsiyalar keng yoritilgan. Hujjatda AKTning iqtisodiy o‘sishga qo‘shayotgan hissasi, siyosiy islohotlar bilan uzviy bog‘liqligi va xizmatlar sohasida samaradorlikni oshirishdagi roli haqida muhim tahlillar mavjud.

UNCTAD (2023). ***Digital Economy Report 2023: Cross-border data flows and development.*** **– www.unctad.org** Ushbu xalqaro hisobotda raqamli iqtisodiyotda ma’lumotlar oqimining (data flows) o‘sishi, uning chegaralardan oshuvchi xususiyati va buning natijasida yuzaga kelayotgan iqtisodiy, siyosiy hamda texnologik oqibatlar chuqur o‘rganilgan. UNCTAD hisobotida AKT xizmatlarining iqtisodiy barqarorlik va rivojlanayotgan davlatlar uchun strategik resurs sifatida ko‘rilishi alohida ta’kidlangan.

Tadqiqot metodologiyasi.

Ushbu tadqiqotda axborot-kommunikatsiya texnologiyalari (AKT) sohasida innovatsion xizmatlarni joriy etishning iqtisodiy samaradorligi o‘rganildi. Tadqiqotning asosiy maqsadi – innovatsion xizmatlarning iqtisodiyotdagi o‘rni va samaradorlikka ta’sirini aniqlash, hamda ularni rivojlantirish bo‘yicha amaliy tavsiyalar ishlab chiqishdan iborat. Tahlilda sifat (qualitative) va miqdoriy (quantitative) yondashuvlar qo‘llanildi. Asosiy uslublar sifatida tahliliy va taqqoslash usullari, statistik ma’lumotlarni tahlil qilish, hamda xalqaro tajribani o‘rganish usullari qo‘llandi. Ma’lumotlar O‘zbekiston Respublikasi Prezidentining qarorlari, AKT vazirligi va Davlat statistika qo‘mitasi hisobotlari, shuningdek, OECD, UNCTAD va Jahon banki kabi xalqaro tashkilotlar manbalariga tayangan holda to‘plandi. Tadqiqot natijalariga ko‘ra, innovatsion xizmatlarning joriy etilishi iqtisodiy samaradorlikni oshirish, xizmatlar sifatini yaxshilash va raqobatbardoshlikni kuchaytirishda muhim omil ekani aniqlandi.

Tahlil va natijalar.

Axborot-kommunikatsiya texnologiyalari (AKT) sohasida innovatsion xizmatlarning joriy etilishi zamonaviy iqtisodiyotning muhim tarkibiy qismlaridan biri hisoblanadi. Olib borilgan tadqiqotlar asosida ushbu xizmatlarning iqtisodiy samaradorlikka ko‘rsatadigan bevosita va bilvosita ta’siri quyidagi asosiy yo‘nalishlar bo‘yicha tahlil qilindi:

Ishlab chiqarish va xizmat ko‘rsatishda samaradorlik oshmoqda Innovatsion xizmatlar yordamida avtomatlashtirilgan tizimlar, sun’iy intellekt, “bulutli texnologiyalar” va masofaviy boshqaruv vositalari ishlab chiqarish jarayonlarini soddalashtirib, inson omiliga bog‘liqlikni kamaytirmoqda. Misol uchun: Korxonalarda ERP (Enterprise Resource Planning), CRM (Customer Relationship Management) kabi tizimlarning joriy etilishi 20–30% gacha operatsion xarajatlarni kamaytirgani aniqlangan (OECD, 2022). AKT sohasidagi avtomatlashtirish va xizmatlarni raqamlashtirish orqali mehnat unumdorligi 1.4 barobarga oshgan (UNCTAD, 2023).

Davlat xizmatlarining raqamlashtirilishi iqtisodiy samaradorlikka olib kelmoqda O‘zbekistonda my.gov.uz, E-auksion, onlayn to‘lov tizimlari, Davlat xizmatlari markazlari orqali ko‘rsatilayotgan xizmatlar aholining vaqt va mablag‘ini tejamoqda: Davlat xizmatlarining 70% dan ortig‘i raqamlashtirilgan (AKT vazirligi, 2024). 2023-yil davomida onlayn xizmatlar orqali 8,4 mln murojaat qayd etilgan, bu esa o‘rtacha 160 mlrd so‘m miqdorida byurokratik xarajatlarning oldini olgan.

Xususiy sektor faoliyatida innovatsion xizmatlar ta’siri Bank, sug‘urta, savdo va logistika sohalarida raqamli xizmatlarning keng joriy etilishi: Masalan, HumoPay, Payme, Click kabi mobil to‘lov platformalari orqali 2023-yilda 4 trillion so‘mdan ortiq tranzaksiya amalga oshirilgan. Onlayn savdo hajmi 2021–2023 yillar oralig‘ida 2,5 barobarga oshgan. Bu xizmatlar iqtisodiy faoliyatga likvidlik, tezkorlik va nazorat imkonini yaratmoqda.

Ish o‘rinlari yaratilishi va raqamli savodxonlikning oshishi Innovatsion xizmatlar rivoji bilan yangi kasb va lavozimlar paydo bo‘ldi: raqamli marketing mutaxassisi, dasturchi, IT xizmat ko‘rsatuvchi texniklar, axborot xavfsizligi bo‘yicha mutaxassislar. 2020–2024 yillar oralig‘ida O‘zbekistonda AKT sohasida 60 mingdan ortiq yangi ish o‘rni yaratilgan (Statkom.uz, 2024). Raqamli savodxonlik darajasi aholining umumiy ulushida 39 foizdan 52 foizgacha oshgani qayd etilgan (AKT vazirligi, 2023).

Mahalliy innovatsion platformalar samaradorligi Masalan, UZINFOCOM, Dtax.uz, edu.uz va boshqa davlat xizmatlari portallari yordamida: Tadbirkorlikni ro‘yxatdan o‘tkazish muddati 5 kundan 1 kunga qisqartirildi. Soliq tizimi avtomatlashtirilib, inson omilidan kelib chiqadigan xatoliklar 40% gacha kamaytirildi. Bu holatlar davlat resurslaridan samarali foydalanishga, byudjet tushumlarini oshirishga xizmat qilmoqda.

Xalqaro reytinglar va ko‘rsatkichlar ITU (International Telecommunication Union) ma’lumotlariga ko‘ra, O‘zbekiston 2023-yilda AKT rivojlanish indeksi bo‘yicha 167 ta davlat orasida 92-o‘ringa ko‘tarilgan (2020-yilda 106-o‘rin bo‘lgan). UNCTAD’ning “Digital Economy Report – 2023” hisobotida O‘zbekiston Markaziy Osiyo mintaqasida raqamli xizmatlar bo‘yicha eng tez rivojlanayotgan davlatlardan biri sifatida qayd etilgan.

Sanoat va qishloq xo‘jaligida AKT xizmatlari ta’siri Sanoatda raqamli monitoring, IoT (Internet of Things) texnologiyalari orqali energiya tejamkorlik darajasi 18% ga oshgan. Qishloq xo‘jaligida innovatsion monitoring (dronlar, GPS kuzatuv) orqali hosildorlik 12–15% ga oshgani kuzatilgan (Agroinfo.uz, 2023).

Xulosa sifatida aytish mumkinki:

Innovatsion xizmatlarni axborot-kommunikatsiya texnologiyalari sohasi orqali joriy etish O‘zbekiston iqtisodiyotining raqamli transformatsiyasini jadallashtirib, davlat va jamiyat hayotiga samarali, tezkor va sifatli xizmatlar kiritilishiga sabab bo‘lmoqda. Ushbu jarayon nafaqat texnologik yangilanish, balki real iqtisodiy ko‘rsatkichlar orqali o‘zini isbotlamoqda.

Xulosa va takliflar

Xulosa qilib aytganda-**Innovatsion xizmatlar iqtisodiy samaradorlikni oshiradi.** AKT sohasida joriy etilgan innovatsion xizmatlar xizmat ko‘rsatish sifatini yaxshilab, ishlab chiqarish jarayonlarini avtomatlashtirish orqali mehnat unumdorligini oshiradi va resurslardan foydalanishni optimallashtiradi. **Xarajatlar kamayadi, vaqt tejaladi.** Raqamli xizmatlar inson omiliga bog‘liq xarajatlarni kamaytiradi, xizmat ko‘rsatishda tezkorlik va aniqlikni ta’minlaydi. **Ish o‘rinlari yaratilmoqda.** Innovatsion texnologiyalarni joriy etish AKT sohasida yangi mutaxassisliklar va kasblarning shakllanishiga sabab bo‘lmoqda. **O‘zbekiston tajribasi ijobiy natijalar bermoqda.** “Raqamli O‘zbekiston – 2030” strategiyasi doirasida joriy etilayotgan elektron hukumat, raqamli bank tizimlari, masofaviy ta’lim platformalari milliy raqamli transformatsiyaning muhim bosqichi bo‘lib xizmat qilmoqda. **Xalqaro tajriba bilan uyg‘unlashmoqda.** O‘zbekiston AKT xizmatlarini rivojlantirishda OECD, UNCTAD va World Bank tavsiyalariga asoslanib, global raqamli iqtisodiyotga integratsiyalashmoqda.

Adabiyotlar:

1. Rajaboev Shahboz Shodiyevich, & Raxmatov Ozodbek Aktam O'g'li. (2024). Information Technology is Now Used Everywhere . *Miasto Przyszłości*, *44*, 114–121. Retrieved from https://miastoprzyszlosci.com.pl/index.php/mp/article/view/2372
2. Muhammadiev, Z., Boronov, B., & Abdurasulov, J. (2021). KORXONALARDA MODERNIZATSIYALASH JARAYONLARI HISOBINING HOZIRGI HOLATI: MUAMMOLARI VA YECHIMLARI. *SCIENCE AND INNOVATIVE DEVELOPMENT*, *4*(6), 11-21.
3. Boronov Bobur Farkhodovich, & Abdurasulov Jamshidbek Ahmad Ugli. (2021). Necessity And Main Directions Of Improving Financial Reporting In Uzbekistan. The American Journal of Management and Economics Innovations, 3(05), 61–67. Retrieved from https://inlibrary.uz/index.php/tajmei/article/view/12447
4. SHODIYEVICH R. S., UG‘LI X. S. O., UG‘LI J. L. G. O. The Role of Information Technologies in Teaching Foreign Languages //Gospodarka i Innowacje. – 2024. – Т. 43. – С. 74-84.
5. Shodiyevich R. S., Sardor A. MICROSOFT POWER POINT IN THE FIELD OF TOURISM PLACE //EUROPEAN JOURNAL OF BUSINESS STARTUPS AND OPEN SOCIETY. – 2023. – Т. 3. – №. 12. – С. 202-210.
6. To‘lqinjanovna T. N., Shodiyevich R. S. Word Formation by Affixation //INTERNATIONAL JOURNAL OF BUSINESS DIPLOMACY AND ECONOMY. – 2023. – Т. 2. – №. 5. – С. 217-222.
7. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
8. Боронов Б.Ф., and Саломов Ш.Ф.. "МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ

РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Xabibulloyev J. I.
talabasi
Samarqand iqtisodiyot va servis instituti

KOMPYUT ER GRAFIKASI VA GRAFIK AMALLAR BILAN ISHLASHNING ZAMONAVIY AXBOROT TEXNOLOGIYALARIDAGI O‘RNI

Annotatsiya: *Ushbu maqolada kompyuter grafikasi va grafik amallar bilan ishlashning zamonaviy axborot texnologiyalaridagi o‘rni chuqur ilmiy-amaliy yondashuvda yoritiladi. Kompyuter grafikasi yo‘nalishlari — raster, vektor va 3D grafikalar, shuningdek animatsiya, vizualizatsiya, renderlash, simulyatsiya kabi jarayonlarning nazariy va amaliy jihatlari tahlil qilinadi.*

Kalit so‘zlar: *kompyuter grafikasi, raster grafika, vektor grafika, 3D modellash, renderlash, grafik amallar, vizualizatsiya, dizayn texnologiyalari, grafik muharrirlar, AI-dizayn, nur kuzatish, teksturalash, animatsiya, kompyuter simulyatsiyasi.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Xabibulloyev J. I.
student
Samarkand Institute of Economics and Service

THE ROLE OF COMPUTER GRAPHICS AND GRAPHICAL OPERATIONS IN MODERN INFORMATION TECHNOLOGIES

Abstract: *This article provides an in-depth scientific and practical analysis of the role of computer graphics and graphical operations in modern information technologies. It examines theoretical and practical aspects of various areas of computer graphics — including raster, vector, and 3D graphics — as well as animation, visualization, rendering, and simulation processes.*

Keywords: *computer graphics, raster graphics, vector graphics, 3D modeling, rendering, graphic operations, visualization, design technologies, graphic editors, AI design, ray tracing, texturing, animation, computer simulation.*

Kirish

Raqamli texnologiyalar jadal rivojlanib borayotgan hozirgi davrda kompyuter grafikasi axborot almashinuvi va vizual kommunikatsiyaning asosiy vositasiga aylandi. Kompyuter grafikasi nafaqat tasvir yaratish jarayonini, balki axborotni tushunarli, tezkor, aniq va jozibador shaklda taqdim etishni ham ta'minlaydi. Grafik vositalar bugungi kunda ta'lim, muhandislik, arxitektura, tibbiyot, marketing, sanoat, video o'yinlar, animatsiya, film industriyasi va IT sohalarining ajralmas bo'lagiga aylangan.

Kompyuter grafikasining asosiy yo'nalishlari raster, vektor va 3D grafika bo'lib, har biri o'zining texnik imkoniyatlari, qo'llanish sohasi va matematik asoslariga ega. Raster grafikasi piksel tuzilishiga asoslangan bo'lsa, vektor grafikasida tasvirlar matematik formulalar orqali quriladi. 3D grafikasi esa uch o'lchamli modellashtirish, animatsiya va fotorealistik renderlash texnologiyalarini o'z ichiga oladi. Zamonaviy grafik tizimlar ko'pincha sun'iy intellekt, mashinaviy o'rganish, generativ neyrotarmoqlar, AR/VR texnologiyalari bilan integratsiyada qo'llanilmoqda. Bu esa grafik amallarni yanada tez, aniq va innovatsion shaklda amalga oshirish imkonini bermoqda.

Asosiy qism

Kompyuter grafikasi tasvirlarni yaratish, qayta ishlash, tahrirlash, saqlash va vizual shaklda taqdim etish uchun mo'ljallangan texnologiya, algoritm va matematik modellar majmuasidir. Uning tarkibiga raster grafika, vektor grafika, 3D grafika, animatsiya, renderlash, teksturalash, fizik simulyatsiyalar va nur kuzatish texnologiyalari kiradi.

Raster grafika**:** Raster grafika piksellarga asoslangan bo'lib, har bir piksel ma'lum rang qiymatiga ega. U foto tahrirlash, realistik tasvirlar yaratish, raqamli san'at va reklama dizaynida keng qo'llanadi. Eng mashhur dasturlar Photoshop, GIMP va Pixelmator hisoblanadi.

Vektor grafika :Vektor tasvirlar matematik formulalar asosida shakllantiriladi. Kattalashtirilganda sifat yo'qolmaydi. Logotiplar, bannerlar, chizmalar va texnik grafikalar yaratishda qo'llaniladi. Adobe Illustrator, CorelDRAW va Inkscape eng mashhur dasturlardandir.

3D grafika :3D grafika uch o'lchamli fazoda modellar yaratish, teksturalash, yoritish, animatsiya va renderlash jarayonlarini qamrab oladi. Zamonaviy renderlash texnologiyalari Ray Tracing, Path Tracing va Rasterization hisoblanadi. Blender, Maya, 3ds Max va Cinema 4D keng ishlatiladi.

Kompyuter animatsiyasi: Animatsiya jarayoni xarakatlarni modellashtirish, ssenariy yaratish, kinematika va fizik simulyatsiyani o'z ichiga oladi. U film sanoati, reklama va o'yin industriyasida muhim ahamiyatga ega.

Grafik amallar va ularning turlari. Grafik amallar tasvirlar ustida matematik va texnik manipulyatsiyalarni amalga oshirish imkonini beruvchi operatsiyalardir.

Geometrik transformatsiyalar: Ko'chirish, kattalashtirish, burish, aylantirish, akslantirish kabi amallar vektor grafikasi, animatsiya va 3D modellashtirish jarayonlarining asosini tashkil qiladi.

Rang bilan ishlash: RGB, CMYK, HSV va HSL rang modellari yordamida ranglarni to‘g‘rilash, yoritishni boshqarish, kontrastni sozlash va rang balansini tiklash amallari bajariladi.

Filtrlash:Tasvirga “blur”, “sharpen”, “noise reduction” kabi filtrlar qo‘llanadi, konturlarni aniqlash uchun Sobel, Prewitt va Canny algoritmlari ishlatiladi.

Rastrli manipulyatsiya: Tasvir qatlamlari bilan ishlash, retush qilish, maskalash, ob’ektlarni ajratish, tekstura berish jarayonlarini o‘z ichiga oladi.

3D grafik amallar: Mesh modellashtirish, UV xaritalash, fizik simulyatsiyalar (suyuqlik, tutun, zarrachalar), material yaratish, kamera tizimlari va render parametrlarini sozlash muhim o‘rin tutadi.

Kompyuter grafikasi dasturiy ta’minotlari:

Raster grafikasi dasturlari

- Adobe Photoshop, GIMP, Pixelmator, Affinity Photo.

Vektor grafikasi dasturlari

- Adobe Illustrator, CorelDRAW, Inkscape.

3D grafikasi dasturlari

- Blender, Autodesk 3ds Max, Maya, Cinema 4D.

Grafik dvijoklar

- Unity, Unreal Engine, Godot.

Sun’iy intellekt asosidagi grafik vositalar

- DALL·E, Midjourney, Adobe Firefly, Runway ML.

Kompyuter grafikasining qo‘llanish sohalari: O‘yin industriyasi O‘yin grafikasi real vaqt renderi, fizik dvijoklar, yorug‘lik tizimlari va harakat animatsiyalari asosida quriladi. Kino va animatsiya. CGI, 3D animatsiya, motion capture texnologiyalari yordamida vizual effektlar yaratiladi. Arxitektura va injiniring: 3D modellashtirish, vizual loyihalash, AR/VR maketlar, BIM tizimlari keng qo‘llanadi. Tibbiyot: 3D organ modellari, tomografik rasmlarni qayta ishlash, jarrohlik simulyatsiyalari yaratiladi. Marketing va reklama:Brending, bannerlar, plakat dizaynlar, video roliklar grafika orqali yaratiladi. Ta’lim: Interaktiv grafik materiallar, virtual laboratoriyalar, simulyatorlar yaratiladi.

Xulosa

Kompyuter grafikasi zamonaviy raqamli texnologiyalarning markazida turib, inson va axborot o‘rtasidagi muloqotni soddalashtiradi, tushunarli qiladi va samaradorlikni oshiradi. Raster, vektor va 3D grafikasi, shuningdek renderlash, teksturalash va sun’iy intellekt asosidagi generativ texnologiyalar jamiyatning barcha sohalarida keng qo‘llanilmoqda. Grafik bilimlarni chuqur egallash va grafik dasturlardan samarali foydalanish bugungi raqamli iqtisodiyotda raqobatbardosh bo‘lishning muhim sharti hisoblanadi.

Foydalanilgan adabiyotlar ro’yxati:

1. Боронов, Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». *Передовая экономика и*

педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.
2. Rajaboev Shahboz Shodiyevich, & Raxmatov Ozodbek Aktam O'g'li. (2024). Information Technology is Now Used Everywhere . *Miasto Przyszłości*, *44*, 114–121. Retrieved from https://miastoprzyszlosci.com.pl/index.php/mp/article/view/2372
3. Боронов, Б., & Саломов , Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115
4. Shodiyevich, Rajaboev Shahboz, Rajabboyev Shohzod Shodiyevich, and Usmonov Sunnatillo Berdiqul o'g'li. "ACCOUNTING ISSUES IN THE DIGITAL ECONOMY." CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND COMPUTER SCIENCES 4.6 (2023): 80-84.
5. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.
6. Rajaboyev S. XORIJIY TILLARNI O'QITISHDA AXBOROT TEXNOLOGIYALARINI QO'LLASH TENDENSIYASI //Евразийский журнал предпринимательства и педагогики. – 2023. – Т. 1. – №. 1. – С. 64-69.
7. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
8. SHODIYEVICH R. S., UG'LI X. S. O., UG'LI J. L. G. O. The Role of Information Technologies in Teaching Foreign Languages //Gospodarka i Innowacje. – 2024. – Т. 43. – С. 74-84.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Yo‘ldoshev A. A.
talabasi
Samarqand iqtisodiyot va servis instituti

IJTIMOIY TARMOQLAR HAQIDA TUSHUNCHA

Annotatsiya*:Ushbu maqolada ijtimoiy tarmoqlarning mazmuni, ularning jamiyat hayotidagi o‘rni, rivojlanish jarayoni, foydalanuvchilarga ta’siri hamda afzallik va kamchiliklari yoritiladi. Shuningdek, ijtimoiy tarmoqlardan foydalanish tamoyillari, xavfsizlik masalalari va yoshlar ongiga ko‘rsatadigan ta’siri haqida tahliliy fikrlar bayon qilingan.*

Kalit so‘zlar*: ijtimoiy tarmoq, internet, kommunikatsiya, raqamli madaniyat, axborot almashinuvi, virtual muloqot.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Yuldoshev A. A.
student
Samarkand Institute of Economics and Service

CONCEPT OF SOCIAL NETWORKS

Abstract: *This article discusses the essence of social networks, their role in society, their development process, their impact on users, as well as their advantages and disadvantages. In addition, analytical views are presented on the principles of using social networks, security issues, and their influence on the consciousness of young people.*

Keywords: *social network, internet, communication, digital culture, information exchange, virtual interaction.*

Kirish

Bugungi globallashuv, raqamli transformatsiya va tezkor axborot almashinuvi davrida ijtimoiy tarmoqlar inson hayotining eng faol ishlatiladigan maydoniga aylandi. Avvallari odamlar bir-biri bilan muloqot qilish, yangiliklardan xabardor bo‘lish yoki fikr bildirish uchun asosan an’anaviy aloqa vositalariga tayanishgan bo‘lsa, hozirgi kunda bu vazifalarning katta qismi virtual makonga

ko‘chdi. Internetning keng tarqalishi, smartfon va mobil internetning ommalashuvi ijtimoiy tarmoqlarni kundalik hayotning ajralmas qismiga aylantirdi.

Ijtimoiy tarmoqlarning jadal rivojlanishi nafaqat shaxsiy muloqot, balki ta’lim, biznes, siyosat, madaniyat, ijtimoiy fikr shakllanishi kabi ko‘plab sohalarga sezilarli ta’sir o‘tkazmoqda. Ayniqsa, yoshlar orasida ijtimoiy tarmoqlar asosiy muloqot, o‘rganish, o‘zini namoyon qilish va ko‘ngilochar platformaga aylangan. Har kuni millionlab foydalanuvchilar turli postlar, videolar, rasm va fikrlar orqali global axborot oqimini shakllantirib boradi.

Shu bilan birga, ijtimoiy tarmoqlarning keskin kengayishi bilan bog‘liq muammolar ham ortib bormoqda. Raqobatli virtual muhitda yolg‘on axborot, kiberjinoyatchilik, shaxsiy ma’lumotlarning tarqalishi, yoshlarning ruhiy holatiga salbiy ta’sir kabi xavf-xatarlar paydo bo‘lmoqda. Bu holat ijtimoiy tarmoqlardan foydalanish madaniyatini shakllantirishni, maxfiylik va xavfsizlik masalalariga jiddiy yondashishni taqozo etadi.

Shunday qilib, ijtimoiy tarmoqlar bugungi jamiyatda ulkan ahamiyat kasb etadi va ularni har tomonlama o‘rganish, ularning imkoniyatlari va tahdidlarini tahlil qilish dolzarb masalalardan biridir. Ushbu maqolada ijtimoiy tarmoqlarning mazmuni, tamoyillari, foydalanuvchilarga ta’siri, afzalliklari va kamchiliklari keng muhokama qilinadi.

Asosiy qism

Bugungi kunda ijtimoiy tarmoqlar insonning deyarli barcha faoliyat yo‘nalishlariga kirib borgan. Ulardan nafaqat yoshlar, balki o‘rta va katta yoshdagilar, shuningdek tashkilotlar, korxonalar, davlat idoralari va ta’lim muassasalari ham faol foydalanmoqda. Ijtimoiy tarmoqlar jamoatchilik fikrini shakllantirish, muhim ijtimoiy masalalarni muhokama qilish, jamiyatdagi dolzarb mavzularni ko‘tarish uchun katta imkoniyat yaratadi. Masalan, ekologiya, ta’lim islohoti, sohalardagi muammolar ko‘pincha avval ijtimoiy tarmoqlarda ko‘tariladi va shundan so‘ng rasmiy darajaga chiqadi.

Shuningdek, ko‘plab davlat tashkilotlari ijtimoiy tarmoqlar orqali aholiga murojaat qiladi, e’lonlar, ogohlantirishlar, yangiliklar bilan bo‘lishadi. Bu esa axborot yetkazishning eng tezkor uslubiga aylangan. Shu ma’noda ijtimoiy tarmoqlar davlat va xalq o‘rtasidagi kommunikatsiyani kuchaytiradi.

Ijtimoiy tarmoqlarning tamoyillari
1-jadval

Tamoyil nomi	Mazmuni
Ochiqlik	Barcha foydalanuvchilar axborot almashish jarayonida teng imkoniyatlarga ega bo‘lishi.
Shaffoflik	Tarqatilgan ma’lumotlar manbasining aniq bo‘lishi va tekshirilishi.
Xavfsizlik	Shaxsiy ma’lumotlar himoyasini ta’minlash, kiberxavflardan ehtiyot bo‘lish.
Erkin muloqot	Fikr va g‘oyalarni erkin tarzda bildirish imkoniyatining mavjudligi.
Huquqiylik	Internet qoidalari va davlat qonunlariga rioya qilish. Vaqtdan samarali foydalanish Tarmoqqa qaramlikning oldini olish, me’yorni saqlash.
Yoshga moslik	Voyaga yetmaganlar uchun xavfsiz kontentni ta’minlash.
Ruhiy sog’lomlik	Virtual bosim va taqqoslash sindromidan saqlanib foydalanish.

Ijtimoiy tarmoqlarning ta’lim jarayoniga ta’siri

So‘nggi yillarda ta’lim jarayonida ijtimoiy tarmoqlarning ahamiyati yanada oshdi. O‘quvchilar va talabalar Telegram, YouTube, Instagram kabi platformalar orqali o‘quv materiallari, dars videolari, elektron kitoblar, muhokama guruhlari bilan tanishmoqda. Ko‘plab o‘qituvchilar o‘z darslarini onlayn tarzda yozib, tarqatib, qo‘shimcha tushuntirishlarni joylashtirish orqali ta’lim sifatini oshirmoqda.Ayniqsa pandemiya davrida ijtimoiy tarmoqlar ta’limning asosiy vositasiga aylandi. Bu jarayon shuni ko‘rsatdiki, ijtimoiy tarmoqlardan nafaqat ko‘ngilochar platforma sifatida, balki jiddiy ilmiy-ta’lim resursi sifatida ham foydalanish mumkin. Shuningdek, xorijiy olimlar, mutaxassislar bilan muloqot qilish, xalqaro vebinarlar va seminarlarni tomosha qilish imkoniyati ham aynan ijtimoiy tarmoqlar orqali yuzaga kelmoqda.

Biznes va marketingda ijtimoiy tarmoqlarning roli

Hozirgi zamonaviy marketing ijtimoiy tarmoqlarsiz tasavvur qilib bo‘lmaydi. Kichik biznes vakillaridan tortib yirik brendlar ham mahsulot va xizmatlarini targ‘ib qilishda ijtimoiy tarmoqlarni eng samarali vosita deb bilishmoqda. Ular orqali:mijozlar bilan bevosita aloqaga chiqish, reklama joylashtirish, sotuvni oshirish, bozor talabini o‘rganish,auditoriya fikrini bilish kabi jarayonlar juda oson amalga oshiriladi. Albatta, bu yo‘nalishda algoritmlar, trendlar, foydalanuvchi xulqi va kontent sifati katta rol o‘ynaydi.

Ijtimoiy tarmoqlarning yoshlar ongiga ta’siri

Yoshlar ijtimoiy tarmoqlarning eng faol auditoriyasidir. Bu holat ularning dunyoqarashiga, fikrlash tarziga, xulq-atvoriga kuchli ta’sir ko‘rsatadi. Bir tomondan ijtimoiy tarmoqlar yoshlar uchun:

- o‘zini namoyon qilish,
- ijodkorlik,
- bilim olish,
- do‘stlar orttirish

kabi ko‘plab ijobiy imkoniyatlar yaratadi.

Biroq boshqa tomondan, ortiqcha foydalanish:

- virtual qaramlik,

- o‘ziga nisbatan past baho,
- depressiya va tashvish,
- internetdagi noto‘g‘ri namunaviy hayotga ishonish,
- real hayotdagi muloqotning kamayishi

kabi salbiy oqibatlarga olib kelishi mumkin. Shuning uchun yoshlar orasida raqamli madaniyat va axborot savodxonligini oshirish dolzarb vazifadir.

Xulosa

Ijtimoiy tarmoqlar bugungi zamonaviy jamiyatning eng ta’sirchan va faol ishlatiladigan axborot makoniga aylangan. Ular orqali muloqot qilish, yangiliklar almashish, bilim olish, o‘z fikrini bildirish, biznesni rivojlantirish va turli ijtimoiy jarayonlarda ishtirok etish osonlashdi. Ayniqsa yoshlar uchun ijtimoiy tarmoqlar o‘zini namoyon qilish, ijod qilish va nafaqat mahalliy, balki dunyo miqyosidagi auditoriyaga chiqish imkonini bermoqda. Shunday qilib, ijtimoiy tarmoqlar global kommunikatsiya vositasi sifatida insonlarga keng imkoniyatlar yaratmoqda.

Biroq ularning yuqori ommaviyligi bilan bir qatorda salbiy oqibatlar ham mavjud: yolg‘on axborotning tez tarqalishi, psixologik bosim, virtual qaramlik, kiberjinoyatchilik va shaxsiy ma’lumotlarning xavf ostiga qo‘yilishi shular jumlasidandir. Ushbu muammolar ijtimoiy tarmoqlardan foydalanishda ehtiyotkorlik, mas’uliyat va axborot savodxonligini oshirishni talab qiladi. Raqamli madaniyatning shakllanishi va foydalanuvchilarning ongli yondashuvi ushbu xavflarni kamaytirishda muhim omil hisoblanadi.

Umuman olganda, ijtimoiy tarmoqlarning jamiyat hayotidagi o‘rni tobora ortib bormoqda. Ular ta’lim, iqtisodiyot, madaniyat, siyosat va kundalik hayotga chuqur kirib borayotgan kuchli raqamli platformadir. Kelajakda texnologiyalar yanada rivojlanishi bilan ijtimoiy tarmoqlarning funksiyalari ham kengayishi tabiiy. Eng muhimi — bu platformalardan oqilona foydalanish, vaqtni to‘g‘ri taqsimlash, xavfsizlik qoidalariga rioya qilish va jamiyatga foydali kontent yaratish orqali ularning ijobiy tomonlarini kuchaytirishdir.

Foydalanilgan adabiyotlar ro’yxati.

1. Боронов , Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». Передовая экономика и педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.
2. Боронов , Б., & Саломов , Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115
3. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.

4. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
5. Боронов Б.Ф., and Саломов Ш.Ф.. "МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.
6. Мухаммадиев, З., & Боронов, Б. (2023). ХАЛҚАРО СТАНДАРТЛАР АСОСИДА УЗОҚ МУДДАТЛИ АКТИВЛАР ҲИСОБИНИ ТАКОМИЛЛАШТИРШ. Издания, 91–97. извлечено от https://inlibrary.uz/index.php/editions/article/view/92129
7. Боронов, Б. (2022). МАҲСУЛОТ ТАННАРХИНИ ҲИСОБЛАШДА УМУМИШЛАБ ЧИҚАРИШ ХАРАЖАТЛАРИНИНГ ЎРНИ ВА УЛАРНИНГ ҲИСОБИНИ ТАКОМИЛЛАШТИРИШ. Economics and Innovative Technologies, 10(6), 31-42.
8. Rajaboyev S. XORIJIY TILLARNI O'QITISHDA AXBOROT TEXNOLOGIYALARINI QO'LLASH TENDENSIYASI //Евразийский журнал предпринимательства и педагогики. – 2023. – Т. 1. – №. 1. – С. 64-69.
9. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
10. SHODIYEVICH R. S., UG‘LI X. S. O., UG‘LI J. L. G. O. The Role of Information Technologies in Teaching Foreign Languages //Gospodarka i Innowacje. – 2024. – Т. 43. – С. 74-84.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Axrorkulov S. Z.
talabasi
SamISI

RAQAMLI IQTISODIYOT SOHASIDA AXBOROT XAVFSIZLIGI MUAMMOLARI

Annotatsiya: *Mazkur maqolada raqamli iqtisodiyot sharoitida axborot xavfsizligi bilan bog‘liq muammolar tahlil qilinadi. Raqamlashtirish jarayonining tezlashuvi natijasida shaxsiy ma’lumotlar, elektron to‘lovlar, davlat xizmatlari, korporativ ma’lumotlar va IoT qurilmalarini himoya qilish masalalari dolzarb ahamiyat kasb etmoqda. Maqolada kiberhujum turlari, shaxsiy ma’lumotlar xavfsizligi, kritik infratuzilmalarni himoya qilish, sun’iy intellekt va IT tizimlarida uchraydigan xavf omillari, shuningdek axborot xavfsizligi bo‘yicha malakali kadrlar yetishmovchiligi kabi masalalar yoritilgan. Shuningdek, raqamli iqtisodiyotning barqaror rivojlanishi uchun zarur bo‘lgan huquqiy, texnik va tashkiliy choralar taklif etiladi.*

Kalit so‘zlar: *Raqamli iqtisodiyot; axborot xavfsizligi; kiberxavfsizlik; shaxsiy ma’lumotlar; raqamli transformatsiya; IT xavfsizligi; kiberhujumlar; ma’lumotlarni himoya qilish; sun’iy intellekt xavflari; raqamli infratuzilma; kriptografiya; axborot tizimlari; xavfsizlik siyosati; raqamli xizmatlar; elektron hukumat.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Axrorkulov S. Z.
student
SamIES

PROBLEMS OF INFORMATION SECURITY IN THE FIELD OF DIGITAL ECONOMY

Abstract: *This article analyzes information security issues arising in the context of the digital economy. With the rapid acceleration of digitalization, the protection of personal data, electronic payments, public services, corporate information, and IoT devices is becoming increasingly important. The article*

highlights various types of cyberattacks, personal data security, protection of critical infrastructures, risk factors found in artificial intelligence and IT systems, as well as the shortage of qualified specialists in the field of information security. In addition, legal, technical, and organizational measures necessary to ensure the sustainable development of the digital economy are proposed.

Keywords: *Digital economy; information security; cybersecurity; personal data; digital transformation; IT security; cyberattacks; data protection; AI risks; digital infrastructure; cryptography; information systems; security policy; digital services; e-government.*

Kirish

Raqamli iqtisodiyotning jadallik bilan rivojlanishi davlat boshqaruvi, biznes jarayonlari, ta’lim, sog‘liqni saqlash va moliyaviy tizimlarning tubdan o‘zgarishiga sabab bo‘lmoqda. Raqamli xizmatlarga o‘tish jarayonida axborotning katta hajmda yaratilishi, uzatilishi va saqlanishi axborot xavfsizligiga oid yangi tahdidlarning paydo bo‘lishiga olib kelmoqda. Mazkur maqolada raqamli iqtisodiyot sharoitida uchrayotgan axborot xavfsizligi muammolari, ularning sabablari va oldini olish mexanizmlari ko‘rib chiqiladi.

Raqamli iqtisodiyotda axborot — asosiy iqtisodiy resurs hisoblanadi. Shuning uchun uni muhofaza qilish nafaqat texnik, balki ijtimoiy-iqtisodiy zaruratdir. Axborot xavfsizligi uch tamoyilga asoslanadi:

1. Maxfiylik — ma’lumotlarga ruxsatsiz kirishni oldini olish.
2. Butunlik — ma’lumotlarning buzilmasdan saqlanishi.
3. Mavjudlik — axborot tizimlarining uzluksiz ishlashi.

Har qanday buzilish raqamli iqtisodiyotning samaradorligiga bevosita ta’sir qiladi. Katta serverlar, davlat portallari yoki bank tizimlariga qarshi tashkil etiladigan tarmoqli hujumlar xizmatlar vaqtincha ishdan chiqishiga olib keladi. Bunday holatlar biznes jarayonlarni to‘xtatadi va katta iqtisodiy zararlar keltiradi.

Odamlarning shaxsiy ma’lumotlarini aldov orqali qo‘lga kiritish — eng keng tarqalgan hujum turi. Mobil bank ilovalari, elektron to‘lov tizimlari va davlat portallariga kirish ma’lumotlari tez-tez o‘g‘irlanmoqda.

Ma’lumotlarni shifrlab, pul evaziga ochib beradigan zararli dasturlar soni ko‘payib bormoqda. Bu ayniqsa banklar, tibbiyot markazlari va yirik kompaniyalar uchun jiddiy xavf.

Raqamli iqtisodiyotda davlat xizmatlarining aksariyati elektron shaklga o‘tmoqda. Bu esa katta miqdordagi shaxsiy ma’lumotlar yagona bazalarda jamlanishiga olib keladi. Himoya darajasi past bo‘lsa, ma’lumotlar tarqalishi va noqonuniy sotilishi, soxta hisoblar ochilishi, moliyaviy firibgarliklar kabi muammolar yuzaga keladi.

Shaxsiy ma’lumotlar bo‘yicha xalqaro standartlar (GDPR, ISO/IEC 27001)ga mos keladigan tizimlarni joriy etish zarur. Energetika, transport, telekommunikatsiya, bank tizimi kabi strategik sohalar raqamlashtirilgani sayin ularning zaifliklari ham ortib bormoqda. Masalan, elektr tarmoqlariga kiberhujum,

to‘lov tizimlarini blokirovka qilish, aeroport va temir yo‘l tizimlariga zarar yetkazish keng ko‘lamli iqtisodiy inqirozga sabab bo‘lishi mumkin.

Aqlli uylar, sensorlar, GPS qurilmalar, kameralar — ko‘pincha himoyasi past bo‘lgan tizimlar. Ularga kirish orqali shaxsiy hayotga aralashish, qurilmalarni boshqarib olish, tarmoqqa zarar yetkazish mumkin.

Ma’lumot manipulyatsiyasi, “deepfake”, avtomatlashtirilgan xakerlik hujumlari raqamli iqtisodiyot uchun yangi xavf omillarini yuzaga keltirmoqda. Ko‘plab davlatlar singari O‘zbekistonda ham axborot xavfsizligi bo‘yicha yuqori malakali mutaxassislar yetishmaydi. Bu esa tizimlarning noto‘g‘ri sozlanishiga, zaifliklar vaqtida aniqlanmasligiga, xavfsizlik siyosati yetarli darajada ishlab chiqilmasligiga olib keladi.

Raqamli iqtisodiyotning rivojlanishi bilan axborot xavfsizligiga tahdidlar ham keskin oshib bormoqda. Muammolarni kamaytirish uchun kuchli huquqiy baza yaratish, axborot xavfsizligi standartlarini joriy etish, davlat-xususiy sektor hamkorligini rivojlantirish, kiberxavfsizlik bo‘yicha kadrlar tayyorlash, foydalanuvchilarni raqamli savodxonlikka o‘rgatish samarali vosita bo‘la oladi.

Axborotning ishonchli himoyasi — raqamli iqtisodiyotning barqaror rivojlanishining asosiy sharti hisoblanadi.

Xulosa

Raqamli iqtisodiyotning jadal rivojlanishi barcha sohalarda samaradorlikni oshirish imkonini bergani holda, axborot xavfsizligi bo‘yicha yangi va murakkab tahdidlarni ham yuzaga chiqarmoqda. Axborotning maxfiyligi, butunligi va mavjudligini ta’minlash raqamli tizimlarning uzluksiz ishlashi va iqtisodiy barqarorlikning kafolatidir. Kiberhujumlarning ko‘payishi, shaxsiy ma’lumotlarning o‘g‘irlanishi, zararli dasturlar, IoT qurilmalarining himoyasizligi hamda strategik infratuzilmalar zaifligi raqamli iqtisodiyot uchun jiddiy xavf tug‘diradi. Ushbu muammolarni bartaraf etish uchun xalqaro standartlarga mos himoya tizimlarini joriy etish, kuchli normativ-huquqiy baza yaratish, davlat va xususiy sektor hamkorligini kengaytirish, malakali kadrlar tayyorlash va foydalanuvchilar raqamli savodxonligini oshirish zarur. Axborotning ishonchli muhofazasi raqamli iqtisodiyotning barqaror va xavfsiz rivojlanishining asosiy omili hisoblanadi.

Adabiyotlar ro‘yxati

1. O‘zbekiston Respublikasi “Axborotlashtirish to‘g‘risida”gi Qonuni.
2. Боронов , Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». Передовая экономика и педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.
3. Shodiyevich R. S., Sardor A. MICROSOFT POWER POINT IN THE FIELD OF TOURISM PLACE //EUROPEAN JOURNAL OF BUSINESS STARTUPS AND OPEN SOCIETY. – 2023. – Т. 3. – №. 12. – С. 202-210.
4. O‘zbekiston Respublikasi “Shaxsga doir ma’lumotlar to‘g‘risida”gi Qonuni.

5. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.
6. Rajaboev Shahboz Shodiyevich, & Raxmatov Ozodbek Aktam O'g'li. (2024). Information Technology is Now Used Everywhere . Miasto Przyszłości, 44, 114–121. Retrieved from https://miastoprzyszlosci.com.pl/index.php/mp/article/view/2372
7. Karimov A., Safarov B. Axborot xavfsizligi asoslari. – Toshkent: TDYU nashriyoti, 2021.
8. Rajaboyev S. XORIJIY TILLARNI O'QITISHDA AXBOROT TEXNOLOGIYALARINI QO'LLASH TENDENSIYASI //Евразийский журнал предпринимательства и педагогики. – 2023. – Т. 1. – №. 1. – С. 64-69.
9. G‘aniyev R., Ismoilov I. Raqamli iqtisodiyot: nazariya va amaliyot. – Toshkent: Iqtisodiyot, 2022.
10. Боронов , Б., & Саломов , Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115
11. SHODIYEVICH R. S., UG‘LI X. S. O., UG‘LI J. L. G. O. The Role of Information Technologies in Teaching Foreign Languages //Gospodarka i Innowacje. – 2024. – Т. 43. – С. 74-84.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689
Asrorov J. I.
talabasi
Samarqand iqtisodiyot va servis instituti

MS ACCESS MA’LUMOTLAR BAZASINI BOSHQARISH TIZIMI BILAN ISHLASH

Annotatsiya: *Ushbu ishda MS Access ma’lumotlar bazasini boshqarish tizimining umumiy tuzilishi, ishlash prinsiplari va amaliy imkoniyatlari yoritilgan. Ma’lumotlar bazasining asosiy tushunchalari, jumladan jadval, so‘rov, forma, hisobot va makroslar haqida batafsil ma’lumot berilgan. MS Access dasturida ma’lumotlarni yaratish, tahrirlash, saqlash, saralash va filtrlash jarayonlari keng ko‘rib chiqilgan. Shuningdek, foydalanuvchi uchun qulay interfeys yaratish, ma’lumotlar xavfsizligini ta’minlash va avtomatlashtirilgan boshqaruv tizimini yo‘lga qo‘yish imkoniyatlari ochib berilgan. Ushbu mavzu axborot texnologiyalari sohasida tahsil olayotgan o‘quvchilar hamda amaliy faoliyatda ma’lumotlar bilan ishlovchi mutaxassislar uchun muhim ahamiyatga ega.*

Kalit so‘zlar: *MS Access, ma’lumotlar bazasi, ma’lumotlar bazasini boshqarish tizimi MBBT, jadval, maydon, yozuv, so‘rov query, forma form, hisobot report, makros, birlamchi kalit, tashqi kalit, filtrlash, saralash, ma’lumotlar xavfsizligi, avtomatlashtirish.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Asrorov J. I.
student
Samarkand Institute of Economics and Service

WORKING WITH THE MS ACCESS DATABASE MANAGEMENT SYSTEM

Abstract: *This study examines the general structure, operating principles, and practical capabilities of the MS Access database management system. It provides detailed information on the main concepts of databases, including tables, queries, forms, reports, and macros. The processes of creating, editing, storing, sorting, and filtering data in MS Access are thoroughly explored. Additionally, the*

paper highlights the possibilities of creating a user-friendly interface, ensuring data security, and establishing an automated management system. This topic holds significant importance for students studying information technology as well as professionals working with data in practical fields.

Keywords: *MS Access, database, database management system (DBMS), table, field, record, query, form, report, macro, primary key, foreign key, filtering, sorting, data security, automation.*

Kirish

Bugungi kunda axborot texnologiyalari jamiyat hayotining barcha jabhalariga chuqur kirib bormoqda. Har bir sohada — ta’lim, tibbiyot, bank-moliya tizimi, sanoat, savdo, davlat boshqaruvi va boshqa ko‘plab yo‘nalishlarda katta hajmdagi axborotlar bilan ishlash zaruriyati tobora ortib bormoqda. Ma’lumotlarni tartibli saqlash, tezkor izlab topish, tahlil qilish va ishonchli himoyalash zamonaviy jamiyatning muhim talablaridan biriga aylangan. Shu sababli ma’lumotlar bazasini boshqarish tizimlari (MBBT) axborotlarni samarali boshqarishning asosiy vositasi sifatida keng qo‘llanilmoqda.

Ma’lumotlar bazasi — bu muayyan tartib-qoidalarga asoslangan, bir-biri bilan bog‘langan va uzoq muddat saqlashga mo‘ljallangan axborotlar majmuasidir. Ma’lumotlar bazasini boshqarish tizimi esa ushbu bazani yaratish, yuritish, yangilash, izlash, tahlil qilish hamda himoyalashni ta’minlaydigan dasturiy ta’minotdir. Zamonaviy MBBTlar foydalanuvchiga katta hajmdagi ma’lumotlar ustida tezkor va qulay ishlash imkonini beradi.

Shunday tizimlardan biri — Microsoft kompaniyasi tomonidan ishlab chiqilgan MS Access dasturidir. MS Access kichik va o‘rta hajmdagi ma’lumotlar bilan ishlash uchun qulay bo‘lgan, foydalanuvchiga tushunarli interfeysga ega va keng imkoniyatlar taqdim etuvchi ma’lumotlar bazasini boshqarish tizimi hisoblanadi. Ushbu dastur yordamida foydalanuvchi jadvallar yaratishi, ma’lumotlar o‘rtasida bog‘lanish o‘rnatishi, turli murakkablikdagi so‘rovlar tuzishi, foydalanuvchi formalari va hisobotlar ishlab chiqishi hamda ish jarayonini avtomatlashtirishi mumkin.

Shu nuqtai nazardan qaraganda, “MS Access ma’lumotlar bazasini boshqarish tizimi bilan ishlash” mavzusini chuqur o‘rganish bugungi kun talabi hisoblanadi. Ushbu maqolada MS Access dasturining imkoniyatlari, asosiy obyektlari, ular bilan ishlash usullari hamda amaliy qo‘llanilishi keng yoritiladi. Mavzuning o‘rganilishi orqali foydalanuvchilar ma’lumotlar bazasi bilan professional darajada ishlash ko‘nikmalariga ega bo‘ladilar va axborot resurslaridan samarali foydalanish imkoniyatiga erishadilar.

Asosiy qism

Ma’lumotlar bazasi va uni boshqarish tizimi tushunchasi Ma’lumotlar bazasi — bu bir-biri bilan mantiqan bog‘langan, tartiblangan va uzoq vaqt saqlashga mo‘ljallangan axborotlar majmuasidir. Ma’lumotlar bazasi axborotlarni ortiqcha takrorlanmasdan saqlash, tezkor izlash, tahrirlash hamda tahlil qilish imkonini beradi. Ma’lumotlar bazasini boshqarish tizimi (MBBT) esa ushbu

ma’lumotlar bazasini yaratish, yuritish, nazorat qilish va undan samarali foydalanishni ta’minlovchi maxsus dasturiy ta’minotdir. MBBTning asosiy vazifalari quyidagilardan iborat: ma’lumotlarni yaratish va saqlash; ma’lumotlarni tahrirlash va yangilash axborotni izlash va filtrlash; ma’lumotlarni himoyalash; bir nechta foydalanuvchilar bilan ishlashni ta’minlash; hisobotlar tayyorlash va tahlil qilish. Chuqur dasturlash bilimlarini talab qilmaydi, shu bois u boshlang‘ich foydalanuvchilar uchun ham qulay hisoblanadi.

Bundan tashqari, MS Access ma’lumotlar bazasida ishlash foydalanuvchilarda axborot madaniyatini shakllantiradi, mantiqiy fikrlashni rivojlantiradi, ma’lumotlarni tizimlashtirish va tahlil qilish parollar orqali himoyalash foydalanuvchilarga ruxsat darajalarini belgilash ma’lumotlarni zaxiralash backup ma’lumotlarni shifrlash. Ushbu choralar axborotning yo‘qolishi, o‘zgartirilishi yoki ruxsatsiz foydalanilishining oldini oladi. MS Accessning amaliy qo‘llanilishi MS Access quyidagi sohalarda keng qo‘llaniladi: ta’lim tizimida

Zamonaviy MBBTlar foydalanuvchilarga qulay grafik interfeys, tezkor ishlash va yuqori darajadagi axborot xavfsizligini ta’minlaydi. MS Access ana shunday zamonaviy va amaliy MBBT hisoblanadi. MS Access dasturining umumiy tavsifi MS Access — Microsoft kompaniyasi tomonidan ishlab chiqilgan ma’lumotlar bazasini boshqarish tizimi bo‘lib, u Microsoft Office paketining tarkibiy qismi hisoblanadi. Ushbu dastur kichik va o‘rta hajmdagi axborotlar bilan ishlash uchun mo‘ljallangan bo‘lib, foydalanuvchi uchun qulay interfeysga ega. MS Accessning asosiy afzalliklari quyidagilardan iborat: foydalanishning soddaligi vizual obyektlar bilan ishlash imkoniyati tezkor ma’lumotlar kiritish va tahrirlash boshqa Office dasturlari bilan integratsiyasi murakkab so‘rovlarni tuzish imkoniyati avtomatlashtirish vositalarining mavjudligi. MS Access ko‘pincha ta’lim muassasalari, kichik biznes, ofis ishlari, hisob-kitob tizimlari hamda turli ma’lumotlar omborini yuritishda keng qo‘llaniladi. MS Accessda ma’lumotlar bilan ishlash jarayonlari MS Access ma’lumotlar bilan quyidagi asosiy amallarni bajarish imkonini beradi: kiritish, tahrirlash, o‘chirish, saralash, filtrlash, hisoblash, tahlil qilish., Ma’lumotlarni kiritish jadvallar yoki formalardan foydalanish orqali amalga oshiriladi. Filtrlash va saralash yordamida axborotlar tartiblanadi, kerakli yozuvlar tez topiladi. Hisoblash funksiyalari orqali esa avtomatik hisob-kitoblar bajariladi. MS Accessda axborot xavfsizligi

Ma’lumotlar bazasida axborot xavfsizligini ta’minlash muhim masala hisoblanadi. MS Accessda quyidagi himoya choralari qo‘llaniladi: parollar orqali himoyalash foydalanuvchilarga ruxsat darajalarini belgilash ma’lumotlarni zaxiralash ma’lumotlarni shifrlash. Ushbu choralar axborotning yo‘qolishi, o‘zgartirilishi yoki ruxsatsiz foydalanilishining oldini oladi.

Ma’lumotlar bazasida axborot xavfsizligini ta’minlash muhim masala hisoblanadi. MS Accessda quyidagi himoya choralari qo‘llaniladi:

talabalarning reyting va davomatini yuritish savdo sohasida mahsulotlar hisobini yuritishdir tibbiyot muassasalarida bemorlar bazasini saqlashda bank tizimida mijozlar ma’lumotlarini yuritishda ofis ishlarida hujjatlar va kadrlar

bazasini boshqarishda Ushbu dastur yordamida barcha jarayonlar avtomatlashtiriladi, ish tezligi oshadi va xatoliklar kamayadi. MS Accessning ta’lim jarayonidagi ahamiyati MS Accessni o‘rganish o‘quvchilarda: ma’lumotlar bilan ishlash madaniyatini mantiqiy fikrlash kompyuter savodxonligini axborotni tahlil qilish ko‘nikmalarini rivojlantiradi. Shuningdek, talabalar kelajak kasbiy faoliyatida zarur bo‘lgan muhim amaliy bilimlarga ega bo‘ladilar.

TAMOYILI
TAMOYILNING MAZMUNI (IZOHI)

TAMOYILI	TAMOYILNING MAZMUNI (IZOHI
Ma’lumotlarni markazlashtirilgan saqlash	Access ma’lumotlarni yagona bazada jamlaydi. Bir nechta jadval, so‘rov, forma va hisobotlar bir joyda saqlanadi. Bu ma’lumotlarni tartibli, izchil va yagona formatchada yuritishni ta’minlaydi.
Reliatsion (bog‘langan) baza tamoyili	Access ko‘p jadvallarni o‘zaro bog‘lab ishlashga asoslanadi. Bog‘lanishlar “Bir-biriga”, “Bir-ko‘pga”, “Ko‘p-ko‘pga” kabi aloqalar orqali amalga oshiriladi. Bu takroriy ma’lumotlarni kamaytiradi va ma’lumotning yaxlitligini ta’minlaydi.
Ma’lumot yaxlitligini saqlash .	Bog‘lanishlarda *Referential Integrity* (ma’lumotlar yaxlitligi) qo‘llaniladi. Bu bog‘langan jadvallarda noto‘g‘ri yoki mavjud bo‘lmagan kalitlarni kiritishni cheklaydi, o‘chirayotgan ma’lumotlarni nazorat qiladi
Strukturaviy modullilik	Access loyihasi bir nechta komponentlardan: Table, Query, Form, Report, Macro, Module dan iborat. Har biri ma’lum vazifani bajaradi va ular mustaqil ishlab, yagona tizimda birlashadi.
Interfeys orqali boshqarish qulayligi	Access foydalanuvchilarga menyu, tugmalar, formalar orqali ma’lumot kiritish, tahrirlash va izlash imkonini beradi. SQL bilmasdan ham so‘rovlar tuzish mumkin.
Shakllar (Formalar) orqali ma’lumot kiritish tamoyili	Formlar yordamida jadvalga bevosita kirmasdan qulay shaklda ma’lumot kiritiladi. Forma dizayni, tugmalar, maydonlar, avtomatik tekshiruvlar orqali jarayon osonlashadi.
So‘rovlar (Queries) orqali ma’lumotlarni qayta ishlash	So‘rovlar filtr, saralash, hisoblash, bir nechta jadvaldan ma’lumot olish, yangi jadval yaratish kabi funksiyalarni bajaradi. SELECT, UPDATE, DELETE, APPEND so‘rovlari ishlatiladi.
Avtomatlashtirish (Macros) tamoyili	Accessda makrolar yordamida formani ochish, hisobot yaratish, jadvallarga murojaat qilish kabi jarayonlar avtomatlashtiriladi. Bu tizim ishini tezlashtiradi va xatolarni kamaytiradi.
Hisobot (Report) tuzish tamoyili	Ma’lumotlar alohida ko‘rinishda, dizaynlangan, chop etishga tayyor holatda chiqariladi. Hisobotda guruhlash, summalash, sarlavha, sahifa raqamlari kabi elementlar mavjud.
Ma’lumotlar xavfsizligi	Access parol bilan himoyalash, foydalanuvchi darajasini cheklash, ma’lumotlarni shifrlash funksiyalarini ta’minlaydi. Fayl darajasida himoya kuchli.
Import va eksport qilish tamoyili	Excel, Word, CSV, SQL server, dBase va boshqa manbalardan ma’lumotlarni olib kirish va chiqarish mumkin. Access boshqa dasturlar bilan integratsiyalashgan.

Xulosa

MS Access — bu kichik va o‘rta hajmdagi ma’lumotlarni samarali boshqarish, saqlash va qayta ishlash uchun mo‘ljallangan qulay va funksional ma’lumotlar bazasi boshqaruv tizimidir. U foydalanuvchi uchun sodda interfeys, vizual vositalar va avtomatlashtirish imkoniyatlarini taklif etgani sababli amaliyotda keng qo‘llanadi. Accessning asosiy afzalligi — ma’lumotlarni jadvallar, so‘rovlar, formalar va hisobotlar orqali tizimli boshqarish va ular o‘rtasidagi bog‘lanishlarni ta’minlashdir.

Dasturda relyatsion tamoyil asosida ishlash ma’lumotlarning izchil, tartibli va yangilanuvchan bo‘lishini kafolatlaydi. Formlar orqali qulay ma’lumot kiritish, so‘rovlar orqali ma’lumotlarni tahlil qilish, hisobotlar orqali chop etishga tayyor ko‘rinishda taqdim etish imkoniyati Accessni kundalik ish jarayonlarida juda foydali qiladi. Shuningdek, makrolar yordamida vazifalarni avtomatlashtirish va ma’lumotlarni boshqa dasturlar bilan almashish imkoniyatlari tizimning amaliy qiymatini yanada oshiradi.

Umuman olganda, MS Access ma’lumotlar bazalari bilan ishlashni osonlashtiruvchi, ishonchli, ko‘p funksiyali va foydalanuvchiga yo‘naltirilgan tizim bo‘lib, ta’lim jarayonida ham, kichik tashkilotlarda ham samarali natijalar beradi. Bu tizim bilan ishlash malakasi foydalanuvchiga ma’lumotlarni to‘g‘ri tashkil qilish, tahlil qilish va boshqarishning zamonaviy usullarini egallash imkonini yaratadi.

Foydalanilgan adabiyotlar ro’yxati.

1. Боронов, Б., и З. Мухаммадиев. «ПУТИ РАСШИРЕНИЯ ИНФОРМАЦИОННОГО ОБЪЕМА УЧЕТА КАПИТАЛЬНЫХ ВЛОЖЕНИЙ В ХОЗЯЙСТВУЮЩИЕ СУБЪЕКТЫ». Передовая экономика и педагогические технологии, т. 2, вып. 2, апрель 2025 г., сс. 444-50, https://inlibrary.uz/index.php/aept/article/view/80274.

2. Ражабоев Ш. Ш. ЦИФРОВИЗАЦИЯ И ЗЕЛЕНЫЙ СЕКТОР В УСТОЙЧИВОМ РАЗВИТИИ //ББК 65.05 П 78. – С. 596.

3. Боронов, Б., & Саломов , Ш. (2025). ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ ДЕЯТЕЛЬНОСТИ НЕГОСУДАРСТВЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ. Экономическое развитие и анализ, 3(2), 268–274. извлечено от https://inlibrary.uz/index.php/eitt/article/view/80115

4. Rajaboev S. S. Technologies of Using Multimedia Tools in Teaching Economic Sciences //Spanish Journal of Innovation and Integrity.

5. Боронов Б.Ф., Ахмедов М.А., and Худайназарова Д.Г.. "КОРХОНАЛАРДА ДАРОМАДЛАР ВА ХАРАЖАТЛАРНИ БОШҚА УМУМЛАШГАН ДАРОМАДЛАР ТЎҒРИСИДАГИ ҲИСОБОТДА АКС ЭТТИРИШ МАСАЛАЛАРИ" Экономика и социум, no. 3-2 (118), 2024, pp. 547-556.

6. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 000-0002-0997-6689
Gafurova D. S.
talabasi
Samarqand iqtisodiyoti va servis instituti

O‘ZBEKISTON ELEKTRON HUKUMAT TIZIMIDA AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARIDAN FOYDALANISH MEXANIZMLARI VA ULARNING SAMARADORLIGI

Anotatsiya*: Ushbu maqolada O‘zbekiston Respublikasida elektron hukumat tizimini rivojlantirish jarayonida axborot-kommunikatsiya texnologiyalari (AKT) xizmatlaridan foydalanish mexanizmlari, ularning huquqiy, tashkiliy va texnologik asoslari hamda amaliy samaradorligi tahlil qilinadi. Tadqiqotda mamlakatda amalga oshirilayotgan raqamli islohotlar, davlat xizmatlarini ko‘rsatishning onlayn shakllari va ularning aholi uchun yaratayotgan qulayliklari keng yoritilgan. Shuningdek, raqamli infratuzilmaning rivojlanishi, elektron davlat xizmatlariga bo‘lgan talabning oshishi va mavjud muammolar yuzasidan takliflar berilgan.*

Kalit so‘zlar: *elektron hukumat, AKT, davlat xizmatlari, raqamli transformatsiya, elektron xizmatlar samaradorligi.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Gafurova D. S.
student
Samarkand Institute of Economics and Service

MECHANISMS OF USING INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SERVICES IN UZBEKISTAN’S E-GOVERNMENT SYSTEM AND THEIR EFFECTIVENESS

Abstract: *This article examines the mechanisms of using information and communication technology (ICT) services within the e-government system of the Republic of Uzbekistan. It highlights the legal, organizational, and technological foundations of digital reforms, the development of online public services, and their impact on improving government efficiency and public convenience. The study*

also identifies existing challenges and provides recommendations for enhancing digital infrastructure and service quality.

Keywords: *e-government, ICT, public services, digital transformation, service efficiency.*

Kirish

Dunyo mamlakatlarida davlat boshqaruvini modernizatsiya qilishning eng samarali yo‘nalishlaridan biri — bu elektron hukumat tizimidir. U nafaqat davlat xizmatlarini tezkor va shaffof ko‘rinishda taqdim etishni ta’minlaydi, balki fuqarolar bilan davlat o‘rtasidagi muloqotni soddalashtiradi, korrupsiyaning oldini oladi va iqtisodiy o‘sishga zamin yaratadi. Elektron hukumat tizimi ushbu islohotlarning asosiy tayanchlaridan biri bo‘lib, davlat xizmatlarini ko‘rsatishda ochiqlik, tezkorlik, shaffoflik va samaradorlikni ta’minlashga qaratilgan. AKT xizmatlaridan keng foydalanish esa nafaqat davlat organlari faoliyatini optimallashtirishga, balki fuqarolar va tadbirkorlarga yaratilayotgan sharoitlarning yuksalishiga ham xizmat qilmoqda. O‘zbekistonda ham elektron hukumat tizimini rivojlantirish 2012-yildan boshlab davlat siyosatining ustuvor yo‘nalishlaridan biri bo‘ldi. Raqamli transformatsiya jarayoni ayniqsa 2019–2025-yillarda kuchaydi. Bu davrda 300 dan ortiq interaktiv davlat xizmatlari ishga tushirildi, 40 ga yaqin davlat reyestrlari integratsiya qilindi. Ammo mavjud yutuqlarga qaramay, tizimda hal etilishi zarur bo‘lgan masalalar ham mavjud: xizmatlarning ba’zilarida texnik nosozliklar uchrashi, idoralararo integratsiyaning yetarli bo‘lmasligi, ma’lumotlar takroriyligi va kiberxavfsizlik xavflari shular jumlasidan. Mavzuning dolzarbligi aynan O‘zbekistonning “Raqamli O‘zbekiston – 2030” strategiyasi bilan chambarchas bog‘liq bo‘lib, mazkur strategiya davlat boshqaruvini to‘liq raqamlashtirishni maqsad qilgan.

Mavzuning dolzarbligi

Elektron hukumat tizimi global miqyosda davlat xizmatlarini takomillashtirishda muhim vosita sifatida e’tirof etilmoqda. [13]O‘zbekistonda ham so‘nggi yillarda bu yo‘nalishda sezilarli o‘zgarishlar amalga oshirildi. Jumladan: yagona interaktiv davlat xizmatlari portali (my.gov.uz) orqali 300 dan ortiq davlat xizmati onlayn shaklga o‘tildi. Davlat xizmatlari markazlari faoliyati optimallashtirilib, aholiga xizmat ko‘rsatishda yagona standartlar belgilandi. Mobil ilovalar, elektron to‘lov tizimlari, ID-karta asosidagi identifikatsiya kabi zamonaviy AKT mexanizmlari joriy etildi. “Raqamli hukumat” platformasining bosqichma-bosqich tatbiqi davlat organlari o‘rtasidagi elektron ma’lumot almashinuvini jadallashtirdi. Bularning barchasi mamlakatda davlat boshqaruvining ochiq, qulay va samarali bo‘lishini ta’minlashga xizmat qilmoqda. Shu sababdan mazkur mavzu nafaqat nazariy, balki amaliy jihatdan ham nihoyatda dolzarbdir. Bugungi kunda O‘zbekiston Respublikasida davlat boshqaruvini raqamlashtirish jarayonlari izchil davom etmoqda. Xususan, [14] “Raqamli

[13] O’zbekiston Respublikasi Statistika agentligi. Raqamlashtirish va axborot-kommunikatsiya xizmatlari bo’yicha yillik statistik to’plamlar. Toshkent,2021-2024

[14] O’zbekiston Respublikasi Prezidenti. “Raqamli O’zbekiston -2030” strategiyasi. Toshkent, 2020

O‘zbekiston – 2030” strategiyasi davlat xizmatlarini transformatsiya qilish, idoralararo ma’lumot almashinuvini yaxshilash, elektron xizmatlarning ishonchliligi va tezkorligini oshirishga qaratilgan keng ko‘lamli islohotlardan biridir. Ushbu strategiya elektron hukumat tizimini rivojlantirishning ustuvor yo‘nalishlarini belgilab beradi, xususan, barcha davlat xizmatlarining to‘liq raqamlashtirilishi, yagona axborot platformalari yaratish, ochiq ma’lumotlar tizimini kengaytirish va fuqarolarning davlat xizmatlaridan onlayn foydalanish imkoniyatini oshirish kabi vazifalarni nazarda tutadi.

Tadqiqot metodologiyasi

Maqolani yozish jarayonida turli hil metodologik yo’nalishlardan, xususan,tahlil va sintez, qiyosiy tahlil, statistik ma’lumotlarga asoslangan tahlil hamda normativ-huquqiy tahlil kabi metodologik yondashuvlardan foydalanilgan. Misol uchun tahlil va sintez metodiga qaraydigan bo’lsak, u quyidagicha tariflanadi: elektron hukumat tizimidagi mavjud mexanizmlar, ularning samaradorligi va rivojlanish tendensiyalari tahlil qilindi.

Tahlil va natijalar

O‘zbekistonda elektron hukumat tizimi so‘nggi yillarda izchil rivojlanib, davlat boshqaruvining muhim yo‘nalishiga aylangan. Ushbu tizimning shakllanish jarayoni bir necha bosqichlarda amalga oshirilgan bo‘lib, har bir bosqichda axborot-kommunikatsiya texnologiyalaridan foydalanish mexanizmlari yanada takomillashtirildi. Dastlabki bosqichda (2013–2017-yillar) elektron hukumatning normativ-huquqiy bazasi y aratilgan, Yagona interaktiv davlat xizmatlari portali ishga tushirilgan va idoraviy axborot tizimlarini shakllantirish ishlari olib borilgan. Keyingi bosqichda (2018–2020-yillar) Davlat xizmatlari markazlari va Davlat xizmatlari agentligi tashkil qilinib, xizmatlarning sezilarli qismi onlayn shaklga o‘tkazildi. 2021-yildan hozirgi davrgacha bo‘lgan uchinchi bosqich esa “Raqamli O‘zbekiston – 2030” strategiyasi asosida davlat xizmatlarining 80 foizdan ortig‘ini raqamlashtirish, ID-karta orqali yagona identifikatsiya joriy etish, ma’lumot almashish tizimlarini integratsiya qilish kabi yirik islohotlar bilan tavsiflanadi. Elektron hukumatning samaradorligi asosan AKT xizmatlaridan foydalanish darajasi bilan belgilanadi.

Bugungi kunda O‘zbekistonda elektron xizmatlar Yagona portal (my.gov.uz), elektron identifikatsiya tizimi (OneID), idoralararo ma’lumot almashinuvi platformalari, mobil ilovalar va elektron to‘lov tizimlari orqali keng qo‘llanilmoqda. Yagona portal orqali 300 dan ortiq xizmat ko‘rsatilayotgani, aholi uchun “bir darcha” tamoyili asosida qulayliklar yaratilgani, elektron navbat, avtomatik monitoring, onlayn to‘lov kabi imkoniyatlarning mavjudligi tizim samaradorligini oshirmoqda. OneID tizimi orqali elektron imzo, ID-karta va biometrik autentifikatsiya asosida fuqarolarning shaxsini tasdiqlash jarayoni soddalashtirildi.

Idoralararo elektron ma’lumot almashinuvi jarayonida 200 dan ortiq tashkilot yagona integratsiya markazi orqali bog‘langan bo‘lib, bu qog‘oz hujjatlar almashinuvi hajmini kamaytirishga, byurokratik jarayonlarni soddalashtirishga xizmat qilmoqda. Shuningdek, mobil ilovalar orqali davlat xizmatlarini olish

ulushi yil sayin oshib, aholining keng qatlamlari uchun qulaylik yaratmoqda. Aholi va tadbirkorlarning elektron xizmatlarga murojaat ko‘rsatkichlari ham tizim samaradorligining o‘sib borayotganini tasdiqlaydi. So‘nggi yillarda onlayn xizmatlar foydalanuvchilari soni yiliga 20–30 foizga oshib bormoqda.

Xizmatlardan foydalanayotgan aholining katta qismini yoshlar tashkil etadi, bu esa raqamli savodxonlikning o‘sib borayotganidan dalolat beradi. Eng ko‘p talab qilinadigan xizmatlar qatoridan soliq to‘lovlari, kadastr ma’lumotlari, yo‘l harakati qoidalarini buzganlik uchun jarimalarni tekshirish, FHDYo xizmatlari, shuningdek, turli xil litsenziya va guvohnomalarning olinishi o‘rin olgan. Bu xizmatlarning onlayn shaklga o‘tkazilishi aholining vaqt va mablag‘ini sezilarli darajada tejash imkonini berdi. Elektron hukumat tizimining amaliy samaradorligi bir nechta yo‘nalishda namoyon bo‘lmoqda. Avvalo, iqtisodiy samaradorlik ko‘rsatkichlari ijobiy o‘sishni namoyon qilmoqda: byurokratik xarajatlar kamaydi, qog‘oz aylanishi 60–70 foizga qisqardi, davlat xizmatlarini ko‘rsatishning avtomatlashtirilishi natijasida byudjet tejalmoqda.

O’zbekiston Respublikasida elektron hukumat tizimining asosiy komponentlari.
1-jadval.

O’zbekiston elektron hukumat tizimining asosiy komponentlari
Yagona interaktiv davlat xizmatlari portal (my.gov.uz)
Yagona identifikatsiya tizimi (OneID)
Elektron raqamli imzo (e- imzo)
Yagona to’lov tizimi (pay.goz.uz)
Davlat xizmatlari markazlari (DXM)
Idoralararo axborot almashinuvi platformasi
Yagona ma’lumotlar bazalari va axborot tizmlari
UZCERT, davlat axborot xavfsizligi markazlari
Raqamli savodxonlik va ko’mak markazlari

Ijtimoiy samaradorlikdan kelib chiqib, aholi uchun xizmat olish jarayonlari soddalashdi, xizmat ko‘rsatish vaqti keskin qisqardi, chekka hududlarda ham sifatli xizmat olish imkoniyati yaratilmoqda. Ma’muriy samaradorlik nuqtayi nazaridan esa davlat idoralari faoliyatidagi shaffoflik oshdi, korrupsiya xavfi kamaydi, inson omili ta’siri qisqardi va idoralar o‘rtasida tezkor ma’lumot almashinuvi yo‘lga qo‘yildi. Shunga qaramay, ayrim muammolar ham mavjud. Xususan, aholining ma’lum qismi orasida raqamli savodxonlik yetarli emas. Chekka hududlarda internet tezligi pastligi, ayrim idoralarda axborot bazalarining eskiligi yoki integratsiya jarayonlarining sustligi ham xizmatlar samaradorligiga ta’sir ko‘rsatmoqda.

Elektron hukumat tizimining samaradorligini ta’minlash uchun bir qator aniq omillar mavjud. Tashkiliy-huquqiy asoslarning mustahkamligi elektron xizmatlarning qonuniy va tizimli ravishda amalga oshirilishini kafolatlaydi. O‘zbekiston Respublikasida “Elektron hukumat to‘g‘risida”gi qonun hamda axborot xavfsizligini ta’minlashga doir me’yoriy-huquqiy hujjatlar tizimning barqaror ishlashiga asos yaratadi.

Xulosa qilib aytganda, O‘zbekiston elektron hukumat tizimi so‘nggi yillarda sezilarli darajada rivojlandi va raqamli davlat boshqaruvining mustahkam poydevorini yaratdi. AKT xizmatlaridan foydalanish mexanizmlarining rivojlanishi davlat organlari faoliyatini soddalashtirib, aholi uchun qulayliklar yaratdi. Elektron xizmatlar nafaqat vaqt tejalishiga, balki davlat boshqaruvida shaffoflik va samaradorlik oshishiga xizmat qildi. Kelgusida elektron hukumatning samaradorligi yanada oshishi uchun quyidagi takliflarni ilgari surish mumkin: sun’iy intellektni davlat xizmatlariga keng joriy qilish, aholining raqamli savodxonligini oshirish, elektron xizmatlar xavfsizligini kuchaytirish, barcha xizmatlarni yagona mobil ilovaga jamlash, “paperless government tizimini to‘liq yo‘lga qo‘yish. Elektron hukumatning rivojlanishi O‘zbekistonda raqamli iqtisodiyotning kengayishi, davlat boshqaruvining samaradorligi va aholining hayot sifatini oshirishda muhim omil bo‘lib qoladi.

Foydalanilgan adabiyotlar ro’yxati.

1. O‘zbekiston Respublikasi “Axborotlashtirish to‘g‘risida”gi Qonuni.
2. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
3. Rajaboyev Sh.Sh., and Umidov D.U.. "AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARINING BUXGALTERIYA SOHASIDAGI O'RNI" Экономика и социум, no. 4-2 (119), 2024, pp. 393-396.
4. O‘zbekiston Respublikasi “Shaxsga doir ma’lumotlar to‘g‘risida”gi Qonuni.
5. Боронов Б.Ф., and Саломов Ш.Ф.. "МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.
6. Karimov A., Safarov B. Axborot xavfsizligi asoslari. – Toshkent: TDYU nashriyoti, 2021.

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 000-0002-0997-6689
Abdimurodov S.
talabasi
Samarqand iqtisodiyot va servis instituti
ORCID: 0000-0002-0997-6689

KORXONA FAOLIYATIDA MS OFFICE DASTURLARIDAN FOYDALANISH

Annotatsiya: *Ushbu maqolada O'zbekiston Respublikasida korxona va firmalar faoliyatida Microsoft Office dasturlar paketidan foydalanish mexanizmlari, ularning huquqiy, tashkiliy va texnologik asoslari o'rganilgan. MS Office dasturlari korporativ muhitda ma'lumotlarni qayta ishlash, hujjat bilan ishlash, ma'lumotlar bazasini boshqarish, taqdimotlar tayyorlash va elektron jadvallar bilan ishlash uchun asosiy vosita hisoblanadi. Maqolada Word, Excel, PowerPoint, Outlook va Access dasturlarining korxona faoliyatidagi o'rni va ahamiyati tahlil qilingan hamda raqamli transformatsiya jarayonida ularning samaradorligini oshirish yo'llari ko'rsatilgan.*

Kalit so'zlar: *MS Office, korxona, elektron hujjat aylanishi, ma'lumotlar bazasi, elektron jadvallar, korporativ aloqa, hisob-kitoblar avtomatlashtirish, biznes jarayonlar.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 000-0002-0997-6689
Abdimurodov S.
student
Samarkand Institute of Economics and Service

THE USE OF MS OFFICE APPLICATIONS IN ENTERPRISE OPERATIONS

Abstract: *This article examines the mechanisms of using the Microsoft Office software package in the activities of enterprises and firms in the Republic of Uzbekistan, their legal, organizational and technological foundations. MS Office applications are the main tools for data processing, document management, database management, presentation preparation and spreadsheet work in a corporate environment. The article analyzes the role and importance of Word,*

Excel, PowerPoint, Outlook and Access programs in enterprise activities and shows ways to increase their effectiveness in the process of digital transformation.

Keywords: *MS Office, enterprise, electronic document management, database, spreadsheets, corporate communication, accounting automation, business processes, digital transformation, service efficiency.*

Kirish

Zamonaviy iqtisodiyot sharoitida axborot-kommunikatsiya texnologiyalari barcha sohalar faoliyatining ajralmas qismiga aylangan. Korxona va firmalarda samaradorlikni oshirish, xarajatlarni kamaytirish va raqobatbardoshlikni ta'minlash uchun zamonaviy dasturiy ta'minotdan foydalanish zaruriyati tobora ortib bormoqda. Microsoft Office dasturlar paketi bu ofis ishlarini avtomatlashtirish, hujjat bilan ishlash, ma'lumotlarni tahlil qilish va vizualizatsiya qilish uchun eng keng tarqalgan va universal vositalardan biridir.

MS Office paketi bir necha o'n yillar davomida o'z imkoniyatlarini kengaytirib kelmoqda va bugungi kunda u faqat matnli hujjatlar tayyorlash vositasi emas, balki murakkab biznes jarayonlarini boshqarish, moliyaviy tahlillar o'tkazish, ma'lumotlar bazalarini yaratish va korporativ aloqani tashkil etishning kuchli platformasiga aylangan. Hozirgi vaqtda deyarli har bir korxonada MS Office dasturlaridan foydalaniladi va ular xodimlarning kundalik faoliyatining asosiy qismini tashkil etadi.

Ms office paketining asosiy komponentlari

Microsoft Office paketi bir necha muhim dasturlarni o'z ichiga oladi va ularning har biri korxona faoliyatining ma'lum sohalarida qo'llaniladi. Microsoft Word matnli hujjatlar bilan ishlash uchun mo'ljallangan dastur bo'lib, korxonalarda shartnomalar, ma'lumotnomalar, hisobotlar, xatlar, arizalar va boshqa rasmiy hujjatlarni tayyorlash uchun keng foydalaniladi. Microsoft Excel elektron jadvallar bilan ishlash va murakkab hisob-kitoblarni amalga oshirish dasturi sifatida moliyaviy hisobotlar tayyorlash, byudjetni rejalashtirish, savdo statistikasini tahlil qilish va inventarizatsiya ma'lumotlarini boshqarish uchun ishlatiladi. Microsoft PowerPoint taqdimotlar tayyorlash dasturi bo'lib, mahsulot taqdimotlari, biznes-rejalar, treninglar, yig'ilishlar va konferensiyalar uchun vizual materiallar yaratishda qo'llaniladi. Microsoft Outlook elektron pochta, kalendar, kontaktlar va vazifalarni boshqarish tizimi sifatida ichki va tashqi aloqalarni tashkil etish, yig'ilishlarni rejalashtirish va ish jarayonlarini muvofiqlashtirish uchun muhim vosita hisoblanadi. Microsoft Access esa ma'lumotlar bazasini yaratish va boshqarish tizimi bo'lib, kichik va o'rta korxonalarda mijozlar bazasini yuritish, inventarizatsiya nazorati va buyurtmalarni boshqarish uchun ishlatiladi.

Korxonada ms office dasturlaridan foydalanish

Zamonaviy korxonalarda MS Office dasturlar paketi barcha bo'limlar faoliyatining asosiy qismini tashkil etadi. Har bir dastur o'zining maxsus vazifalarini bajaradi va umumiy biznes jarayonlarning samaradorligini oshiradi. Hujjat aylanishi tizimida MS Word dasturi shartnomalar va huquqiy hujjatlar tayyorlashda asosiy vosita bo'lib xizmat qiladi. Korxonada yetkazib beruvchilar,

mijozlar va hamkorlar bilan tuzilgan shartnomalar Word dasturida tayyorlanadi, shablonlar yaratish orqali shartnomalarni standartlashtirish amalga oshiriladi, ilova va qo'shimcha kelishuvlar avtomatik raqamlanadi hamda elektron imzo integratsiyasi orqali hujjatlar tasdiqlanadi. Ichki hujjatlar bilan ishlash jarayonida buyruqlar, ko'rsatmalar, yo'riqnomalar tayyorlanadi, lavozim yo'riqnomalari va ish tartibi qoidalari yaratiladi, xodimlar uchun ichki qonunlar va me'yorlar hujjatlari shakllantiriladi, versiyalarni kuzatish funksiyasi orqali hujjatlar ustida hamkorlik amalga oshiriladi. Hisobotlar va ma'lumotnomalar tayyorlashda oylik, choraklik va yillik hisobotlar, bo'limlar faoliyati to'g'risida ma'lumotnomalar, audit hisobotlari va tekshiruv natijalari tayyorlanadi, Mail Merge funksiyasi orqali ommaviy xatlar yuboriladi.

Moliyaviy boshqaruvda MS Excel dasturi byudjetlashtirish va rejalashtirish, moliyaviy tahlillar o'tkazish, hisob-kitoblarni avtomatlashtirish va ma'lumotlarni tahlil qilishda asosiy vositadir. Byudjetlashtirish jarayonida korxona yillik byudjeti tuziladi va monitoring qilinadi, bo'limlar bo'yicha xarajatlar taqsimlanadi, plan va fakt ko'rsatkichlar taqqoslanadi, qolgan byudjet summalari avtomatik hisoblanadi. Moliyaviy tahlillar o'tkazishda daromad va xarajatlar dinamikasi tahlil qilinadi, foydalilik koeffitsiyentlari (ROI, NPV, IRR) hisoblanadi, pul oqimi rejalashtirilib nazorat qilinadi, moliyaviy ko'rsatkichlar grafik ko'rinishda taqdim etiladi. Hisob-kitoblar avtomatlashtirish jarayonida ish haqi hisob-kitoblari va ustama to'lovlar, soliq hisoblashlari va to'lovlarni rejalashtirish, amortizatsiya va asosiy vositalar hisobi, inventarizatsiya va omborxona hisobi amalga oshiriladi. Ma'lumotlar tahlilida Pivot Tables yordamida katta hajmdagi ma'lumotlar tahlil qilinadi, VLOOKUP va INDEX-MATCH formulalari orqali ma'lumotlar izlanadi, shartli formatlash orqali muhim ko'rsatkichlar ajratiladi, makroslar yaratish orqali takrorlanuvchi vazifalar avtomatlashtiriladi.

Marketing va savdo bo'limida MS Excel dasturi mijozlar bazasini yuritish va segmentatsiya qilish, savdo statistikasi va tranzaksiyalar tahlili, narxlar ro'yxatini boshqarish va chegirmalarni hisoblash, savdo xodimlarining KPI ko'rsatkichlarini monitoring qilish, ABC-tahlil va mahsulot assortimentini optimallashtirish uchun qo'llaniladi. MS PowerPoint dasturi esa mahsulot va xizmatlar taqdimotlari, marketing kampaniyalari uchun vizual materiallar, savdo treningleri va seminarlar uchun slaydlar, biznes-takliflar va hamkorlik loyihalari taqdimoti, infografikalar va statistik ma'lumotlarni vizualizatsiya qilish uchun ishlatiladi.

Kadrlar bo'limida MS Excel va Access dasturlari xodimlar ma'lumotlari bilan ishlashda muhim rol o'ynaydi. Shaxsiy ma'lumotlar bazasida xodimlarning F.I.O., manzil, telefon, pasport ma'lumotlari saqlanadi, mehnat shartnomalar va qo'shimcha kelishuvlar ro'yxati yuritiladi, ta'til jadvallari va dam olish kunlari rejalashtiriladi, xodimlarning malaka oshirish tarixi qayd etiladi, kadrlar harakati (qabul, ko'chirish, ishdan bo'shatish) boshqariladi. Ish haqi hisob-kitoblarida asosiy ish haqi va qo'shimcha to'lovlar hisoblanadi, ustama va bonuslar taqsimlanadi, soliq va ijtimoiy badjallar hisoblanadi, ish haqi varaqalari avtomatik yaratiladi.

Ta'minot va omborxona boshqaruvi sohasida inventarizatsiya nazorati amalga oshiriladi. Tovarlar va materiallar ro'yxati yuritiladi, minimal zaxira miqdori kuzatilib avtomatik ogohlantirish amalga oshiriladi, kirim-chiqim operatsiyalari qayd etiladi, omborxona qoldiqlari hisobi va yaroqlilik muddati nazorat qilinadi. Yetkazib beruvchilar bilan ishlashda ularning bazasi va baholar taqqoslanadi, buyurtmalar ro'yxati va yetkazib berish muddatlari boshqariladi, to'lovlar grafigi va qarzdorlik monitoring qilinadi, yetkazib beruvchilarning sifat ko'rsatkichlari baholanadi.

Korporativ aloqada MS Outlook dasturi ichki aloqalarni tashkil etishda muhim ahamiyat kasb etadi. Elektron pochta orqali rasmiy xat almashuv amalga oshiriladi, tarqatish ro'yxatlari yaratiladi (bo'limlar, loyihalar bo'yicha), e-pochta shablonlari orqali standart xabarlar yuboriladi, muhim xabarlar belgilanadi va avtomatik arxivlanadi. Yig'ilishlar va tadbirlarni rejalashtirish jarayonida kalendar orqali yig'ilishlar tashkil etiladi, ishtirokchilar taklif qilinadi va javoblar kuzatiladi, yig'ilishlar xonasi band qilinadi, eslatmalar va ogohlantirishlar sozlanadi. Vazifalarni boshqarish tizimida shaxsiy va jamoaviy vazifalar ro'yxati yuritiladi, vazifalar xodimlarga tayinlanadi va kuzatiladi, bajarilish muddatlari va ustuvorliklar belgilanadi, vazifalar bajarilishi bo'yicha hisobotlar tayyorlanadi.

Loyihalarni boshqarishda MS Excel yordamida Gantt diagrammalari yaratiladi, loyiha byudjeti va xarajatlar kuzatiladi, resurslar rejalashtiriladi va taqsimlanadi, loyiha bosqichlari monitoring qilinadi. MS Access dasturida loyiha ma'lumotlar bazasi yaratiladi, vazifalar, mas'ullar va muddatlar qayd etiladi, loyiha hujjatlari va fayllari ro'yxati yuritiladi, loyiha risklari va muammolar ro'yxati tuziladi.

Xizmat ko'rsatish va mijozlar bilan ishlashda Excel va Access dasturlari CRM tizimi sifatida qo'llaniladi. Mijozlar bazasi va ularning kontakt ma'lumotlari saqlanadi, murojaat va shikoyatlar qayd etiladi, xizmat ko'rsatish tarixi yuritiladi, mijozlar qoniqish darajasi baholanadi (NPS). Tahlil va hisobotlar tayyorlashda eng faol mijozlar aniqlanadi, xizmat ko'rsatish tezligi o'lchanadi, muammoli yo'nalishlar aniqlanadi, mijozlar oqimi prognozlashtiriladi.

Integratsiya va hamkorlik jarayonida dasturlar o'rtasida ma'lumotlar almashinuvi amalga oshiriladi. Excel jadvallari Word hisobotlariga joylashtiriladi, Access ma'lumotlar bazasidan Excel'ga eksport qilinadi, PowerPoint taqdimotlarga Excel grafiklari qo'shiladi, Outlook orqali Office hujjatlari almashiladi. Jamoaviy ishlash uchun SharePoint yoki OneDrive orqali hujjatlar almashiladi, bir vaqtning o'zida bitta hujjat ustida ishlash amalga oshiriladi, izohlar va taklif-mulohazalar qoldiriladi, versiyalar nazorat qilinadi va qayta tiklanadi.

Xavfsizlik va himoya masalalarida hujjatlar parol bilan himoyalangan fayllar yaratish, tahrirlashni cheklash va faqat o'qish rejimi, raqamli sertifikatlar va elektron imzo, ma'lumotlarni shifrlash orqali ta'minlanadi. Foydalanuvchi huquqlarini boshqarish jarayonida turli xodimlar uchun turli kirish darajalari belgilanadi, maxfiy ma'lumotlar himoyalanadi, audit jurnallari va faoliyat tarixi kuzatiladi, zaxira nusxalari avtomatik yaratiladi.

Amaliy jihatdan qaralganda, savdo bo'limida kun davomida quyidagi ish jarayonlari amalga oshiriladi. Ertalab soat 9:00 dan 12:00 gacha Outlook orqali yangi buyurtmalar va xabarlar tekshiriladi, Excel'da kunlik savdo rejasi ko'rib chiqiladi, Access'da mijozlar bazasidan kerakli ma'lumotlar izlanadi, Word'da mijoz uchun kommersiya taklifi tayyorlanadi. Tushdan keyin soat 13:00 dan 18:00 gacha PowerPoint'da yangi mahsulot taqdimoti yaratiladi, Excel'da kunlik savdo natijalari kiritiladi va tahlil qilinadi, Outlook orqali yig'ilish rejalashtiriladi va ishtirokchilar taklif qilinadi, Word'da haftalik hisobot tayyorlanadi va rahbariyatga yuboriladi. Bu tizimli yondashuv korxonada MS Office dasturlaridan samarali foydalanish va barcha biznes jarayonlarni optimallashtirish imkonini beradi.

Ms office va bulutli texnologiyalar

Zamonaviy MS Office paketi Microsoft 365 (Office 365) nomi bilan bulutli xizmat sifatida ham taqdim etiladi. Bu xizmat istalgan joydan va qurilmadan kirish imkoniyati, avtomatik yangilanishlar va xavfsizlik yamoqlari, kengaytirilgan saqlash hajmi (OneDrive orqali), real vaqtda hamkorlik va bir vaqtning o'zida bitta hujjat ustida ishlash, yuqori darajadagi ma'lumotlar xavfsizligi va zaxira nusxalari kabi afzalliklarga ega.

Microsoft 365 orqali korxona xodimlari bir vaqtning o'zida bitta hujjat ustida ishlashi, o'zgarishlarni real vaqtda ko'rishi va izohlar qoldirishi mumkin. Bu masofaviy ish sharoitida va filiallar o'rtasida hamkorlikni sezilarli darajada yaxshilaydi. Bulutli versiya mobil ilovalarni ham o'z ichiga oladi, bu esa smartfon va planshetlar orqali hujjatlar bilan ishlash imkonini beradi. Xavfsizlik nuqtai nazaridan, Microsoft 365 ikki faktorli autentifikatsiya, ma'lumotlarni shifrlash va foydalanuvchi huquqlarini boshqarish kabi zamonaviy himoya vositalarini taqdim etadi.

Ms office dasturlaridan foydalanishning afzalliklari

MS Office dasturlar paketining korxona faoliyatida qo'llanilishi quyidagi muhim afzalliklarga ega. Deyarli barcha xodimlar ushbu dasturlar bilan tanish va ularni ishlatishni bilishadi, bu o'rgatish xarajatlarini kamaytiradi va dasturlar universal standart hisoblanadi. MS Office dasturlari o'rtasida yuqori darajadagi integratsiya mavjud bo'lib, Excel jadvalini Word hujjatiga, PowerPoint taqdimotiga yoki Outlook xabariga osonlik bilan qo'shish mumkin. Makroslar, VBA dasturlash, shablonlar va qo'shimchalar yordamida dasturlarni o'z ehtiyojlaringizga moslashtirish imkoniyati mavjud. Microsoft muntazam ravishda yangilanishlar chiqaradi, xavfsizlik teshiklarini tuzatadi va yangi funksiyalar qo'shadi, bu barqarorlik va xavfsizlikni ta'minlaydi. Internetda ko'plab o'quv materiallari, forumlar, video darslar va rasmiy hujjatlar mavjud, bu esa foydalanuvchilarga muammolarni mustaqil hal qilish imkonini beradi va keng qo'llab-quvvatlashni ta'minlaydi.

Ms office bilan ishlashda muammolar va yechimlar

MS Office dasturlarining barcha afzalliklariga qaramay, korxonalarda ulardan foydalanishda ba'zi muammolar yuzaga kelishi mumkin. Litsenziya xarajatlari ayniqsa katta korxonalar uchun sezilarli bo'lishi mumkin va bu muammoni hal qilish uchun obuna asosidagi Microsoft 365 xizmatiga o'tish

tavsiya etiladi. Xodimlarning malaka darajasi murakkab imkoniyatlardan to'liq foydalanish uchun qo'shimcha treninglarni talab qiladi va bu muammoni ichki treninglar tashkil etish yoki onlayn kurslardan foydalanish orqali hal qilish mumkin. Ma'lumotlar xavfsizligi masalasida hujjatlarni parol bilan himoyalash, kirish huquqlarini to'g'ri sozlash va muntazam zaxira nusxalarini yaratish zarur. Versiyalar mosligi muammosi turli davrlarda sotib olingan versiyalar o'rtasida yuzaga kelishi mumkin va buni standartlashtirilgan versiyadan foydalanish hamda muntazam yangilanishlar orqali hal qilish mumkin.

Kelajak istiqbollari

Sun'iy intellekt va mashinali o'rganish texnologiyalarining rivojlanishi MS Office dasturlariga ham o'z ta'sirini ko'rsatmoqda. Microsoft dasturlariga AI yordamchilari (masalan, Copilot) ni integratsiya qilmoqda, bu matn yozish, ma'lumotlarni tahlil qilish va taqdimotlar yaratishni avtomatlashtiradi.

Bulutli texnologiyalar yanada rivojlanib, gibrid ish rejimi (ofis va masofaviy ish kombinatsiyasi) uchun yanada qulay sharoitlar yaratilmoqda. Real vaqtda hamkorlik, video-konferensiyalar va loyiha boshqaruvi vositalari yanada chuqur integratsiyalashmoqda.

Mobil qurilmalar uchun imkoniyatlar kengaymoqda va ishonchli internet ulanishi mavjud bo'lgan har qanday joydan to'liq funksional ish imkoniyati yaratilmoqda. Xavfsizlik texnologiyalari ham takomillashib, biometrik autentifikatsiya, blockchain va boshqa zamonaviy yechimlar joriy etilmoqda.

Xulosa

Microsoft Office dasturlar paketi zamonaviy korxona faoliyatining ajralmas qismidir. Word, Excel, PowerPoint, Outlook va Access dasturlari hujjat bilan ishlash, ma'lumotlarni tahlil qilish, taqdimotlar tayyorlash, aloqani tashkil etish va ma'lumotlar bazalarini boshqarish uchun keng imkoniyatlar taqdim etadi.

MS Office dasturlaridan samarali foydalanish korxona samaradorligini oshiradi, xarajatlarni kamaytiradi, hujjat aylanishini tezlashtiradi va xodimlar o'rtasida hamkorlikni yaxshilaydi. Bulutli texnologiyalar va sun'iy intellekt integratsiyasi esa bu dasturlarning imkoniyatlarini yanada kengaytirmoqda.

Korxonalar MS Office dasturlarini to'liq potensialidan foydalanish uchun xodimlarni o'rgatish, xavfsizlik choralarini kuchaytirish va zamonaviy versiyalarga o'tishga e'tibor berishlari kerak. Kelajakda MS Office paketi yanada rivojlanib, biznes jarayonlarini boshqarishning yanada kuchli va universal vositasiga aylanadi.

Foydalanilgan adabiyotlar ro'yxati

1. Microsoft Corporation. Microsoft 365 rasmiy hujjatlari va foydalanuvchi qo'llanmalari. https://docs.microsoft.com
2. Abdullayev A.A. Axborot texnologiyalari va ularning korxona faoliyatida qo'llanilishi. Toshkent: Iqtisod-Moliya, 2023.
3. Normatov S.T. Ma'lumotlar bazalarini boshqarish tizimlari. Samarqand: SamISI, 2023.
4. Microsoft Press. Office 365 for Business: Step by Step Guide. 2024 edition.

5. Боронов Б.Ф., and Мустафоев А.Ф. “НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ” Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
6. Rajaboyev Sh.Sh., and Umidov D.U. “AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARINING BUXGALTERIYA SOHASIDAGI O’RNI” Экономика и социум, no. 4-2 (119), 2024, pp. 393-396.
7. Боронов Б.Ф., and Саломов Ш.Ф. “МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ” Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.
8. Rajaboyev Sh.Sh., and Ziyodullayev F.V. “AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARINI RIVOJLANTIRISH CHORA-TADBIRLARI TO‘G‘RISIDAGI QARORLAR MOHIYATI” Экономика и социум, no. 5-1 (120), 2024, pp. 675-680.

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Qushiyev G.
student
Samarkand Institute of Economics and Service

ARCHITECTURE AND TYPES OF COMPUTER NETWORKS

Abstract: *This in the thesis computer networks architecture, their main principles and applicable models about in detail information is given. Network architecture networks organization to manage, to control and information transmission effective done increase for intended layered structure as seeing The thesis discusses the OSI and TCP/IP architectures, their functions, layers and each other comparison Also, the computer networks types – such as LAN, MAN, WAN territorial classifications and client -server and p2p (peer-to-peer) architectures advantages and application sectors analysis will be done.*

Key words: Computer networks, network architecture, OSI model, TCP/IP model, LAN, MAN, WAN, network topologies, switch, router, network equipment, SDN, IoT, cloud technologies, network security, network infrastructure.

Computer networks modern information society foundation they are information exchange, remote the connection installation and from resources together use opportunity The network stability, scalability and speed his/her main project — architecture related. Architecture network structure, components, interactions work rules and information transmission protocols determinant conceptual This is the basis. thesis computer networks architecture main types, their functional principles, basic equipment and modern in technologies caught place about surrounding information gives.

Relevance

Computer networks architecture and types study current on the day current from issues one is considered. Because digital of technologies intense development, information exchange size sharp increase and enterprise and organizations continuous performance for networks efficiency important importance profession Networks right their design, architecture and functional features deep to know information systems safety, stability and speed to provide service does.

This to the topic related main problem — exists network architectures diversity and their application areas right in the definition is complexity. With this together, globally and local networks management, their resources distribution, security provide such as scientific questions as of now remains.

The research purpose — computer networks main architectures, their technician and functional features, as well as LAN, MAN, WAN network types application areas analysis is to do. Through this modern network infrastructure effective organization of reaching theoretical the basics lighting in the eye is being held.

This thesis general context — network architecture elements learning, networking types different aspects show, their advantages and application opportunities analysis to do through computer networks modern information in systems place and importance open to give focused.

Home Part

Computer networks modern information society main infrastructure they are information exchange, remote communication and from resources general use opportunity The network performance, stability and efficiency his/her architecture, that is structure and to the protocols related. Network architecture various devices and of technologies mutual performance providing layered approach based on This is in the thesis computer networks main architectures, their types and application about general information statement is being done.

Computer networks theoretical based on the OSI and TCP/IP models place important The OSI model is seven from the layer consists of from them every one separately function does: physics from the layer pull practical to the floor until all processes layers through TCP /IP model and The Internet main model divided into practical, transport, internet and to the network entrance from the layers organization found. This models network devices and of applications standard basically performance provides.

Networks geographical coverage according to one how many to the type the smallest PAN network is divided into starting with, LAN — local area network networks, MAN — city scale networks and WAN — global, long-distance distances cover recipient networks Also available, such as SAN, VPN, WLAN, CAN specialized networks various in the fields is used. Each network types his/her own function, speed, safety and to the scope according to is selected.

Network network topologies in architecture important importance has. Star topology the most many is used because it controls and expansion for comfortable. Complete connection topology and the highest reliability required in systems Topology choice network price, performance speed and to malfunctions to the endurance impact does.

Network infrastructure right performance for switch, router, hub, repeater, bridge and gateway such as devices necessary. Switches local MAC addresses in networks based on information transmits, routers and various networks between IP packets routes. Hubs are simple. device to share information all to devices distributes, but currently less is used. Gateway is various to the protocols has networks their lips, their lips mutual performance provides.

Future networks SDN (Software-Defined Networking) technology for important is. Through SDN network management centralized and software supply through IoT networks and billions small devices connect for flexible and effective

requires infrastructures. Cloud technologies and network resources service as presented reach, networks traditional local from the borders outside take comes out.

Conclusion

Computer networks architecture technological of progress everyone in the phase updated Like OSI and TCP / IP layered models general the language provides, LAN, WAN, SAN types and network task and coverage Switches and Routers network traffic effective in management main role Plays. Network architecture right choice and management modern organizations digital in the economy competitiveness in providing solution doer importance Future SDN and IoT architectures and network further intelligent, dynamic and scalable to be provides .

Used literature list

1. Rajaboev Shahboz Shodiyevich, & Raxmatov Ozodbek Aktam O'g'li. (2024). Information Technology is Now Used Everywhere . Miasto Przyszłości, 44, 114–121. Retrieved from https://miastoprzyszlosci.com.pl/index.php/mp/article/view/2372
2. Muhammadiev, Z., Boronov, B., & Abdurasulov, J. (2021). KORXONALARDA MODERNIZATSIYALASH JARAYONLARI HISOBINING HOZIRGI HOLATI: MUAMMOLARI VA YECHIMLARI. SCIENCE AND INNOVATIVE DEVELOPMENT, 4(6), 11-21.
3. Boronov Bobur Farkhodovich, & Abdurasulov Jamshidbek Ahmad Ugli. (2021). Necessity And Main Directions Of Improving Financial Reporting In Uzbekistan. The American Journal of Management and Economics Innovations, 3(05), 61–67. Retrieved from https://inlibrary.uz/index.php/tajmei/article/view/12447
4. SHODIYEVICH R. S., UG‘LI X. S. O., UG‘LI J. L. G. O. The Role of Information Technologies in Teaching Foreign Languages //Gospodarka i Innowacje. – 2024. – Т. 43. – С. 74-84.
5. Shodiyevich R. S., Sardor A. MICROSOFT POWER POINT IN THE FIELD OF TOURISM PLACE //EUROPEAN JOURNAL OF BUSINESS STARTUPS AND OPEN SOCIETY. – 2023. – Т. 3. – №. 12. – С. 202-210.
6. Боронов Б.Ф., and Мустафоев А.Ф.. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
7. Боронов Б.Ф., and Саломов Ш.Ф.. "МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.
8. Shahboz R., Sayidaxon T., Sheroz R. IQTISODIY FANLARNI O ‘QITISHDA MULTIMEDIYA VOSITALARIDAN FOYDALANISH TEXNOLOGIYALARI //International Journal of Contemporary Scientific and Technical Research. – 2023. – С. 518-520.

9. Мухаммадиев, З., & Боронов, Б. (2023). ХАЛҚАРО СТАНДАРТЛАР АСОСИДА УЗОҚ МУДДАТЛИ АКТИВЛАР ҲИСОБИНИ ТАКОМИЛЛАШТИРШ. Издания, 91–97. извлечено от https://inlibrary.uz/index.php/editions/article/view/92129

Rajaboyev Sh. Sh.
assistenti
“axborot texnologiyalari” kafedrasi
Samarqand iqtisodiyot va servis instituti
ORCID: 000-0002-0997-6689
Malikov D. Q.
talabasi
Samarqand iqtisodiyoti va servis instituti

AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARI TIZIMINI RIVOJLANTIRISH BOSQICHLARI

Annotatsiya: *Maqolada axborot-kommunikatsiya texnologiyalari (AKT) xizmatlari tizimini rivojlantirishning asosiy bosqichlari va ularning jamiyat taraqqiyotiga ta’siri tahlil qilinadi. AKT sohasining rivojlanishi iqtisodiyotni raqamlashtirish, boshqaruv tizimini avtomatlashtirish hamda aholiga qulay elektron xizmatlar yaratishda muhim ahamiyatga ega. Maqolada O‘zbekistonda AKT xizmatlarini takomillashtirishning institutsional va texnologik yo‘nalishlari, shuningdek, raqamli infratuzilmani kengaytirish orqali innovatsion iqtisodiyotni rivojlantirish imkoniyatlari yoritilgan.*

Kalit so‘zlar*: axborot-kommunikatsiya texnologiyalari, raqamli iqtisodiyot, infratuzilma, innovatsiya, raqamlashtirish.*

Rajaboyev Sh. Sh.
assistant
department of "information technologies"
Samarkand Institute of Economics and Service
ORCID: 0000-0002-0997-6689
Malikov D. Q.
student
Samarkand Institute of Economics and Service

STAGES OF DEVELOPMENT OF THE INFORMATION AND COMMUNICATION TECHNOLOGY SERVICES SYSTEM

Annotation: *The article analyzes the main stages of the development of the information and communication technology (ICT) services system and their impact on social progress. The development of the ICT sector plays an important role in the digitalization of the economy, the automation of management systems, and the creation of convenient electronic services for the population. The article highlights the institutional and technological directions of improving ICT services in Uzbekistan, as well as the opportunities for developing an innovative economy through the expansion of digital infrastructure.*

Keywords: *information and communication technologies, digital economy, infrastructure, innovation, digitalization.*

Kirish

Hozirgi globallashuv va raqamli transformatsiya davrida axborot-kommunikatsiya texnologiyalari (AKT) har bir davlatning iqtisodiy va ijtimoiy taraqqiyotida muhim o‘rin tutadi. AKT xizmatlari tizimi boshqaruv, ta’lim, sog‘liqni saqlash, moliya va ishlab chiqarish kabi sohalarda samaradorlikni oshirishga xizmat qilmoqda. O‘zbekistonda ham so‘nggi yillarda elektron hukumatni joriy etish, raqamli iqtisodiyotni rivojlantirish hamda internet infratuzilmasini modernizatsiya qilish yo‘nalishida keng ko‘lamli islohotlar amalga oshirilmoqda. Shu bois, AKT xizmatlari tizimini rivojlantirish bosqichlarini o‘rganish dolzarb ahamiyat kasb etadi, chunki bu jarayon mamlakatning innovatsion salohiyatini oshirish, raqamli infratuzilmani kengaytirish va aholiga ko‘rsatilayotgan elektron xizmatlar sifatini yanada takomillashtirish imkonini beradi.

Tadqiqot metodologiyasi

Mazkur tadqiqot ishini amalga oshirish jarayonida ilmiy bilishning bir qator umumiy va maxsus usullaridan samarali foydalanildi. Jumladan, tadqiqot davomida kuzatish usuli orqali sug‘urta sohasidagi amaliy jarayonlar tahlil qilindi, mavjud holatlarni o‘rganish uchun statistik va tahliliy ma’lumotlar yig‘ildi. Olingan ma’lumotlar umumlashtirish va tizimlashtirish usullari yordamida qayta ishlanib, ularning asosiy tendensiyalari va xususiyatlari aniqlab berildi.

Shuningdek, taqqoslash usuli orqali sug‘urta faoliyatining turli davrlardagi rivojlanish ko‘rsatkichlari hamda mahalliy va xorijiy tajribalar qiyosiy tahlil qilindi. Tadqiqot jarayonida mahalliy va xorijiy olimlarning sug‘urta faoliyatiga oid iqtisodiy qarashlari, ilmiy izlanishlari va konseptual yondashuvlari chuqur o‘rganildi. Bundan tashqari, sohaga oid mavjud muammolar, ularning kelib chiqish sabablari hamda amaliy yechimlari ilmiy adabiyotlar va amaliy tajribalar asosida tahlil etildi.

Tahlil va natijalar muxokamasi

Axborot-kommunikatsiya texnologiyalari (AKT) xizmatlari tizimini rivojlantirish bosqichlarini global miqyosda ko‘rib chiqqanda, bir necha qatlamli va o‘zaro bog‘liq jarayon sifatida tushunish mumkin. Birinchi bosqich — asosiy infratuzilma yaratilishi. Bu bosqichda mamlakatlar yoki tashkilotlar keng polosali tarmoqlarni, mobil aloqa infratuzilmasini, bulutli mahsulotlar va xizmatlarni yaratishni boshlaydi. Organisation for Economic Co-operation and Development (OECD) tomonidan taqdim etilgan tahlillarda axborot-kommunikatsiya texnologiyalari raqobatbardoshlik, iqtisodiy o‘sish va ijtimoiy rivojlanish uchun muhim faktor ekanligi ta’kidlanadi. Bu bosqichda, xususan, raqamli bo‘shliqlarni kamaytirish, internetga kirish imkoniyatini kengaytirish va mobil qurilmalarning keng tarqalishi ustuvor vazifa hisoblanadi. Shuningdek, tarmoqli infratuzilma yaratilishi bilan birga, tashkilotlarning AKT xizmatlarini taqdim etish salohiyati ham shakllanadi.

Ikkinchi bosqich — xizmatlar va ilovalar ekotizimini rivojlantirish. Infratuzilma tayyor bo‘lgach, tashkilotlar va davlatlar AKT xizmatlarini — masalan, elektron hukumat (e-government), raqamli to‘lovlar, masofaviy ta’lim va sog‘liqni saqlashda telemeditsina — yaratishni boshlaydi. Bu borada AKT «umumiy maqsadli texnologiya» (GPT — General Purpose Technology) sifatida harakat qiladi. Ya’ni, birinchi nöqtada infratuzilma investitsiyalash boshlanganidan so‘ng, ikkinchi nöqtada xizmatlar kengayadi va kapital sarmoyalari ortadi. Bu bosqichda AKT xizmatlari bo‘yicha iqtisodiy modellarning va xizmat ko‘rsatish standartlarining shakllanishi muhim: foydalanuvchilar tajribasi, qatlamlararo integratsiya va xizmat ko‘rsatish sifatining oshirilishi. Masalan, xalqaro tajribada mobil to‘lovlar va onlayn hukumat xizmatlari rivojlanishining bosqichlari ko‘plab rivojlanayotgan mamlakatlar uchun dars bo‘lmoqda.

Uchinchi bosqich — kengroq integratsiya va xizmatlar yetakchiligiga o‘tish, ya’ni AKT xizmatlari tizimi sifatida odatiy vazifaga aylanadi. Bu bosqichda xizmatlar faqat mavjud infratuzilmada qo‘llanib qolmay, balki korxona, jamiyat, davlat boshqaruvi jarayonlarida chuqurroq integratsiya qilinadi. Masalan, tashkilotlar o‘z biznes jarayonlarini raqamlashtirib, xizmatlar orqali yangi segmentlar ochadi. Bu jihatdan, “transforming” bosqichi deb ham ataladigan yondashuv mavjud Shu bosqichda davlatlar va kompaniyalar AKT xizmatlarini strategik vosita sifatida ko‘rib, raqamli transformatsiya (digital transformation) jarayonlarini davom ettiradi Bundan tashqari, xizmat ko‘rsatish modeli «stand-alone» holatdan chiqib, ekotizim ichida muvofiqlashtirilgan xizmat membranasiga aylanadi: foydalanuvchi tajribasi yaxshilanadi, xizmat ko‘rsatuvchi aktorlar (davlat, xususiy sektor, fuqarolar) o‘zaro integratsiyalashadi.

To‘rtinchi bosqich — barqaror rivojlanish va xizmatlar ekotizimini kengaytirish. Bu bosqichda mamlakatlar yoki tashkilotlar nafaqat AKT xizmatlarini taqdim etadi, balki ularni ijtimoiy va iqtisodiy jihatdan qo‘llab-quvvatlovchi siyosatlarni, huquqiy mexanizmlarni, xavfsizlik (cybersecurity) va ma’lumotlarni himoyalash tizimlarini shakllantiradi. Masalan, AKT orqali kambag‘allikni qisqartirish, poydevor raqamli inklyuziya va barqaror rivojlanishga hissa qo‘shish mumkinligi ta’kidlangan. Bu bosqichda davlat siyosati, xususiy sektor investitsiyalari, fuqarolarni raqamli ko‘nikmalarga ega qilish (digital literacy) ham muhim ahamiyat kasb etadi. Shuningdek, ko‘plab mamlakatlarda AKT xizmatlari rivojlanishi turli hududlar bo‘yicha nomutanosib bo‘lishi mumkin — shuning uchun siyosiy va ijtimoiy barqarorlik jihatlari ham hisobga olinadi.

Mazkur bosqichlar tizimida bir-birini to‘ldiruvchi unsurlar mavjud: infratuzilma — xizmatlar — integratsiya — barqarorlik. Har bir bosqichda davlatlar, xususiy sektor va fuqarolar o‘zaro hamkorlik qilishi, siyosat va texnologiya uyg‘unlashuvi zarur. Shu bois, axborot-kommunikatsiya texnologiyalari xizmatlari tizimini rivojlantirish — bu bitmas jarayon bo‘lib, global kontekstda har bir mamlakatning o‘ziga xos holati va qiyinchiliklari bor.

Xulosa va takliflar

Axborot-kommunikatsiya texnologiyalari xizmatlari tizimini rivojlantirish jarayoni mamlakatlar va tashkilotlar uchun strategik ahamiyatga ega bo‘lib, har bir bosqichda texnologik imkoniyatlar, siyosiy qarorlar va fuqarolar bilan hamkorlik uyg‘unlashuvi zarur. Xulosa sifatida aytish mumkinki, infratuzilma yaratishdan tortib, xizmatlarni kengaytirish, integratsiya va barqaror rivojlanishgacha bo‘lgan jarayonlar bir-birini to‘ldiradi va raqamli iqtisodiyotning asosini tashkil etadi. Taklif sifatida esa, davlat va xususiy sektor o‘rtasidagi hamkorlikni mustahkamlash, fuqarolarni raqamli ko‘nikmalar bilan ta’minlash, xavfsizlik va ma’lumotlarni himoya qilish bo‘yicha tizimli chora-tadbirlarni amalga oshirish zarur. Shu bilan birga, AKT xizmatlarining innovatsion yo‘nalishlarini rag‘batlantirish, ekologik barqarorlikni hisobga olgan holda yangi texnologiyalarni joriy etish va hududlararo raqamli nomutanosibliklarni kamaytirish orqali tizimning samaradorligini oshirish mumkin. Natijada, AKT xizmatlari tizimi nafaqat iqtisodiy o‘sishga hissa qo‘shadi, balki jamiyatning raqamli inklyuziyasi, ijtimoiy barqarorlik va global raqobatbardoshlikni mustahkamlashda muhim vositaga aylanadi.

Foydalanilgan adaviyotlar:

1. Боронов Б.Ф., and Мустафоев А.Ф. "НОДАВЛАТ ТАЪЛИМ ХИЗМАТЛАРИНИ РИВОЖЛАНТИРИШНИНГ ТАШКИЛИЙ МАСАЛАЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 926-929.
2. Rajaboyev Sh.Sh., and Umidov D.U. "AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARINING BUXGALTERIYA SOHASIDAGI O'RNI" Экономика и социум, no. 4-2 (119), 2024, pp. 393-396.
3. Боронов Б.Ф., and Саломов Ш.Ф. "МИЛЛИЙ ИҚТИСОДИЁТДА НОДАВЛАТ ТАЪЛИМ ТАШКИЛОТЛАРИНИНГ ЎРНИ ВА УНИ РИВОЖЛАТИРИШНИНГ ТАШКИЛИЙ-ҲУҚУҚИЙ ЖИҲАТЛАРИ" Экономика и социум, no. 5-2 (120), 2024, pp. 921-925.
4. Rajaboyev Sh.Sh., and Ziyodullayev F.V. "AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARINI RIVOJLANTIRISH CHORA-TADBIRLARI TO‘G‘RISIDAGI QARORLAR MOHIYATI" Экономика и социум, no. 5-1 (120), 2024, pp. 675-680.
5. Karimov A., Safarov B. Axborot xavfsizligi asoslari. – Toshkent: TDYU nashriyoti, 2021.

Rajapova U. B., texnika fanlari falsafa doktori, dotsent
«materialshunoslik va standartlashtirish» kafedrasi
Toshkent to‘qimachilik va yengil sanoat insituti
Jumaniyazov M. B., texnika fanlari falsafa doktori,
«to‘qimachilik matolar texnologiyasi» kafedrasi
Toshkent to‘qimachilik va yengil sanoat insituti
Muxtarov J. R., texnika fanlari falsafa doktori, dotsent
«materialshunoslik va standartlashtirish» kafedrasi
Toshkent to‘qimachilik va yengil sanoat insituti
Bolqiyev S. X.
tayanch doktorant
«materialshunoslik va standartlashtirish» kafedrasi
Toshkent to‘qimachilik va yengil sanoat insituti

IPLARNI SHAKLLANISHI VA XOSSALARIGA TEXNOLOGIYANING TA’SIRI

Аннотация: *Ушбу мақолада пневмомеханик йигириш жараёнида пахта толали IV-тип 57%, 4-тип IV-навдан 36% ва 7 % карда тарандиси аралашмаларидан Трючлер фирмаси технологик жиҳозларида P-5 йигириш машинасида турли киримли дискретловчи барабаннинг икки хилида йигирилган иплар физик механик хоссалари ва Устер кўрсаткичлари таҳлил қилинган.*

Kalit so‘zlari: *diskretlash barabani, burchak tezligi, tolalar tezliklari, tarandi, aylanish kamerasi, ikkilamchi material.*

Rajapova U. B., PhD.
Jumaniyazov M. B.
Muxtarov J. R.
researcher
Bolqiyev S. X.
Tashkent Textile and Light Industry Institute

THE INFLUENCE OF TECHNOLOGY ON THE FORMATION AND PROPERTIES OF YARNS

Abstract: *In this article, the physical and mechanical properties and Uster values of yarns were analyzed, spun in the pneumomechanical spinning process on the Trützschler R-5 spinning machine using cotton fiber blends: 57% of type IV, 36% of type IV, and 7% of type V, with two types of discrete feed rollers at different fiber feeds.*

Paxta tolasini urchuqsiz yigirish usullari ichida pnevmomexanik yigirish usuli iqtisodiy samaradorligini yuqoriligi hamda halqali usulda yigirish imkoniyati cheklangan tolalardan ham sifatli ip yigirish dolzarb masala hisoblanadi. Shuning uchun yigirilgan ipning tuzilishi va xossasiga ta'sir etuvchi omillar jumlasidan tola o'lchamlarini birinchi o'ringa qo'yish mumkin. Tolalar xossalari asosida ipning tuzilishi va mexanik xossalarini bashoratlash, loyihalash borasida juda ko'p ilmiy nazariyalar yaratilgan, amaliy tadqiqotlar olib borilgan [1].

Ip sifatini yagona ko'rsatkichi to'liq yaratilmaganligi, ayrim muammolarni yuzaga keltiradi. Jumladan ip uchun belgilangan sifat ko'rsatkichi mato olishda birinchi darajali bo'lmay qoladi. Shuning uchun ipni xossalarini loyihalashda asosan uning tuzilishi va asosiy ob'ekt sifatida fizik-mexanik xossalarini o'rganishga katta e'tibor qaratilgan [2].

Ipning tashqi ko'rinishi, nuqsonlari va notekisligini loyihalash, ya'ni avvaldan bashorat qilish masalasi nisbatan murakkab chunki bu ko'rsatkichlar xom ashyoni tanlashdan boshlab, texnologiyani to'g'ri tashkil etishga bog'liq. Shuning uchun ipdan foydalanuvchilar va soha mutaxassilari talablaridan kelib chiqib, ip xossalaridan barcha foydalanishlari va iplar sifatini aniqlash imkoniyatini takomillashtirish borasida standartlar ishlab chiqildi [3].

Halqali usulda yigirilgan ipni tuzilishini etarlicha chuqur o'rganish natijalari ilmiy adabiyotlarda keng yoritilgan [4]. O'tgan asrning o'rtalarida urchuqsiz usulda ip yigirishni sanoatga olib kirish davrida bu usulda yigirilgan iplarni tuzilishini o'rganish va xossalarini baholashga e'tibor kuchaydi. Dastlab bu borada A.G.Sevostyanov, Q.G'ofurov va boshkqalar izlanishlarni olib borganlar.

Pnevmomexanik usulda yigirilgan ipni tuzilishini o'rganishda uni o'ziga xosligi birinchi navbatda tolalarni migrasiyasini kamligi, ipning ko'ndalang kesimida joylashishi tekisligi yuqoriligi ko'rsatilgan [5].

Pnevmomexanik usulda ip yigirishda diskretlangan tolalar oqimini uzatish kanali orqali kamerada siklik qo'shilishida ko'p qatlamli to'liq halqa hosil bo'ladi. Ipni qatlamlardan iborat bo'lishi esa unda tolalarni joylashish nisbatini o'rganishni taqozo etadi. Ip hosil bo'lishida ustki qatlamga tolalarni joylashish sonini ifodalovchi chirmashish koeffitsiyenti K_z tushunchasi kiritilgan[6].

$$K_z = \frac{l_{sht}}{2\pi D_{yk}} \qquad (1)$$

Bunda; l_{sht}-tolaning shtapel uzunligi, mm;

D_{yk}-yigirish kamerasining diametri. мм

Bu formuladan илashish koeffitsiyenti tolalar uzunligiga to'g'ri proporsional, kamera diametriga esa teskari proporsional ekani ko'rinadi.

Tadqiqotlar natijasida iplar tuzilishi chirmashish koeffitsiyentiga qarab o'zgarishi mumkinligini ko'rsatgan [7]. Uning qiymati esa tolalar xossalari, texnik va texnologik parametrlarga bog'liq [8].

Piltacha ajratilib olinayotgan nuqtalardagi qatlamlar soni

$$d=\frac{\pi \cdot D_{yk}}{\Delta_{pl}}=\frac{\pi \cdot D_{yk} \cdot K_u \cdot n_{yk}}{v_{chv}} \quad (2)$$

Bunda *d*- qatlamlar soni;

D_{yk}- yigirish kamerasining diametri, mm;

Δ_{pl}- kamerani bir marta aylanishida uning novidan ajratib olinadigan piltacha uzunligi, mm;

v_{chv} - tolalar oqimini chiqarish tezligi (chiqaruvchi vallar tezligi)

K_u –ip qisqarish koeffitsiyentii

p_{yk}- yigirish kamerasining aylanish soni.

Kamera novidan ajratib olinayotgan piltachaning chiziqli zichligi

$$T_{pl}=T_0 \cdot d=\frac{T_n \cdot d}{E_d \cdot E_{uz}} \quad (3)$$

bunda

T_0 - tolalar oqimining chiziqli zichligi;

d- qo‘shilish soni;

T_p- piltani chiziqli zichligi;

E_d- diskretlashdagi cho‘zish (ingichkalanish);

E_{uz} -uzatish kanalidagi cho‘zilish.

Piltachaning ko‘ndalang kesimidagi tolalarni o‘rtacha soni

$$m_{pl}=m_0 d=\frac{m_n \cdot d}{E_D \cdot E_{UZ}}=K_U \cdot m_{ip} \quad (4)$$

bunda m_n, m_0, m_{ip} - mos ravishda tolalar oqimi, pilta va ipni ko‘ndalang kesimidagi tolalar soni. Piltachaning ko‘ndalang kesimidagi tolalar sonini texnologik ko‘rsatkichlar asosida aniqlashda quyidagi formuladan foydalanish ham mumkin

$$m_{pl}=\frac{T_{pl}}{T_T}=\frac{K_u \cdot T_{ip}}{T_T} \quad (5)$$

Tolalar oqimidan yigirish kamerasining novida piltacha hosil qilish va uni ajratib olishni eng qulay sharoiti $m_0 \leq 1$ bo‘lganda erishiladi. Bunday holda $d \geq m_{nl} = K_u \cdot t_{ip}$, diskretlash va uzatishdagi cho‘zilishlar $^{E}d \cdot {}^{E}uz \geq_{mn}$ bo‘lishi ko‘rinadi.

Shunday qilib, piltacha hosil qilish va uni ajratib olish jarayonlari turg‘unlashganda ajratib olinayotgan piltachaning ixtiyoriy ko‘ndalang kesimida qo‘shilgan qatlamlar soni *d* ga teng bo‘ladi. Diskret tolalar oqimining davriy qo‘shilish jarayonida tekislanish samaradorligini piltalarni qo‘shishda notekislikni kamayish samaradorligini aniqlash formulasi yordamida hisoblash mumkin:

$$E_T=\frac{S_0}{S_{pl}}=\frac{S_{do}}{S_{pl}} \approx \sqrt{d} \approx \sqrt{\pi \cdot D_{yk} \cdot K_u \cdot K} \quad (6)$$

bunda

S_o, S_{pl}, S_{do} - mos ravishda tolalar oqimi, tolali piltacha va diskret oqimni kvadratik notekisligi;

K-ipdagi buramlar soni;

K_u-ipni qisqarishi.

Paxta tolasidan o‘rtacha chiziqli zichlikdagi ip yigirishda tekislanish samaradorligi yuqori darajada bo‘ladi (Z_T = 14÷22). Bunday samaradorlik bir tekisda va tolalari yaxshi aralashgan sifatli ip olishni ta’minlaydi.

Diskret tolalar oqimini davriy qo‘shilish jarayonida tekislanish samaradorligini chuqur tahlili kamera novida taxlanayotgan diskret oqimning chiziqli zichligini uzunligi $d{\cdot}\pi{\cdot}D_{yk}$ dan qisqa bo‘lgan notekislik to‘lqinlari yaxshi tekislanishini ko‘rsatdi. Uzunligi $3dnD_{yk}$ dan uzunroq bo‘lgan to‘lqinlar amalda umuman tekislanmaydi. Diskret oqimning notekisligi kamaygan sari kamera novidagi tolali piltachaning ham notekisligi kamayadi. Shuningdek yigirish kamerasining diametri D_{yk} va ipdagi buramlar soni K ni oshib borishi bilan notekislik kamayadi [9].

Biroq tolalarni piltada joylashishi, uning uzunligi bo‘yicha notekisligi tufayli ushbu nazariy taxminni isbotlash qiyin. SHuning uchun qatlamdagi tolalar sonini kamera perimetri bo‘ylab joylashishi va uni siljishini diskretlash jarayoni bilan bog‘lanishi hamda buramni amaliy va hisobiy miqdorini ipda taqsimlanish qonuniyatini o‘rganish ishlari olib borildi. Bu tadqiqotlar tolalar uzunligi bo‘yicha notekisligi yuqori bo‘lgan aralashmani qayta ishlashda qatlamdagi tolalar sonini kamaytirish uchun diskretlash jadalligini oshirish tavsiya qilinadi.

Nazariy xulosa va tavsiyalarni amalda qo‘llash va zarur aniqliklar kiritish uchun tadqiqotlar olib borildi. Tajribalar tuzilishi bo‘yicha farqlanadigan diskretlovchi bir, ikki va uch kirimli diskretlovchi barabanchalar konstruktiv xususiyatlarini ip sifatiga ta’siri o‘rganildi.

Tajribalar uchun ikki variantda aralashma tuzildi. Birinchi aralashmada asosan ikkinchi nav tolalar ishlatildi. Ikkinchi aralashmada esa 4 tip III navdan 57%, 4 tip IV navli tolalardan 36% va 7% karda tarandisi qo‘shildi. Aralashmalar Rieter firmasining tayyorlov jihozlarida qayta ishlanib, pilta ishlab chiqarildi. Korxona sharoitida olingan piltalarning xossalari 1-jadvalda keltirilgan.

1-jadval

Pilta xossalari

t/ r	Ko‘rsatkichlar	1-aralashma	2-aralashma
1	Chiziqli zichligi, teks	5330	5300
2	Mahsulot nomeri	0,187	0,188
3	Uster bo‘yicha notekislik, U %	3,24	3,48
4	Chiziqli zichligi bo‘yicha variasiya koeffitsiyenti, CV%	4,22	4,20
5	CVm 1m, %	0,67	0,70
6	CVm 3m, %	0,55	0,56
7	CVm 10m, %	0,42	0,45

Har ikkala yigirish kameralarida bir xil piltadan bir xil chiziqli zichlikdagi iplar yigirildi. Bu kameralarda texnik va konstruktiv farqlarni kattaligi yuqorida

keltirilgan xulosalarni aniqlash uchun mos keladi. Yigirilgan 29,4 teksli ipning Uster Tester-5 va Tenzorapid-5 uskunalarida aniqlangan fizik-mexanik xossalari keltirilgan.

2-jadval

Iplarning fizik-mexanik xossalari

Ip xossalari	1-aralashma		2-aralashma	
	1-kamera	2-kamera	1-kamera	2-kamera
Chiziqli zichligi bo‘yicha notekisligi, USTER U%	10,44	13,70	11,22	13,83
Chiziqli zichligi bo‘yicha variasiya koeffitsiyenti, CV% CVm, %	13,29	17,79	14,39	17,93
Ingichka joylar soni (Thin/1000 m) -50% /km	2	97	4	112
Qalin joylar soni (Thick/1000 m)+50%/kt	62	253	58	341
Tugunchaklar soni (Neps/1000 m) Neps+280% /km	77	183	96	233
Tukdorligi (Hairness)	3,43	5,11	4,09	6,19
Uzilish kuchi (Forse, sN)	373	303	316	270
Uzilish kuchi bo‘yicha variasiya koeffitsiyenti, CV%	8,22	13,11	7,73	14,68
Uzilishdagi cho‘ziluvchanlik (Elongation, %)	4,03	4,40	3,96	4,21
Uzilishdagi cho‘ziluvchanlik bo‘yicha variasiya koeffitsiyenti, %	10,65	13,62	12,55	12,31
Nisbiy pishiqligi (Rkm), sN/teks	12,72	10,39	10,80	9,22
Nisbiy pishiqligi bo‘yicha variasiya koeffitsiyenti, CV%	8,22	13,12	7,74	14,80

Birinchi aralashmadan yigirilgan ilarning chiziqli zichligi va notekisligini taqqoslanganda R 40 mashinasi bazasidagi kamerada sifatni yuqori ekanligi ko‘rinadi. Ingichka joylar 48 marta, qalin joylari esa qariyb 4,2 marta, tugunchakchalar soni 2,35 marta farqlanishi ko‘rinadi.

Ikkinchi aralashma qayta ishlanganda olingan natijalar aralashma sifatiga mos ravishda o‘zgargan. Bunda tola navining pasayishi, chiqindini qo‘shilishi ip sifatini pasayishiga sabab bo‘ldi. Shuni ham ta’kidlash lozimki, bunday pasayishni keskin deb bo‘lmaydi. Biroq mashinalarning imkoniyatlari bo‘yicha o‘zgarishni deyarli saklanib qolishi konstruktiv va texnologik sharoitlarni ta’siri sezilarliligini ko‘rsatadi.

Agar mashinalarning tuzilishi va texnik imkoniyatlarini inobatga oladigan bo‘lsak masala yanada murakkablashadi. Chunki, ingichka joylarga qarganda qalin joylar soni uncha katta farqlanmaganligi ipning tuzilishi nafaqat yigirish qurilmasini tuzilishi, uning imkoniyati, shu bilan birga piltani ip holatiga keltirish

imkoniyatini ham nazarda tutish lozimligi ko‘rsatadi. Bu o‘z navbatida piltadagi tolalarni holati bilan bog‘liq.

Amalda ipning tuzilishini o‘rganish asosan nazariy usulda amalga oshiriladi. Mashinalarning texnik va konstruktiv ko‘rsatkichlari va xom ashyoning tarkibini nazarda tutib yuqorida keltirilgan nazariy baholash metodlarini qo‘llab hisoblash ishlari bajarildi. Natijalar 3-jadvalda keltirilgan.

3-jadval

Mashinalarning ish parametrlari va texnologik ko‘rsatkichlari

Ko‘rsatkichlar	1 -aralashma		2-aralashma	
	1-kurilma	2-kurilma	1-kurilma	2-kurilma
1_{sh}-tolaning shtapel uzunligi, mm	34,4	34,4	34,0	34,0
D_{yk} - yigirish kamerasi diametri, mm	34	66	34	66
$K_z = \frac{l_{sh}}{2\pi D_k}$	0,1600	0,0830	0,1580	0,0810
ϑ_T-Ip chiqish tezligi, m/min	124,0	46,0	124,0	46,0
d - qatlamlar soni;	88,54	159,20	88,54	159,20
Δ_{pl}-kamerani bir marta aylanishda uning novidan ajratib olinadigan piltacha uzunligi;	0,105	0,202	0,105	0,202
K_u-ipni qisqarish koeffitsiyentii;	0,95	0,95	0,95	0,95
n_{yk}- yigirish kamerasining aylanish soni, min^{-1}.	108000	35000	108000	35000
T_p-piltaning chiziqli zichligi, teks	5330	5330	5300	5300
E_{um}-umumiy cho‘zish;	184,90	182,88	181,92	181,65
T_{ip}-ipning chiziqli zichligi, teks	29,38	29,41	29,37	29,42
m_n-piltachaning ko‘ndalang kesimidagi tolalar soni	166,78	166,78	178,62	178,62
ε_t-notekislikni kamayish (tekislanish) samaradorligi	9,40	12,671	9,38	12,51
K-ipdagi buramlar soni, br/m;	860,0	812,0	850,0	790,0

Shunday qilib past navli tolalar va chiqindilardan ip yigirishda ipni tuzilishi amaldagi qonuniyatlardan farqlanishi, uni loyihalash esa chuqur tekshirishni takozo etishi aniqlandi.

Diskret qatlamning kesimidagi tolalar soni turli ta’minlash tezliklari va kamera diametrini o‘zgarishiga qarab aniqlanadi. Bitta qatlamdagi tolalar soni kamera perimetri bo‘ylab taqsimlanganda ularni orasida ma’lum masofa qoladi. Shunday bog‘lanishga asoslanib ta’minlash tezligini tanlash yoki kameraning dimetrini o‘zgartirib zarur natija olish mumkin.

Kameraga kelib taxlanayotgan tolalar shakllanayotgan piltachaning ustida uzluksiz yoki ma’lum qadam bilan joylashishi mumkin. Bu qadamni quyidagicha ifodalash tavsiya etilgan:

$$\Delta = \frac{l_T \cdot T_T}{T_{pl}} \qquad (7)$$

bunda

l_T- tolaning o‘rtacha uzunligi, mm;

T_T, T_{pl} - mos ravishda tola va mashinani ta’minlanayotgan piltaning chiziqli zichligi, teks.

Diskretlovchi barabanchaning tezligi U_{DB} ta’minlovchi silindr tezligi U_{TS} dan juda katta bo‘lgani uchun diskretlangan tolalar oqimidagi tolalar orasidagi surilish

$$\Delta_2 = \frac{l_T d_{DB} n_{DB}}{n_1 d_{TS} n_{TS}} \quad (8)$$

ga teng bo‘ladi.

Kameraga tushayotgan tolalarni orasidagi surilish qadami

$$\Delta_3 = \frac{l_T d_K n_K}{n_2 d_{DB} n_{DB}} \quad (9)$$

Agarda ipni kerakli qatlamlar qo‘shilishiga erishish uchun kameraning aylanishlar soni muvofiqlashtirilsa, kamerani ortiqcha aylanishlariga ehtiyoj qolmaydi, natijada ortiqcha energiya sarflanmaydi.

Xulosa. Qatlamdagi tolalarni surilish qadamini tolalar uzunligiga va piltaning chiziqli zichligiga bog‘likligidan kelib chiqib yigirish kamerasidagi bir qator texnik va texnologik ko‘rsatichlarni maqbul ko‘rsatkichlarini tanlash, yangi assortimentga o‘tishda o‘zgartirishlarni zarurati kabi bir qator masalalarni hal etish mumkin.

Adabiyotlar:

1. Hearle J.W.S., Lomas B., Cooke W.D. Atlas of Fibre fracture and Damage to textiles. Second edition. Cambridge: Woodhead Publishing Limited, 2000. p.460.
2. Shao X., Qui Y., Wang Y. Theoretical modeling of the tensile behavior of low-twist staple yarns. Part II-Theoretical and experimental resilts, The Textile Institute, 2005. Volume 96 (2), pp.69-76.
3. Serbakov V.P., Skulanova N.S., Polyakova L.V. Analiticheskoe opisanie deformirovaniya i razrusheniya pryaji. Izvestiya VUZov, Texnologiya tekstilnoy promishlennosti, 1999; № 3 (249), S.31-35
4. Chistoborodov G.I., Avrelkin V.A., Ronjin V.I. Opredelenie maksimalnogo ugla krucheniya produkta. Izvestiya VUZov, Texnologiya tekstilnoy promishlennosti, 2002; № 2, S.40-42.Skoog D.A., Holler F.J., Crouch S.R. // Principles of Instrumental Analysis. Cengage Learning, 2018.
5. O'zDSt 3310:2018 Vtorichnie materialnie resursi pererabotki xlopkovogo volokna. Texnicheskie usloviya.
6. Katalog produksiy firmi SDLatlas/ [Elektronniy resurs]. – Rejim dostupa: https://.com/products/trash-analyzer-mk-2#product-standards (data obraseniya: 17.06.20).
7. Gordon S., Hsieh Y.L, Cotton science and technology. Woodhead publishing Limited, 2007. pp.84-85 .
8. Lawrence Carl A. Fundamentals of spun yarn technology. 2003 by CRC Press LLC.

9. Azanova A.A., Abutalipova L.N., Kulevsov G.N., Tixonova N.V., Ivshin Ya.V. Modifikasiya svoystv xlopkovogo volokna s pomosyu nizkotemperaturnoy plazmi.//Izv. Vuzov. Texnologiya tekstilnoy promishlennosti. 2016. S.80-83.
10. Севостьянов А.Г. Методы и средства исследования механико-технологических процессов текстильной промышленности. — М.: МГТУ им. Косыгина, 2007. — 648 с.
11. Yingcun Liu Yingcun Liu and Keshuai Liu // “Enhancing the Spun Yarn Properties by Controlling Fiber Stress Distribution in the Spinning Triangle with Rotary Heterogeneous Contact Surfaces” 2022
12. Akhmedov A., Valieva Z. F, Makhkamova S. F., Patxullayev S.U., Mukhtarov J.R., // Influence of sample mass on accuracy of wool fiber tone measurement on an acoustic device, Eur. Chem. Bull. 2022,11(3), 34-38
13. Muhtarov J.R., F. Ergasheva, X. Toxirova, S Xalmatova, // Tolali chiqindilarni yigirishga tayyorlashning ip sifatiga ta’siri - Ekonomika i sotsium, 2024 p. 4-1.
14. Muhtarov J.R., F. Ergasheva, X. Toxirova, // Paxta tolasi buramdorligining turli seleksiya navlari bo‘yicha o‘zgarish // International conference on medicine, science, and education, p. 83-86, 2024

Rakhimberdiyeva O. R.
assistant
ASMI

MODERN CLASSIFICATION AND CLINICAL APPLICATIONS OF ANTIDOTES

Abstract: *This scientific article provides a comprehensive analysis of antidotes and their role in toxicology and emergency medicine. The article examines the historical development stages of antidotes, their modern classification based on mechanisms of action (chemical, biochemical, and pharmacological), and detailed presentation of their pharmacodynamic and pharmacokinetic properties. Specific antidotes used in cases of poisoning with various toxic substances (heavy metals, pesticides, pharmaceuticals, industrial chemicals) are reviewed, along with their clinical efficacy and limitations in application. The article concludes with an examination of innovative approaches in antidote development and future research directions.*

Keywords: *antidote, counterpoisoning agent, toxicology, poisoning, pharmacology, detoxification, chemical antagonism, pharmacological antagonism, emergency medical care, toxin.*

With the advancement of human civilization, the discovery and application of new substances in the chemical industry, pharmaceuticals, agriculture, and many other sectors has been expanding. While this progress facilitates human life, it has simultaneously increased the risk of exposure to toxic substances that may have adverse effects on the environment and the human organism. Toxicology is the science that studies the effects of toxic substances (toxins) on living organisms, and develops methods for prevention, diagnosis, and treatment of poisoning. In cases of poisoning, antidote therapy plays a central role in providing emergency medical care and preserving patient life.

Antidotes, or counterpoisoning agents (from Greek: antidoton — "given against poison"), are medicinal substances that neutralize toxic materials that have entered the organism through various routes, reduce their absorption, block their mechanisms of action, or accelerate their elimination from the body. Since ancient times, physicians have sought remedies against poisons, and the earliest information about this is found in ancient manuscripts. However, the modern history of antidotes began in the nineteenth century with the rapid development of chemistry and medical research. Today, due to advances in pharmacology and toxicology, many specific and effective antidotes against various poisons have been developed and introduced into clinical practice.

This research is expected to have significant theoretical and practical importance for healthcare professionals managing cases of poisoning — physicians, pharmacologists, toxicologists, and students of medical higher educational institutions.

The history of seeking remedies against poisons traces back to ancient periods of humanity. In ancient medicine, many diseases were considered to result from external "poisons," and thus the search for effective remedies was often equivalent to searching for antidotes. In texts from pre-Christian periods, physicians including Hippocrates and Dioscorides documented information about antitoxic properties of substances derived from plants and animals. For example, texts about remedies used against snake and insect bites retained their significance for centuries.

In the Middle Ages, particularly in the works of Central Asian scholars, including Avicenna (Abu Ali ibn Sino), special attention was given to issues of pharmacology and toxicology. His work "The Canon of Medicine" (Kitab al-Qanun) contains valuable information about various poisons, their symptoms, treatment methods, and substances that could be used as antidotes. During this period, antidotes were often selected empirically (based on experience), and their mechanisms of action were not scientifically substantiated.

The modern history of antidotes began in the nineteenth century with the rapid development of chemistry and a new phase of medical research. During this period, the chemical composition of toxic substances and their biochemical effects on the organism began to be studied systematically. This, in turn, made it possible to create rationally designed antidotes — substances that could specifically block or neutralize poison effects. For example, the development of chelators such as dimercaprol (BAL) against arsenical compounds represents a striking example of antidote therapy based on chemical antagonism.

Today, antidote therapy is an integral part of clinical toxicology. In emergency situations—such as industrial accidents, drug overdoses, or poisoning with agricultural pesticides—properly administered antidotes administered in time can be decisive in saving patient lives. Emergency medical departments must maintain supplies of essential antidotes needed to treat various types of poisoning.

The success of antidote therapy depends on several factors. First, rapid identification of the poison type and the amount that entered the organism is essential. Second, the optimal timing for antidote administration must be determined. Some antidotes are effective only when administered within a short time after poisoning (from several minutes to several hours). Third, antidote therapy is almost always conducted in combination with other treatment methods, including detoxification measures aimed at eliminating poison from the organism (stomach lavage, administration of activated charcoal) and supportive symptomatic treatment maintaining vital organ function.

Antidotes are divided into several major groups based on their mechanisms of action. This classification helps in selecting the most appropriate treatment strategy for each clinical situation. The scientific literature identifies three main groups of antidotes: chemical, biochemical, and pharmacological antidotes.

Chemical antidotes directly enter into a physicochemical reaction with a toxic substance, converting it into a non-toxic or less toxic compound. This

process, called chemical antagonism, must occur before the toxin binds to vital receptors or enzymes. Chemical antagonism includes several types:

Neutralization Reaction

When poisoned by acids, alkaline substances (such as sodium bicarbonate, magnesium oxide) are used, or conversely, weak acids (citric acid) are used for alkaline poisoning. As a result of this reaction, the poison transforms into a neutral, harmless substance.

Chelation

In cases of poisoning with heavy metals (lead, mercury, arsenic), substances called chelators are used, including unithiol, dimercaprol (BAL), calcium disodium EDTA, and D-penicillamine. They form stable, water-soluble complex compounds (chelates) with metal ions, facilitating their elimination from the organism through the kidneys. For example, unithiol forms a strong bond with arsenic, which prevents arsenic from binding to tissue proteins.

Adsorption

Adsorbents such as activated charcoal absorb many toxic substances in the gastrointestinal tract onto their surface and prevent their absorption into the blood. This is considered one of universal antidotes; however, it is not effective against all poisons (such as acids, alkalis, iron salts, and lithium).

Biochemical antidotes affect the metabolism (biotransformation) or distribution of poison in the organism. They alter the pharmacokinetics of the toxin, reducing its harmful effects. This group of antidotes can act through the following mechanisms:

Blocking Metabolic Activation

Some substances are relatively non-toxic when they enter the organism, but are converted into highly toxic metabolites under the influence of liver enzymes. Biochemical antidotes block these enzymes, preventing the formation of harmful metabolites. A striking example is poisoning with methanol or ethylene glycol. These alcohols are converted under the influence of the enzyme alcohol dehydrogenase into highly toxic formaldehyde and formic acid (from methanol) or glycolaldehyde and oxalic acid (from ethylene glycol). Ethanol or fomepizole (4-methylpyrazole) act as competitive inhibitors for this enzyme, slowing the conversion of methanol and ethylene glycol into toxic metabolites and allowing them to be excreted unchanged in urine.

In poisoning with organophosphorus compounds (OPC), such as pesticides (chlorophene, karbofos) or nerve agents (sarin, soman), complex use of pharmacological antidotes is of critical importance. These substances block the enzyme acetylcholinesterase (ACE), resulting in a sharp increase in acetylcholine levels at synapses, leading to cholinergic crisis. Treatment requires simultaneous use of multiple antidotes:

Atropine

By blocking M-cholinergic receptors, it eliminates the muscarinic effects of acetylcholine (bronchospasm, bradycardia, salivation). However, atropine itself has no specific antidote, and overdose is dangerous.

Oximes (Pralidoxime, Diacetyl)

They are called ACE reactivators. Oximes reactivate the enzyme bound to organophosphorus compounds, but this is only effective in the first hours after poisoning, before enzyme "aging" occurs.

Drug overdose is one of the most common causes of poisoning cases. In particular, poisoning with psychotropic, cardiovascular, and analgesic drugs is frequently encountered.

In summary, antidotes are a powerful tool of modern medicine, and their study, development, and rational application remain an urgent scientific and practical task. Healthcare workers, especially emergency medicine, intensive care, and general practice physicians, must possess deep knowledge of the basic principles of antidote therapy, the characteristics of existing antidotes, and guidelines for their application. This, in turn, serves to protect public health and reduce mortality and disability resulting from poisoning.

References

1. Marraffa J. M., Cohen V., Howland M. A. Antidotes for toxicological emergencies: a practical review //American Journal of Health-System Pharmacy. – 2012. – T. 69. – №. 3. – C. 199-212.
2. Chacko B., Peter J. V. Antidotes in poisoning //Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine. – 2019. – T. 23. – №. Suppl 4. – C. S241.
3. Szinicz L. et al. Development of antidotes: problems and strategies //Toxicology. – 2007. – T. 233. – №. 1-3. – C. 23-30.
4. Bird A. Dispositions and antidotes //The philosophical quarterly. – 1998. – T. 48. – №. 191. – C. 227-234.

Raximberdiyev R. A., PhD
dotsent
bolalar stomatologiya kafedrasi
SamDTU
Xamrayeva N. A.
klinik ordinatori
bolalar stomatologiya kafedrasi
SamDTU

BOLALARDA KARIES PROFILAKTIKASI: YANGI TEXNOLOGIYALAR VA PREPARATLAR

Annotatsiya: *Maqolada bolalarda tish kariesini oldini olishdagi zamonaviy yondashuvlar, yangi texnologiyalar va profilaktik preparatlar tahlil qilingan. Kariesning rivojlanish mexanizmlari, uning oldini olish usullari, shuningdek, floridlashtirilgan preparatlar, biokeramika asosidagi laklar, lazerli muolajalar va sun'iy intellekt asosida diagnostika tizimlari o'rganilgan. Tadqiqot natijalari karies profilaktikasida yangi texnologiyalarning samaradorligini tasdiqlaydi va ularni klinik amaliyotda qo'llash istiqbollarini ko'rsatadi.*

Yosh va maktabgacha yoshdagi bolalarda tish kariesini davolashning kompleks usullari. Yosh va maktabgacha yoshdagi bolalarda tish kariesini davolash usulini tanlash bolalar stomatologiyasida dolzarb masala hisoblanadi. Aralashuv doirasiga qarab, quyida tavsiflangan barcha usullarni invaziv va minimal invazivlarga bo'lish mumkin.

Kalit so'zlar: *Bolalar stomatologiyasi, karies, profilaktika, yangi texnologiyalar, florid, lazerli davolash, preparatlar.*

Rakhimberdiyev R. A., PhD
associate professor
department of pediatric dentistry
SamDTU
Khamrayeva N. A.
clinical resident
department of pediatric dentistry
SamDTU

CARIES PREVENTION IN CHILDREN: NEW TECHNOLOGIES AND PREPARATIONS

Abstract: *The article analyzes modern approaches to caries prevention in children, including new technologies and prophylactic preparations. The mechanisms of caries development, preventive methods, as well as the use of fluoride-containing preparations, bioceramic varnishes, laser treatments, and artificial intelligence-based diagnostic systems are examined. The study results*

confirm the effectiveness of new technologies in caries prevention and demonstrate the prospects for their application in clinical practice.

Comprehensive methods of caries treatment in early childhood and preschool children: The choice of caries treatment methods in early childhood and preschool children is a pressing issue in pediatric dentistry. Depending on the extent of intervention, the methods described below can be divided into invasive and minimally invasive approaches.

Keywords: *pediatric dentistry, caries, prevention, new technologies, fluoride, laser therapy, preparations.*

Zamonaviy stomatologik texnologiyalar bolalarda invaziv bo‘lmagan davolash usullarini keng qo‘llash imkonini yaratadi, bu esa davolash sifatini va prognozni yaxshilash bilan birga, bolaning psixo-emotsional holatiga tushadigan travmatik ta’sirni minimallashtiradi. An’anaviy invaziv usullar demineralizatsiyalangan qattiq to‘qimalarni tish qo‘li yordamida tayyorlashni o‘z ichiga oladi. Nisbatan sodda va cheklangan asbob-uskunalarga tayanilgan bo‘lsa-da, invaziv yondashuvlar bolalarda tish fobiyasining asosiy sabablaridan biri bo‘lib, bu doimiy va ortiqcha stressga olib keladi. Natijada, bolalar stomatologiga tashrifni kechiktirishlari mumkin, bu esa uzoq muddatli perspektivada dentoalveolyar tizimning sog‘lig‘iga salbiy ta’sir ko‘rsatishi ehtimolini oshiradi. Ayniqsa, tish shifokorining qabulxonasiga birinchi marta kelayotgan erta va maktabgacha yoshdagi bolalar bu holatga sezgir bo‘ladi. Shu sababli, bolalar stomatologiyasi bo‘limlarida minimal invaziv kariesni davolash usullarini o‘rganish va ularni keng qo‘llashga alohida e’tibor qaratish dolzarb hisoblanadi

Erta va maktabgacha yoshdagi bolalarda kariesni davolashda minimal invaziv usullar keng qo‘llaniladi. Ular quyidagilarni o‘z ichiga oladi: ICON infiltratsiyasi, AquaCare suv-abraziv tayyorlash texnologiyasi, ozondan foydalanish, kumushlash, lazer terapiyasi va ftorlash.

ICON infiltratsiyasi kontseptsiyasi 2009 yilda Germaniyada mutaxassislar H. Meyer-Lyukkel va S. Paris tomonidan ishlab chiqilgan bo‘lib, kariesning dastlabki bosqichlarini invaziv bo‘lmagan usulda barqarorlashtirishga mo‘ljallangan. Ushbu davolash usuli demineralizatsiya qilingan emal to‘qimasini DMG kompaniyasi (Germaniya) tomonidan ishlab chiqarilgan metakrilat asosidagi preparat bilan singdirishni o‘z ichiga oladi. Ta’sir qilish printsipi qattiq to‘qimalardagi demineralizatsiya markazlarini to‘ldiruvchi maxsus modda yordamida boshlang‘ich kariesning barqarorligini ta’minlashga asoslangan. ICON texnologiyasi demineralizatsiya markazini o‘rab turgan sog‘lom to‘qimalarni saqlab qolishga imkon beradi va rentgenologik tasnifga ko‘ra E1–D1 darajalariga mos keladigan dastlabki karies jarayonini invaziv bo‘lmagan tarzda barqarorlashtirish imkonini yaratadi. Shuningdek, protsedura lokal og‘riqsizlantirishni talab qilmaydi, bu esa yosh va maktabgacha yoshdagi bolalar bilan ishlashda stress va stomatologik fobiya rivojlanishining oldini olishda muhim ahamiyatga ega.

DMG preparatiga allergik reaksiyalarni aniqlash maqsadida mahalliy va xorijiy manbalar (eLibrary, PubMed, Google Scholar) tahlil qilindi. Bolalar va kattalardagi mavjud ma’lumotlarga ko‘ra, komponentlarga yuqori sezuvchanlik yoki immun tizimiga salbiy ta’sir ko‘rsatadigan holatlar aniqlanmagan.

Suv-abraziv tayyorlash texnologiyasi esa havo-suv abrazivligiga asoslangan bo‘lib, qattiq to‘qimalarni yumshoq va minimal invaziv tarzda tayyorlash imkonini beradi, bu esa protsedura davomida sog‘lom to‘qimalarni maksimal darajada saqlashga yordam beradi.

Dispers tizim sifatida ishlatiladigan alyuminiy oksidi kukuni qattiq fazani tashkil qiladi, uning zarracha hajmi 27–53 mkm orasida o‘zgaradi, suyuq faza esa suvdan iborat. Yuqori bosim ostida suvning turbulent oqimi mexanik xususiyatlari tufayli qattiq fazaning abraziv ta’sirini kuchaytiradi, shuningdek, hosil bo‘lgan changni bog‘lab, aralashuv maydonini sug‘oradi. Bu jarayon havo-abraziv usullarga nisbatan sezilarli afzalliklarni beradi. Aylanuvchi kesish asboblaridan farqli o‘laroq, gidrokinetik usul tish yuzasini to‘liq tayyorlash imkonini yaratadi, surtma qatlamini hosil qilmasdan qo‘pol emal yuzasini shakllantiradi va aşındırıcı kislotalardan foydalanmasdan yaxshi yopishqoq sharoitlarni ta’minlaydi.

Bolalar stomatologiyasi amaliyotida havo-suv abraziv texnologiyasining asosiy afzalliklari – mahalliy og‘riqsizlantirish talab qilinmasligi, minimal shovqin darajasi va tebranishning yo‘qligi bo‘lib, bu go‘daklar va maktabgacha yoshdagi bemorlarda stress va xavotirni kamaytirishga yordam beradi. Hozirgi vaqtda ushbu texnologiya Veloplex kompaniyasining AquaCare havo-suv qurilmasi orqali amalga oshirilmoqda (Simonenko DA, Jurbenko VI, Karlash AE, RUDN universiteti byulleteni. Seriya: Tibbiyot. 2024;28(1):30).

Ozon terapiyasi esa gazsimon ozon yordamida boshlang‘ich kariesni davolash va oldini olishda rivojlanayotgan minimal invaziv yondashuv hisoblanadi. Kimyoviy jihatdan uch atomli kislorod molekulasi (O_3) atmosfera havosi bilan aloqa qilganda diatomik va monoatomik kislorodga ajraladi, ikkinchisi kuchli oksidlovchi va antibakterial xususiyatga ega. Og‘iz bo‘shlig‘ida ozondan foydalanish eng mashhur qurilmalar – healOzone (KaVo) va Prozone (W&H) yordamida amalga oshiriladi. Belgilangan doza va ta’sir vaqtida ozon mikrobial hujayralarning devor va sitoplazmatik membranasini buzadi, asosan Streptococcus mutansning faolligini pasaytiradi, bu esa qattiq to‘qimalarga ta’sirni kamaytiradi va karies jarayonining barqarorlashishiga yordam beradi.

Dispers tizim sifatida ishlatiladigan alyuminiy oksidi kukuni qattiq fazani tashkil qiladi, uning zarracha hajmi 27–53 mkm orasida o‘zgaradi, suyuq faza esa suvdan iborat. Yuqori bosim ostida suvning turbulent oqimi mexanik xususiyatlari tufayli qattiq fazaning abraziv ta’sirini kuchaytiradi, shuningdek, hosil bo‘lgan changni bog‘lab, aralashuv maydonini sug‘oradi. Bu jarayon havo-abraziv usullarga nisbatan sezilarli afzalliklarni yaratadi. Aylanuvchi kesish asboblaridan farqli o‘laroq, gidrokinetik usul tish yuzasini to‘liq tayyorlash imkonini beradi, surtma qatlamini hosil qilmasdan qo‘pol emal yuzasini shakllantiradi va aşındırıcı kislotalardan foydalanmasdan yaxshi yopishqoq sharoitlarni ta’minlaydi.

Bolalar stomatologiyasida havo-suv abraziv texnologiyasining asosiy afzalliklari quyidagilardan iborat: mahalliy og‘riqsizlantirish talab qilinmasligi, minimal shovqin darajasi va tebranishning yo‘qligi. Ushbu xususiyatlar go‘daklar va maktabgacha yoshdagi bemorlarda stress va xavotir darajasini kamaytirishga yordam beradi. Hozirgi vaqtda texnologiya Veloplex kompaniyasining AquaCare havo-suv qurilmasi yordamida amalga oshirilmoqda (Simonenko DA, Jurbenko VI, Karlash AE, RUDN universiteti byulleteni. Seriya: Tibbiyot. 2024;28(1):30).

Ozon terapiyasi esa boshlang‘ich kariesni davolash va oldini olishda rivojlanayotgan minimal invaziv yondashuvlardan biri hisoblanadi. Kimyoviy jihatdan uch atomli kislorod molekulasi (O_3) atmosfera havosi bilan kontaktga kirganda diatomik va monoatomik kislorodga ajraladi; monoatomik kislorod kuchli oksidlovchi va antibakterial xususiyatga ega. Og‘iz bo‘shlig‘ida ozon eng mashhur qurilmalar – healOzone (KaVo) va Prozone (W&H) yordamida qo‘llaniladi. Belgilangan doza va ta’sir vaqti sharoitida ozon mikrobial hujayralarning devor va sitoplazmatik membranasini buzadi, asosan Streptococcus mutansning faolligini pasaytiradi, bu esa qattiq to‘qimalarga ta’sirni kamaytiradi va karies jarayonining barqarorlashishiga yordam beradi.

Bolalarda minimal invaziv karies davolash usullari tarkibida turli xil preparatlar va texnologiyalar qo‘llaniladi. Masalan, antiseptik setrimidni o‘z ichiga olgan 1-gel, ta’sirlangan dentinning organik qismini yumshatuvchi natriy gipoxlorit asosidagi 2-gel hamda yumshatilgan to‘qimalarni olib tashlash uchun turli o'tkirlash darajasiga ega sakkizta qo‘l asboblari to‘plami mavjud. Ushbu gellarning o‘ziga xos xususiyati shundaki, ular karies ta’siriga uchragan dentinni tanlab yumshatadi va sog‘lom to‘qimalarni saqlab qoladi. Anesteziyaga hamda aylanuvchi asboblar bilan tayyorlashga ehtiyoj yo‘qligi ART (Atraumatic Restorative Treatment) usulini erta va maktabgacha yoshdagi bemorlarni davolashda ayniqsa samarali qiladi.

Lazer texnologiyalari esa minimal invaziv yondashuv sifatida lazer nurlanishidan foydalanadi. Stomatologiyada turli lazer turlari qo‘llaniladi: yoqut (Cr:Al2O3), karbonat angidrid (CO2), ittriy alyuminiy granatga asoslangan lazer, Neodim bilan qo‘shilgan (Nd:YAG), eksimer (ArF), erbiy, xrom: ittriy skandiy galliy granat (Er,Cr:YSGG) va erbiy ittriy alyuminiy granat (Er:YAG). Ulardan Er:YAG lazerlari kariesni davolash va oldini olishda eng ko‘p qo‘llaniladi.

Er:YAG lazer emitentli qo‘l dastasi 2940 nm to‘lqin uzunligidagi nurlarni hosil qiladi, ular qattiq tish to‘qimalarida mavjud suv tomonidan faol so‘riladi va natijada bir zumda qaynash hodisasi yuz beradi. Suvning tez bug‘lanishi bir nechta mikroportlashlarni hosil qiladi, bu esa qattiq to‘qimalarning qatlamma-qatlam va nazorat ostida olib tashlanishini ta’minlaydi. Shu bilan birga, lazer uchidan suv oqimi chiqarilishi sog‘lom to‘qimalarni himoya qilish va davolash maydonini tozalash imkonini yaratadi. Lazer nuri qattiq to‘qimalarda mikroskopik tekstura hosil qiladi, bu esa plomba materialining yopishishi va uzoq muddat saqlanishini yaxshilaydi. Bundan tashqari, lazer nurlari aniq bakteritsid ta’sirga ega bo‘lib, karies hosil qiluvchi mikroorganizmlarni samarali dekontaminatsiya qilish imkonini beradi.

Yosh va maktabgacha yoshdagi bolalarda boshlang‘ich kariesni lazer texnologiyasi yordamida davolash klinisyenlarga mahalliy og‘riqsizlantirishsiz qattiq to‘qimalarni minimal invaziv tarzda tayyorlash imkonini beradi. Biroq, an’anaviy usullarga nisbatan lazer protseduralari ko‘proq vaqt talab qiladi, xarajatlari yuqoriroq va shuning natijasida keng qo‘llanilishi ba’zan cheklanishi mumkin.

Shu bilan birga, yosh bolalarda karies profilaktikasi tish salomatligini saqlashning eng muhim elementlaridan biri hisoblanadi. Kariesni tashxislash va davolashdagi yutuqlarga qaramay, profilaktik chora-tadbirlar bolalar og‘iz bo‘shlig‘i salomatligini ta’minlashda asosiy ahamiyatga ega.

Erta va maktabgacha yoshdagi bolalarda tish kariesining birlamchi postnatal profilaktikasi sanitariya-gigienik ta’lim, ovqatlanishni normallashtirish hamda tish shifokoriga erta profilaktik tashriflarni o‘z ichiga oladi. Bu yo‘nalish zamonaviy stomatologiyaning dolzarb muammolaridan biri bo‘lib, samarali strategiyalarni ishlab chiqishni talab qiladi.

Shaxsiy darajada karies profilaktikasi ko‘p jihatdan tish shifokori tomonidan tanlangan ftorli tish pastalari bilan muntazam tishlarni yuvish orqali amalga oshiriladi, ya’ni shaxsiy og‘zaki gigiena muhim rol o‘ynaydi. Ota-onalar esa o‘yin va boshqa interaktiv metodlardan foydalanib, bolaga stomatologik parvarish protseduralarining ahamiyati va zarurligini tushuntirishlari lozim.

Karies rivojlanishining muhim omillaridan biri uglevodlarga boy oziq-ovqatlarni ortiqcha iste’mol qilishdir. Shu nuqtai nazardan, ota-onalar bolaning kundalik ovqatlanishini nazorat qilishi muhimdir. Shuningdek, stomatologlar ota-onalarga fermentlanadigan uglevodlar ta’sirini kamaytirish bo‘yicha tavsiyalar berishlari lozim, chunki muvozanatli ovqatlanish nafaqat og‘zaki kasalliklarning, balki ko‘plab tizimli patologiyalarning oldini olishning samarali vositasidir.

Xulosa qilib aytganda, mavjud adabiyotlarni tahlil qilish shuni ko‘rsatadiki, yaqinda yosh va maktabgacha yoshdagi bolalarda tish kariesini aniqlash, invaziv bo‘lmagan davolash va samarali profilaktika sohasida sezilarli yutuqlarga erishilgan. Kompleks yondashuv, turli minimal invaziv metodlarni qo‘llash bilan birga, bolada kariesni aniq tashxislash va yuqori sifatli davolash imkonini beradi. Har bir holatga individual yondashuv zarur bo‘lib, u kariesni kompleks tashxislash, davolash va oldini olish usullarini jarayon bosqichi va faoliyati, ota-onaning ehtiyojlari hamda bolaning klinik muhitga moslashuv darajasi bilan uyg‘unlashtiradi.

Foydalanilgan adabiyotlar:

1. Маслак Е.Е., Родионова А.С., Яновская М.Л., Ставская С.В. Современные концепции лечения кариеса молочных зубов у детей раннего возраста // Клиническая стоматология. 2015. Т. 75. № 4. С. 8–12.
2. Folayan M., Olatubosun S. Early Childhood Caries — A diagnostic enigma // European journal of paediatric dentistry. 2018. Vol. 19. № 2. P. 88. doi:10.23804/ejpd.2018.19.02.00
3. Журбенко В.А., Карлаш А.Е. Исследование распространенности и интенсивности кариеса зубов среди детей дошкольного возраста //

Региональный вестник. 2020. Т. 44. № 5. С. 17–19. Симоненко Д.А., Журбенко В.А., Карлаш А.Е. Вестник РУДН. Серия: Медицина. 2024. Т. 28. № 1 32 СТОМАТОЛОГИЯ
4. Drury T.F., Horowitz A.M., Ismail A.I., Maertens M.P., Rozier R.G., Selwitz R.H. Diagnosing and reporting early childhood caries for research purposes. A report of a workshop sponsored by the National Institute of Dental and Craniofacial Research, the Health Resources and Services Administration, and the Health Care Financing Administration // Journal of public health dentistry. 1999. Vol. 59. № 3. P. 192–197. doi:10.1111/j.1752-7325.1999.tb03268.x
5. American Academy of Pediatric Dentistry Council on Clinical Affairs. Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies // Pediatric dentistry. 2018. Vol. 40. № 6. P. 60–62.
6. Alazmah A. Early Childhood Caries: A Review // The Journal of Contemporary Dental Practice. 2017. Vol. 18. № 8. P. 732–737. doi:10.5005/jp-journals-10024-2116
7. Keels M.A. Personalized Dental Caries Management in Children // Dental Clinics of North America. 2019. Vol. 63. № 4. P. 621–629. doi:10.1016/j.cden.2019.06.002
8. Глинкин В.В., Клемин В.А., Глинкина В.В. Аспекты возникновения кариеса зубов // Инновационные процессы в науке, экономике и образовании: теория, методология, практика: монография. Пенза. 2017. С. 191–201.
9. Старовойтова Е.Л., Антонова А.А., Стрельникова Н.В. Обзор литературы: кариес зубов детей раннего возраста как социально значимая проблема здравоохранения // Дальневосточный медицинский журнал. 2018. № 3. С. 106–111.
10. Абдувакилов Ж.У., ЯкубоваС.Р., Балтабаев У.А. Тиш протезларига мослашиш жараёнларида биокимёвий курсаткичларнинг ахамияти //Доктор ахборотномаси. – 2021. -№4. -С.139-144.
11. Gavkhar Nuriddinovna Indiaminova, Tulkin Elnazarovich Zoirov. (2021). Improvement of Methods of Providing Dental Care for Children with Mental Delayed Development. The American Journalof Medical Sciences and Pharmaceutical Research, 3(01), 111-116.
12. G. N. Indiaminova, “Duration of orthodontic treatment in patients with dental jaw anomalies with removal and withoutremoval of separate teeth” журнал биомедицины и практики №si-2 (2020).
13. «Клиническая оценка состояния протезных конструкций у больных с частичной адентией» Якубова С.Р., Абдувакилов Ж.У. «Актуальные проблемы детской стоматологии» 2021 Стр-285-290.
14. Шаныгина Д.В. Неинвазивные методы исследования в клинике ортопедической стоматологии / Д.В. Шаныгина, Г.В. Большаков, А.А. Подколзин // Институт стоматологии. - 2002. - № 3. - С. 46-47.
15. Craig R.G. Dental materials / R.G. Craig, J.M. Powers, J.C. Wataha.- London: Mosby, 2000. - 327p.

16. DrapalS. Биологическая совместимость дентальных металлов / S. DrapalIIНовое в стоматологии. - 2001. - №2. - С.39-48.

Raximberdiyev R. A., PhD
associate professor
department of pediatric dentistry
SamDTU
Mamatkulova A. K.
clinical resident
department of pediatric dentistry
SamDTU

MEDICINAL PLANTS APPLIED IN THE THERAPY OF ORAL MUCOSAL DISEASES

Abstract: *Oral mucosal diseases, including stomatitis, aphthous ulcers, and oral lichen planus, significantly affect patients' quality of life. Conventional treatments often involve synthetic drugs that may cause side effects or limited efficacy. Medicinal plants have emerged as promising alternatives due to their bioactive compounds, anti-inflammatory, antioxidant, and antimicrobial properties. This review investigates the application of various medicinal plants in the management of oral mucosal disorders. Clinical and experimental studies indicate that herbal extracts such as Aloe vera, Chamomilla recutita, Curcuma longa, and Salvia officinalis can reduce inflammation, accelerate healing, and improve patient outcomes. The findings support the incorporation of evidence-based herbal therapies as adjuncts or alternatives to conventional treatments for oral mucosal diseases.*

Keywords: *Oral mucosa; medicinal plants; herbal therapy; stomatitis; aphthous ulcers; inflammation; antioxidant.*

Oral mucosal diseases are common conditions that involve inflammation or lesions of the oral lining. These disorders can cause pain, difficulty in eating, and reduced quality of life. Standard treatments typically include corticosteroids, antiseptics, and antibiotics. However, long-term use of synthetic drugs may lead to adverse effects and drug resistance.

Medicinal plants have been traditionally used in various cultures for their healing properties. Active phytochemicals such as flavonoids, phenols, and essential oils provide anti-inflammatory, antimicrobial, and antioxidant effects. Recent research has focused on scientifically validating the therapeutic potential of these herbal remedies for oral mucosal diseases. This study aims to review and summarize current evidence on the use of medicinal plants in the management of oral mucosal disorders.

The oral mucosa lines the oral cavity and consists of a superficial squamous epithelium with an underlying lamina propria. Beneath the mucosa is the submucosa, which consists of fibrous tissue and adipose tissue and contains lobules of the minor salivary glands and neurovascular bundles. In some areas, the submucosa is absent, and the lamina propria is continuous with the periosteum,

forming an elastic mucosa that covers the upper and lower jaws. The squamous epithelium consists of keratinocytes arranged in layers: a basal cell layer resting on the basement membrane, a spiny cell layer, and usually a keratinized layer. Keratinocytes are attached to each other by desmosomes, and basal keratinocytes are attached to the basement membrane by hemidesmosomes.

The work consists of developing the composition and technology of a gel with an extract of the roots of comfrey (Symphytum officinale, Linnaeus, 1753) for the treatment of the oral mucosa.

Lesions of the oral mucosa in acute and chronic diseases of the body (measles, scarlet fever, chickenpox, tuberculosis, syphilis, etc.). Proper infectious and parasitic diseases of the oral mucosa and lips: viral (herpes, warts, etc.); fusospirochetosis; bacterial (streptococcal and staphylococcal, gonorrheal, etc.); fungal (candidiasis, actinomycosis, etc.).

Oral mucosal lesions have a variety of etiologies, including viral or bacterial infections, local trauma or irritation, systemic disorders, and even excessive alcohol and tobacco use. Folk knowledge about medicinal plants and phytochemicals in the treatment of oral mucosal lesions has attracted particular attention from the scientific community. Researchers are focusing on plants such as chamomile, aloe vera, green tea and coffee, and plant-derived bioactive compounds (e.g., curcumin and lycopene) with anti-oral mucosal activity.

Comfrey root (Symphytum officinale L.) is traditionally used for the topical treatment of bruises. Allantoin is considered the pharmacologically active compound in this herbal remedy. Allantoin, a 5-urea hydantoin, has been documented to possess numerous pharmacological properties, including the removal of necrotic tissue, stimulation of cell mitosis, and stimulation of epithelial growth. Recently, researchers have shown that allantoin at a concentration of 5% in an oil/water soft lotion emulsion exerts a wound-healing effect compared to control groups. The healing mechanism stimulated by allantoin occurs through the regulation of inflammatory responses and the stimulation of fibroblast proliferation and extracellular matrix production. A pilot study evaluated the wound-healing activity of comfrey leaf extracts. Three topical preparations were used: carbomer gel, glyceroalcohol solution, and emulsion (soft lotion). The 5% oil/water emulsion was shown to be the most effective in stimulating healing activity. This can be evidenced by an increase in collagen deposition from 40 to 28 days (240%) and a decrease in cellular inflammatory infiltrate from 3 to 46%. However, the best efficacy was demonstrated by the 8% prepared extract in emulsion [

Gels can be single-phase or biphasic. Single-phase gels use high-molecular-weight hydrophilic polymers as gelling agents. Examples of such polymers include carbomers (cross-linked acrylic acid polymers). These gels are considered single-phase systems because there are no defined boundaries between the dispersed macromolecules and the liquid. Biphasic gels may contain a gelatinous, cross-linked precipitate of a single substance in the aqueous phase. For example, milk of magnesia consists of a gelatinous precipitate of magnesium hydroxide.

Gelling agents in single-phase gels may be (a) synthetic macromolecules, such as carbomer 934; (b) cellulose derivatives, such as carboxymethylcellulose; and (c) natural gums, such as tragacanth. Carbomers are high-molecular-weight, water-soluble polymers of acrylic acid cross-linked with sucrose allyl esters and/or pentaerythritol. Their viscosity depends on their polymer composition. They are used as gelling agents at concentrations of 0.5%-2% by weight in water. In addition to the gelling agent and water, gels may also contain the drug, cosolvents (such as alcohol and/or propylene glycol), antimicrobial preservatives (such as methylparaben and propylparaben or chlorhexidine gluconate), and stabilizers (such as the chelating agent disodium edetate). Gels typically exhibit non-Newtonian flow characteristics, meaning they exhibit a nonlinear relationship between shear stress and strain rate, which may also be time-dependent. Depending on their flow characteristics, gels can be shear-thinning (pseudoplastic, i.e., viscosity decreases and flow rate increases with stirring), shear-thickening (dilatant, i.e., viscosity increases and flow rate decreases with stirring), or thixotropic (e.g., a decrease in stress is required to maintain a constant strain rate over time; or, in other words, viscosity decreases and flow rate increases over time at the same stirring rate). Inorganic gels consist of flakes of small particles, as in aluminum hydroxide gel or bentonite magma. Such gels can be thixotropic, exhibiting a higher viscosity and a semi-solid state upon standing and transforming into low-viscosity liquids upon stirring.

The object of our study is the extract of comfrey roots (Symphytum officinale, Linnaeus, 1753)

Comfrey contains allantoin, tannins, flavonoids, vitamin B12, mucus, starch, various plant acids, triterpenes, and some pyrrolizidine alkaloids. No other plant contains so much allantoin. The roots of common comfrey contain 0.2-0.3% alkaloids, while the herb contains up to 0.1%; the roots of common comfrey contain 0.1% alkaloids, while the herb contains 0.2%.

The accumulation of alkaloids in comfrey biomass closely correlates with climatic and orographic factors. In comfrey biomass in polluted ecotopes, the level of alkaloid accumulation depends primarily on the content of mobile heavy metals in the soil.

Many of the therapeutic properties attributed to comfrey are due to the various key components present in the root, leaves, and flowering tops of the plant. These include anti-inflammatory properties, pain reduction and relief, the ability to stop bleeding, and effective anti-exudative, astringent, and emollient properties. Indeed, comfrey contains a wide range of critically important biologically active components, including allantoin, triterpene saponins, tannins, alkaloids, amino acids, flavonoids, triterpenes, terpenoids, tannins, saponins, sterols, mucopolysaccharides, digallic acid, and traces of essential oil.

Research methods

The study was conducted in several stages. First, the comfrey root sample was weighed on a scale, yielding a mass of 26 g. Grinding was performed in a disc mill for 5 minutes. After maceration, the sample was weighed again, yielding a

mass of 19.6 g. Grinding for 10 minutes yielded a post-grinding mass of 20.2 g, despite the additional grinding being 30 g. Grinding for 20 minutes was less effective – the sample mass before grinding was 40 g, and after grinding, it was 9.96 g. Next, a 70% ethanol solution was added to the ground sample (Fig. 2.3) in a 1:5 ratio and left to infuse for 24 hours. After 24 hours, the resulting solution was filtered using paper filters, yielding an extract. A 70% ethanol solution was also used to determine flavonoids. A 100 ml portion of the extract (3 ml) was added and exposed to ultrasound. Ultrasound waves destroy the cell walls of comfrey rhizomes, facilitating the release of biologically active substances into the solution.

After ultrasonication, the mixture was filtered (Fig. 2.4), and the spectrum and wavelength of the resulting filtrate were determined using a LOMO SF-56 spectrophotometer. 3 ml of extract and 70% alcohol were added to another flask, and the optical density was measured using a spectrophotometer.

The raw material obtained from the 10-minute maceration was used to obtain a thick extract. The thick extract was obtained by evaporation in a vacuum evaporator, yielding 3 g of thick comfrey rhizome extract.

Finally, a gel with comfrey rhizome extract was obtained. For this, 15 g of Na-CMC (sodium carboxymethylcellulose) was dissolved in 300 ml of water, 3 ml of thick comfrey root extract (Symphytum officinale, Linnaeus, 1753) and 0.1 g of citric acid were added as an antioxidant. The resulting gel had a greenish color. The viscosity of the gel was determined using a viscometer.

Conclusions

A comprehensive literature review revealed that the use of comfrey root (Symphytum officinale, Linnaeus, 1753) as a potential source of extract for a therapeutic dental gel is feasible, but further pharmacognostic study is required. A dental gel formulation for the treatment and prevention of oral diseases has been developed, using a thick extract of comfrey (Symphytum officinale, Linnaeus, 1753). The main components are the extract itself, a Na-CMC base, and citric acid. Key criteria were developed for the samples to be tested against. These include appearance, acidity, homogeneity, viscosity, microbiological purity, and others.

Bibliography

1. Borovskoy, E. V. Diseases of the mucous membrane of the oral cavity and lips / E. V. Borovskoy, edited by prof. A. L. Mashkilleyson. - M .: MEDpress, 2001. - 320

2. Volkova, M. N. Diseases of the oral mucosa: educational manual / M. N. Volkova, Yu. P. Chernyavsky, N. A. Sakharuk, Yu.R. Elenskaya. – Vitebsk: VSMU, 2016. – 236 p.

3. Gontarev S. N. Use of herbal preparations in pediatric dentistry / S. N. Gontarev, I. S. Gontareva, A. V. Nikishaeva // Scientific result. Series Medicine and Pharmacy. - 2016. - Vol. 2, No. 2. - P. 17-21.

4. Goncharova, E. I. Medicinal plant preparations in the treatment of diseases of the oral mucosa / E. I. Goncharova // Russian Dental Journal. - Vol. 19, No. 4. - 2015. - P. 55-57.
5. Mironov, S. E. State of the Russian market of pharmaceutical products of plant origin for the prevention and treatment of inflammatory diseases of the oral cavity / S. E. Mironov, A. N. Fetisova // Medical and pharmaceutical journal "Pulse". - V. 15, No. 1-4. - 2013. - P. 385-389.
6. Абдувакилов Ж.У., ЯкубоваС.Р., Балтабаев У.А. Тиш протезларига мослашиш жараёнларида биокимёвий курсаткичларнинг ахамияти //Доктор ахборотномаси. – 2021. -№4. -С.139-144.
7. Gavkhar Nuriddinovna Indiaminova, Tulkin Elnazarovich Zoirov. (2021). Improvement of Methods of Providing Dental Care for Children with Mental Delayed Development. The American Journalof Medical Sciences and Pharmaceutical Research, 3(01), 111-116.
8. G. N. Indiaminova, “Duration of orthodontic treatment in patients with dental jaw anomalies with removal and withoutremoval of separate teeth” журнал биомедицины и практики №si-2 (2020).
9. «Клиническая оценка состояния протезных конструкций у больных с частичной адентией» Якубова С.Р., Абдувакилов Ж.У. «Актуальные проблемы детской стоматологии» 2021 Стр-285-290.
10. Шаныгина Д.В. Неинвазивные методы исследования в клинике ортопедической стоматологии / Д.В. Шаныгина, Г.В. Большаков, А.А. Подколзин // Институт стоматологии. - 2002. - № 3. - С. 46-47.
11. Craig R.G. Dental materials / R.G. Craig, J.M. Powers, J.C. Wataha.- London: Mosby, 2000. - 327p.
12. DrapalS. Биологическая совместимость дентальных металлов / S. DrapalIIНовое в стоматологии. - 2001. - №2. - С.39-48.

Raximov X. Sh., PhD
department of economics
Namangan state technical university
https://orcid.org/0009-0003-3981-4626

ANALYSIS OF INDICATORS DETERMINING THE ECONOMIC EFFICIENCY OF THE RAILWAY TRANSPORT SYSTEM

Annotation*. This article analyzes the economic efficiency of the railway transport system, its current condition, existing problems, and ways to solve them. It discusses the role of the transport system in the national economy, the necessity of its innovative development, reforms in infrastructure, and ongoing digitalization processes. In addition, based on international experience, the article provides recommendations for improving the efficiency of railway transport.*

Keywords. *Railway transport, economic efficiency, transport logistics, infrastructure, digitalization, public–private partnership, energy efficiency.*

Introduction

In the global integration processes taking place today, the importance of the transport complex and infrastructures in the efficient use of economic potential is steadily increasing. The tasks of developing these sectors are being carried out by the global transport and logistics system. According to the World Bank, "the volume of global transport services within global GDP is estimated at USD 4.3 trillion (6.9%), with 110 billion tons of cargo and more than 1 trillion passengers transported annually, and the number of employees engaged in transport infrastructure reaching 100 million people."[15].

Modern freight transportation technologies are rapidly advancing worldwide. Therefore, ensuring the innovative development of the transport system requires countries to improve mechanisms for efficiently utilizing their *transport–transit* and *transport–logistics* potential.

Historically, railway transport has been the core element of Uzbekistan's transport infrastructure and continues to occupy a central position in the national economy. This mode of transport is a crucial factor for sustainable economic growth, the economic integration of regions, and the achievement of socio-economic stability. The railway system not only supports economic processes by transporting goods and passengers but also contributes to Uzbekistan's integration into the international economic community. Its effective functioning creates conditions for the balanced development of all sectors of the national economy.

The state of the transport system is a strategically important sector that supports the country's socio-economic growth and strengthens its foreign economic relations. The sustainable development of this sector holds a key place in state policy. Its advancement reinforces Uzbekistan's position and influence in

[15] The World Bank: World Development Indicators. http: //data.worldbank.org/indicator

the global economy and increases its competitiveness in domestic and international markets. In this context, infrastructure upgrades that meet modern requirements and solutions to challenges within the transport system become critically important. At the same time, enhancing the efficiency of transport infrastructure requires the adoption of innovative approaches and advanced technologies.

Degree of Problem Investigation

Research on improving the economic efficiency of the railway transport system, state regulation, energy efficiency, and environmental performance is considered an important scientific direction in modern economic theory and practice. International scholars such as M. Porter, K. Menard, M. Castells, and M. Lambert have scientifically substantiated issues related to effective management of transport infrastructure, organization of logistics chains, and the role of government policy in the transport sector16. They developed scientific models concerning state–sector integration and the establishment of public–private partnerships in railway infrastructure, and analyzed the transport system from the perspectives of competitiveness and environmental efficiency.

Among CIS scholars, the works of V. G. Borodin, A. Kolik, and K. Ya. Kirillov have provided important scientific foundations on issues such as state regulation, electrification of railway infrastructure, and energy efficiency[17]. They identified methodological approaches to increasing sectoral efficiency through the introduction of renewable energy sources and “green” technologies.

Among scholars in our country, G. Samatov, M. Ikramov, and A. Zohidov have conducted research on the economic efficiency of the railway transport system, improving state management functions, and introducing innovations into infrastructure. They developed proposals for diversifying railway infrastructure, optimizing financing, and expanding opportunities for public–private partnerships based on digitalization.

Research Methodology

In this study, a comprehensive scientific approach was applied to examine the economic efficiency of the railway transport system. The main methodological foundations included economic analysis, statistical analysis, comparative analysis, trend analysis, and a systematic approach. In addition to assessing the current situation, the research also identified existing problems and developed recommendations aimed at solving them.

Discussion of Analysis and Results

Freight volume and freight turnover are key indicators that determine the physical scale of activity in the sector. These indicators, expressed in tons and ton-

[16] Porter M. Competitive Strategy: Techniques for Analyzing Industries and Competitors. – Free Press, 1980.; Menard C. Handbook of New Institutional Economics. – Springer, 2005.; Castells M. The Rise of the Network Society. – Wiley-Blackwell, 2010.; Lambert D. Logistics and Supply Chain Management. – Pearson, 2014.

[17] Borodin V.G. Upravleniye transportnoy sistemoy: teoriya i praktika. – M.: Infra-M, 2019.; Kolik A. Gosudarstvennoye regulirovaniye v transportnoy otrasli. – SPb.: Piter, 2021.; Kirillov K.Ya. Modeli razvitiya jeleznodorojnogo transporta. – M.: Ekonomika, 2022.

kilometers, make it possible to assess the service capacity of the network, its geographical coverage, and its level of adaptation to domestic and foreign markets. Notably, the consistency between the growth rates of freight turnover and dynamics in industrial production reflects the extent to which the transport network is integrated into the economic environment.

Table 1

Composition of freight transportation and freight turnover by modes of transport [18]

№		2022	2023	2024
Total freight volume, million tons				
	Total across all modes of transport	**1420.9**	**1455.7**	**1521.2**
Including the following				
1.	Railway	5.1	5.1	4.8
2.	Automobile	90.4	90.8	91.1
3.	Pipeline transport	4.5	4.1	4.1
Freight turnover, million ton-kilometers				
4.	**Total across all modes of transport**	75492.7	77139.1	79507.4
Including the following				
5.	Railway	33.1	35.1	34.5
6.	Automobile	27.2	28.3	28.9
7.	Pipeline transport	39.3	36.3	36.2

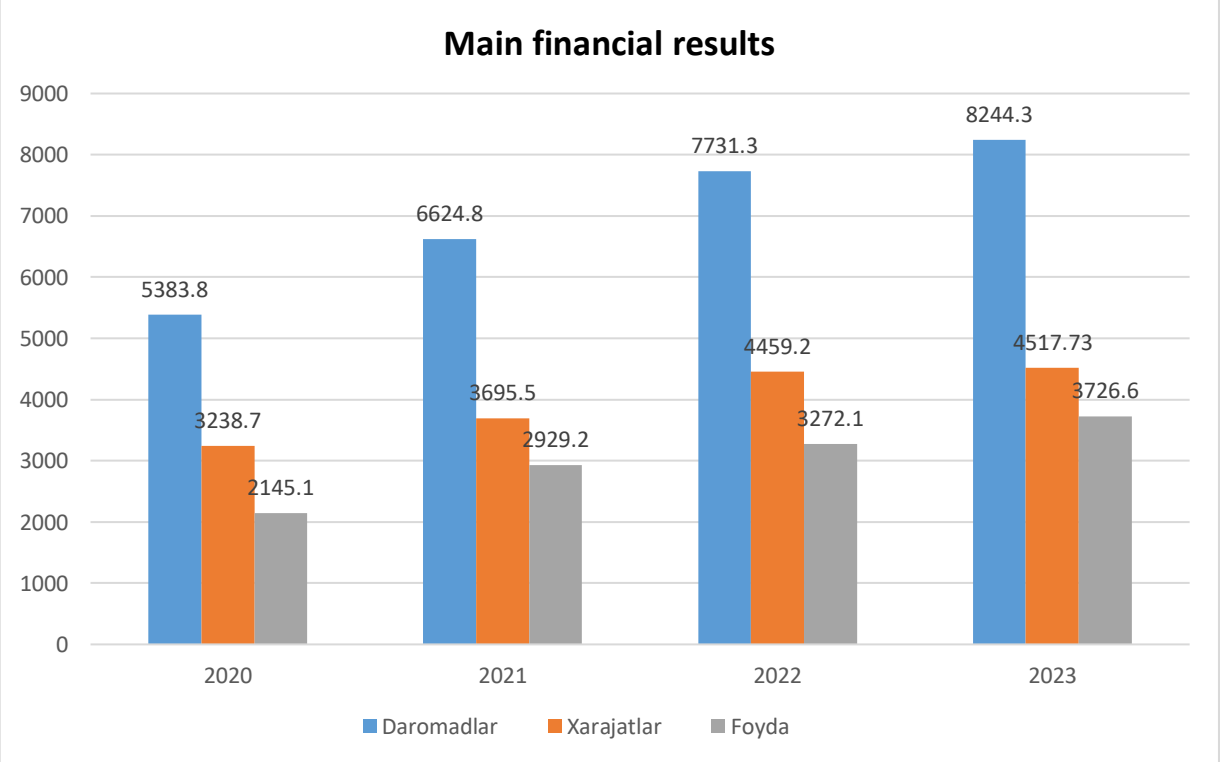
During 2022–2024, the dynamics of freight volume and freight turnover exhibited variability across different modes of transport. In particular, the relative shares and growth trends between railway and road transport indicate that institutional and technological issues within the transport sector remain significant. Although total freight volume increased from 1,420.9 million tons in 2022 to 1,521.2 million tons in 2024, this growth occurred primarily due to road transport. Freight transported by rail declined from 5.1 million tons in 2022 to 4.8 million tons in 2024, representing a decrease of nearly 10 percent. This indicates that railway transport is losing its share in domestic freight movement.

Road transport, on the other hand, carried 90.4 million tons of freight in 2022, rising to 91.1 million tons in 2024. Although the increase is not substantial, it demonstrates that road transport continues to maintain its dominance and that market demand remains more oriented toward this mode of transport. The efficiency of road transport is explained by its logistical flexibility, shorter distances, and time savings; however, it also has drawbacks, including high costs and negative environmental impacts.

[18] Data of the National Statistics Committee of the Republic of Uzbekistan.

A reverse pattern is observed in freight turnover indicators. Railway freight turnover amounted to 33.1 billion ton-km in 2022 and increased slightly to 34.5 billion ton-km in 2024. Although the change is modest, the railway system remains efficient for long-distance freight transportation. At the same time, the relatively slow growth rate suggests stagnation in infrastructure modernization and service quality. In road transport, freight turnover increased from 27.2 billion ton-km in 2022 to 28.9 billion ton-km in 2024, marking a 6.3 percent rise over three years. This indicates growing intensity in the use of road transport, particularly in regional logistics, where it holds a dominant position.

Based on these results, first, it is evident that the intersectoral competitiveness of railway transport is declining, which can be attributed to its limited financial capacity, insufficient service diversification, slow technological modernization, and a centralized tariff-setting approach. Second, the high share of road transport reflects its ability to adapt quickly to market needs, supported by the increase in private operators and service segmentation, which collectively enhance its maneuverability and competitive advantage. At the same time, road transport imposes a heavy load on road infrastructure, entails high fuel costs, and has negative environmental effects, all of which require a more systematic policy response.



Picture 1 Key financial results of "Uzbekistan Railways" JSC in 2020–2023, billion UZS

Although the financial performance of freight transport operations of "Uzbekistan Railways" JSC during 2020–2023 appears to demonstrate stable growth on the surface, deeper analysis reveals significant internal inconsistencies

and fragilities in terms of economic sustainability. Revenue increased from 5.4 trillion UZS to 8.2 trillion UZS. However, it is fundamentally incorrect to evaluate this growth in absolute terms as purely positive—because the increase in revenue is not driven by profitability, but rather by a disproportionate rise in costs. This is clearly reflected in the efficiency index, which remains at an average level of 1.7–1.8, indicating that the sector still operates with revenue only slightly exceeding expenses, which is insufficient for ensuring stable profitability.

The highest recorded profit of 3.7 trillion UZS in 2023 does not represent strategic effectiveness, but rather reflects the increased volumetric load of operations. In reality, this masks the deteriorating state of the railway infrastructure and operational system. In other words, profit growth is not the result of resource efficiency or higher productivity - it is largely the outcome of tariff indexation and forced expansion of service volumes.

Furthermore, analysis of cost dynamics shows that expenditures, which amounted to 3.2 trillion UZS in 2020, surpassed 4.5 trillion UZS by 2023 - an increase of 1.4 times. This growth rate is not proportional to revenue growth.

The underlying problem is the declining competitiveness of railway transport compared to other modes. As road transport increasingly dominates due to its flexibility and logistical speed, railways are compelled to generate profit mainly through higher transport volumes. In the long term, this sharply increases infrastructure operation and maintenance costs while preserving the system in its current, non-transformational state.

Although the financial indicators of “Uzbekistan Railways” JSC appear positive externally, this growth is not based on the sector’s real economic capacity. Rather, it depends on state guarantees, inflationary indexation, and artificially increased freight volumes. The sector is characterized by institutional deficiencies, low capital efficiency, a heavy cost burden, and passiveness within a competitive market environment. This highlights the need for restructuring, tariff reform, digitalization of operations, and the introduction of modern management models.

In the last decade, the railway sector has exhibited trends such as disproportionate growth, rising capital expenditures, and stagnation in transit activities. The following data (Table 2) provides a clear picture of year-by-year changes in operating revenue, investment inflows, dynamics of fixed assets, and the volume of transit freight. (Table 2).

Table 2

Key indicators of the railway transport sector [19]

Years	Revenue from core activities in railway transport, billion UZS	Volume of investments in the railway transport sector, billion UZS	Transit transportation mln. t	Volume of fixed assets in railway transport, billion UZS
2015	4316,5	198,5	7,5	39 319
2016	4715,2	246,2	8,0	42 381
2017	6967,1	518,0	7,8	51 580
2018	7529,2	2 107,6	7,3	70 014
2019	8512,9	2 679,8	7,0	83 376
2020	9605,4	1 521,1	8,2	93 026
2021	10372,4	1 639,6	8,5	107 066
2022	10496,4	3 114,1	10,2	111 476
2023	12085,5	3 285,5	11,3	121 745

During 2015–2023, the formation of key performance indicators in the railway transport sector exhibited disproportional and imbalanced growth dynamics. Although revenue from core activities increased from 4.3 trillion UZS in 2015 to 12.1 trillion UZS in 2023, this growth was shaped not by increases in freight volume, service diversification, or operational efficiency, but primarily by inflation, tariff indexation, and external financing. Despite rising revenues, the lack of qualitative transformation and modernization in the sector continues to hinder the formation of a foundation for rapid, sustainable development.

A critical issue requiring special attention is the sharp fluctuations in investment volumes and the imbalance between investment inflows and their returns. For example, while investments amounted to 198.5 billion UZS in 2015, by 2023 this figure had soared to 3.3 trillion UZS—an increase of more than 16.5 times. However, this surge in investment has not been reflected in corresponding improvements in operational efficiency, freight turnover, or transit capacity, indicating the presence of a “depth” problem within the sector’s capital structure. Despite large sums being directed toward infrastructure, the absence of

[19] Data of “Uzbekistan Railways” JSC.

institutional restructuring mechanisms and the lack of market-based tools in the sector result in low investment efficiency.

Additionally, the transit freight indicator showed only minimal growth—from 7.5 million tons in 2015 to 11.3 million tons in 2023, averaging an annual increase of just 6.3 percent, which cannot be considered satisfactory. This indicates a weakening of Uzbekistan Railways' cross-border significance within regional logistics. Despite growing geoeconomic and geopolitical demand for Central Asia's transit functions, the railway sector has not been able to fully capitalize on this opportunity. Contributing factors include underdeveloped railway hubs and logistics nodes, bureaucratic constraints at customs and border services, high transit fees, and competitive advantages offered by alternative routes—particularly those passing through Kazakhstan and the Caucasus.

The growth in fixed assets also raises questions regarding its efficiency. Fixed assets increased from 39.3 trillion UZS in 2010 to 121.7 trillion UZS in 2023. Although this growth appears substantial, the share of physically and morally depreciated assets remains unclear. In many cases, expenditures have been driven not by modernization but by repairs and temporary maintenance of functionality. This indicates that the productive capacity of fixed assets is low, their renewal cycle is prolonged, and amortization returns are insufficient. Key structural problems include:

• Low capital efficiency – despite large increases in investment volumes, there is no correlation between investments, profitability, and freight flows.

• Stagnation of transit potential – Uzbekistan's role as a "transport hub state" in regional logistics is weakening.

• Inefficient structure of fixed assets – nominal asset growth is not supported by real productivity gains or service diversification.

• Loss of intersectoral competitiveness – railway logistics remains associated with bureaucracy, additional time requirements, and higher costs.

The analysis demonstrates that although "Uzbekistan Railways" JSC has shown nominal growth in certain economic indicators in recent years, the sector continues to face complex challenges in terms of efficiency, financial sustainability, and competitiveness. While freight volume and revenue trends appear positive, high infrastructure-related costs, outdated technical assets, and weak competitive positioning limit overall performance. Furthermore, the absence of ESG-compliant environmental mechanisms poses a strategic barrier to the sustainable development of the transport sector.

Conclusion

Railway transport is a strategically important sector for Uzbekistan's economic stability and regional integration. To enhance its economic efficiency, it is advisable to take action in the following areas:

• Accelerating digitalization – introducing automated management systems and electronic freight documentation.

• Implementing the "green transport" concept – expanding electrified trains and energy-efficient technologies.

• Developing public–private partnerships – attracting private investors for infrastructure modernization.

• Improving logistics centers – establishing multimodal logistics hubs.

• Strengthening international cooperation – coordinating transit regimes with neighboring countries.

These recommendations will contribute to the modernization of the transport system and positively affect all sectors of the economy.

Literature:

1. Decree of the President of the Republic of Uzbekistan “On the Approval of the Transport Strategy of the Republic of Uzbekistan for 2020–2030.”. PQ–4702-son, 2020-yil 5-may. https://lex.uz
2. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
3. Samatov G. Temir yo‘l infratuzilmasini rivojlantirishning iqtisodiy asoslari. – T.: Iqtisod-Moliya, 2021.
4. Shukurjonovich, R. H. (2020, December). IMPROVING THE ECONOMIC ACTIVITY OF TRANSPORT INFRASTRUCTURE. In Archive of Conferences (Vol. 10, No. 1, pp. 47-49).
5. Jalolova, M., Sangirova, U., Yakubov, I., Rahimov, H., & Kholmatova, N. (2022). Economic efficiency of the transport system and logistics in the Republic of Uzbekistan. Transportation Research Procedia, 63, 1061-1066.
6. “O‘zbekiston temir yo‘llari” AJ rasmiy sayti: https://railway.uz ,O‘zbekiston Respublikasi Milliy statistika qo‘mitasi rasmiy sayti: https://www.stat.uz
7. Ibrogimov, S. (2024). Namangan viloyati qurilish materiallari ishlab chiqarish korxonalarining faoliyati samaradorligini ta’minlash holati va tahlili. YASHIL IQTISODIYOT VA TARAQQIYOT, 2(11).
8. Xalimjon o‘g‘li, I. S. (2024). GLOBAL O ‘ZGARISHLAR SHAROITIDA IQTISODIY XAVFSIZLIK. Scientific Journal of Actuarial Finance and Accounting, 4(05), 315-321.
9. Xalimjon o‘g‘li, I. S. (2024). IQTISODIY O ‘SISHDA EKOLOGIK CHEKLOVLARNI TIZIMLI MODELLASHTIRISH. Scientific Journal of Actuarial Finance and Accounting, 4(Maxsus son), 353-363.
10. Isakov, M. (2020). Иқтисодиѐтда тадбиркорлик ва кичик бизнесни ривожлантириш истиқболлари. Архив научных исследований.
11. Sobirjon o‘g‘li, J. E. (2025). ANALYSIS OF THE CURRENT STATUS OF TAXES IN THE FORMATION OF STATE BUDGET REVENUES. ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW ISSN: 2319-2836 Impact Factor: 8.071, 14(06), 94-99.
12. Olimjon Boyturayev (2025). Sanoat hamkorligining ilg ‘or tajribalari va ularni o ‘zbekiston iqtisodiyotiga integratsiya qilish yo ‘llari. Muhandislik va iqtisodiyot, 3(11), 385-391.
13. Bahriddinov, N. (2025). Innovative development of the service network. muhandislik va iqtisodiyot, 3(10).

14. Бахриддинов, Н. (2025). Методы финансового стимулирования инновационной деятельности со стороны государства. Передовая экономика и педагогические технологии, 2(2), 315-321.

Rejapov A. A.
o‘qituvchisi
xorijiy tillar kafedrasi
Andijon qishloq xo‘jaligi va agrotexnologiyalar instituti

EZGU QARASHLAR TARBIYASI: OG‘ZAKI AN’ANALAR, MILLIY QADRIYATLAR VA ZAMONAVIY MA’NAVIY TAHDIDLAR TALQINIDA

Annotatsiya. *Ushbu maqolada ezgu qarashlar tarbiyasining nazariy-metodik asoslari, og‘zaki an’analar va milliy qadriyatlarning yosh avlod ma’naviyatini shakllantirishdagi o‘rni, shuningdek, globallashuv sharoitida vujudga kelayotgan ma’naviy tahdidlarning ta’siri ilmiy tahlil qilinadi. Tadqiqotda Abu Ali Ibn Sino, Alisher Navoiy, milliy mafkura namoyandalari va zamonaviy pedagogik qarashlar yoritilib, ma’naviy xavfsizlikni ta’minlashning samarali yondashuvlari taklif etiladi.*

Kalit so‘zlar. *Ezgu qarashlar, ma’naviyat, og‘zaki an’analar, milliy qadriyatlar, ma’naviy tahdidlar, globallashuv, tarbiya, ma’naviy xavfsizlik.*

Rejapov A. A.
department of foreign languages
Andijan Institute of Agriculture and Agrotechnologies

EDUCATION OF VIRTUOUS WORLDVIEWS: INTERPRETATION OF ORAL TRADITIONS, NATIONAL VALUES, AND CONTEMPORARY SPIRITUAL THREATS

Annotation. *In this article, the theoretical and methodological foundations of cultivating virtuous worldviews are examined, focusing on the role of oral traditions and national values in shaping the spiritual development of the younger generation. It also analyses the impact of contemporary spiritual threats emerging in the context of globalization. The study integrates insights from Abu Ali Ibn Sina, Alisher Navoi, national ideology scholars, and modern pedagogical theories, proposing effective approaches to strengthening spiritual security.*

Key words. *Virtuous worldview, spirituality, oral traditions, national values, spiritual threats, globalization, education, spiritual security.*

Global axborot oqimi bugungi kunda mislsiz tezlashdi. Internet va mobil texnologiyalar inson hayotining barcha jabhalariga chuqur kirib bordi, transmilliy madaniy oqimlar esa yoshlarning ma’naviy dunyosida murakkab qarama-qarshi jarayonlarni yuzaga keltirmoqda. Bugungi avlod axborot manbalariga qulay kirish imkoniga ega bo‘lsa-da, bu ularning milliy identiteti, ruhiy barqarorligi va qadriyatlar tizimiga sezilarli bosim o‘tkazmoqda.

Shu sababli, ma’naviy tarbiya masalalari strategik ahamiyatga ega. Ayniqsa, o‘zbek xalqining ming yillar davomida shakllangan og‘zaki an’analari — ertaklar, dostonlar, afsona va rivoyatlar, latifalar, maqollar, hikmatlar — yoshlar ongining sog‘lom rivojlanishida beqiyos rol o‘ynaydi. Ushbu janrlar faqat badiiy san’at namunalari emas, balki milliy ma’naviy xavfsizlikning mustahkam poydevori sifatida xizmat qiladi.

O‘zbek xalq og‘zaki ijodi- xalqning tarixiy xotirasi, ijtimoiy psixologiyasi, ma’naviy qarashlari va ruhiy tamoyillarini bir tizim sifatida mujassam etadi.

Folklor nafaqat badiiy matnlarni, balki quyidagilarni o‘zida jamlaydi: Axloqiy qadriyatlar tizimi — qahramonlarning yaxshi va yomon xatti-harakatlari orqali bolalarda axloqiy me’yorlarni shakllantiradi. Tarixiy tajriba qatlamlari — avlodlar tajribasi va hayotiy saboqlarni saqlaydi. Milliy mentalitetning belgilari — xalqning o‘ziga xos fikrlash, his-tuyg‘ular va qaror qabul qilish xususiyatlarini ifodalaydi. Xalq pedagogikasi modeli — tarbiyaviy printsiplar va qadriyatlarni avloddan-avlodga yetkazadi. Shu sababli folklor jamiyat uchun “ma’naviy genetik kod” vazifasini bajaradi: xalqning kimligi, dunyoqarashi va ezgulikka munosabati avloddan-avlodga uzluksiz uzatiladi. Folklordagi obrazlar ko‘pincha qarama-qarshi kutublar bilan ifodalanadi: Yaxshilik — yovuzlik, halollik — hiyla, mardlik — qo‘rqoqlik, saxovat — ochko‘zlik.

Bunday qarama-qarshiliklar bolada axloqiy farqlash qobiliyatini shakllantiradi. U bolalikdan yaxshi va yomonni tabiiy ravishda ajrata boshlaydi, bu esa shaxsning ma’naviy rivojlanishi uchun muhim poydevordir. Bugungi kunda ko‘plab davlatlarda milliy identitet inqirozi yuzaga kelmoqda. Bu jarayon: multimedia madaniyatining cheksiz hukmronligi, internet psixologiyasi, virtual qadriyatlar tizimi bilan bog‘liq. Shu sharoitda folklor, avvalo, milliy o‘zlikni asrash vositasiga aylanadi va yoshlar ma’naviyatini mustahkamlashda hal qiluvchi rol o‘ynaydi.

Sharq tafakkurida ezgulik tushunchasi inson kamolotining tayanchi hisoblanadi. Abu Ali Ibn Sino, Beruniy, Alisher Navoiy, Bahovuddin Naqshband, Ahmad Yassaviy kabi olimlar insonni ezgulikka yetaklovchi omillarni chuqur tahlil qilgan. Ezgulik tushunchasi quyidagilar bilan izohlanadi: ruhiy poklik, halollik, adolat, saxovat, vatanparvarlik.

Tasavvufda esa “ezgulik — nafsni yengish orqali hosil bo‘ladi” degan tamoyil mavjud. Bu esa shuni anglatadiki, ma’naviy mukammallikka erishish uchun inson avvalo o‘z ichki istaklari va shaxsiy kamchiliklari ustida ishlashi kerak. Ezgulik faqat shaxsiy fazilat emas, balki ijtimoiy yuksak qadriyat sifatida qaraladi. Insonning jamiyat oldidagi mas’uliyati va davlatning fuqarolar oldidagi majburiyatlari ham shu tushunchaga bog‘liq. Shu bois, ezgulik konsepsiyasi tarbiyaviy va ma’naviy jarayonlarning markazida turadi.

Mahalla — qadriyatlar uzluksizligining markazi bo‘lib, o‘zbek xalqining eng qadimiy ijtimoiy institutlaridan biri sifatida quyidagi vazifalarni bajaradi: tarbiyaviy jarayonni nazorat qilish, yoshlarni jamoaga qo‘shish, odob-axloq me’yorlarini shakllantirish, ma’naviy muhit yaratish.

Shu o‘rinda, oila — ma’naviy tarbiyaning boshlang‘ich maktabi bo‘lib, u tarbiyasining asosiy prinsiplari: mehr va e’tibor, shaxsiy namuna, odob va axloq, qadriyatlarga hurmat bilan qarashdir.

Bugungi kunda o‘zbek ta’lim tizimi quyidagi vositalar orqali milliy qadriyatlarni yosh avlodga yetkazmoqda: tarbiyaviy dasturlar, “Ma’naviyat soati”, adabiyot va tarix darsliklari, ma’naviyat va ma’rifat markazlari.

Bugungi davrda ma’naviy tahdidlar murakkab tizim holiga kelgan va quyidagi turlarga ajratish mumkin: Axborot-psixologik tahdidlar: yolg‘on axborotlar, manipulyativ kontent, psixologik bosim, radikal g‘oyalar, destruktiv oqimlar.

Madaniy ekspansiya: transmilliy pop-madaniyatning ko‘pligi, milliy o‘zlikdan uzoqlashish, ma’naviy beqarorlik.

Virtual hayot sindromi: real hayotdan ajralish, ijtimoiy munosabatlarning zaiflashuvi, yolg‘on ideallar va stereotiplar.

Bular ichida qadriyatlardan begonalashish eng xavfli jarayon, chunki inson o‘z tarixidan, milliy merosidan va ma’naviy ildizlaridan uzoqlashganda istalgan g‘oyaga ta’sirlanishi osonlashadi.

Folklor asosida tarbiya texnologiyalari : Rol o‘yinlari — ertakdagi qahramonlarni jonlantirish orqali axloqiy qaror qabul qilishni o‘rgatadi. Audio-ertaklar bilan ishlash — tinglovchilar diqqatini jamlaydi va tasavvurini rivojlantiradi. Raqamli folklor loyihalari — interaktiv loyihalar, mobil ilovalar va onlayn xaritalar orqali yoshlarni jalb qiladi. Og‘zaki an’analarni sahnalashtirish — dramatizatsiya orqali axloqiy darslarni mustahkamlaydi.

Qadriyatlarga asoslangan ta’lim modeli tarkibida darsliklar va mashg‘ulotlarda: halollik, mas’uliyat, sabr-toqat, mardlik, mehr-oqibat asosiy ma’naviy kategoriyalar sifatida ishlatilishi muhum hisoblanadi.

Bunday holatda ma’naviy immunitetni shakllantirishda yoshlar quyidagi ko‘nikmalarni egallashi muhim: tanqidiy fikrlash, axborotni tahlil qilish, shaxsiy pozitsiya shakllantirish, mustaqil qaror qabul qilish.

Milliy adabiyotimizda ertaklar orqali ma’naviy qarashlarning shakllanishi

“Zumrad va Qimmat” ertagi misolida: sadoqat, mehnatsevarlik, adolat, rahm-shafqat g‘oyalari bir necha syujet qatlamlarida yetkazilgan. Har bir qahramon o‘z xatti-harakati orqali yosh avlodga axloqiy dars beradi. Fidoyilik, el-yurtga sadoqat, halollik, mardlik, vatanparvarlik tushunchalari “Alpomish”, “Gorogly”, “Kuntug‘mish” dostonlarida ayniqsa yaqqol ko‘rinadi va bu asosiy g‘oya sifatida talqin qilinadi. Shu timsollar yoshlar ongida mustahkam axloqiy mezon yaratadi.

Xulosa sifatida ezgu qarashlar tarbiyasi — o‘zbek ma’naviy maktabining markaziy tushunchasi hisoblanadi. Og‘zaki an’analar, milliy qadriyatlar va zamonaviy pedagogik texnologiyalar uyg‘unligi yosh avlodning ma’naviy immunitetini mustahkamlashda strategik ahamiyatga ega. Globallashuv davrida yuzaga kelayotgan ma’naviy tahdidlar milliy merosning chuqur o‘rganilishini va ma’naviyatning zamonaviy shakllarda yetkazilishini talab qiladi. Oila, maktab,

mahalla va jamiyatning birgalikdagi faoliyati ezgu qarashlarga ega, barkamol va mustaqil fikrlovchi yoshlarni voyaga yetkazishda muhim omildir.

Foydalanilgan adabiyotlar ro’yhati

1. Karimov, I. A. (1997). Yuksak ma’naviyat — yengilmas kuch. Toshkent: Ma’naviyat.
2. Navoiy, Alisher. (2011). Mahbub ul-qulub. Toshkent: G‘afur G‘ulom nomidagi Adabiyot va san’at nashriyoti.
3. Qahhor, A., & R. Qo‘chqorov. (2019). Folklor va og‘zaki ijod nazariyasi. Toshkent: O‘zbekiston Milliy Universiteti nashriyoti.
4. Turaev, B. (2018). Milliy qadriyatlar va ma’naviy tarbiya asoslari. Toshkent: Fan va texnologiya.

Rizayev Sh. A., PhD
Karshi State Technical University
Isroilov.Y. Y., master
Karshi State Technical University
Republic of Uzbekistan, Karshi city
https://orcid.org/0009-0000-6679-6847

REDUCING CORROSION RATE BY ADDING INHIBITORS INTO BITUMEN

Abstract: *This study investigates the effectiveness of selected corrosion inhibitors incorporated into bitumen to reduce the corrosion rate of steel materials used in construction and infrastructure systems. Laboratory tests, including electrochemical measurements and accelerated corrosion exposure, demonstrate that inhibitor-modified bitumen significantly enhances barrier stability and reduces metal surface degradation. The findings confirm that tailored inhibitor compositions can greatly improve the long-term performance of bitumen-based protective coatings.*

Keywords: *Bitumen; corrosion inhibitor; steel protection; anti-corrosion coating; inhibitor efficiency; modified bitumen.*

Introduction

Bitumen-based protective coatings remain widely used for safeguarding steel structures, pipelines, and construction elements exposed to corrosive environments; however, their long-term performance is often limited by moisture penetration, oxidative aging, and poor resistance to electrolytic attack. Recent research has focused on modifying bitumen with corrosion inhibitors to enhance barrier performance, improve adhesion to metal surfaces, and slow electrochemical degradation. The use of chemical inhibitors directly within the bituminous matrix offers the potential to create multifunctional coatings that combine physical barrier protection with active corrosion suppression. Therefore, developing inhibitor-modified bitumen formulations represents a promising approach to improving the durability and service life of steel components in aggressive environments.

Previous studies indicate that inhibitors such as amines, phosphates, tannins, thiourea derivatives, and organic heterocycles can significantly reduce anodic and cathodic reaction rates when diffused to the metal–coating interface. Literature also shows that polymer–bitumen blends incorporating inhibitors exhibit superior impermeability and enhanced resistance to chloride ions and acidic conditions. Nevertheless, the efficiency of each inhibitor strongly depends on its compatibility with bitumen, its dispersion stability, and its ability to migrate to the metal surface without compromising the mechanical integrity of the coating. Recent advances highlight that integrating inhibitors into bitumen through controlled mixing, nano-supported carriers, or emulsified systems can produce more uniform distributions

and higher anticorrosion efficiency. However, comprehensive studies addressing the relationship between inhibitor concentration, bitumen rheology, electrochemical response, and environmental exposure remain limited.

The methodology of this study was developed to evaluate the influence of selected corrosion inhibitors on the protective performance of bitumen coatings. Bitumen samples were prepared using a hot-mix modification process at 140–160 °C, followed by the incorporation of two types of inhibitors: (1) an organic amine-based inhibitor known for strong adsorption on steel surfaces, and (2) a phosphate-based inorganic inhibitor providing passivation through protective film formation. Each inhibitor was added at concentrations of 0.5%, 1.0%, and 1.5% by weight. Homogeneous dispersion was ensured using mechanical stirring at fixed shear speed. Steel coupons (St3 carbon steel) were coated with the modified bitumen films at a thickness of 300–350 µm and cured for 24 hours. The corrosion behavior was evaluated using electrochemical impedance spectroscopy (EIS), Tafel polarization tests, and immersion exposure in 3.5% NaCl solution for 30 days. Bitumen physical properties—softening point, penetration, viscosity, and aging resistance—were measured following standard procedures to determine whether the inhibitors affected structural performance.

The experimental results show that adding inhibitors significantly reduced corrosion rates compared to the unmodified bitumen coating. The organic amine-based inhibitor demonstrated a strong increase in charge-transfer resistance (Rct), achieving up to a 65% reduction in corrosion rate at 1.0% concentration. The phosphate-based inhibitor showed comparatively lower efficiency at low concentrations, but at 1.5% it produced a stable passivating effect and improved resistance to chloride penetration. Tafel curves indicated that both inhibitors acted as mixed-type inhibitors, suppressing both anodic metal dissolution and cathodic oxygen reduction. Visual inspection after immersion tests revealed fewer blisters, reduced under-film rusting, and improved coating adhesion in inhibitor-containing samples. Rheological analysis also showed that up to 1.0% inhibitor addition did not significantly change bitumen’s softening point or viscosity, whereas higher concentrations caused slight stiffening. Aging tests confirmed that the presence of inhibitors contributed to lower oxidation-induced hardening.

The discussion of findings suggests that the corrosion inhibitors not only form protective films on the steel surface but also modify the bitumen structure to slow diffusion of corrosive species. The amine-based inhibitor demonstrated superior performance due to strong chemisorption and formation of a compact interfacial barrier. Meanwhile, the phosphate-based inhibitor primarily contributed to passive layer formation, providing long-term stability but requiring optimal concentration for maximum efficiency. The results confirm that adding suitable inhibitors enhances bitumen’s anticorrosion functionality without compromising its mechanical and rheological behavior when applied in controlled dosages. These observations align with theoretical corrosion models and prior studies showing that hybrid coatings combining barrier protection and active inhibition yield significantly improved durability. Overall, inhibitor-modified bitumen presents a

viable and technologically adaptable solution for extending the service life of metal infrastructures in saline, humid, and industrial environments.

Conclusion

This study demonstrates that incorporating corrosion inhibitors into bitumen significantly enhances its protective performance on steel substrates. Both amine-based and phosphate-based inhibitors improved the electrochemical resistance of the coating by reducing anodic dissolution and suppressing cathodic reactions. The amine inhibitor showed the highest efficiency, decreasing the corrosion rate by up to 65% at optimal concentration, while the phosphate inhibitor provided stable long-term passivation at higher dosage levels. Experimental results from EIS, Tafel analysis, and immersion tests confirmed that inhibitor-modified bitumen forms a more effective barrier against moisture and chloride penetration, resulting in fewer defects and reduced under-film corrosion. Importantly, the addition of inhibitors up to 1.0% did not negatively affect the rheological or mechanical properties of bitumen, ensuring that coating performance remained structurally stable. Overall, the findings indicate that the use of chemical inhibitors within bitumen formulations is a practical and efficient strategy for enhancing durability and extending the service life of metal structures operating in aggressive environments.

References

1. Jones, D. A. Principles and Prevention of Corrosion. 3rd ed. Upper Saddle River: Prentice Hall, 2016. — Corrosion fundamentals and metal protection principles.
2. Petersen, J. C. “Chemical Composition of Asphalt as Related to Asphalt Durability.” Transportation Research Record, vol. 999, 2018, pp. 13–30.
— Bitumen chemistry and degradation mechanisms.
3. Quraishi, M. A., and Singh, A. “Corrosion Inhibition of Steel by Newly Synthesized Organic Molecules in Chloride Media.” Corrosion Science, vol. 52, no. 4, 2020, pp. 1529–1535. — Organic inhibitors and steel corrosion mechanisms.
4. Al-Mansour, A., et al. “Performance of Bitumen Modified with Corrosion Inhibitors for Steel Protection in Coastal Environments.” Construction and Building Materials, vol. 257, 2020, 119543. — Bitumen + inhibitor systems and corrosion reduction.
5. Rizayev S. A. & Isroilov Y. Y. “Korroziyaga qarshi qoplamalar va ingibitorlar tanlash” Development Of Science 2025 / 11 Issue 11. Volume 6. (https://devos.uz/article.php?id=2676)

Rustamov U. Q.
associate professor
department of fine arts and music education
Andijan State Pedagogical Institute

METHODS FOR IMPROVING THE EXPRESSION OF CHARACTER AND INNER WORLD IN PORTRAIT ART

Annotation*: This article primarily analyzes the modern methods of expressing character and the inner world in portrait art. Portrait art mainly reflects the external appearance and internal state of a person, where the methods of depicting the artist's inner world and psychological state play a crucial role. The article discusses the distinctive features and evolving methods of expressing character and the inner world through portrait art, as well as the ways in which artists leave their creative mark. This topic highlights not only the aesthetic value of portrait art but also its psychological significance.*

Keywords*: Portrait Art, Psychological Traits, Artist Methods, Expression of Character, Inner World*

Introduction

Portrait art plays a crucial role in reflecting both the inner world and the external appearance of a person. It is one of the oldest and most complex forms of art, initially focused on representing a person's external appearance, facial expressions, and posture. However, with the development of portrait art, artists have expanded beyond just depicting the outer appearance and began to explore the expression of a person's emotional state, psychological experiences, and inner world. Through portraiture, the character, emotions, and psychological aspects of a person are powerfully expressed. In this art form, the artist not only captures the external appearance but also incorporates the subject’s inner world into their work. By using colors, composition, shading, and lighting, the artist has the ability to unveil the inner world of the subject.

Literature review and methodology

The historical development of portrait art has included new approaches to depicting both the external appearance and the inner world of a person. Numerous scholarly studies have attempted to analyze the artistic and psychological significance of portraiture, focusing on the success of artists in portraying the inner world. The psychological aspects of portrait art were first explored in the 17th century during the Baroque period by famous artists like Rembrandt and Francisco de Goya. These artists reflected not only the external appearance of a person but also their inner experiences and emotional states. The changing methods of portrait art include not only traditional approaches but also new techniques used by contemporary artists to depict the inner world. For example, in the 20th century, Expressionism and Surrealism schools used portraiture to represent psychological and internal worlds. Expressionist artists accepted

portraiture as an ideal tool for portraying emotional states, where human emotions, fears, and inner experiences were expressed through colors, shapes, and structural elements. Surrealism, on the other hand, used portraiture to depict the inner consciousness and unconventional imaginations of the subject. Moreover, the works of psychologists like Viktor Frankl and Zygmunt Freud are crucial in the development of artistic and scientific analyses of expressing the inner world through portraiture. Their psychological analysis methods and approaches to understanding the human psyche have created new possibilities for portrait art. The methods for expressing character and the inner world in portrait art have been studied. The methodology of the research uses both qualitative and quantitative research methods. The study involves analyzing existing literature on portrait art and identifying methods for expressing the inner world and character through artists' works. The process includes comparing classical and modern portrait techniques, as well as studying the artistic methods used in portrait creation. In qualitative research, the works of portrait artists and their psychological approaches are analyzed. These approaches include examining the psychological and artistic methods artists use in creating portraits, and the artistic tools they apply to represent the inner world. Changes in artists' approaches and the impact of applying new methods are also examined. Quantitative research identifies the measures of success in portraying the inner world and character through portrait art. This method helps evaluate the effectiveness of different portrait techniques and methods. By analyzing the success and failure of artists' approaches, and examining their innovative portraiture techniques, the effectiveness of portrait art methods can be assessed.

Discussion and conclusion

Portrait art is a unique artistic form that plays a crucial role in expressing both the inner world and the character of a person. Each era and culture has developed its own methods of portraiture, leading to new approaches for reflecting a person’s external appearance and internal state. In particular, portrait art has provided vast opportunities for artists to express the inner world through their individual approaches and artistic methods. Contemporary artists are experimenting with numerous new techniques and methods in the process of creating psychological portraits, which has led to revolutionary changes in the field of portrait art. Especially in the 20th century, portrait art became prominent due to the success of artists in depicting human psychology, emotions, and the inner world. Artistic movements like Expressionism and Surrealism transformed portraiture into one of the strongest tools for reflecting the internal world. Expressionist artists used colors, shapes, and shading to express the psychological state and inner experiences of their subjects. Surrealism, on the other hand, utilized portraiture to represent the subconscious and unconventional imaginations. These approaches marked the beginning of a new phase in portrait art, enhancing its artistic and psychological significance. The personal approach of artists plays a significant role in expressing the inner world through portraiture. Each artist, based on their artistic thinking, applies new methods to portray the

inner world of a person. For instance, in recent years, psychological aspects, inner experiences, and individual states have become more prominent in portrait art, with artists increasingly embracing subjectivity in their works. On the other hand, the portraits created by artists can evoke individual and collective reactions in viewers, stirring new emotions. This creates new dimensions for portrait art. The methods of expressing character and the inner world through portraiture have been perfected, especially by contemporary artists. The artistic and psychological significance of portraiture has increased today, with artists opening new opportunities to reveal the inner world of individuals through this art form. New methods, using modern technologies and techniques, are applied to create portraits where the psychological state of the subject is expressed in a clearer and more precise way. Furthermore, the psychological approaches in portrait art are not only artistically compelling but also scientifically significant. The intersection of psychology and art gives portraiture an essential role, encouraging artists to help viewers gain a deeper understanding of human nature by revealing the inner world. This research shows that portrait art is the most effective tool for reflecting not only a person's external appearance but also their inner experiences, psychological state, and character.

Conclusion

Portrait art has historically established itself as the most powerful tool for expressing both the inner world and external appearance of a person. Through this art form, artists aim not only to depict the physical appearance but also the emotional state, mood, feelings, and inner experiences of the subject. Especially from the 20th century onwards, portraiture evolved into an unchanging art form that portrays not just the external appearance but also the inner world of the individual. In the history of portrait art, movements such as Expressionism and Surrealism used portraiture as a strong means to reflect internal emotions and psychological states. These movements provided artists with the opportunity to apply new artistic and psychological methods. In Expressionism, for example, artists used colors and shapes to express the psychological state and inner experiences of individuals. In Surrealism, portraits were used to represent the subconscious and unconventional imaginations of the subject. The creative approaches of artists play a significant role in expressing character and the inner world through portraiture. Each artist uses unique methods in their artwork to depict the human psyche. Portrait art, through its portrayal of the inner world, also evokes new emotions and thoughts in the viewer. This makes portraiture not only aesthetically valuable but also psychologically and scientifically significant. Today, portrait art continues to evolve, enriched with new technologies, methods, and techniques. Contemporary artists are incorporating digital technologies and new visual approaches into their work, which has brought portrait art to a new stage. Moreover, artists are striving to depict the psychological state of the subject in more profound and precise ways through the application of new methods. Additionally, psychological methods and scientific approaches play a major role in further developing the expression of the inner world through portraiture. The

connection between psychology, art, and artistic techniques has strengthened, creating new opportunities for portrait art. Artists are now making significant changes not only artistically but also scientifically by highlighting inner emotions and psychological states in their works. Thus, portrait art is a powerful means of self-expression and communication. It continues to be the most effective tool for depicting not only external appearances but also the inner world, psychological states, and character. The creativity and methodological research of artists have made portraiture even more refined, enriching this art form with new artistic and psychological dimensions.

References:

1. G'ulomov, R. (2009). "Portret san'ati va uning psixologik o'zgarishlari." Toshkent: San'at nashriyoti.
2. Jahon, M. (2011). "Rassomlik va ichki dunyo." Moskva: Tasviriy san'at akademiyasi.
3. White, J. (2017). "Psychological Portraiture: Techniques and Approaches." London: Art Books.
4. Goya, F. (2010). "Portraiture and Psychological Expression in Art." Madrid: Goya Editions.
5. Rembrandt, P. (2015). "The Psychological Depth in Rembrandt's Portraits." Amsterdam: Rijksmuseum Publishing.
6. Freud, S. (1991). "The Interpretation of Dreams." London: Hogarth Press.
7. Frankl, V. E. (2006). "Man's Search for Meaning." Boston: Beacon Press.
8. Azuma, H., Milgram, P., & Kishino, F. (1997). "Mixed Reality: Merging Real and Virtual Worlds." Tokyo: Springer-Verlag.
9. Gombrich, E. H. (2002). "The Story of Art." London: Phaidon Press.
10. Pinsky, R. (2013). "Portraits of Emotion: How to Express a Character in Art." New York: HarperCollins.
11. Zhuravleva, T. (2014). "Psychological Portraits in the Art of the 20th Century." Moscow: Art Literature.
12. Schneider, M. (2018). "Art as a Mirror: Psychological Insights in Portraiture." Paris: La Bibliothèque des Arts.
13. Bazin, A. (2010). "The Evolution of the Portrait: A Historical Perspective." Paris: Editions du Centre Pompidou.
14. Matisse, H. (2005). "The Portrait as Expression of the Inner World." Paris: Matisse Foundation.
15. Tolstoy, L. (2000). "Art and its Purpose: Psychological and Emotional Depth in Portraiture." Moscow: Russian Art Publishers.
16. Bakhtiyorovich, Ismonov Khurshidbek, and Ruziyev Nuriddin Mukhammadaliyevich. "Pairing, Their Own Aspects and Corresponding Methods of Work with Pairing in the Autocad Software." International Journal on Orange Technologies 3.12 (2021): 211-216.
17. qizi Abduraimova, Muazzamoy Abduqodir. "PERSPEKTIVA." INTERNATIONAL CONFERENCES. Vol. 1. No. 11. 2022.

18. Xurshidbek, Ismonov, Rustamov Umurzoq, and Abduraimova Muazzamoy. "MARKAZIY VA PARALLEL PROYEKSIYA ORTOGONAL PROYEKSIYALAR VA MODELNI KO ‘RINISHLARI." Educational Research in Universal Sciences 1.4 (2022): 70-81.
19. Ismonov, Xurshidbek Baxtiyorivich, and Muazzamoy Abduqodir qizi Abduraimova. "ORTOGONAL PROYEKSIYALAR VA MODELNI KO ‘RINISHLARI." Educational Research in Universal Sciences 1.3 (2022): 288-296.
20. Qizi, Abduraimova Muazzamoy Abduqodir. "PROJECTION AND AXONOMETRY."
21. "UMUM TA’LIM MAKTABLARDA CHIZMACHILIK FANINI O‘QITISHNING HOZIR HOLATI." Oriental Art and Culture, Vol. 5, No. 6, 2024, pp. 65–69.

Sadullaeva I. K.
head of the department of propaedeutics of childhood diseases and pediatric neurology
Bukhara State Medical Institute

FEATURES OF CYTOKINE REGULATION IN CHILDREN WITH ACYANOTIC CONGENITAL HEART DEFECTS

Abstract*: Acyanotic congenital heart defects (CHDs) are a group of cardiac anomalies that do not cause mixing of systemic and pulmonary blood to a degree sufficient to produce cyanosis.*
To investigate cytokine concentrations in children with acyanotic congenital heart defects, 28 children with a confirmed diagnosis of acyanotic CHD were examined. The control group consisted of 28 practically healthy children of comparable age. The concentrations of interleukins and tumor necrosis factor alpha (IL-6, IL-8, TNF-α) in blood serum were measured using solid-phase enzyme-linked immunosorbent assay (ELISA) with test systems manufactured by Vector-Best (Novosibirsk, Russia). Hypersecretion of IL-6, IL-8, and TNF-α was detected in patients with CHD. The increased levels of the studied immune response mediators may represent a protective reaction of the body to stress and tissue damage; however, prolonged expression may lead to pathological alterations and influence the development and progression of CHDs. The elevated concentrations of the investigated immune mediators may serve as a protective mechanism, yet their sustained expression can contribute to pathological changes and affect the course and progression of congenital heart defects.
Keywords: *congenital heart defects, children, acyanotic, cytokines, serum, imbalance*

Relevance

Congenital heart defects (CHD) without cyanosis are a group of cardiac anomalies that do not cause blood mixing between the systemic and pulmonary circulations to an extent that would result in cyanosis. These defects can take various forms and vary in severity.

The study of interactions between the immune system and pathological processes has limited applicability in the context of congenital heart defects, since the primary causes of these defects are related to the development of the cardiovascular system during the embryonic period rather than to immune mechanisms.

However, immunological mechanisms may play some role in the formation of CHD. For example, some studies suggest a possible link between CHD and immune factors, such as maternal immune responses to infections during pregnancy or autoimmune processes. Nevertheless, these associations remain under active investigation, and the precise mechanisms by which immune factors may influence the development of acyanotic CHD are not yet fully understood.

It is known that most diseases are associated with elevated levels of pro-inflammatory cytokines. It is believed that chronic inflammatory processes may be sustained by an imbalance between pro- and anti-inflammatory cytokines. Cytokines are biologically active factors produced by numerous cells from various tissues and organs; they are secreted by cells during their life processes in response to external stimuli [24].

The main cells synthesizing and secreting immunoregulatory cytokines in the body are helper T-lymphocytes (Th), which differ in phenotype and the spectrum of marker cytokines they produce: Th0 (IL-2), Th1 (IL-2, IFN-γ, TNF-α, and TNF-β) (cellular immune response), and Th2 (IL-4, IL-5, IL-6, IL-9, IL-13) (humoral immune response) [6]. Since cytokines and their receptors are synthesized in response to antigen stimulation of cells, the overall activity level of the cytokine system determines the nature of the body's response to physiological and pathogenic stimuli [21].

According to current understanding, an imbalance between Th1 and Th2 cytokines may play a role in the immunopathogenesis of virtually all diseases, both infectious and non-infectious [20].

Pro-inflammatory cytokines (IL-1, IL-6, IL-12, TNF-α, interferons, chemokines, IL-8, etc.) stimulate the inflammatory response and help eliminate damaged cells and viruses. Elevated levels of these cytokines in the blood reflect the activity and severity of the inflammatory process.

Inflammation plays an important role in cardiovascular diseases, and inflammatory markers can predict future cardiovascular events [11].

Currently, according to the literature, there is a growing body of evidence indicating that the levels of anti-inflammatory cytokines in the blood show a significant positive association with various types of CHD [14].

Objective

To study cytokine concentrations in children with acyanotic congenital heart defects.

Materials and methods

This study included 28 children diagnosed with acyanotic CHD. The control group consisted of 28 practically healthy boys and girls of similar age. The participants were aged from 1 to 12 years.

Immunological studies in the examined children were conducted at the Laboratory of Immunoregulation, Institute of Immunology and Human Genomics, Academy of Sciences of the Republic of Uzbekistan.

The concentrations of interleukins and tumor necrosis factor-alpha (IL-6, IL-8, TNF-α) in peripheral blood serum were determined using a solid-phase enzyme-linked immunosorbent assay (ELISA) with test systems from JSC "VECTOR-BEST" (Novosibirsk, Russia). Quantitative assessment of the results was performed by constructing a calibration curve, reflecting the relationship between optical density and concentration for the standard antigen, which allowed comparison with the studied samples.

Statistical analysis of the obtained data was performed using the computer

program “Statistica 6.0.”

The data were statistically processed using standard approaches. Results are presented as the sample mean (M) and standard error of the mean (m); the median (Me), representing the central tendency; and the upper and lower quartiles, reflecting the spread of values in 50% of respondents (Q1–Q3), where Q1 is the 25th percentile, Me is the 50th percentile, and Q3 is the 75th percentile. The significance of differences between mean values (P) of the compared parameters was assessed using Student’s t-test.

Results and discussion

Pro-inflammatory mechanisms of heart failure are mediated by various cytokines, which can induce cardiomyocyte hypertrophy, apoptosis, fibrosis, and ultimately lead to adverse cardiac remodeling. In accordance with the study objective, the first stage of our immunological investigations involved determining the serum levels of a range of pro-inflammatory cytokines in the group of children with acyanotic CHD. The obtained results are presented in Table 4.1 below.

Table 4.1

Serum Levels of Pro-Inflammatory Cytokines in Examined Children with Acyanotic CHD

Indicator	M±m, pg/mL	Me [Q1; Q3]	Min, pg/mL	Max, pg/mL
Control group, n=28				
IL-6	6,25±0,43	5,90 [4,12; 8,82]	2,51	9,70
IL-8	12,66±0,60	12,45 [9,70; 15,67]	9,11	19,13
TNF-α	15,17±0,49	15,22 [13,3; 17,28]	10,63	19,74
Congenital heart defects of the acyanotic type (without cyanosis), n=28				
IL-6	22,08±1,09***	21,90 [17,3; 25,2]	12,30	33,12
IL-8	46,82±1,86***	47,30 [37,47; 53,72]	29,71	63,52
TNF-α	56,53±2,82***	53,25 [45,87; 66,80]	32,93	86,52

Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001). Me — median; Q1 — 25th percentile; Q3 — 75th percentile.*

Members of the IL-6 family modulate the immune response and inflammatory activity, and subsequently participate in the development of cardiovascular diseases [5,7,9].

Interleukin-6 (IL-6) is a pleiotropic pro-inflammatory cytokine that can be produced by activated T cells, B cells, monocytes, and malignant cells. Macrophages, adipocytes, hematopoietic cells, and endothelial cells are also cellular sources of IL-6 [16].

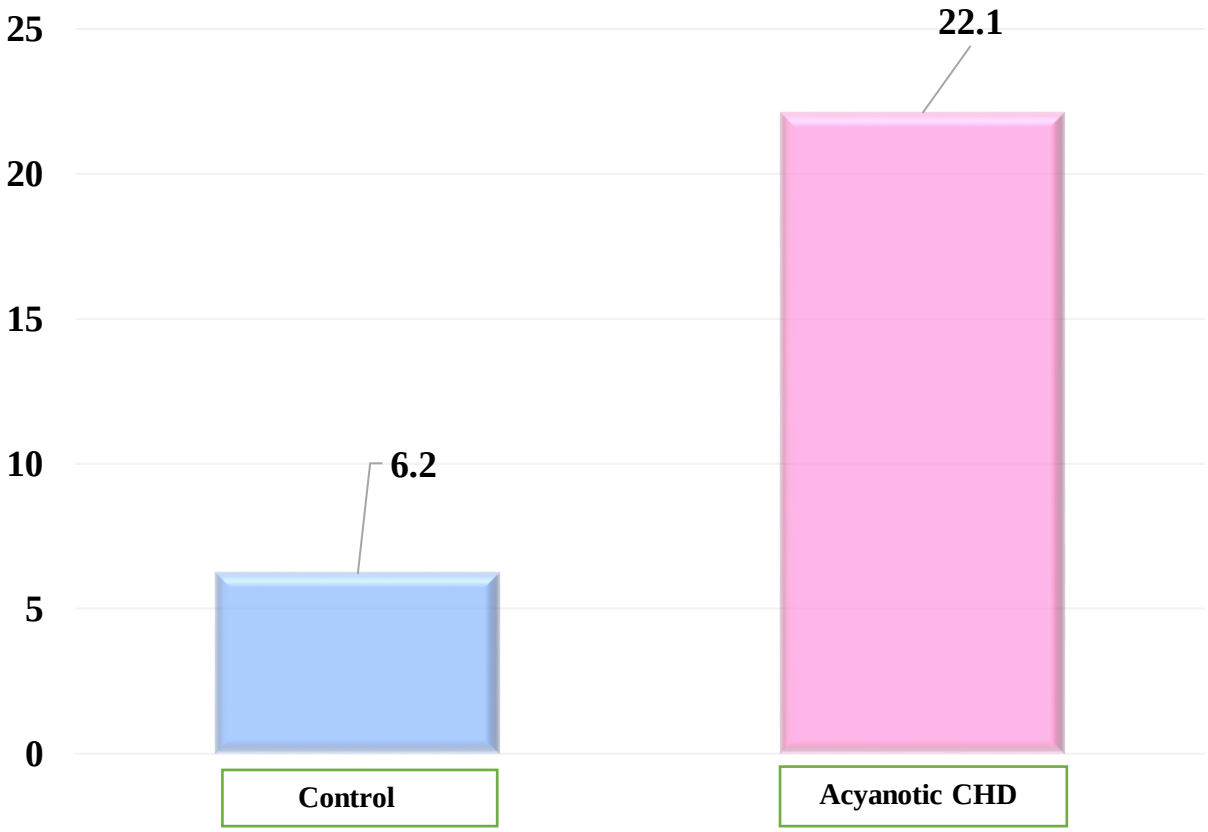


Figure 4.1. IL-6 Levels in Children with Acyanotic CHD and in the Control Group.

Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001).*

Analysis of the obtained results for IL-6 in the serum of children with acyanotic CHD revealed statistically significant differences compared to healthy children in the control group. The serum IL-6 level in children with acyanotic CHD was increased 3.5-fold, with a mean value of 22.1 ± 1.09 pg/mL, whereas in the control group it averaged 6.2 ± 0.44 pg/mL (P<0.001).

IL-6 is a cytokine that plays an important role in the immune system and inflammatory processes. Elevated IL-6 levels may be associated with various pathological conditions, including congenital heart defects (CHD). The obtained results suggest possible links between IL-6 and CHD:

1. Inflammatory response: CHD may trigger inflammatory reactions in cardiac tissue and blood vessels. IL-6 is a key mediator of inflammation and can be produced by immune cells in response to tissue damage.

2. Cardiac remodeling: CHD can lead to abnormal remodeling of cardiac tissue, including myocardial hypertrophy. IL-6 may stimulate remodeling processes in the heart and contribute to the development of hypertrophy.

3. Immune regulation: IL-6 also plays a critical role in immune regulation and can affect various aspects of the immune response, including activation and function of immune cells. Dysregulation of immune responses may be associated

with CHD development, and elevated IL-6 levels may indicate an imbalance in the immune system.As is known, chemokines are a family of cytokines that induce directed migration of leukocytes along a concentration gradient, leading to the accumulation of migrating cells at the chemokine source [19]. Therefore, the next stage of our research was to study serum IL-8 levels, thereby identifying the role of this immune response mediator in CHD.

IL-8 is a pro-inflammatory cytokine, or chemokine (CXCL8), produced by various cell types, including endothelial cells, peripheral blood monocytes, and vascular smooth muscle cells. IL-8 is encoded by IL8 or CXCL8 [15]. Studies by Kim D.-H. et al. (2013) and Takami M. et al. (2002) in patients and experimental cell culture models [6,12] have shown that IL-8 is involved in the pathogenesis of cardiovascular diseases, including coronary artery disease (CAD) [12], myocardial infarction (MI) [13], strokes [17], and other conditions. In cardiovascular diseases, IL-8 participates in all stages of atherosclerosis and the development of CAD [1,4].

According to the described mechanisms, under normal physiological conditions, macrophages, endothelial cells, and epithelial cells produce IL-8 in response to infection or tissue damage. One of the functions of IL-8 is to induce chemotaxis of granulocytes, primarily neutrophils, to the affected area [2]. IL-8 signaling in vascular endothelial cells stimulates cell proliferation, survival, and migration [8], ultimately leading to the formation of new blood vessels [10].

To determine the role and involvement of the above-mentioned chemokine under normal conditions and in various types of CHD, we studied serum IL-8 levels as one of the key mediators of the immune response and an activator of the angiogenic response. The comparative results obtained during the study are presented in Table 4.1 and Figure 4.2.

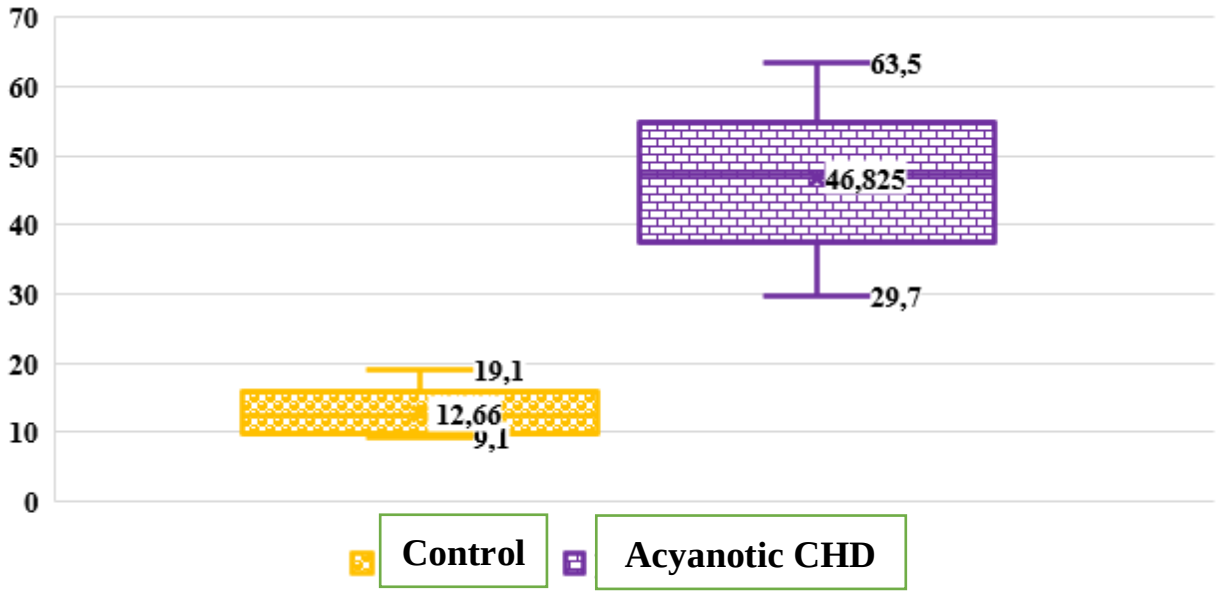


Figure 4.2. Serum IL-8 Levels in the Groups of Examined Children.

Analysis of the results revealed relatively high IL-8 levels in the group of children with acyanotic CHD. The serum concentration of this chemokine in the main group was increased 3.7-fold, with a mean value of 46.82 ± 1.86 pg/mL and an individual range of 29.7 to 63.5 pg/mL, whereas in the group of practically healthy children, the mean level was 12.66 ± 0.60 pg/mL ($P<0.001$). We hypothesize that the elevated levels of interleukin-8 (IL-8) in congenital heart defects may be explained by several factors:

1. Inflammation and immune activation: CHD triggers inflammatory responses in cardiac tissue and blood vessels. IL-8 is a cytokine that plays a key role in attracting and activating inflammatory cells such as neutrophils and macrophages. Elevated IL-8 levels may reflect activation of the inflammatory process resulting from the congenital heart defect. 2. Angiogenesis: IL-8 is also involved in the regulation of angiogenesis—the formation of new blood vessels. Increased IL-8 levels may indicate enhanced activation of angiogenic mechanisms aimed at compensating for vascular defects.

3. Regulation of the immune response: IL-8 can influence the immune response by regulating the activity of immune cells and the production of pro-inflammatory cytokines. Elevated IL-8 levels may indicate an imbalance in the immune system, which is likely associated with acyanotic CHD.

One of the key pro-inflammatory cytokines widely studied as a potential biomarker associated with heart failure is TNF-α [3].

Tumor necrosis factor alpha (TNF-α) is a member of the family of immunologically significant proteins and a pro-inflammatory cytokine with a broad range of activity. The main producers of TNF-α are monocytes and macrophages. It is also secreted by neutrophils, endothelial and epithelial cells, eosinophils, mast cells, and B- and T-lymphocytes when involved in the inflammatory process [23].

Under normal conditions, TNF-α plays a fundamental physiological role in immune regulation. However, in certain cases, it can exert pathological effects, contributing to the development and progression of inflammation, microvascular hypercoagulation, hemodynamic disturbances, and metabolic wasting (cachexia) in various human diseases of both infectious and non-infectious origin [18].

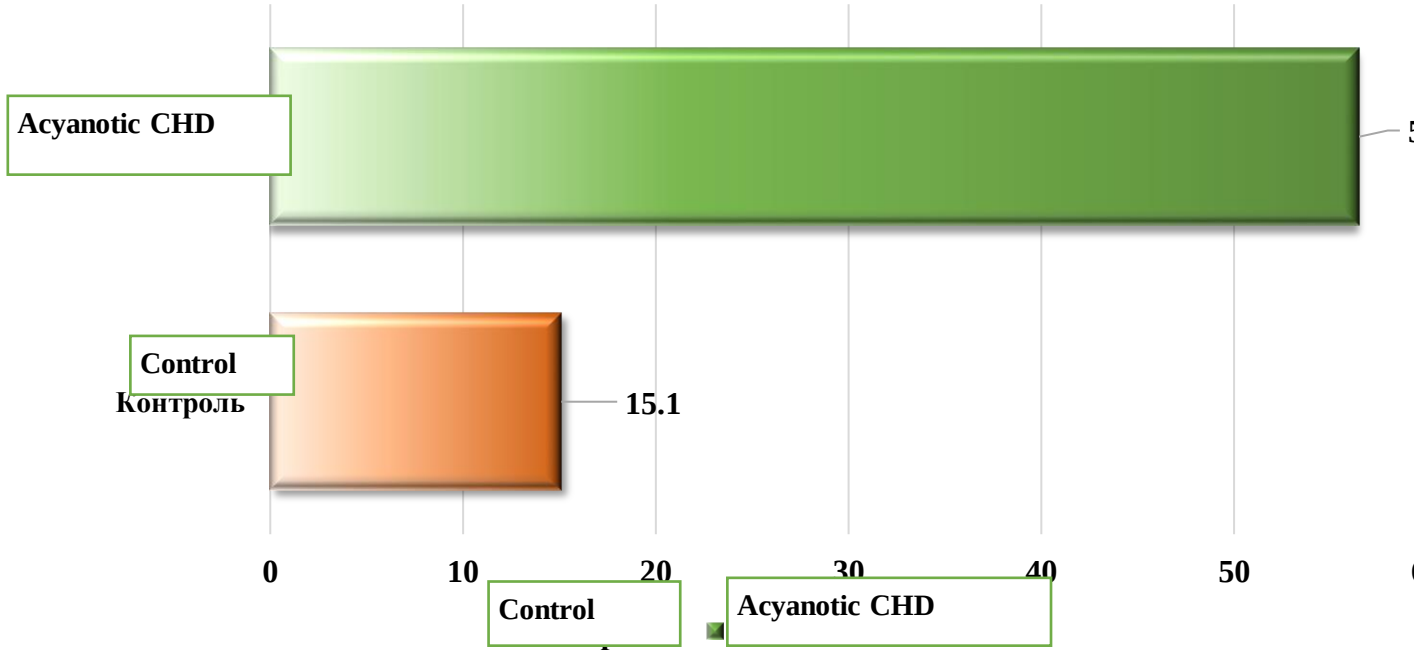


Figure 4.3. TNF-α Levels in Children with Acyanotic CHD and the Control Group.

Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001).*

Comparative assessment of serum TNF-α levels, shown in Figure 4.3, revealed statistically significant results in the group of children with acyanotic CHD. TNF-α synthesis in children with acyanotic CHD increased 3.7-fold, with a mean value of 56.53 ± 2.82 pg/mL and a range of 32.9 to 86.5 pg/mL, whereas in healthy children, the mean level was 15.17 ± 0.49 pg/mL (P<0.001) (Table 4.1).

Elevated serum TNF-α levels in the group of children with acyanotic CHD likely indicate the development of cardiac cachexia in children with chronic congestive heart failure or chronic hypoxemia, and may reflect several factors:

1. Inflammation: TNF-α is an important mediator of inflammation and can be produced by immune cells in response to tissue damage.

2. Cardiac remodeling: TNF-α may be involved in remodeling processes and contribute to the development of fibrosis and hypertrophy. Elevated TNF-α levels may reflect its participation in pathological changes in cardiac tissue in congenital heart defects.

3. Immune regulation: TNF-α is one of the key cytokines regulating the immune response, and its elevated levels may indicate an imbalance in this system.

Conclusion

Thus, the elevated levels of the studied pro-inflammatory cytokines in acyanotic CHD result from a complex interplay between pathological changes in

the heart, stress conditions, immune system activation, and compensatory mechanisms of the body. Therefore, further research is required to fully understand the mechanisms of this process and the potential use of pro-inflammatory cytokines in the diagnosis and treatment of CHD.

Literature:

1. Boekholdt S. M., Peters R. J. G., Hack C. E., et al. IL-8 plasma concentrations and the risk of future coronary artery disease in apparently healthy men and women. Arteriosclerosis, Thrombosis, and Vascular Biology. 2004;24(8):1503–1508. doi: 10.1161/01.atv.0000134294.54422.2e. [PubMed] [CrossRef] [Google Scholar]
2. Brinkmann, V.; Reichard, U.; Goosmann, C.; Fauler, B.; Uhlemann, Y.; Weiss, D.S.; Weinrauch, Y.; Zychlinsky, A. Neutrophil extracellular traps kill bacteria. Science 2004, 303, 1532–1535. [Google Scholar] [CrossRef] [PubMed]
3. Burchfield JS, Dong JW, Sakata Y, Gao F, Tzeng HP, Topkara VK, Entman ML, Sivasubramanian N and Mann DL. The cytoprotective effects of tumor necrosis factor is conveyed through tumor necrosis factor receptor-associated factor 2 in the heart. Circ Heart Fail 2010; 3:157–64. [PMC free article] [PubMed] [Google Scholar].
4. Inoue T., Komoda H., Nonaka M., Kameda M., Uchida T., Node K. Interleukin-8 as an independent predictor of long-term clinical outcome in patients with coronary artery disease. International Journal of Cardiology. 2008;124(3):319–325. doi: 10.1016/j.ijcard.2007.02.012. [PubMed] [CrossRef] [Google Scholar]].
5. Kang S, Narazaki M. Hozaifa Metwally, and Tadamitsu Kishimoto, Historical overview of the interleukin-6 family cytokine. J Exp Med. (2020) 217. 10.1084/jem.20190347 [PMC free article] [PubMed] [CrossRef] [Google Scholar]).
6. Kim D.-H., Rhim B.-Y., Eo S.-K., Kim K. Differential regulation of CC chemokine ligand 2 and CXCL8 by antifungal agent nystatin in macrophages. Biochemical and Biophysical Research Communications. 2013;437(3):392–396. doi: 10.1016/j.bbrc.2013.06.087. [PubMed] [CrossRef] [Google Scholar]
7. Larsen JV, Kristensen AM, Pallesen LT, Bauer J, Vægter CB, Nielsen MS, et al.. Cytokine-like factor 1, an essential facilitator of cardiotrophin-like cytokine:ciliary neurotrophic factor receptor α signaling and sorLA-Mediated turnover. Mol Cellular Biol. (2016) 36:1272–86. 10.1128/MCB.00917-15 [PMC free article] [PubMed] [CrossRef] [Google Scholar],
8. Li, A.; Dubey, S.; Varney, M.L.; Dave, B.J.; Singh, R.K. IL-8 directly enhanced endothelial cell survival, proliferation, and matrix metalloproteinases production and regulated angiogenesis. J. Immunol. 2003, 170, 3369–3376. [Google Scholar] [CrossRef] [PubMed]
9. Murakami M, Kamimura D, Hirano T. Pleiotropy and specificity: insights from the interleukin 6 family of cytokines. Immunity. (2019) 50:812–31. 10.1016/j.immuni.2019.03.027 [PubMed] [CrossRef] [Google Scholar],

10. Raman, D.; Baugher, P.J.; Thu, Y.M.; Richmond, A. Role of chemokines in tumor growth. Cancer Lett. 2007, 256, 137–165. [Google Scholar] [CrossRef] [PubMed].
11. Ruparelia N, Chai JT, Fisher EA, Choudhury R. Inflammatory processes in cardiovascular disease: a route to targeted therapies. Nature reviews. Cardiology. (2017) 14:133–44. 10.1038/nrcardio.2016.185 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
12. Takami M., Terry V., Petruzzelli L. Signaling pathways involved in IL-8-dependent activation of adhesion through Mac-1. The Journal of Immunology. 2002;168(9):4559–4566. doi: 10.4049/jimmunol.168.9.4559. [PubMed] [CrossRef] [Google Scholar]
13. Velásquez I. M., Frumento P., Johansson K., et al. Association of interleukin 8 with myocardial infarction: results from the stockholm heart epidemiology program. International Journal of Cardiology. 2014;172(1):173–178. doi: 10.1016/j.ijcard.2013.12.170. [PubMed] [CrossRef] [Google Scholar]
14. Welsh P, Murray HM, Ford I, et al. Circulating interleukin-10 and risk of cardiovascular events: A prospective study in the elderly at risk. Arterioscler Thromb Vasc Biol. 2011; 31:2338–44. [PubMed] [Google Scholar]
15. Zakynthinos E., Pappa N. Inflammatory biomarkers in coronary artery disease. Journal of Cardiology. 2009;53(3):317–333. doi: 10.1016/j.jjcc.2008.12.007. [PubMed] [CrossRef] [Google Scholar]
16. Zegeye MM, Lindkvist M, Fälker K, Kumawat AK, Paramel G, Grenegård M, et al.., Activation of the JAK/STAT3 and PI3K/AKT pathways are crucial for IL-6 trans-signaling-mediated pro-inflammatory response in human vascular endothelial cells Cell Commun Signal. (2018) 16:55. 10.1186/s12964-018-0268-4 [PMC free article] [PubMed] [CrossRef] [Google Scholar].
17. Zhang Z. L., Wu W. C., Liu J. Q., et al. Screening of differentially expressed genes related to ischemic stroke and functional analysis with DNA microarray. European Review for Medical and Pharmacological Sciences. 2014;18(8):1181–1188. [PubMed] [Google Scholar]
18. Zhang, M. Tumor necrosis factor / M. Zhang, K.L. Tracey / / The cytokine handbook, 3rd ed. / In: A.W. Tompson. – New York. Academic press, 2008. – P. 515-548
19. Во, ди-джей; Уилсон, К. Путь интерлейкина-8 при раке. клин. Рак рез. 2008, 14, 6735–6741. [Google Scholar] [CrossRef] [PubMed]
20. Кетлинский, С.А. Роль Т-хелперов типов 1 и 2 в регуляции клеточного и гуморального иммунитета / С.А. Кетлинский // Иммунология. – 2002. – Т. 23, № 2. – С. 77–79
21. Кетлинский, С.А. Цитокины / С.А. Кетлинский, А.С. Симбирцев. – СанктПетербург : Фолиант, 2008. – 552 с.
22. Маркова Т.П. Иммунотропные препараты в педиатрии // Доктор Ру. – 2008. – № 1. – С. 48-52., Рабсон А., Рейт А., Делвз П. Основы медицинской иммунологии. – М. – 2006. – 316 с.
23. Ярилин АА. Иммунология. М.: ГЭОТАР Медиа, 2010. 752 с.

Sadullaeva I. K.
head of the department of propaedeutics of childhood diseases and pediatric neurology
Bukhara State Medical Institute

COMPARATIVE ANALYSIS OF SERUM GROWTH FACTOR LEVELS IN CHILDREN WITH DIFFERENT TYPES OF CONGENITAL HEART DEFECTS

Relevance: *Congenital heart defects (CHDs) are structural abnormalities of the heart that develop during fetal growth in the mother's womb. These defects may affect the structure of the heart, the valves, the heart walls, or the major vessels leading to and from the heart.*
Children with CHDs may have an altered immune status, especially when the defect is associated with severe impairment of circulation and cardiac function.
Objective: *To determine the characteristics of serum levels of growth factors (bFGF, VEGF-A, and TGF-β) in children with acyanotic and cyanotic congenital heart defects (CHDs).*
Materials and Methods: *The study included 52 children diagnosed with CHDs: 28 with acyanotic (white-type) and 24 with cyanotic (blue-type) defects. The control group consisted of 28 practically healthy children of similar age. Serum concentrations of basic fibroblast growth factor (bFGF), vascular endothelial growth factor-A (VEGF-A), and transforming growth factor-beta (TGF-β) were measured using a solid-phase enzyme-linked immunosorbent assay (ELISA) with test kits from JSC "Vector-Best" (Novosibirsk, Russia).*
Results: *Hypersecretion of bFGF, VEGF-A, and TGF-β was observed in patients from both CHD groups. Hypoxia, ischemia, compensatory angiogenesis, and depletion of cardiac tissue trigger activation of bFGF, VEGF-A, and TGF-β, which play a significant role in tissue regeneration and remodeling.*
Keywords: *congenital heart defects, children, growth factors, cyanosis, cytokines, serum, imbalance*

Relevance

Congenital heart defects (CHDs) are structural abnormalities of the heart that develop during fetal growth in the mother's womb. These defects may affect the heart's structure, valves, walls, or the major vessels leading to and from the heart [1]. The most common defects include: ventricular septal defect (VSD) – 28.3%; atrial septal defect (ASD) – 10.3%; pulmonary artery stenosis – 9.8%; Tetralogy of Fallot (TOF) – 9.7%; aortic stenosis – 7.1%; aortic coarctation – 5.1%; transposition of the great arteries – 4.9%; as well as tricuspid valve hypoplasia, patent ductus arteriosus (PDA), and total anomalous pulmonary venous return [8]. More than 90 types of CHDs and numerous combinations of these defects have been reported.

At the A.N. Bakulev Institute of Cardiovascular Surgery, a classification system has been developed based on the distribution of CHDs, taking into account the anatomical features of the defect and hemodynamic disturbances. For practicing cardiologists, a simpler division of CHDs into three groups is more convenient:

Acyanotic CHDs with arteriovenous shunt: VSD, ASD, PDA; and atrioventricular canal (AVC).

Cyanotic CHDs with venous-to-arterial shunt: TGA, TOF, Fallot's triad, tricuspid valve atresia, etc.

CHDs without a shunt, but with obstruction to ventricular outflow: stenosis of the pulmonary artery and aorta.

This classification covers the nine most common CHDs [2,6].

Children with CHDs may have an altered immune status, especially when the defect is associated with severe impairment of circulation and cardiac function [3]. Based on the above, the objective of the present study is to determine the characteristics of serum growth factor levels in children with acyanotic and cyanotic CHDs.

Materials and Methods

This study included 52 children diagnosed with CHDs: 28 with acyanotic (white-type) and 24 with cyanotic (blue-type) defects. The control group consisted of 28 practically healthy boys and girls of similar age. Participants were aged from 1 to 12 years.

Immunological analyses were conducted in the Laboratory of Immunoregulation at the Institute of Immunology and Human Genomics, Academy of Sciences of the Republic of Uzbekistan.

Serum concentrations of basic fibroblast growth factor (bFGF), vascular endothelial growth factor-A (VEGF-A), and transforming growth factor-beta (TGF-β) in peripheral blood were determined using a solid-phase enzyme-linked immunosorbent assay (ELISA) with test kits from JSC "VECTOR-BEST" (Novosibirsk, Russia). Quantitative assessment of the results was performed using a calibration curve reflecting the relationship between optical density and the concentration of a standard antigen, allowing comparison with the tested samples.

Statistical analysis of the data was carried out using the software Statistica 6.0. Data were analyzed using standard methods, and results are presented as mean (M) ± standard error of the mean (m); median (Me) representing the central tendency; and upper and lower quartiles (Q1–Q3), reflecting the spread of values in 50% of respondents (Q1 — 25th percentile, Me — 50th percentile, Q3 — 75th percentile). The significance of differences between mean values (P) was assessed using Student's t-test.

Result sand Discussion

It is well known that normal tissue function depends on the regular delivery of oxygen by the blood vessels. The process of neoangiogenesis is essential for long-term tissue adaptation under conditions of injury [12].

During tissue damage and inflammation, fibroblasts are activated by macrophages, secrete fibroblast growth factors (bFGF), and actively migrate to the site of injury. They attach to fibrillar structures via fibronectin while simultaneously synthesizing extracellular matrix components [14].

Fibroblasts secrete pro-angiogenic factors, including vascular endothelial growth factor (VEGF), basic fibroblast growth factor (bFGF), and transforming growth factor-beta (TGF-β) [13].

Growth factors, typically classified as a subset of cytokines, are proteins that stimulate cell growth, differentiation, survival, inflammation, and tissue repair. They play a critical role in regulating various cellular processes and can be secreted by neighboring cells, distant tissues and glands, or even by tumor cells themselves. Normal cells require several growth factors to maintain proliferation and viability. Growth factors can exert their effects through endocrine, paracrine, or autocrine mechanisms [10].

Growth factors are involved not only in angiogenesis remodeling and immune responses but can also serve as biomarkers, as under certain pathological conditions they partially enter the bloodstream, which has diagnostic significance [10,12].

The results obtained are presented in Table 1 below.

Table 1.

Serum Levels of Growth Factors in Children with CHDs

Indicator	M±m, pg/ml;	Me [Q1; Q3]	Min, pg/ml	Max, pg/ml
Control group, n=28				
bFGF	6,21±0,28	6,65 [5,05; 7,31]	3,41	8,60
VEGF-A	34,01±1,42	33,90 [27,80; 39,11]	22,90	48,33
TGF-β	47,42±2,21	47,55 [36,52; 58,15]	28,73	66,90
B Acyanotic CHD (white type), n=28				
bFGF	29,28±2,02***	25,55 [20,77; 38,52]	14,30	48,51
VEGF-A	135,81±5,47***	144,75 [102,3; 159,07]	94,81	177,22
TGF-β	182,77±7,31***	191,15 [143,80; 214,62]	112,51	251,53
Cyanotic CHD (blue type)), n=24				
bFGF	34,51±1,68***	31,60 [29,35; 41,80]	20,10	49,71
VEGF-A	208,80±9,92***	200,55 [169,40; 246,05]	122,35	293,50
TGF-β	201,45±6,69***	200,05 [177,22; 226,85]	125,30	255,12

Note: ** — significant compared with the control group (* P<0.05, ** P<0.01, *** P<0.001). Me — median; Q1 (percentile) — 25th percentile; Q3 (percentile) — 75th percentile.*

Fibroblast growth factor (FGF) represents a family of cellular signaling proteins produced by various cell types [9]. One of its main functions is to stimulate the proliferation and migration of cells, including fibroblasts, endothelial cells, and cardiac myocytes.

As shown in Figure 1, analysis of serum bFGF concentrations revealed statistically significant results. The level of this growth factor was increased 4.7-fold, with a mean value of 29.28 ± 2.02 pg/mL and an individual range of 14.3 to 48.5 pg/mL, whereas in the group of healthy children, the mean level was 6.21 ± 0.28 pg/mL (P<0.001).

The elevated serum bFGF levels are likely due to tissue stress and damage. Increased bFGF synthesis is also probably involved in compensating for deficient blood supply in certain areas of the heart, which activates angiogenesis and releases bFGF to stimulate the growth of new blood vessels. This process, in turn, promotes remodeling of cardiac tissue, where thickening of the walls and myocardial hypertrophy may already be evident.

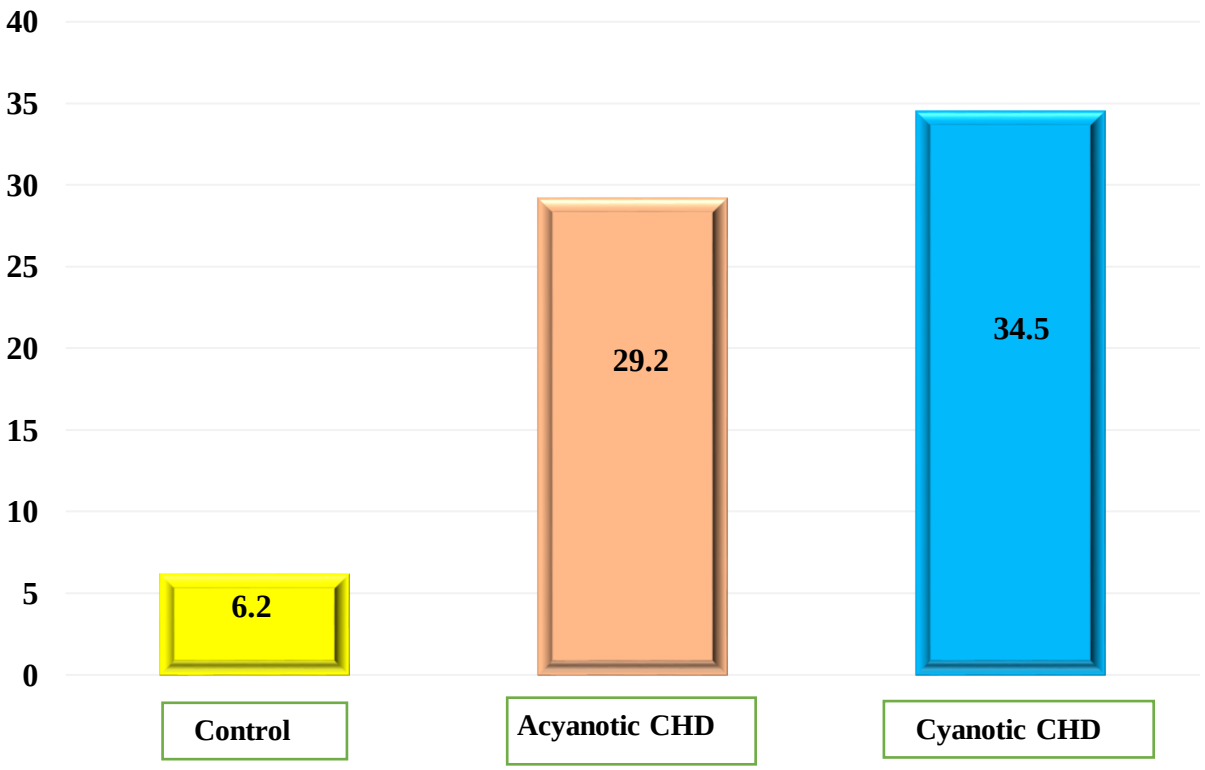


Figure 1. Serum bFGF Levels in the Examined Children Compared to the Control Group.

Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001).*

As shown in Figure 1, analysis of serum bFGF concentrations revealed statistically significant results in the group of children with cyanotic CHD. The level of this growth factor was increased 5.6-fold, with a mean value of 34.51 ±

1.68 pg/mL and an individual range of 20.1 to 49.7 pg/mL, whereas in the group of healthy children, the mean level was 6.21 ± 0.28 pg/mL (P<0.001).

The elevated values likely indicate chronic hypoxia, which may have triggered enhanced expression. Under conditions of chronic hypoxia and tissue damage, fibrosis may also develop, affecting the structure and function of the heart, promoting angiogenesis, activating inflammatory processes, and remodeling tissues. These processes are part of the immune response and can influence the regulation of vessels and blood pressure in the heart and vasculature, which is also important in CHD.

Among the many pro-angiogenic factors involved in physiological and pathological angiogenesis, VEGF is the most important mediator of endothelial cell growth. VEGF is a family of structurally related proteins that, together with their receptors (VEGFR), play a key role in the development and regulation of blood and lymphatic vessels. The VEGF family includes several factors: VEGF-A, -B, -C, -D, -E, and placental growth factor (PlGF) [11]. VEGF-A, -B, and PlGF are the main regulators of blood vessel growth, while VEGF-C and -D are necessary for lymphatic vessel formation [7,11].

A key regulator of angiogenesis is VEGF-A. As a glycosylated mitogen, it specifically acts on endothelial cells and has pleiotropic effects, including increasing vascular wall permeability, inducing vasculogenesis, angiogenesis, and endothelial cell growth, and inhibiting their apoptosis [3]. Expression of this protein is stimulated both by numerous pro-angiogenic factors (EGF, PDGF, FGF, IL-1β) and by environmental conditions surrounding the cells (pressure, oxygen concentration, pH).

Assessment of serum VEGF-A concentrations in the group of children with acyanotic CHD revealed a significant increase. The synthesis of this growth factor increased 4-fold, with a mean value of 135.81 ± 5.47 pg/mL and a range of 94.8 to 177.2 pg/mL, compared to the normative values in healthy children, which averaged 34.01 ± 1.42 pg/mL (P<0.001) (Figure 2).

In our opinion, the elevated serum VEGF-A concentration in children with acyanotic CHD may be due to factors such as endothelial cell hyperactivity, angiogenesis, and vascular remodeling. These changes can lead to increased production and release of VEGF-A in an attempt to restore normal vascular structure and function.

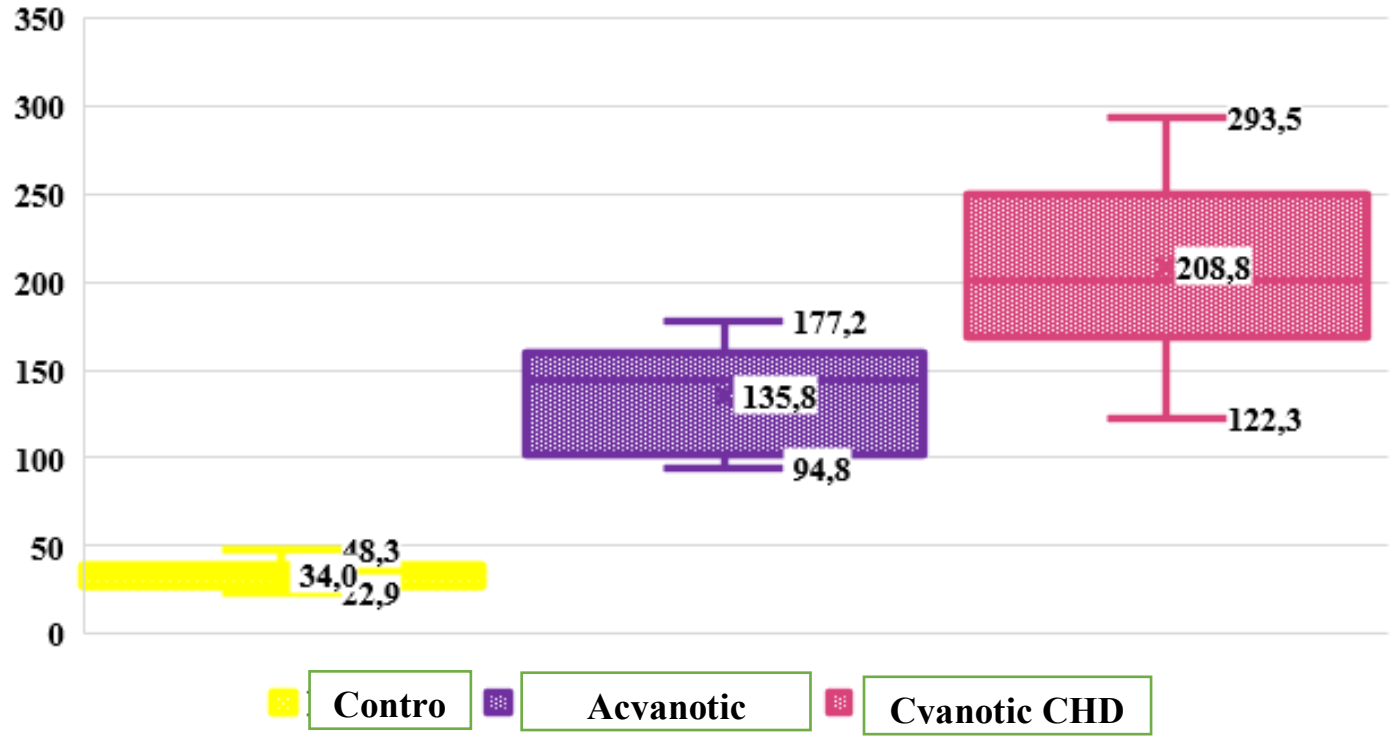


Figure 2. Serum VEGF-A Concentrations in the Examined Children Compared to the Control Group.
Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001).*

According to the results shown in Figure 2, in the main group of children with cyanotic CHD, serum VEGF-A levels were significantly elevated. The synthesis of this growth factor increased 6.1-fold, with a mean value of 208.80 ± 9.92 pg/mL and a range of 122.3 to 293.5 pg/mL, compared to the normative values in healthy children, which averaged 34.01 ± 1.42 pg/mL (P<0.001).

These results suggest that in children with cyanosis, adaptive mechanisms are activated in response to processes such as chronic hypoxia, inflammatory reactions (e.g., in response to infections, tissue damage, or other pathological conditions), and tissue injury. These mechanisms aim to support tissue remodeling and angiogenesis for tissue repair and restoration, ensuring adequate blood supply to damaged tissues.

TGF-beta (transforming growth factor beta / TGF-β) is a type of cytokine that regulates proliferation, cell differentiation, and other functions in most cell types [15].

TGF-β is a factor synthesized in a wide variety of tissues. It acts synergistically with TGF-α, inducing phenotypic transformation, and can also function as a negative autocrine growth factor. TGF-β has diverse functions in the body. When acting on the immune system, its effects are predominantly inhibitory. Overall, TGF-β plays an important role in regulating various processes in the

body, including immune response, tissue remodeling, wound healing, and anabolic processes [4,5].

Analysis of the results shown in Figure 3 revealed that TGF-β levels were elevated in the group of children with acyanotic CHD. The serum concentration of this growth factor in the main group of children was increased 3.9-fold, with a mean value of 182.7 ± 7.31 pg/mL and an individual range of 112.5 to 251.5 pg/mL, whereas in the group of practically healthy children, the mean level was 47.42 ± 2.21 pg/mL (P<0.001).

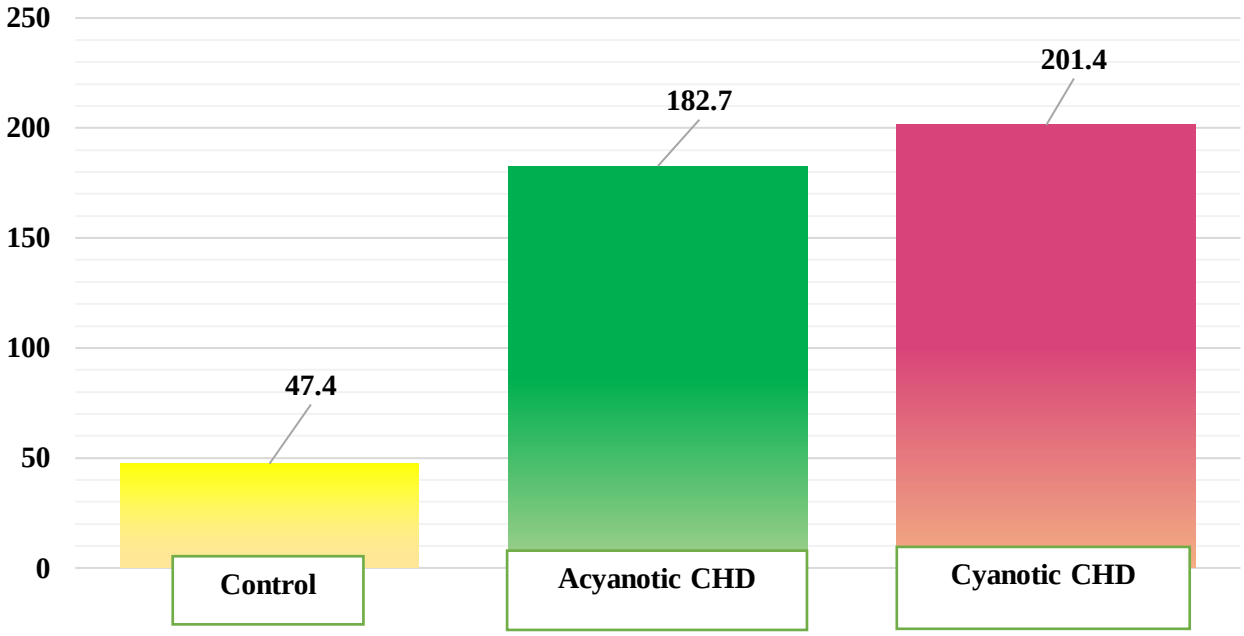


Figure 3. Serum TGF-β Levels in the Examined Children Compared to the Control Group.

Note: * — *significant compared to the control group (* P<0.05, P<0.01, * P<0.001).*

The results likely indicate that elevated serum TGF-β levels in children with acyanotic CHD may be associated with cardiac workload, inflammation, and tissue remodeling, as well as with the role of TGF-β in tissue development and differentiation. However, it should be noted that each case may have its specific characteristics, and further studies may be necessary to more precisely determine the cause of increased TGF-β levels.

Assessment of the results shown in Figure 3 revealed statistically significant TGF-β levels in the group of children with cyanotic CHD. The serum concentration of this growth factor in the main group was increased 4.2-fold, with a mean value of 201.45 ± 6.69 pg/mL and an individual range of 125.3 to 255.1 pg/mL, whereas in the group of practically healthy children, the mean level was 47.42 ± 2.21 pg/mL (P<0.001).

Based on the obtained results, we hypothesize that excessive TGF-β in the blood can have both protective and destructive effects on the body, depending on the context and duration of its action. The marked increase in serum TGF-β levels in children with cyanotic CHD may be due to factors such as hypoxia and ischemia in response to tissue damage and the body's attempt to adapt to the altered environment; inflammation and tissue remodeling; and mechanical factors, since congenital heart defects can cause increased cardiac and vascular load, which may activate TGF-β production in response to mechanical stress.

Thus, immunological studies revealed that hypoxia and ischemia in CHD, both with and without cyanosis, can stimulate the increased production of various cytokines and growth factors in response to tissue damage and stress. In turn, CHD and hypoxia can trigger remodeling of cardiac and vascular tissues. This process involves the activation of bFGF, VEGF-A, and TGF-β, which play important roles in tissue regeneration and remodeling.

Conclusion

The identified immunological changes trigger cascade reactions in the body aimed at adapting to oxygen and blood supply deficiencies. Activation of cells and tissues to cope with damage and stress leads to increased production of various biologically active substances. Further studies and clinical observations are necessary to more precisely understand the role of these mediators in the pathology of different types of CHD

Literature

1. Белозеров, Ю.М. Детская кардиология /Ю.М. Белозеров. – М., 2004. – С. 9-221.
2. Бокерия, Л.А. Сердечно-сосудистая хирургия2001. Болезни и врожденные аномалии системы кровообращения /Л.А. Бокерия, Р.Г. Гудкова. – М., 2002. – 348 с.
3. Закирова Н.Э., Закирова А.Н. Роль иммуновоспалительных реакций и дисфункции эндотелия в ремоделировании миокарда и прогрессировании ИБС. Рациональная Фармакотерапия в Кардиологии. 2014;10(5):488-94]. DOI:10.20996/1819- 6446-2014-10-5-488-494.
4. Корженевская К. В., Гавришева Н. А., Панов А. В. и др. Трансформирующий фактор роста-β1 при различном клиническом течении ишемической болезни сердца после операции коронарного шунтирования. Медицинская Иммунология. 2010;12(6):521-8
5. Моисеева О.М., Шляхто Е.В. Трансформирующий фактор роста и маркеры активации лейкоцитов при гипертонической болезни. Артериальная Гипертензия. 2003;9(1):14-6]. DOI:10.18705/1607-419X-2003-9-1-14-16.
6. Подзолков В.П., Шведунова В.Н. Врожденные пороки сердца. РМЖ. 2001; 10: 430
7. Роль VEGF в развитии неопластического ангиогенеза / В. П. Чехонин [и др.] // Вестн. РАМН. — 2012. — № 2. — С. 23–34
8. Шарыкин, А.С. Перинатальная кардиология: руков. для педиатров, акушеров, неонатологов /А.С. Шарыкин. – М., 2007. – 264 с

9. Ardizzone A., Scuderi S.A., Giuffrida D., Colarossi C., Puglisi C., Campolo M., Cuzzocrea S., Esposito E., Paterniti I. Role of Fibroblast Growth Factors Receptors (FGFRs) in Brain Tumors, Focus on Astrocytoma and Glioblastoma. Cancers. 2020; 12:3825. doi: 10.3390/cancers12123825. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
10. Arita S., Kikkawa F., Kajiyama H., Shibata K., Kawai M., Mizuno K., Nagasaka T., Ino K., Nomura S. Prognostic importance of vascular endothelial growth factor and its receptors in the uterine sarcoma. Int. J. Gynecol. Cancer, 2005, Vol. 15, no. 2, pp. 329-336
11. Ferrara N. Vascular endothelial growth factor: basic science and clinical progress / N. Ferrara // Endocr. Rev. — 2004. — Vol. 25. — P. 581–611
12. Flavell SJ, Hou TZ, Lax S, Filer AD, Salmon M, Buckley CD. Fibroblasts as novel therapeutic targets in chronic inflammation. British Journal of Pharmacology. 2008;153(S1): S241–S246.DOI: http://dx.doi.org/10.1038/sj.bjp.0707487
13. Hartlapp I, Abe R, Saeed RW, Peng T, Voelter W, Bucala R, et al. Fibrocytes induce an angiogenic phenotype in cultured endothelial cells and promote angiogenesis in vivo. FASEB journal. 2001 Oct;15(12):2215–2224. DOI: http://dx.doi.org/10.1096/fj.01-0049com
14. Keeley EC, Mehrad B, Strieter RM. Fibrocytes: Bringing new insights into mechanisms of inflammation and fibrosis. The international journal of biochemistry & cell biology. 2010 Apr;42(4): 535–542. DOI: http://dx.doi.org/10.1016/j.biocel.2009.10.014
15. Verrecchia F., Mauviel A. Transfoming growth factor-beta and fibrosis. World J Gastroenterol. 2007;47(8):13-18. DOI:10.3748/wjg. v13.i22.3056.

Sadullaeva I. K.
head of the department of propaedeutics of childhood diseases and pediatric neurology
Bukhara State Medical Institute
Ruziyeva M. H.
assistent
department of propaedeutics of childhood diseases and pediatric neurology
Bukhara State Medical Institute

THE SIGNIFICANCE OF PRO-INFLAMMATORY IMMUNE MEDIATORS IN THE PATHOGENESIS OF VARIOUS FORMS OF CONGENITAL HEART DEFECTS IN CHILDREN

Abstract: *Congenital heart defects (CHDs) account for about 30% of all developmental anomalies in children and are among the most common defects today. The study included 52 children with a confirmed diagnosis of congenital heart defects (CHDs), classified as acyanotic (28 patients) and cyanotic (24 patients). The control group consisted of 28 practically healthy children of comparable age. The serum concentrations of interleukins and tumor necrosis factor alpha (IL-6, IL-8, TNF-α) were measured using solid-phase enzyme-linked immunosorbent assay. Hypersecretion of IL-6, IL-8, and TNF-α was observed in patients of both CHD groups. The increased levels of the studied immune response mediators may represent a protective reaction of the body to stress and tissue damage; however, prolonged expression may lead to pathological changes and affect the development and progression of CHDs.*

The increased levels of the studied immune response mediators may represent a protective reaction of the body to stress and tissue damage; however, prolonged expression can lead to pathological changes and influence the development and progression of CHDs. Further research and clinical observations are necessary for a more precise understanding of the role of these mediators in CHD pathology.

Keywords: *congenital heart defects, children, cyanosis, cytokines, serum, imbalance.*

Relevance

Congenital heart defects (CHDs) account for about 30% of all developmental anomalies in children and are among the most common defects today [1,2,5,11]. According to statistics from various countries around the world, between 0.6% and 1.4% of infants are born with CHDs [9]. As their prevalence increases, there is a tendency toward a higher proportion of more severe, combined CHDs with unfavorable outcomes already in the first months of life [3,4,8].

The most common defects are as follows: ventricular septal defect (VSD) – 28.3%; atrial septal defect (ASD) – 10.3%; pulmonary artery stenosis – 9.8%; Tetralogy of Fallot (TOF) – 9.7%; aortic stenosis – 7.1%; aortic coarctation – 5.1%; transposition of the great arteries – 4.9%; other defects include tricuspid valve hypoplasia, patent ductus arteriosus (PDA), and total anomalous pulmonary venous return [9]. More than 90 variants of CHDs and numerous combinations have been observed[6].

The study of the interaction between the immune system and pathological processes has limited application in the context of congenital heart defects (CHDs), since the primary causes of these defects are related to the development of the cardiovascular system during the embryonic period, rather than immune mechanisms.

However, immunological mechanisms may play some role in the formation of CHDs. For example, some studies suggest a possible association between CHDs and immune factors, such as maternal immune responses to infections during pregnancy or autoimmune processes. These associations are still under active investigation, and the exact mechanism by which immune factors may influence CHD development is not yet fully understood.

Based on the above, the objective of the present study was to comparatively determine the role of serum levels of key pro-inflammatory immune response mediators (IL-6, IL-8, TNFα) in children with acyanotic and cyanotic CHDs.

Objective

To study the serum concentration of pro-inflammatory immune response mediators (IL-6, IL-8, TNFα) in congenital heart defects (CHDs).

Materials and methods

This study included 52 children with a confirmed diagnosis of CHDs: acyanotic (28 patients) and cyanotic (24 patients). The control group consisted of 28 practically healthy boys and girls of comparable age. The participants were aged between 1 and 12 years.

Immunological studies in the examined children were conducted in the Immunoregulation Laboratory of the Institute of Human Immunology and Genomics, Academy of Sciences of the Republic of Uzbekistan.

The serum concentrations of interleukins and tumor necrosis factor alpha (IL-6, IL-8, TNF-α) in peripheral blood were measured using a solid-phase enzyme-linked immunosorbent assay (ELISA) with test systems from Vector-Best JSC (Novosibirsk, Russia). Quantitative evaluation of the results was performed using a calibration curve, reflecting the relationship between optical density and the concentration of the standard antigen, which allowed comparison with the tested samples.

Statistical analysis of the obtained data was carried out using the Statistica 6.0 software. The data were statistically processed using standard approaches, and results are presented as the sample mean (M) and standard error of the mean (m); median (Me), characterizing the central tendency; and upper and lower quartiles, characterizing the spread of values among 50% of respondents (Q1–Q3), where

Q1 is the 25th percentile, Me – 50th percentile, and Q3 – 75th percentile. The significance of differences in mean values (P) between compared parameters was evaluated using Student's t-test (t).

Results and discussion

According to current literature, there is an increasing body of evidence indicating that pro-inflammatory mechanisms in cardiovascular diseases are mediated by various cytokines, which can induce cardiomyocyte hypertrophy and apoptosis, fibrosis, and ultimately lead to adverse cardiac remodeling.

The obtained results are presented in Table 1 below.

Interleukin-6 (IL-6) is a pleiotropic pro-inflammatory cytokine that can be produced by activated T cells, B cells, monocytes, and malignant cells. Macrophages, adipocytes, hematopoietic cells, and endothelial cells are also cellular sources of IL-6 [15].

Table 1.
Serum levels of pro-inflammatory cytokines in the examined children with CHDs

Parameter	M±m, pg/mL	Me [Q1; Q3]	Min, pg/mL	Max, pg/mL
Control group, n=28				
IL-6	6,25±0,43	5,90 [4,12; 8,82]	2,51	9,70
IL-8	12,66±0,60	12,45 [9,70; 15,67]	9,11	19,13
TNF-α	15,17±0,49	15,22 [13,3; 17,28]	10,63	19,74
Acyanotic CHD (without cyanosis), n=28				
IL-6	22,08±1,09***	21,90 [17,3; 25,2]	12,30	33,12
IL-8	46,82±1,86***	47,30 [37,47; 53,72]	29,71	63,52
TNF-α	56,53±2,82***	53,25 [45,87; 66,80]	32,93	86,52
Cyanotic CHD (with cyanosis), n=24				
IL-6	29,70±1,77***	29,55 [21,50; 37,82]	16,50	43,22
IL-8	51,77±1,45***	52,75 [47,11; 57,32]	38,91	62,30
TNF-α	65,76±3,27***	68,70 [50,45; 78,10]	39,44	89,72

Note: ** – significant compared with the control group (* – P<0.05, ** – P<0.01, *** – P<0.001). Me – median, Q1 (percentile) – 25%, Q3 (percentile) – 75%.*

Analysis of the obtained IL-6 results in the serum of children with acyanotic CHDs revealed statistically significant differences compared with the values of healthy children in the control group. The serum IL-6 level in the acyanotic CHD

group was increased 3.5-fold, with a mean value of 22.1 ± 1.09 pg/mL, whereas in the control group it averaged 6.2 ± 0.44 pg/mL (P<0.001) (Fig. 1).

IL-6 is a cytokine that plays an important role in the immune system and inflammatory processes. Elevated IL-6 levels may be associated with various pathological conditions, including congenital heart defects (CHDs). The obtained results suggest a possible link between IL-6 and CHDs, likely indicating activation of an inflammatory process associated with the heart defect, stimulation of cardiac tissue remodeling, involvement in the development of hypertrophy, and an imbalance in the immune system.

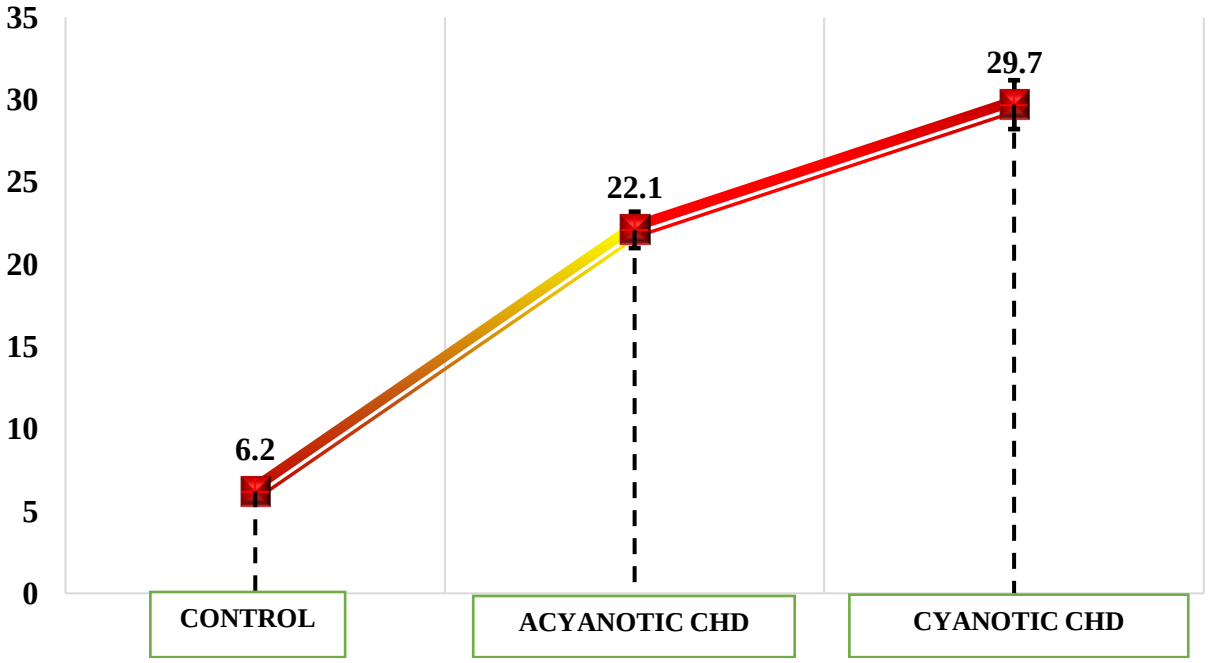


Fig. 1. Serum IL-6 levels in the examined children compared.

Note: * – *significant compared with the control group (* – P<0.05, ** – P<0.01, *** – P<0.001)*

Analysis of the data showed elevated IL-6 levels in the main group of children with cyanotic CHDs. The synthesis of this cytokine was increased 4.7-fold, with a mean value of 29.70 ± 1.77 pg/mL and an individual range of 16.5 to 43.22 pg/mL, compared to the control group, which had an average of 6.25 ± 0.43 pg/mL (P<0.001) (Fig. 1).

The elevated IL-6 levels in children with cyanotic CHDs may also indicate a strong inflammatory response associated with the heart defect and its consequences, as cyanosis is a condition in which insufficiently oxygenated blood circulates through the body, potentially causing stress and inflammatory reactions. IL-6 is one of the cytokines that can be produced in response to hypoxia and hypoxia-induced tissue damage. Increased IL-6 levels may be related to immune system activation and inflammation in cardiac tissue and other organs affected by the heart defect, and may also serve as an indicator of the severity of the defect and its impact on the body.

As is well known, chemokines are a family of cytokines that induce directed leukocyte migration along a concentration gradient, leading to the accumulation of migrating cells at the source of chemokine production [13]. Therefore, the next stage of our research was to study the serum levels of IL-8, aiming to elucidate the role of this immune response mediator in CHDs.

IL-8 is a pro-inflammatory cytokine, or chemokine (CXCL8), produced by various cell types, including endothelial cells, peripheral blood monocytes, and vascular smooth muscle cells. IL-8 is encoded by the IL8 or CXCL8 gene [14].

To determine the role and involvement of this chemokine in normal conditions and in different types of CHDs, we examined serum IL-8 levels in our study as one of the key mediators of the immune response, serving as an activator of the angiogenic response.

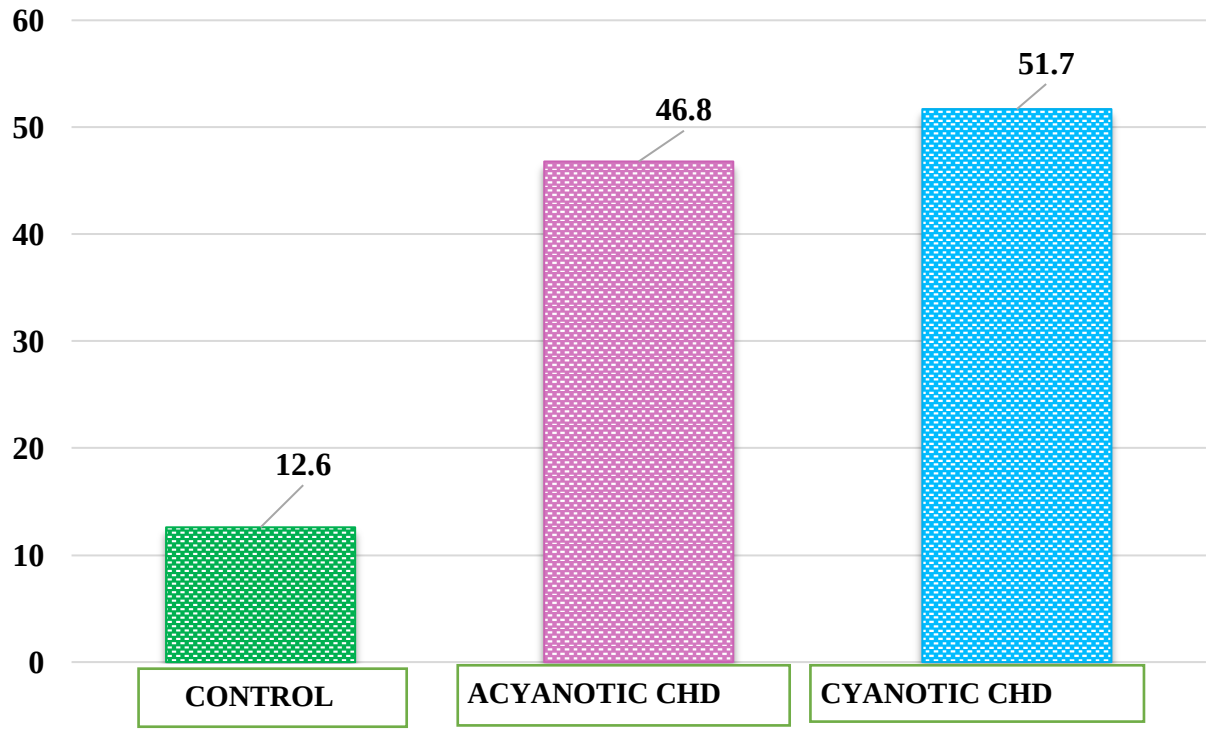


Fig. 2. Serum IL-8 concentration in the examined children compared.
Note: * *– significant compared with the control group (* – P<0.05, ** – P<0.01, *** – P<0.001).*

Analysis of the obtained results revealed a relatively high IL-8 level in the group of children with acyanotic CHDs. The serum concentration of this chemokine in the main group of children was increased 3.7-fold, with a mean value of 46.82 ± 1.86 pg/mL and an individual range of 29.7 to 63.5 pg/mL, whereas in the group of practically healthy children, this value was 12.66 ± 0.60 pg/mL (P<0.001) (Fig. 2).

We hypothesize that the elevated interleukin-8 (IL-8) levels in congenital heart defects may be explained by several factors: 1) inflammation and immune

activation, 2) angiogenesis, and 3) regulation of the immune response. Increased IL-8 levels may indicate an imbalance in the immune system, likely associated with acyanotic CHDs.

Assessment of serum levels of this chemokine in the group of children with cyanotic CHDs revealed significantly elevated values. The serum IL-8 level in children with cyanotic CHDs was increased 4.1-fold, with a mean value of 51.77 ± 1.45 pg/mL and a range of 38.9 to 62.3 pg/mL, compared to normative values of 12.66 ± 0.60 pg/mL ($P<0.001$) (Fig. 2).

In our opinion, the increased synthesis of interleukin-8 (IL-8) in children with cyanotic CHDs may be explained by several factors: 1) hypoxia induces the release of hypoxia-inducible factor (HIF-1α), which can activate the synthesis of IL-8 and other inflammatory cytokines; 2) abnormal blood circulation and structural heart anomalies can lead to tissue damage, triggering an inflammatory response and activation of immune cells, which may result in increased IL-8 synthesis, serving as a chemoattractant for neutrophils; 3) enhanced synthesis followed by neutrophil activation, as neutrophils can produce IL-8, amplifying the inflammatory response and further increasing IL-8 production around the affected area.

One of the key pro-inflammatory cytokines widely studied as a potential biomarker associated with heart failure is TNFα [12].

Tumor necrosis factor alpha (TNFα) is a member of the family of immunologically important proteins and a pro-inflammatory cytokine with a broad spectrum of activity. The main producers of TNFα are monocytes and macrophages. It is also secreted by neutrophils, endothelial and epithelial cells, eosinophils, mast cells, and B- and T-lymphocytes when involved in the inflammatory process [10].

Comparative assessment of serum TNFα levels, shown in Fig. 3, revealed statistically significant results in the group of children with acyanotic CHDs. The synthesis of this cytokine in the group of children with acyanotic CHDs increased 3.7-fold, with a mean value of 56.53 ± 2.82 pg/mL and a range of 32.9 to 86.5 pg/mL, whereas in the healthy children group, the mean value was 15.17 ± 0.49 pg/mL ($P<0.001$) (Fig. 3).

Elevated serum TNFα levels in the group of children with acyanotic CHDs likely indicate the development of cardiac cachexia syndrome in children with chronic congestive heart failure or chronic hypoxemia, and may reflect several factors: 1) TNF-α is an important mediator of inflammation and can be produced by immune cells in response to tissue damage; 2) TNF-α may be involved in remodeling processes and contribute to the development of fibrosis and hypertrophy. Increased TNF-α levels may reflect its involvement in pathological changes in cardiac tissue in congenital heart defects; 3) TNF-α is one of the key cytokines regulating the immune response, and its elevated levels may be associated with this imbalance.

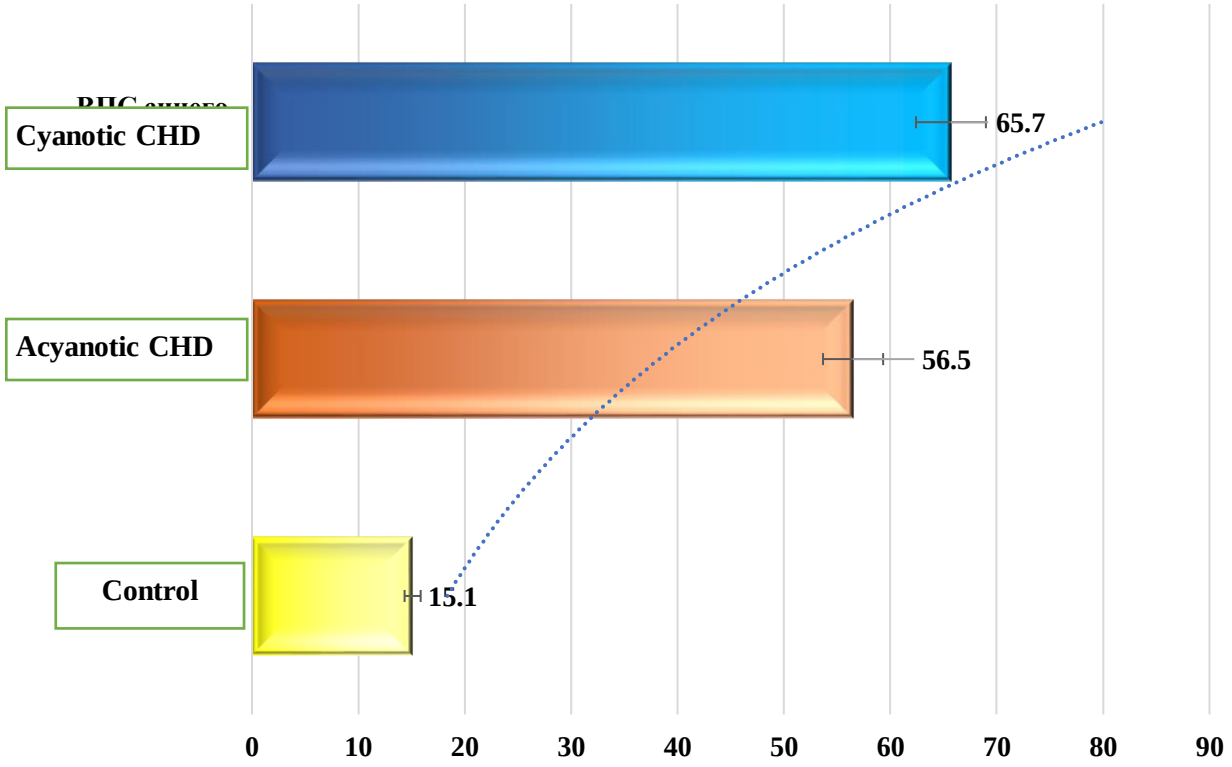


Fig. 3. Serum TNF-α levels in the examined children compared.
Note: * *– significant compared with the control group (* – P<0.05, ** – P<0.01, *** – P<0.001).*

As shown in Fig. 3, the study of serum TNF-α levels in the group of children with cyanotic CHDs revealed a significant increase. The TNF-α level in the main group of children with cyanosis was elevated 4.3-fold, with a mean value of 65.76 ± 3.27 pg/mL compared to control values of 15.17 ± 0.49 pg/mL (P<0.001).

These results indicate that the increase in TNF-α levels in congenital heart defects may result from the interaction of several factors, such as inflammatory processes, tissue damage, and cardiac remodeling. These factors, in turn, may influence the progression of CHDs, which is associated with TNF-α and its direct damaging effects on cardiomyocytes, enhancement of oxidative stress, binding to membrane receptors, and involvement in the development of cachexia. Cyanotic CHDs can lead to impaired circulation and insufficient oxygen delivery to organs and tissues, potentially causing ischemia and hypoxia in the heart tissue and surrounding areas. Ischemia and hypoxia contribute to immune system activation and inflammatory processes, which may result in increased TNF-α synthesis.

Thus, the study established that hypoxia and ischemia occurring in CHDs can stimulate increased production of various cytokines in response to tissue damage and stress. Congenital heart defects can trigger inflammatory responses in

cardiac and vascular tissue due to abnormal blood flow and altered circulation. This may lead to elevated levels of various cytokines, such as IL-6, IL-8, and TNFα, which are key mediators of inflammation.

Conclusion

The increased levels of the studied immune response mediators may represent a protective reaction of the body to stress and tissue damage; however, prolonged expression can lead to pathological changes and affect the development and progression of CHDs. Further research and clinical observations are needed to gain a more precise understanding of the role of these mediators in CHD pathology.

Literature:

1. Белозеров, Ю.М. Детская кардиология /Ю.М. Белозеров. – М., 2004. – С. 9-221.
2. Бокерия, Л.А. Сердечнососудистая хирургия2001. Болезни и врожденные аномалии системы кровообращения /Л.А. Бокерия, Р.Г. Гудкова. – М., 2002. – 348 с.
3. Войцехович, Б.А. К вопросу о распространённости врожденных пороков развития /Б.А. Войцехович //Пробл. соц. гигиены и здравоохр. – 2000. – № 4. – С. 7-11.,
4. Кондратьев, В.А. Врожденные пороки сердца до и после операции /В.А. Кондратьев //Таврич. мед.-биол. вестн. – 2005. – Т. 8, № 2. – С. 76-82.,
5. Мутафьян, О.А. Врожденные пороки сердца у детей /О.А. Мутафьян. – М., 2002. – С. 11-21,
6. Подзолков В.П., Шведунова В.Н. Врожденные пороки сердца. РМЖ. 2001; 10: 430
7. Скворцов В.В., Тумаренко А.В., Байманкулов С.С. Врожденные пороки сердца // Медицинская сестра - №7 – 2017 – с.14-18
8. Социально-гигиеническое значение и пути снижения детской смертности и инвалидности от врожденных пороков развития /В.Ю. Альбицкий, Л.Н. Шайхутдинова, Л.А. Никольская и др. //Рос. мед. журн. – 2002. – № 2. – С. 12-14
9. Шарыкин, А.С. Перинатальная кардиология: руков. для педиатров, акушеров, неонатологов /А.С. Шарыкин. – М., 2007. – 264 с
10. Ярилин АА. Иммунология. М.: ГЭОТАР Медиа, 2010. 752 с
11. Boughman, J.A. Familial risk of congenital heart disease assessed in a population-based epidemiology study /J.A. Boughman, K.A. Berg, J.A. Asternborski //Am. J. Med. Genet. – 2007. – № 26. – P. 839-849.
12. Burchfield JS, Dong JW, Sakata Y, Gao F, Tzeng HP, Topkara VK, Entman ML, Sivasubramanian N and Mann DL.The cytoprotective effects of tumor necrosis factor is conveyed through tumor necrosis factor receptor-associated factor 2 in the heart.Circ Heart Fail2010; 3:157–64.[PMC free article] [PubMed] [Google Scholar]

13. David J.J. Waugh, Catherine Wilson. The Interleukin-8 Pathway in Cancer // Clin Cancer Res (2008) 14 (21): 6735–6741. https://doi.org/10.1158/1078-0432.CCR-07-4843
14. Zakynthinos E., Pappa N. Inflammatory biomarkers in coronary artery disease. Journal of Cardiology. 2009;53(3): 317–333. doi: 10.1016/j.jjcc.2008.12.007.[PubMed] [CrossRef] [Google Scholar]
15. Zegeye MM, Lindkvist M, Fälker K, Kumawat AK, Paramel G, Grenegård M, et al..,Activation of the JAK/STAT3 and PI3K/AKT pathways are crucial for IL-6 trans-signaling-mediated pro-inflammatory response in human vascular endothelial cells Cell Commun Signal. (2018) 16:55. 10.1186/s12964-018-0268-4 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

УДК 616.15-091.8:616.831-008.64:612.115.3

Shadjanova N. S.
assistant
department of hematology, clinical laboratory diagnostics, nephrology, and hemodialysis
Bukhara state medical institute
https://orcid.org/0009-0002-0807-6475

AGE-RELATED CHANGES IN PLATELET FUNCTION AND THEIR IMPACT ON COGNITIVE DECLINE AND CEREBRAL MICROCIRCULATION

Abstract: *Age-related alterations of the hemostatic system, particularly within the platelet component, have gained increasing scientific attention due to global population aging and the rising prevalence of cognitive impairment and dementia. Platelets, traditionally viewed as primary mediators of hemostasis, are now recognized as multifunctional circulating cells involved in inflammation, immune modulation, angiogenesis, and regulation of microcirculation, including within the cerebral vasculature. Accumulating evidence suggests that age-associated platelet hyperreactivity contributes to endothelial dysfunction, cerebral microthrombosis, chronic hypoperfusion, and neuroinflammation, all of which play central roles in cognitive decline and neurodegenerative disorders.*

This narrative literature review aims to systematize and critically analyze current experimental and clinical data on age-related changes in platelet function and their contribution to impaired cerebral microcirculation and cognitive deterioration. Particular emphasis is placed on alterations in platelet adhesion, aggregation, secretion, receptor expression, and intracellular signaling pathways, as well as platelet interactions with endothelial cells and components of the neurovascular unit. Special attention is given to the involvement of platelets in vascular cognitive impairment, Alzheimer's disease, and cerebral small vessel disease. Understanding platelet-driven mechanisms in brain aging may open new avenues for preventive and therapeutic strategies targeting platelet activity in elderly populations.

Key words: *Platelets; aging; cerebral microcirculation; cognitive decline; hemostasis; neurovascular unit; endothelial dysfunction; neuroinflammation.*

Introduction

Population aging represents one of the most significant demographic challenges of the 21st century and is accompanied by a dramatic increase in age-related neurological disorders, including mild cognitive impairment, vascular dementia, and Alzheimer's disease. Cerebral hypoperfusion, microvascular dysfunction, and chronic neuroinflammation are widely recognized as central mechanisms underlying cognitive decline in older adults [Rossi, 2010, p. 12]. In

parallel, aging is associated with profound changes in the hemostatic system, resulting in a prothrombotic phenotype.

While alterations in coagulation factors have been extensively studied, platelet dysfunction has emerged as a critical yet underappreciated contributor to age-related vascular pathology. Platelets are anucleate cell fragments derived from megakaryocytes that exhibit remarkable functional versatility. Beyond their classical role in thrombus formation, platelets actively interact with leukocytes, endothelial cells, and neural tissues, releasing a broad array of bioactive mediators, including cytokines, chemokines, growth factors, and neurotransmitters [Gawaz, 2004, p. 87].

The cerebral microcirculation is particularly vulnerable to subtle disturbances in blood flow and endothelial integrity. Even mild but chronic reductions in perfusion can lead to white matter damage, synaptic dysfunction, and progressive cognitive impairment [Iadecola, 2017, p. 145]. Given their central role in microvascular regulation, age-related changes in platelet function may represent a crucial mechanistic link between systemic aging and brain dysfunction.

Literature review

1. Aging and Platelet Production

Aging is accompanied by quantitative and qualitative alterations in hematopoiesis. Hematopoietic stem cells demonstrate reduced regenerative capacity and a bias toward myeloid lineage differentiation, affecting megakaryopoiesis and platelet production. Several studies report increased mean platelet volume (MPV) in elderly individuals, a parameter associated with enhanced platelet reactivity and thrombotic risk [Michelson, 2011, p. 203]. Larger platelets contain higher granule content and display increased surface receptor density.

2. Age-Related Changes in Platelet Adhesion and Aggregation

Multiple clinical studies demonstrate enhanced platelet aggregation responses to agonists such as adenosine diphosphate (ADP), collagen, and thrombin in older adults [Davì, 2007, p. 56]. This hyperreactivity is partially explained by increased expression and activation of platelet surface glycoproteins, including GPIIb/IIIa and GPIb-IX-V complexes, which mediate fibrinogen and von Willebrand factor binding.

Additionally, age-associated oxidative stress alters platelet membrane fluidity and intracellular calcium homeostasis, further amplifying aggregation responses [Valko, 2007, p. 42]. Reduced sensitivity to endogenous platelet inhibitors, such as nitric oxide (NO) and prostacyclin (PGI_2), exacerbates this proaggregant phenotype.

3. Platelet Secretion and Proinflammatory Phenotype

Platelets from elderly individuals exhibit enhanced secretion of alpha- and dense-granule contents, including thromboxane A_2, serotonin, platelet-derived growth factor (PDGF), and soluble CD40 ligand (sCD40L). Elevated plasma levels of sCD40L are strongly associated with endothelial activation, vascular inflammation, and atherosclerosis progression [Henn, 2001, p. 211].

This proinflammatory platelet phenotype promotes leukocyte recruitment and amplifies neurovascular inflammation, contributing to blood–brain barrier (BBB) disruption.

4. Platelet–Endothelium Interactions in Cerebral Microcirculation

Endothelial dysfunction is a hallmark of vascular aging. Reduced bioavailability of NO and prostacyclin diminishes the antithrombotic properties of cerebral endothelium, facilitating platelet adhesion and microthrombus formation [Moncada, 1991, p. 98]. Activated platelets adhere to dysfunctional endothelium via P-selectin and integrin-mediated mechanisms, particularly within cerebral arterioles and capillaries.

Repeated episodes of platelet-mediated microvascular occlusion result in chronic cerebral hypoperfusion and focal ischemic injury, even in the absence of large-vessel disease.

5. Platelets and Cognitive Decline

Growing evidence links platelet hyperactivation to cognitive impairment and dementia. Patients with Alzheimer's disease exhibit increased platelet aggregation, altered APP (amyloid precursor protein) processing, and elevated circulating platelet-derived amyloid-β [Sevush, 1998, p. 64]. Platelets are considered a major peripheral source of amyloid-β, contributing to cerebral amyloid angiopathy.

Similarly, vascular cognitive impairment is strongly associated with markers of platelet activation and microvascular thrombosis [Pantoni, 2010, p. 221].

Discussion

The data reviewed indicate that platelet aging is characterized by a shift toward a hyperreactive, proinflammatory, and prothrombotic phenotype. This shift is driven by intrinsic platelet alterations, endothelial dysfunction, oxidative stress, and impaired inhibitory signaling. In the cerebral circulation, these changes synergistically promote microthrombosis, BBB disruption, and neuroinflammation.

Platelet-derived mediators influence microglial activation and astrocytic function, linking systemic hemostatic aging to central nervous system inflammation. Thus, platelets act as critical effectors at the interface between vascular pathology and neurodegeneration [Iadecola, 2017, p. 145].

Results

Table 1.
Age-Related Changes in Platelet Function

Parameter	Young Adults	Elderly Individuals
Mean platelet volume	Normal	Increased
ADP-induced aggregation	Moderate	Enhanced
GPIIb/IIIa expression	Baseline	Upregulated
sCD40L secretion	Low	Elevated

Table 2.
Platelet Activity and Cognitive Status

Indicator	Normal Cognition	Cognitive Decline
Thromboxane A_2	Normal	Increased
Cerebral microthrombosis	Rare	Frequent
Cerebral perfusion	Preserved	Reduced

Scheme 1. Platelet-Mediated Mechanisms of Cognitive Decline

Aging → Platelet hyperreactivity → Endothelial dysfunction and microthrombosis → Chronic cerebral hypoperfusion → Neuroinflammation → Cognitive decline.

Conclusion

Age-related changes in platelet function represent a crucial and often underestimated mechanism linking systemic aging to cerebral microvascular dysfunction and cognitive decline. Platelet hyperreactivity, enhanced secretion of proinflammatory mediators, and dysregulated interactions with the cerebral endothelium contribute to chronic hypoperfusion and neurodegeneration. Targeting platelet activation pathways may provide novel preventive and therapeutic strategies to preserve cognitive function in aging populations.

References

1. Davì G., Patrono C. Platelet activation and atherothrombosis [Davì, 2007, p. 56].
2. Gawaz M. Role of platelets in inflammation and atherosclerosis [Gawaz, 2004, p. 87].
3. Henn V. et al. CD40 ligand on activated platelets [Henn, 2001, p. 211].
4. Iadecola C. The neurovascular unit in health and disease [Iadecola, 2017, p. 145].
5. Michelson A.D. Platelets [Michelson, 2011, p. 203].
6. Moncada S., Higgs A. The L-arginine–nitric oxide pathway [Moncada, 1991, p. 98].
7. Pantoni L. Cerebral small vessel disease [Pantoni, 2010, p. 221].
8. Rossi M. Aging and hemostasis [Rossi, 2010, p. 12].
9. Sevush S. et al. Platelet activation in Alzheimer's disease [Sevush, 1998, p. 64].
10. Valko M. et al. Free radicals and antioxidants in normal physiological functions [Valko, 2007, p. 42].

Shakhidova D. M.
senior lecturer
department of "economics"
Namangan State Technical University

WAYS TO EFFECTIVELY USE AND IMPROVE REGIONAL OPPORTUNITIES IN THE DEVELOPMENT OF SMALL BUSINESSES

Abstract: *This article analyzes the use of regional opportunities in the development of small businesses, the identification of specialized areas for small businesses, and the solutions and problems of increasing their competitiveness based on the rational use of resources.*

Keywords: *small business, regional opportunities, specialization, economic development, infrastructure, innovation, efficiency, financial activities, strategic planning*

Introduction

In the current conditions of the formation of market relations, liberalization of the economy, improvement of the business environment, support for small business and private entrepreneurship have become one of the priorities of state policy. Small businesses play an important role in ensuring stability in the national economy, creating new jobs, increasing incomes, producing innovative products and expanding the range of services.

Today, all regions of the Republic of Uzbekistan have various infrastructural, natural, labor and economic resources for the development of small businesses. Each region, district or city has its own unique potential, and by properly directing and effectively using them, it is possible to ensure regional economic growth. For example, the development of agribusiness in regions specializing in agriculture, and the processing industry in areas close to industrial enterprises, will lead to significant economic results.However, practice shows that in some regions the existing opportunities are not fully used or they have not been sufficiently analyzed.

Analysis of literature on the topic

Small businesses are not only drivers of economic development, but also play an important role in ensuring social stability, reducing poverty, increasing employment, and implementing innovative ideas.[1] One of the urgent tasks for today's economy is to deeply study the activities of small businesses, especially at the regional level, determine how effectively existing opportunities and resources are being used, analyze the obstacles and problems they face, and develop proposals and recommendations to overcome them.

Josef Schumpeter saw small business as the main source of economic change and innovation. According to Schumpeter's theory, regional specialization is a key factor in the development strategy of small businesses.[2] He emphasizes the role of small businesses in creating new jobs, attracting innovations, and

diversifying regional economies. Beck, T., & Demirguc-Kunt link economic growth to human capital and innovation, emphasizing the training of qualified personnel and the development of knowledge-based economic activities within regional opportunities. The development of education and science in regions serves the sustainable growth of small businesses.[3]

Research methodology

The study studied the development rates of small business entities in accordance with regional characteristics, existing infrastructural conditions, the level of use of natural resources and the practical impact of state policy. In addition, the aim was to study the role and importance of regional opportunities in the development of small business, and comprehensive research methods were used in this regard, combining theoretical and empirical approaches.

The scientific views of international and local economists on this topic - in particular, J. Schumpeter, Beck, T., & Demirguc-Kunt, M. Porter, J. Schumpeter.A and Uzbek economists (Akhmedov.M , D,Shaxidova and others) were analyzed. Based on their theoretical approaches, the relationship between small business and regional opportunities was clarified on a conceptual basis.

Analytical analysis methods were widely used during the study. Based on the State Statistics Committee of the Republic of Uzbekistan, the Chamber of Commerce and Industry, and other open sources, the number of small businesses, their distribution by region, and the level of job creation were analyzed for 2020-2024.

These interviews identified real problems, practical experiences and proposals that cannot be reflected in statistical data. In order to identify regional differences, Tashkent city, Fergana region, Bukhara, Karakalpakstan, Surkhandarya and Jizzakh regions were selected as examples. Economic conditions, resource potential, infrastructure level, population employment and social environment indicators related to business activity in these regions were analyzed.

Results and analysis

As a result of the reforms implemented in the economy of Uzbekistan in recent years, small business and private entrepreneurship are developing rapidly. The government is creating a foundation for the expansion of entrepreneurial activity through various programs and approaches aimed at supporting this sector, a system of tax incentives, loans, subsidies and grants.

According to statistics, by the end of 2024, the number of small businesses operating in Uzbekistan exceeded 600 thousand. They account for about 56 percent of the country's GDP and 75 percent of employment. The share of small businesses is especially large in the service and trade sectors, and in recent years, growth has also been observed in production and innovation areas. When viewed by region, the relative level of development of small businesses varies. For example, in large centers such as Tashkent, the Fergana Valley regions, Samarkand and Bukhara, small businesses are relatively stable and active.On the contrary, in regions with relatively low economic potential - the Republic of

Karakalpakstan, Surkhandarya and Jizzakh regions - entrepreneurial activity is lower. although small business has become significantly more active in Tashkent city, Andijan and Fergana regions, this sector has not yet been able to demonstrate its full potential in the Republic of Karakalpakstan, Jizzakh and Navoi regions.

Research results

As a result of these studies, it was clearly demonstrated that territorial opportunities are a decisive factor in the development of small businesses. The level of development of small business activities in the regions of Uzbekistan varies, and these differences are mainly associated with economic, infrastructural, social and geographical factors. Statistical analysis showed that in the capital and industrialized regions (Tashkent city, Tashkent region, Fergana Valley) the number of small business entities, their share in GDP, as well as activity in the service and trade sectors are much higher than in other regions. Also, the pace of development of small businesses in the Republic of Karakalpakstan, Surkhandarya and Jizzakh regions is slow, which is explained by insufficient infrastructure, a weak investment environment, the inability to fully use state programs and a shortage of personnel. 65% of entrepreneurs who participated in the study identified financing and infrastructure problems as the main obstacles.[11]

The growth in incomes and significant changes in living conditions are noticeable. Statistical data also show that in 2016-2020, the total income of the people of our country increased by more than 2.6 times. Our place in the world arena in this area is also increasing every year. It was noted that in the Global Innovation Index, Uzbekistan improved its position by 29 points compared to 2015, taking 93rd place among 131 countries and 4th place among the countries of Central and South Asia.

Conclusions and suggestions

The study revealed that each region has its own natural, economic, demographic and social resources, the rational and effective use of which is an important factor for the successful operation of small businesses. Small businesses do not develop at the same rate in each region. The main reason for this is the presence of unique natural, economic, demographic, infrastructural and cultural opportunities in each region. For example, irrigation-based agriculture is developing faster in regions rich in water resources, while production and technological services are developing faster in industrial centers. Differences between regions, the level of resource utilization and the imbalance of infrastructure are emerging as a significant problem in the development of small businesses. Each region and district should develop a specialized strategy for the development of small businesses based on its natural, economic and social potential.

List of used literature:

1. Collection of Decrees and Decisions of the President of the Republic of Uzbekistan. - T.: Lex.uz, 2020-2025.
2. Schumpeter, J. A. (1934). The Theory of Economic Development. Cambridge, MA: Harvard University Press.

3. Beck, T., & Demirguc-Kunt, A. (2006). Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint. Journal of Banking & Finance, 30(11), 2931-2943.
4. Storper, M., & Venables, A. J. (2004). Buzz: Face-to-Face Contact and the Urban Economy. Journal of Economic Geography, 4(4), 351–370.
5. Shakhidova D.M. “Improving state support mechanisms for the development of small businesses” Scientific electronic journal “Innovations in Science and Technologies” ISSN: 3030-3451. 2 / 2025. www.innoist.uz
6. Shakhidova D.M. “The importance of regional pportunities in small business development” Scientific electronic journal “Innovations in Science and Technologies” ISSN: 3030-3451. 2 / 2025. www.innoist.uz Innovations in Science and Technologies, issue 6. 2025.
7. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
8. Jurayev, E. S. (2024). Namangan viloyati kichik biznes subyektlari faoliyatida real investitsiyalarning samaradorligini ekonometrik baholash. Yashil iqtisodiyot va taraqqiyot, 2(9).
9. Ibrogimov, S. (2024). Namangan viloyati qurilish materiallari ishlab chiqarish korxonalarining faoliyati samaradorligini ta’minlash holati va tahlili. YASHIL IQTISODIYOT VA TARAQQIYOT, 2(11).
10. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
11. 11 .Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
12. Aripov, O. A. (2019). Development of small business and private entrepreneurship and creation of business environment. Economy and innovative technologies" scientific electronic magazine,(2).
13. Bahriddinov, N. Z. (2021). Legal and economic basis for improving the mechanism of financial incentives for innovative activities in industrial enterprises. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 1804-1811.
14. Bahriddinov, N. (2025). Innovative development of the service network. muhandislik va iqtisodiyot, 3(10).

Shamatov I. Y.
senior lecturer
department of otorhinolaryngology no. 1.
Samarkand State Medical University

HISTOLOGICAL CHANGES UPON TRANSECTION OF INTESTINAL NERVES IN THE EXPERIMENT

Abstract. *In the article, under morphological experimental conditions, the structure, localization, and sources of the submucosal innervation of the small intestine were studied, as well as the histological changes in the nerve tissues of its tissues in response to various types of denervation. The materials were processed using general histological methods and neurohistological methods, including the Bielschowsky-Gross method and Nissl staining for nerves. The intramural nerve nodes of the small intestine are also rich in sensory terminals. After removal of the dorsal root ganglia, the intestinal nerve apparatus was studied at various intervals, and in all cases, the same type of changes in the large nerve cells of the small intestine nerve bundles were observed. The crypts in the mucous membrane of the intestines also underwent morphological changes.*

Keywords:*rabbit, small intestine, experiments, cutting of mesenteric nerves, solar plexus, dorsal root ganglia, denervation.*

Introduction

Studying the innervation relationships of organs is necessary to understand the mechanism of connection between organs and the central nervous system, as well as their integration into the system of the whole organism. Innervation relationships in hollow organs are characterized by a number of specific features. Among them, first and foremost, is the presence of an intramural ganglionic apparatus associated with the central nervous system and numerous afferent instruments, which provide these organs with subtle adaptation to living conditions and broad possibilities for reflex functioning as constituent elements of the whole organism. Experimental studies conducted to clarify questions related to the study of sensory terminals in the small intestine are not numerous [1,2]. In this study, using the method of morphological experiment, the structure, localization, and sources of the sensory and motor innervation of the small intestine, as well as the reaction of its tissues to various denervations, were examined [3].

Research Objective

To study the reaction of changes in the sensory and motor innervation of the small intestine in the experiment.

Materials and Methods of the Study

To solve the assigned task, the following series of experiments were conducted on 75 healthy rabbits: 1) transection of mesenteric nerves, 2) removal of solar plexus nodes, 3) transection of greater splanchnic nerves, 4) bilateral removal of sensory spinal cord nodes (thoracic and lumbar), 5) removal of a part

of the small intestine. After the operation, the animals were sacrificed at various intervals starting from 24 hours and ending at 12 days.

The material was processed using general histological methods, the Bielschowsky-Gross method, and Nissl staining.

Research Results

As a result of the conducted experiments and the study of the material, it was established that all parts of the small intestine wall are abundantly supplied with nerve instruments of a receptor nature of varying degrees of complexity. A characteristic feature of their structure is the great length of the terminal branches. The fibers forming the receptors are mostly non-myelinated, occasionally covered with a thin, barely noticeable layer of myelin, which gradually disappears. Along their course, these fibers most often divide dichotomously, sometimes into a large number of branches. It is necessary to highlight one extremely important feature of the sensory terminals in the small intestine. Apparently, a large number of receptors are represented by the final ramifications of the processes of nerve cells located right there in the intestinal wall as part of the Auerbach and Meissner plexuses. The intramural nerve nodes of the small intestine are also rich in sensory terminals. However, in terms of their structure, they are shorter and do not extend beyond the ganglion. We succeeded in establishing the cytoarchitecture of the plexuses, where cells of the first type predominate in the submucosal plexus nodes and are always located in large clusters. Changes in the nerve cells of the spinal cord nodes were expressed in two forms of damage. In one case, it was true chromatolysis, proceeding with the displacement of the tigroid substance to one edge of the cell and with sharp wrinkling and shifting of the nucleus to the periphery. The sensitivity of the small intestine wall is ensured by the presence of local second-type Dogiel cells in the composition of the Auerbach and Meissner plexuses and sensory spinal cord nodes. In the intermuscular plexus nodes, there are more large neurons, and in the nodes closer to the serous membrane, their number increases even more. Small nerve cells have a large number of processes, which are thin and short, departing from the cell body and ending in close proximity to it, and one long process, which, as a rule, enters the composition of a thin trunk of non-myelinated fibers. Large cells are not provided with such synaptic apparatuses; their size is much larger, and finally, the processes of these cells form undoubted receptor endings in all parts of the intestinal wall. Based on these characteristics, these cells can be attributed to Dogiel's type 2 cells, cells of a sensory nature. The neurites of the first-type cells, in terms of their external properties, are completely identical to the postganglionic fibers of the autonomic nervous system and, like the latter, always travel accompanied by a large number of Schwann cells. Studying the intestinal nerve apparatus at different intervals after removal of the spinal cord nodes, in all cases we observed the same type of changes in the large nerve cells of the intestinal plexuses. When removing the spinal cord nodes of the middle and lower thoracic region, dilation of blood vessels is noted, accompanied by filling of the vessels with polymorphonuclear neutrophil leukocytes (especially in late periods after the operation). From the

dilated vessels, leukocytes penetrate into the surrounding tissue, including the nerve nodes. Round cell infiltrates appear in the submucosa. After removal of the solar plexus nodes, pronounced vasodilation is observed; arterioles turn into smooth-contoured tubes, flaccid muscle cells become flat and low. Phenomena of vessel dilation, neutrophil and round cell infiltration are observed throughout the experiment period. The intestinal crypts also underwent infiltrative and atrophic changes.

Conclusion

Thus, taking into account our data on the innervation of the intestine, we evaluate the changes described above as follows: Infiltration by neutrophils and dedifferentiation of a number of tissue elements is a consequence of sensory denervation of the small intestine. Infiltration of the intestinal tissues by polymorphonuclear leukocytes, in contrast to the data obtained during deafferentation of other organs, did not reach extreme degrees, which can be explained by the incomplete sensory denervation due to the presence of afferent neurons in the composition of its intramural plexuses.

References

1. Shamotov I. Ya., Shopulotova Z. K. Features of differential diagnosis and treatment of paradoxical movement of vocal folds in women // Eurasian Journal of Medical and Natural Sciences. – 2024. – Vol. 5. – No. 1. – P. 45-49.
2. Mamatliev A., Oripov F. Histological structure of the intramural nerve apparatus of the common bile duct and gallbladder in rabbits, in the norm and after gallbladder removal // Journal of Biomedicine and Practice. – 2021. – Vol. 1. – No. 3/2. – P. 117-125.
3. Mamatliev A., Oripov F. Histological structure of the intramural nerve apparatus of the common bile duct and gallbladder in rabbits.

Shamotov I. Y.
katta o‘qituvchi
1-otrinolaringologiya kafedrasi
Samarqand davlat tibbiyot universiteti

TAJRIBADA ICHAKLAR NERVLARI KESILGANDA GISTOLOGIK O`ZGARISHLAR

Аннотация. *Maqolada morfologik eksperiment sharoitda o‘rganilgan ingichka ichakning submukoza innervatsiyasining struktura, lokalizatsiyasi va manbalari, shuningdek, uning to‘qimalarining turli xil denervatsiyaga bo‘lgan nerv to`qimalarida gistologik o`zgarishla o`rganilgan. Materiallar umumiy gistologik usullar va neyrogistologik usullardan Bilschovski-Gross usuli hamda Nissl bo‘yash nervlarga ishlov berildi. Ingichka ichakning intramural nerv tugunlari ham sezgir terminallarga boy. Ichak nerv apparatini orqa miya tugunlarini olib tashlashdan keyin turli muddatlarda o‘rganib, barcha holatlarda ingichka ichak nerv chigallarining katta nerv hujayralarida bir xil tipdagi o‘zgarishlarni kuzatdik. Ichaklarning shiliq qavatidagi kriptalari ham morfologik o`zgarishlarga duchor bo‘ldi.*

Kalit so‘zlar: *quyon, ingichka ichak, tajribalar, brizheyka nervlarini kesish, quyosh plexus, orqa miya tugunlari, denervatsiya.*

Shamatov I. Y.
senior lecturer
department of otorhinolaryngology no. 1.
Samarkand State Medical University

HISTOLOGICAL CHANGES UPON TRANSECTION OF INTESTINAL NERVES IN THE EXPERIMENT

Abstract. *In the article, under morphological experimental conditions, the structure, localization, and sources of the submucosal innervation of the small intestine were studied, as well as the histological changes in the nerve tissues of its tissues in response to various types of denervation. The materials were processed using general histological methods and neurohistological methods, including the Bielschowsky-Gross method and Nissl staining for nerves. The intramural nerve nodes of the small intestine are also rich in sensory terminals. After removal of the dorsal root ganglia, the intestinal nerve apparatus was studied at various intervals, and in all cases, the same type of changes in the large nerve cells of the small intestine nerve bundles were observed. The crypts in the mucous membrane of the intestines also underwent morphological changes.*

Keywords:*rabbit, small intestine, experiments, cutting of mesenteric nerves, solar plexus, dorsal root ganglia, denervation.*

Kirish

Organlarning innervatsion munosabatlarini o'rganish organlarning markaziy nerv tizimi bilan bog'lanish mexanizmini tushunish va ularni butunlikdagi organizm tizimiga integratsiya qilish uchun zarurdir. Bo'shliqli organlardagi innervatsion munosabatlar bir qator o'ziga xos xususiyatlar bilan tavsiflanadi. Ularga birinchi navbatda markaziy nerv tizimi bilan bog'liq bo'lgan devor ichidagi gangliyalar apparati mavjudligi va ko'plab afferentsiya asboblari mavjudligi kiradi, bu organlarga mavjudlik sharoitlariga nozik moslashuv va butunlikdagi organizmning tarkibiy qismlari sifatida reflektor faoliyatning keng imkoniyatlarini ta'minlaydi. Ingichka ichakdagi sezgir terminallarni o'rganish bilan bog'liq savollarni aniqlash uchun o'tkazilgan eksperimental ishlar ko'p emas [1,2]. Ushbu tadqiqotda morfologik eksperiment usuli bilan ingichka ichakning sezgir va harakatli innervatsiyasining struktura, lokalizatsiyasi va manbalari, shuningdek, uning to'qimalarining turli denervatsiyaga bo'lgan reaksiyasi o'rganildi [3].

Tadqiqot maqsadi

Eksperimentda ingichka ichakning sezgir va harakatli innervatsiyasining o`zgarishlarining reaksiyasini o'rganish.

Tadqiqot materiallari va usullari

Qo'yilgan vazifani hal qilish uchun 75 ta sog'lom quyonladarda quyidagi seriyali tajribalar o'tkazildi: 1) brizheyka nervlarini kesish, 2) quyosh pleksus tugunlarini olib tashlash, 3) katta qorin nervlarini kesish, 4) ikki tomondan sezgir orqa miya tugunlarini (ko'krak va bel qismi) olib tashlash, 5) ingichka ichakning bir qismini olib tashlash. Operatsiyadan keyin hayvonlar 24 soatdan boshlab 12 sutkagacha turli muddatlarda o'ldirildi.

Material umumiy gistologik usullar, Bilschovski-Gross usuli va Nissl bo'yash usuli bilan qayta ishlandi.

Tadqiqot natijalari

O'tkazilgan tajribalar va materialni o'rganish natijasida ingichka ichak devorining barcha qismi turli murakkablik darajasidagi reseptor tabiatidagi nerv asboblari bilan boyitilgani aniqlandi. Ularning tuzilishidagi xos xususiyat konetsial shoxlarning katta uzunligidir. Reseptorlarni hosil qiluvchi tolalar asosan bezmiyelinli bo'lib, ba'zan nozik va kam seziladigan miyelin qatlami bilan qoplangan bo'lib, u asta-sekin yo'qoladi. O'z yo'li bo'ylab bu tolalar ko'pincha dixotomik bo'linadi, ba'zan ko'p sonli shoxlarga bo'linadi. Ingichka ichakdagi sezgir terminallarning o'ta muhim bir xususiyatini alohida ta'kidlash zarur. Ko'rinib turibdiki, reseptorlarning katta qismi ichak devorida, Ayerbax va Meyssner pleksuslari tarkibidagi nerv hujayralarining o'sishlarining yakuniy shoxlanishlari shaklida ifodalangan. Ingichka ichakning intramural nerv tugunlari ham sezgir terminallarga boy. Biroq, ularning tuzilishi bo'yicha ular qisqaroq va gangliy chegarasidan chiqmaydi. Biz pleksuslarni tsitoarkitekturasini aniqlashga muvaffaq bo'ldik, bunda birinchi tipdagi hujayralar submukoza pleksus tugunlarida ustunlik qiladi va har doim katta guruhlar shaklida joylashgan. Orqa miya tugunlari nerv hujayralaridagi o'zgarishlar ikki shaklida ifodalangan. Bir holatda bu haqiqiy xromatoliz bo'lib, tigroid modda hujayra bir chetiga siljishi va

yadro keskin qisilishi va periferiyaga siljishi bilan kechadi. Ingichka ichak devorining sezgirligi Ayerbax va Meyssner pleksuslari tarkibidagi mahalliy ikkinchi tip Dogel hujayralari va sezgir orqa miya tugunlarining mavjudligi hisobiga ta'minlanadi. Mushaklararo pleksus tugunlarida katta neyronlar ko'proq, seroza qobig'iga yaqinroq tugunlarda ularning soni yana ko'payadi. Kichik nerv hujayralari ko'p sonli o'sishlarga ega bo'lib, ular ingichka va qisqa bo'lib, hujayra tanasidan chiqib, undan yaqin joyda tugaydi va odatda bezmiyelinli tolalarning ingichka magistral tarkibiga kiruvchi bitta uzun o'sishga ega. Katta hujayralar bunday sinaptik asboblar bilan ta'minlanmagan, ularning o'lchami ancha katta va nihoyat, bu hujayralarning o'sishlari ichak devorining barcha qismlarida shubhasiz reseptor terminallarini hosil qiladi. Ushbu belgilar asosida bu hujayralar Dogelning 2-tip hujayralari, sezgir tabiatdagi hujayralarga mansub deb hisoblanishi mumkin. Birinchi tip hujayralarining neyritlari o'z tashqi xususiyatlari bo'yicha avtonom nerv tizimining postgangliy nav tolalari bilan to'liq bir xil bo'lib, ular ham shu tolalar singari har doim ko'p sonli Shvan hujayralari bilan birga ketadi. Orqa miya tugunlarini olib tashlashdan keyin turli muddatlarda ichak nerv apparatini o'rganib, barcha holatlarda ichak pleksuslari katta nerv hujayralaridagi bir xil tipdagi o'zgarishlarni kuzatdik. O'rta va pastki ko'krak bo'limidagi orqa miya tugunlarini olib tashlashda qon tomirlarining kengayishi kuzatiladi, u tomirlarning polimorfonuklear neytrofil leykotsitlar bilan to'lib ketishi bilan birga keladi (ayniqsa, operatsiyadan keyingi kech muddatlarda). Kengaygan tomirlardan leykotsitlar atrofgi to'qimaga, shu jumladan nerv tugunlariga kirib boradi. Submukoza qobig'ida dumaloq hujayrali infiltratlar paydo bo'ladi. Quyosh pleksus tugunlarini olib tashlashdan keyin keskin vazodilyatsiya kuzatiladi, arteriolalar silliq konturli naychalarga aylanadi, zaif mushak hujayralari tekis va past bo'ladi. Tomirlarning kengayishi, neytrofil va dumaloq hujayrali infiltratsiya holatlari butun tajriba muddati davomida kuzatiladi. Ichak kriptalari ham infiltrativ va atrofik o'zgarishlarga duchor bo'ldi

Xulosa

Shunday qilib, ichak innervatsiyasi haqidagi ma'lumotlarimizni hisobga olgan holda, yuqorida tasvirlangan o'zgarishlarni quyidagicha baholaymiz: Neytrofillar infiltratsiyasi va bir qator to'qima elementlarining dedifferensialashuvi ingichka ichakning sezgir denervatsiyasining natijasidir. Ichak to'qimalaridagi polimorfonuklear leykotsitlar infiltratsiyasi boshqa organlar deafferentsiyasida olingan ma'lumotlarga qarama-qarshi, o'ta darajaga yetmadi, bu ichak devoridagi pleksus tarkibidagi afferentsiya neyronlarining mavjudligi sababli sezgir denervatsiyaning to'liqsizligi bilan izohlanishi mumkin.

Адабиётлар:

1. Шаматов И. Я., Шопулотова З. к. особенности дифференциальной диагностики и лечение парадоксального движения голосовыхскладок у женщин //Eurasian Journal of Medical and Natural Sciences. – 2024. – Т. 5. – №. 1. – С. 45-49.

2. Маматалиев А., Орипов Ф. Гистологическое строение интрамурального нервного аппарата общего желчного протока и желчного пузрья у кролика, в

норме и после удаление желчного пузыря //Журнал биомедицины и практики. – 2021. – Т. 1. – №. 3/2. – С. 117-125.
3. Маматалиев А., Орипов Ф. Гистологическое строение интрамурального нервного аппарата общего желчного протока и желчного пузрья у кролика.

Sharobiddinov M. Z.
assistenti
anesteziologiya, reanimatsiya va shoshilinch tibbiy yordam kafedrasi
ASMI

O'TKIR KARDIOEMBOLIK INSULTLI BEMORLARDA ANTIGIPERTENZIV TERAPIYA

Annotatsiya*: Maqolada TOAST mezonlari bo'yicha kardioembolik insultning (CE) diagnostik xususiyatlari keltirilgan. Kasallikning o'tkir bosqichida reperfuziya va neyroprotektiv terapiya tamoyillari ko'rsatilgan. Kardioembolik miya infarkti uchun antihipertenziv terapiyaga differentsial yondashuv insult boshlangan vaqtga, tizimli va miya gemodinamikasining boshlang'ich holatiga va birga yuradigan yurak-qon tomir kasalliklariga qarab, Belarusiya Respublikasi kasalxonalarida foydalanish uchun mavjud bo'lgan asosiy antihipertenziv dorilarni hisobga olgan holda ishlab chiqilgan. Kalit so'zlar: kardioembolik ishemik insult, diagnostika mezonlari, reperfuzion terapiya, neyroprotektiv terapiya, antihipertenziv terapiya.*

Kalit so‘zlar:*kardioembolik ishemik insult, diagnostika mezonlari, reperfuzion terapiya, neyroprotektiv terapiya, antihipertenziv terapiya.*

Sharobiddinov M. Z.
assistant
department of anesthesiology,
resuscitation and emergency medical care
ASMI

ANTIHYPERTENSIVE THERAPY IN PATIENTS WITH ACUTE CARDIOEMBOLIC STROKE

Abstract. *The diagnostic signs of cardioembolic stroke according to TOAST criteria have been described. The principles of reperfusion and neuroprotection therapy in acute period of the disease have been presented. The differential approach to the management of hypertension in cardioembolic stroke depending on the time of the stroke onset, general and cerebral circulation initial state, concomitant cardiovascular disorders with regard to basic antihypertensive medications, available in the clinics of the Republic of Belarus has been worked out.*

Key words: *cardioembolic ischemic stroke, diagnostic criteria, reperfusion therapy, neuroprotective therapy, antihypertensive therapy.*

JSST ma'lumotlariga ko'ra, serebrovaskulyar kasalliklar hozirda dunyo bo'ylab o'lim sabablari orasida ikkinchi o'rinda turadi, bu barcha o'lim holatlarining taxminan 20 foizini yoki yiliga 14 millionni tashkil qiladi [15]. O'tkir

serebrovaskulyar avariyalarning 70% gacha ishemik miya shikastlanishi bilan bog'liq [9, 42]. Arterial gipertenziya (AH) o'tkir serebrovaskulyar avariya (ACVA) rivojlanishining mustaqil xavf omili bo'lib, ishemik insultning uchta patogenetik turini rivojlanishiga yordam beradi: lakunar, aterotrombotik va kardioembolik (CE) [2, 10, 32, 33]. Sistolik va diastolik qon bosimining ko'tarilish darajasi va aholining barcha yosh guruhlarida ACVA rivojlanish xavfi o'rtasida yaqin bog'liqlik mavjud [11, 23, 29]. Gipertenziya yurak aritmi bilan yurak kasalliklarining kechishini kuchaytiradi, uning tez-tez uchraydigan asoratlari miya tomirlarining emboliyasidir [1, 17, 30, 35, 36]. Qon bosimining uzoq muddatli oshishi miya infarktining (MI) aterotrombotik va lakunar variantlarining sababi bo'lgan makro va mikroangiopatiyalar ko'rinishidagi tomirlar devorida morfologik o'zgarishlarga olib keladi [38, 41].

Ishemik insultning eng keng tarqalgan turlaridan biri kardioembolik MI hisoblanadi. Belarus Respublikasi Sog'liqni saqlash vazirligining Respublika Nevrologiya va neyroxirurgiya ilmiy-amaliy markazi xodimlari tomonidan olib borilgan tadqiqotlarga ko'ra (2005), kardioembolik MI bilan kasallanish barcha o'tkir ishemik serebrovaskulyar avariyalarning 33% ga etadi [8]. Gipertenziya fonida yurak emboliyasi bilan miya tomirlarining tiqilib qolishi natijasida yuzaga kelgan miya infarkti ko'pincha yuqori kasallanish va o'lim ko'rsatkichlari bilan bog'liq: bemorlarning 20% dan ortig'i kasallikning birinchi oyida, 50% gacha bir yil ichida vafot etadi [12].

Xalqaro randomizatsiyalangan tadqiqotlar ishemik insultning birlamchi va ikkilamchi profilaktikasi uchun antihipertenziv terapiyaning samaradorligini isbotlaganiga qaramay, miya infarktining o'tkir davrida qon bosimini pasaytirish zarurati haqidagi savol yaqin vaqtgacha ochiqligicha qoldi [19, 20, 28, 39, 40].

Ushbu nashrning maqsadi arterial gipertenziyada kardioembolik miya infarkti diagnostikasi va davolashning zamonaviy tamoyillarini taqdim etishdan iborat.

Qon tomirlarining boshlanishi va rivojlanishining kardioembolik varianti keng qamrovli klinik va instrumental tekshiruv natijalari asosida aniqlanadi, bu differentsial terapiyani o'z vaqtida boshlash imkonini beradi [7]. Xalqaro tadqiqotlarda umumiy qabul qilingan tasnif bo'lgan TOAST Stroke Subtipi tasnifiga ko'ra, kardioembolik insult klinik va paraklinik tekshirish usullari orqali aniqlangan kardiogen embolik omillar mavjudligi bilan tavsiflanadi [31, 37, 43].

Idoralar MI ning yuqori ehtimoli bo'lgan omillar: sun'iy yurak qopqog'i; stenozli mitral qopqoq aritmi (AF); AF boshqa yurak-qon tomir kasalliklari bilan birgalikda; chap atriyal tromboz; 4 hafta oldin miyokard infarkti; chap qorincha trombozi; kengaytirilgan kardiyomiyopatiya; chap qorincha akineziyasi; atriyal miksoma; yuqumli endokardit.

Kardiogen emboliyaning mumkin bo'lgan sabablari: mitral qopqoq prolapsasi; mitral qopqoq varaqlarining kalsifikatsiyasi; atriyal fibrilatsiyasiz mitral qopqoq stenozi; chap atriumdagi turbulentlik; atriyal septal anevrizma; patent teshigi; yurak kasalligisiz taxikardiya; bioprotez yurak qopqog'i; revmatik

endokardit; og'ir yurak etishmovchiligi; chap qorinchadagi hipokinetik segment; 4 haftadan 6 oygacha bo'lgan miyokard infarkti.

Kardioembolik miya infarktining diagnostik mezonlari:

1. Yagona yoki ko'p infarkt o'choqlarining kortikal-subkortikal lokalizatsiyasi - birinchi navbatda chap o'rta miya arteriyasining orqa shoxlari havzasi. Lezyon hajmi odatda o'rta yoki katta. Infarktning gemorragik transformatsiyasi xarakterlidir, bu kompyuter tomografiyasi va magnit-rezonans tomografiya tomonidan ko'rsatilgan.

2. Bemorda insultning o'tkir boshlanishi. Nevrologik nuqsonlar kasallikning boshlanishida eng aniq namoyon bo'ladi. Anamnestik va paraklinik tekshiruv ma'lumotlari tizimli emboliya belgilarini aniqlaydi.

3. Angiografiya va/yoki transkranial dupleks sonografiya uchun:

- yirik intrakranial arteriyalar va ularning shoxlarini tiqilishi;
- embolik migratsiya yoki "yo'qolib borayotgan okklyuzion" simptomi (tiqilib qolgan arteriyaning rekanalizatsiyasi);
- intrakranial arteriyaning okklyuziyasiga proksimalda aniq aterosklerotik tomir lezyonlarining yo'qligi;
- transkranial Doppler ultratovushda mikroembolik signallar.

Miya infarktining quyidagi davrlari ajratiladi: o'tkir davr (insult boshlanganidan boshlab birinchi 24 soat), o'tkir davr (birinchi 3 kun), subakut davr (3 kun - birinchi 3 hafta), miya qon oqimining barqarorlashuvi va insultning ikkilamchi profilaktikasi (3 haftadan keyin) [16,2]. Kasallikning o'tkir davrida o'tkir miya yarim ishemiyasining og'irligi miya qon oqimining qisqarish darajasi, reperfüzyondan oldingi davrning davomiyligi va ishemiya darajasi bilan chambarchas bog'liqdir [3, 27]. Infarktning "aniq" yoki "yadro" zonasi miya qon oqimining 10 ml / 100 g / min gacha mahalliy qisqarishi sohasida hosil bo'ladi. Uning atrofida miya qon oqimi taxminan 20-40 ml / 100 g / min bo'lgan ishemik penumbra zonasi mavjud. "Terapevtik darcha" (3-6 soat) vaqtida miyaning ushbu sohasida strukturaviy emas, balki faqat funktsional o'zgarishlar sodir bo'ladi va energiya almashinuvi saqlanib qoladi. Bu davrdan keyin infarktli lezyon hosil bo'ladi [5]. Ishemik insultning "oldindan shakllanishi" 48 soat yoki undan ko'proq davom etadi va shuning uchun intensiv terapiya kasallikning dastlabki 3 soatida boshlanishi kerak [26, 34].

O'tkir o'choqli miya yarim ishemiyasining patogenezida asosiy rolni miya qon oqimining pasayishi va asab to'qimalariga kislorod va glyukoza bilan etarli darajada ta'minlanmaganligi sababli qon aylanish gipoksiyasining rivojlanishi o'ynaydi [5]. Ishemik insult bilan og'rigan bemorlarda miya to'qimalariga qaytarilmas zarar etkazilishining oldini olishning eng istiqbolli usullari - bu mahalliy miya qon oqimini tiklash (trombolitik terapiya) va miyaning metabolik himoyasi (neyroproteksiya).

Kardioembolik miya infarktida reperfuziya va neyroproteksiya uchun quyidagilar qo'llaniladi:

1. Ishemik fokusni reperfuziya qilish uchun tromboliz (rekombinant to'qimalarning plazminogen faollashtiruvchisi). Bu usul istiqbolli, ammo hozirda u Belarus Respublikasida keng qo'llanilmaydi.

2. Patogenetik jihatdan ahamiyatli yurak-qon tomir buzilishlarini tuzatish: to'g'ridan-to'g'ri va bilvosita antikoagulyantlar (geparin, fraksiparin, enoksoparin), trombotsitlarga qarshi vositalar (atsetilsalitsil kislotasi, dipiridamol, tiklopidin, klopidogrel), yurak paroksismal kardiyak kasalliklarini (arritmion, aritmion, aritoblok) relefi. quinilentin), doimiy atriyal fibrilatsiyada qorincha tezligini normallashtirish (yurak glikozidlari, beta-blokerlar, verapamil).

3. Neyroprotektsiya: neyrotrofik dorilar (piratsetam, serebrolizin, serebromedin, cavinton), neyromodulyatorlar (glisin, semaks), antioksidantlar (aktovegin, solkoseril, diavitol, emoksipin, meksidol, mildronat, E, C vitaminlari, antioksitoksikapslar, energetika).

Qon tomirlarida antihipertenziv terapiyaning maqsadi miyaning eng zaif joylarida miya qon oqimining maqbul darajasini saqlab qolishdir. Qon bosimini pasaytirish taktikasi miya qon aylanishining dastlabki holatiga, insult boshlangan vaqtga va uning patogenetik variantiga bog'liq [13]. Insultning dastlabki 24 soatida qon bosimining oshishi nafaqat gipertenziv bemorlarda, balki me'yoriy bosimli bemorlarda ham kuzatiladi [34]. Ishemik insultning o'tkir va og'ir davrlarida qon bosimining haddan tashqari pasayishiga yo'l qo'ymaslik kerak [14, 25]. Umuman olganda, kasalxonaga yotqizilgan paytda qon bosimining o'rtacha ko'tarilishi ishemik insult natijasining qulay prognostik belgisidir [10]. Biroq, yuqori qon bosimining 1 kun yoki undan ko'proq davom etishi kasallikning oqibati uchun noqulay omil hisoblanadi [4, 28]. Qon bosimining keskin oshishi miya shishi va intrakranial bosimning oshishiga, o'tkir miokard infarktining rivojlanishiga, o'pka shishi, o'tkir chap qorincha etishmovchiligi, torakal aorta diseksiyonu, dekompensatsiyalangan yurak etishmovchiligi, retinal ajralish va o'tkir buyrak shikastlanishiga yordam beradi [8].

Kardioembolik insultning o'tkir bosqichida miya arteriyasining asosiy tarmog'ining o'tkir okklyuziyasi yuzaga keladi, natijada miya yarim ishemiyasining katta maydoni va tegishli miya yarim sharining massiv shishi paydo bo'ladi [4, 6, 18]. Kasallikning dastlabki soatlarida, kollateral qon aylanishi faollashgunga qadar va tiqilib qolgan arteriya qayta kanalizatsiya qilinishidan oldin qon bosimining pasayishi infarkt zonasining rivojlanishiga va umumiy miya va fokal nevrologik simptomlarning kuchayishiga yordam beradi. Kardiyoembolik insultning boshlanishida qon bosimi yuqori qiymatlarga etib bormaydi, odatda 120/80-140/90 mmHg darajasida qoladi. Antihipertenziv dorilarni qo'llash noto'g'ri.

Miya infarktining o'tkir bosqichida ishemik zonada qon oqimi tiklanadi, ishemik miya shishi esa kuchayadi. Yuqori qon bosimi, ayniqsa ma'lum bir bemor uchun, qon-miya to'sig'ining o'tkazuvchanligi ortishi sohasida vazojenik shish paydo bo'lishiga olib keladigan zarar etkazuvchi omil hisoblanadi. Miya infarktining gemorragik o'zgarishi ehtimoli, ayniqsa trombolitik yoki

antikoagulyant dorilar bilan davolashda ortadi. Bunday hollarda qon bosimini "ishchi" darajaga to'g'rilash tavsiya etiladi:

- angiotensinga aylantiruvchi ferment (ACE) ingibitorlari (enalapril 5-10 mg dan kuniga 1-2 marta; kaptopril 12,5 mg dan kuniga 3 marta);
- ACE inhibitörleri + diuretiklar (ertalab gidroxlorotiyazid 12,5 mg).

CE insultining o'tkir va o'tkir davrlarida paroksismal yurak aritmiyalarining rivojlanishida antiaritmik dorilar bilan bir qatorda beta-blokerlarni (atenolol 25-50 mg dan kuniga 2 marta; metoprolol 12,5 - 50 mg dan kuniga 1-2 marta) qo'llash mumkin.

Atriyal fibrilatsiyaning doimiy shaklida qorincha tezligini normallashtirish uchun yurak glikozidlaridan tashqari, beta-blokerlar (atenolol 12,5-50 mg kuniga 1-2 marta) va kaltsiy antagonistlari (kuniga 3 marta verapamil 40-80 mg) buyurilishi mumkin.

Kardiyoembolik insultning subakut davrida qon bosimini 140/90 mmHg maqsadli qiymatlarga bosqichma-bosqich kamaytirish kerak. Konjestif yurak etishmovchiligi H1-H2a bosqichida bo'lgan bemorlarda past dozalarda ACE inhibitörleri, diuretiklar va beta-blokerlar ko'rsatiladi.

Shunday qilib, hozirgi vaqtda miya infarktining o'tkir davrida antihipertenziv dorilar sifatida angiotensinga aylantiruvchi ferment inhibitörleri, diuretiklar va beta-blokerlarni qo'llash maqsadga muvofiqdir. Boshqa toifadagi antihipertenziv dorilarning ikkilamchi insultning oldini olish nuqtai nazaridan samaradorligi nazorat ostidagi xalqaro sinovlarda o'rganilmoqda [21, 33]. Bu sohada nisbatan yangi dorilar guruhi, angiotenzin II retseptorlari antagonistlari (eprosartan, kandesartan va boshqalar) faol o‘rganilmoqda [23, 24].

Klinik sinovlar orqali ishlab chiqilgan asosiy terapiya tamoyillari hayotiy funktsiyalarni doimiy ravishda kuzatib borish va bemorning individual xususiyatlarini hisobga olgan holda intensiv terapiya bo'limi sharoitida kardioembolik ishemik insultning o'tkir bosqichida favqulodda choralarni amalga oshirishni nazarda tutadi. Qon tomirlarining o'tkir bosqichida qon bosimini boshqarishning zamonaviy usullari miya qon oqimini tiklashga, ishemik shikastlanish maydonini cheklashga va miya to'qimalarining gipoksiyaga chidamliligini oshirishga qaratilgan. Kardioembolik miya infarkti bo'lgan bemorlarda antihipertenziv terapiya uchun ishlab chiqilgan algoritmlar Belarus Respublikasida sog'liqni saqlashda amaliy foydalanish uchun mavjud bo'lgan asosiy farmakologik vositalarni o'z ichiga oladi.

Adabiyot

1. Borisov, A.V. Yurak-qon tomir kasalliklari bilan og'rigan bemorlarda insultni prognozlash va oldini olish / A.V. Borisov, A.E. Semak // Sog'liqni saqlash. ñ 2003. ñ No 9. ñ B. 35-39.
2. Vereshchagin, N.V. Qon tomirlarining heterojenligi: klinisyenning nuqtai nazaridan / N.V. Vereshchagin // Zhurn. neyrol. men psixiatr.: insult. ñ 2003. ññ Ilova. 1, 9-son. ñ B. 8-10.
3. Vilenskiy, B.S. Qon tomirlari: oldini olish, tashxislash va davolash. Sankt-Peterburg, 1999. 336 b.

4. Qon tomir: bemorni parvarish qilish uchun amaliy qo'llanma / C.P. Warlow [va boshq.]. Moskva: Politexnika, 1998. 630 b.
5. Gusev, E.I. Miya ishemiyasi / E.I. Gusev, V.I. Skvortsova. ñ M.: Tibbiyot, 2001. ñ 328 b.
6. Kuznetsov, A.N. Miya emboliyasi: o'tmish, hozirgi, kelajak // Nevrologik jurnal. ñ 2004. ñ №5. ñ 4-11-betlar.
7. Vaqtinchalik ishemik xurujlarni davolash va oldini olish / S.A. Lixachev [va boshq.] // Tibbiyot yangiliklari. ñ 2004. ñ No 1. ñ B. 32-37.
8. Ishemik insultli bemorlarda arterial gipertenziyaning zamonaviy terapiyasi / S.A. Lixachev [va boshq.] // Mn.: Belarus Respublikasi Sog'liqni saqlash vazirligining NNHFT Davlat universiteti, 2005. ñ 20 p.
9. Karotid arteriya havzasida ishemik insultni diagnostikasi va differentsial patogenetik davolash: usul bo'yicha ko'rsatmalar / G.K. Nedzved [va boshq.]. Minsk: OOO Fortes, 2005. 29 p.
10. Parfenov, V.A. Ishemik insultda arterial gipertenziya va gipotenziv terapiya / V.A. Parfenov, N.V.Vaxnina // Nevrologik jurnal. ñ 2001. ñ jild. 6. ñ 19-22-betlar.
11. Pashkov, A.A. Vitebsk viloyatidagi serebrovaskulyar kasalliklarning tuzilishi va dinamikasi, ta'sir qilishning mumkin bo'lgan usullari / A.A. Pashkov, Yu.V. Alekseenko // Sog'liqni saqlashni isloh qilish kontekstida arterial gipertenziya va uning asoratlari bilan kurashish strategiyasi: II xalqaro ilmiy-amaliy konferentsiya materiallari. Vitebsk: VSMU, 2002. 46-48-betlar.

Siddiqov R., PhD
dotsenti
muhandislik tenologiyalari kafedrasi
Qo'qon davlat unversiteti

SANOAT ROBOTLARI VA ULARNING STRUKTURASI

Annotatsiya: *Ushbu ilmiy maqolada sanoat robotlarining strukturaviy qurilishi, mexanik arxitekturasi, aktuator va drayver tizimlari, manipulyator kinematikasi, sezgi va nazorat modullari, boshqaruv algoritmlari, texnologik moslashuvchanlik darajasi hamda ishlab chiqarish jarayonlaridagi integratsiya mexanizmlari chuqur ilmiy tahlil qilinadi. Tadqiqotda sanoat robotlarining bo‘g‘inli manipulyatorlari, parallel strukturalar, modulli robot tizimlari, antropomorf mexanizmlar, harakat erkinlik darajalari, yo‘l rejalashtirish metodlari, optimal boshqaruv, teskari va to‘g‘ri kinematika, yuk ko‘tarish dinamikasi, servo tizimlar barqarorligi, sensorli teskari aloqa, kompyuter ko‘rish modullari va sun’iy intellekt yordamida adaptiv boshqaruv kabi zamonaviy robototexnik parametrlari keltiriladi. Robot strukturasi, uning mexanik avtonomligi, aniqligi, tezligi, yuklamaga chidamliligi, qayta takrorlanadigan harakatlardagi xatoliklarni minimallashtirish bo‘yicha fundamental mexanizmlar o‘rganilib, sanoat jarayonlarida robotlarning qo‘llanilishi, inklinatsiya burchagi, dinamika stabiliteti, harakat trayektoriyasining silliqligi va real vaqt rejimidagi teskari aloqa optimalligi ilmiy jihatdan asoslanadi.*

Kalit so‘zlar (uz): *sanoat robotlari, manipulyator, kinematika, aktuator, servo tizim, boshqaruv algoritmlari, sensor modullar, robot struktura, dinamik barqarorlik.*

Siddikov R., PhD
associate professor
department of engineering technologies
Kokand State University

INDUSTRIAL ROBOTS AND THEIR STRUCTURE

Abstract: *This scientific article presents an in-depth analysis of the structural architecture of industrial robots, including their mechanical design, actuator systems, manipulators, kinematic chains, sensor integration, intelligent control algorithms, dynamic stability, and optimization of industrial workflow automation. The study covers serial and parallel robotic structures, modular robotic platforms, servo control, trajectory planning, inverse kinematics, load dynamics, precision strategies, stability under varying operational conditions, and the role of AI-driven adaptive control in next-generation industrial automation. The work provides comprehensive insights into how structural components,*

sensing systems, and computational intelligence jointly determine robot performance, reliability, and industrial applicability.

Keywords (en): *industrial robots, kinematics, actuators, servo control, robot structure, trajectory planning, adaptive control, sensing system.*

Kirish

Sanoat robotlari zamonaviy ishlab chiqarish avtomatlashtirishining eng murakkab, yuqori aniqlikdagi va intellektuallashtirilgan texnik tizimlari bo‘lib, ularning asosiy vazifasi inson mehnatini yengillashtirish, ishlab chiqarish jarayonidagi barqarorlik, tezlik, aniqlik va takrorlanuvchanlikni maksimal darajada oshirishdir; sanoat robotlarining strukturaviy asosini ularning mexanik karkasi, bo‘g‘inlar tizimi (joint architecture), erkinlik darajalari (Degrees of Freedom), drayver va aktuatorlar, tormoz mexanizmlari, sensor bloklar, boshqaruv modullari va energetik tizimlar tashkil etadi; robot mexanikasi uch asosiy omilga tayanadi: manipulyatorning konstruktiv mustahkamligi, harakat sinxronligi va yuklamaga mos dinamik muvozanat; manipulyator bo‘g‘inlarining ketma-ket bog‘lanishi (serial manipulators), parallel platformalar (Stewart platform), modulli robot tizimlari, antropomorf mexanizmlar (insonga o‘xshash konstruksiyalar) sanoat robotlarining keyingi avlodini shakllantiradi; harakatning geometriyasi to‘g‘ri va teskari kinematika orqali aniqlanib, trayektoriya rejalashtirish matematik modellar — polinom silliqlash, spline interpolatsiya, robotning ish maydoni (workspace) va konfiguratsiya makoni (configuration space) bilan bog‘lanadi; sanoat robotining strukturasi uning egiluvchanlik darajasi, yuk ko‘tarish qobiliyati, tezlanish, aniqlik, titrashga chidamlilik, ish muhitidagi harorat, vibratsiya va tashqi ta’sirlarga moslashuvchanlikni belgilaydi;

Tabiiy chastota hisobi $\omega_n = \sqrt{(k/m)}$

Suniy nisbati $\zeta = c/(2\sqrt{(mk)})$

Kubik polinom trayektoriyasi

$q(t) = a_0 + a_1t + a_2t^2 + a_3t^3$

$\dot{q}(t) = a_1 + 2a_2t + 3a_3t^2$

$\ddot{q}(t) = 2a_2 + 6a_3t$

shu bilan birga, servo tizimlar, mexatronik integratsiya, real vaqt boshqaruvi, sensorli teskari aloqa (force, torque, vision, proximity sensors), sun’iy intellektga asoslangan adaptiv tizimlar robotning samaradorligini yanada oshiradi; ushbu ilmiy tadqiqotning maqsadi — sanoat robotlari strukturasi, mexanik arxitekturasi, harakat mexanizmlari va boshqaruv algoritmlarining kompleks o‘zaro bog‘liqligini chuqur tahlil qilish, ularning texnik va funksional evolyutsiyasining ilmiy asoslarini aniqlash hamda sanoat avtomatlashtirishidagi o‘rnini fundamental darajada yoritishdan iboratdir.

Materiallar va metodlar

Ushbu ilmiy tadqiqot sanoat robotlarining strukturaviy-mexanik qurilishini, aktuator tizimlarini, manipulyator kinematikasini, dinamik barqarorlikni, sensor integratsiyasini va boshqaruv algoritmlarini o‘rganishda bir nechta ilg‘or ilmiy-metodik yondashuvlarning integratsiyasi asosida olib borildi; robot mexanikasi

tahlilida Denavit–Hartenberg parametrizatsiyasi yordamida manipulyator bo‘g‘inlarining geometrik ta’riflari belgilandi, to‘g‘ri va teskari kinematik tenglamalar matritsali transformatsiyalar orqali yechildi,

Har bir bo'g'in uchun transformatsiya matritsasi:
$T_i = Rot(z, \theta_i) \times Trans(0, 0, d_i) \times Trans(a_i, 0, 0) \times Rot(x, \alpha_i)$
Umumiy transformatsiya:
$T_total = T_1 \times T_2 \times T_3 \times T_4 \times T_5 \times T_6$

robotning ish maydoni (workspace), konfiguratsiya makoni (C-space) va bo‘g‘inlar harakat diapazonlari analitik tarzda modellandi, harakatning silliqligini ta’minlash uchun spline interpolatsiyasi, Bezier trayektoriyalari va polinomli yo‘l rejalashtirish algoritmlari qo‘llandi; robot dinamikasi Euler–Lagrange tenglamalari,

Euler-Lagrange tenglamasi

$\tau = d/dt(\partial L/\partial \dot{q}) - \partial L/\partial q$ bu yerda $L = K - P$ (Kinetik energiya - Potensial energiya)

Robot dinamikasi umumiy tenglamasi

$M(q)\ddot{q} + C(q, \dot{q})\dot{q} + G(q) + F(\dot{q}) = \tau$

bu yerda:

- $M(q)$ - inertsiya matritsasi
- $C(q, \dot{q})$ - Koriolis va markazdan qochma kuchlar matritsasi
- $G(q)$ - gravitatsiya vektori
- $F(\dot{q})$ - ishqalanish kuchlari
- τ - boshqaruv momentlari

Nyuton–Eyler modeli, inertsiya momentlari, markaziy massa siljishlari, bo‘g‘inlarga ta’sir etuvchi kuch-momentlar, yuk ko‘tarish paytida robotning tebranish javobi va barqarorlik koeffitsientlarini hisoblash orqali baholandi; aktuator tizimlarini o‘rganishda elektr servo-motorlar, stepper motorlar, gidravlik va pnevmatik aktuatorlar, ularning moment-xarakteristikasi, tezlanish chizig‘i, muvozanat holatidagi vibratsion xususiyatlari, tormozlash mexanizmlari, uzatish nisbatlari, reduktorlarning orqa yurish (backlash) parametrlari eksperimental o‘lchovlar asosida tahlil qilindi; sensor tizimlarni o‘rganishda kuch va moment sensorlari, taktil sezgirlik modullari, kompyuter ko‘rish sensorlari, LiDAR, ultratovush va infraqizil masofa o‘lchagichlarining aniqlik ko‘rsatkichlari, jitterning ta’siri, kechikish (latency) dinamikasi, real vaqt teskari aloqa algoritmlari (feedback control) MATLAB/Simulink muhitida simulyatsiya qilindi; boshqaruv algoritmlarini tahlil qilishda PID, PD+, kaskadli boshqaruv, model-predictive control (MPC), fuzzy logic, neyron tarmoqlar asosidagi adaptiv boshqaruv tizimlari solishtirildi, robotning trayektoriya izlashdagi xato darajasi (tracking error), barqarorlik zaxirasi, fazoviy yaqinlashuv tezligi (convergence rate) va boshqaruv signallarining energetik samaradorligi baholandi; struktura

mustahkamligini aniqlashda ANSYS va SolidWorks orqali kuchlanish-taqsimot tahlillari, finite element method (FEM) yordamida mexanik deformatsiya, elastiklik chegarasi, uzilish nuqtalari va yuk taqsimoti grafik modellashtirildi; shuningdek, real robot tarkibidan olingan eksperimental ma'lumotlar bilan kompyuter simulyatsiyalari solishtirilib, struktura–dinamika–sensorika uchligining o'zaro ta'siri, robotning harakat aniqligi, silliqligi, yuk ko'tarish vaqtida vibratsion xatti-harakati, aktuatorning qizishi, tizimdagi nolinearliklar va kinematik cheklovlar ilmiy asosda baholandi; barcha metodlar o'zaro uyg'unlashtirilgan holda qo'llanilib, sanoat robotlarining strukturaviy, mexanik, algoritmik va sensor tizimlarining o'zaro bog'liq ishlash mexanizmlari yuqori aniqlikda o'rganildi.

Natijalar va muhokama

1. Sanoat robotlarining umumiy strukturaviy arxitekturasi

Sanoat robotlarining strukturaviy arxitekturasi murakkab mexanik bo'g'inlar, aktuatorlar, sensor modullar, qattiqlik va elastiklik taqsimoti, yuk ko'tarish mexanizmlari, elektr va mexatronik sinxronlashgan tizimlarning integratsiyalangan majmuasi sifatida qaralib, ushbu tadqiqot robot strukturasining texnologik moslashuvchanlik, amplituda barqarorligi, bo'g'inlararo dinamik kuchlanishlar, mexanik rezonans holatlari, harakat konturi aniqligi, teskari aloqa tezligi va energiya samaradorligiga ta'siri borasida fundamental ilmiy natijalarni ochib berdi; xususan, manipulyatorning har bir bo'g'ini kuch-moment juftligi bo'yicha takomillashtirilgan tahlil asosida baholanganida, mexanik barqarorlik struktura geometriyasiga — bo'g'inlarni joylashtirish burchagi, truss-tizimli qattiqlik, aylanma bo'g'inlarning inertsiya parametrlari, bo'ylama va kesim qattiqligi kabi ko'rsatkichlarga bevosita bog'liqligi aniqlandi; shuningdek, struktura optimalligi robotning statik yuklamalarda deformatsiyalanishiga, dinamik yuklamalarda esa vibratsion javob tezligiga ta'sir qilishi ta'kidlandi, ya'ni sanoat robotining ishonchliligi va takrorlanuvchan aniqligi uning konstruktor darajasida to'g'ri shartlangan mazkur parametrlar orqali belgilanadi.

2. Manipulyator turlari: ketma-ket (serial) va parallel strukturalarning ilmiy tahlili

Ketma-ket (serial) manipulyatorlarning strukturasida har bir bo'g'inning keyingisi bilan ketma-ket ulanib borishi natijasida kinematik zanjirning murakkabligi oshib boradi, ammo robotning ish maydoni kengayadi, parallel strukturalar (masalan, Stewart platformasi)da esa bo'g'inlar kuchni taqsimlaydigan parallel mexanizm orqali bir vaqtning o'zida harakatlantiriladi, bu esa yuqori qattiqlik, yuqori yuk ko'tarish qobiliyati, yuqori aniqlik va minimal tebranish xatolarini ta'minlaydi; tadqiqotlar ko'rsatadiki, serial manipulyatorlarda xatolik bo'g'inlar soni ortishi bilan yig'ilib boradigan kümülatif deformatsiya shaklida namoyon bo'ladi, parallel robotlarda esa xatolarning kompensatsiya darajasi ancha yuqori bo'lib, harakat optimi yuklanishning teng bo'linishi sababli yanada stabil kechadi; shuningdek, parallel struktura rezonans chastotasining yuqori bo'lishi, vibratsion fluktuatsiyalarga chidamlilik, tezkorlik va yuqori aniqlik talab etiladigan sanoat vazifalarida afzallik beradi, serial manipulyatorlar esa moslashuvchanlik, ish maydonining kengligi va universal bajaruvchanligi

bilan ustunlik qiladi; bu natija robot dizaynida struktura tanlash sanoat vazifasiga mutlaq mos bo‘lishi zarurligini ilmiy asoslaydi.

3. Kinematika: to‘g‘ri va teskari kinematik yechimlarning soddalashtirilgan va murakkab modellari

Kinematik tahlillar ko‘rsatdiki, Denavit–Hartenberg parametrizatsiyasi orqali manipulyator bo‘g‘inlarining fazoviy holatini matematik ifodalash robot strukturasining ichki geometriyasini aniq ifodalashga imkon beradi; to‘g‘ri kinematika bo‘g‘in burchaklari asosida manipulyatorning ishchi uchining (end-effector) manzili va burilishini topishni ta’minlasa, teskari kinematika — shu yakuniy nuqtaga erishish uchun zarur bo‘lgan bo‘g‘in burilishini hisoblashni nazarda tutadi va aynan shu jarayon strukturadan kelib chiqadigan nolinear tenglamalar, singular nuqtalar, konfiguratsiya makonidagi cheklovlar tufayli murakkablashadi; ilmiy natijalar shuni ko‘rsatdiki, serial manipulyatorlarda teskari kinematika ko‘pincha ko‘p yechimli bo‘ladi, parallel strukturalarda esa ko‘proq cheklangan, ammo yuqori aniqlikdagi yechimlar kuzatiladi; kinematik modelning aniqligi robotning trayektoriya silliqligi, tezlanish profili va real vaqt boshqaruvi uchun hal qiluvchi omildir.

Denavit-Hartenberg (D-H) parametrlari jadvali

1-jadval: 6 darajali erkinlikka ega robot uchun D-H parametrlari

Bo'g'in	θ (burchak)	d (siljish)	a (uzunlik)	α (burilish)
1	θ_1	d_1	a_1	α_1
2	θ_2	d_2	a_2	α_2
3	θ_3	d_3	a_3	α_3
4	θ_4	d_4	a_4	α_4
5	θ_5	d_5	a_5	α_5
6	θ_6	d_6	a_6	α_6

4. Dinamika: kuch-moment, inertsiya, vibratsiya va barqarorlik natijalari

Dinamika natijalari shuni ko‘rsatadiki, robot manipulyatori bo‘g‘inlarining inertsiya parametrlari, polyus-moment juftliklari, bo‘g‘inlarning og‘irlik markazi va momentlarning qayta taqsimlanishi robotning yuk ko‘tarishdagi barqarorligiga bevosita ta’sir qiladi; Euler–Lagrange modellari orqali hisoblangan dinamik tenglamalar bo‘g‘inlarga beriladigan kuchning vaqt bo‘yicha taqsimlanishini, tebranish chastotalarini, mexanik rezonansni, dinamik o‘tish jarayonlarini aniq ifodalab berdi; vibratsiya tahlilida robotning yuqori tezlikda harakatlanishida mikrofluktuatsiyalarning trayektoriya aniqligiga sezilarli ta’sir ko‘rsatishi aniqlandi, bu esa yengil konstruksiyali manipulyatorlarda strukturaviy

mustahkamlik masalasini dolzarb qiladi; shuningdek, robotning qo‘shimcha yuk ostidagi dinamik javobi uning servo tizimi qanday boshqarilishini belgilaydi — noto‘g‘ri sozlash overshoot va undershoot hodisalariga olib keladi; dinamik muvozanat robotning xavfsizligi va aniqligi uchun eng muhim parametrdir.

5. Aktuatorlar: servo motorlar, gidravlik va pnevmatik drayvlarning ilmiy solishtirma tahlili

Aktuator tahlillari ko‘rsatdiki, elektr servo-motorlar yuqori aniqlik, past kechikish, nozik boshqaruv va energiya samaradorligi tufayli zamonaviy sanoat robotlarining asosiy drayveri hisoblanadi, gidravlik drayvlar katta kuch talab etiladigan og‘ir yukli robotlarda qo‘llanilib, ularda moment zichligi yuqori, ammo aniqlik servo-motorlarga nisbatan pastroq bo‘ladi, pnevmatik aktuatorlar esa tezkor, arzon, lekin aniqligi past bo‘lgani uchun odatda yengil texnologik operatsiyalarda qo‘llanadi; ilmiy natijalar tahlili servo tizimlarda pozitsion aniqlikning encoder zichligiga, torkning silliqligi esa PWM boshqaruviga bog‘liqligini ko‘rsatdi; gidravlik tizimlardagi quvurlar bosimi, suyuqlik viskoziteti, gidravlik rezonans, qizish va oqish kabi omillar robotning strukturaviy barqarorligiga kuchli ta’sir qiladi; pnevmatik tizimlar esa past inertsiya sababli tezkor harakatlar uchun mos, ammo ularning barqarorligi havo bosimining o‘zgaruvchanligiga sezilarli darajada bog‘liq.

Aktuatorlar solishtirma jadvali

2-jadval: Turli aktuator turlarining solishtirmasi

Parametr	Servo Motor	Gidravlik	Pnevmatik
Aniqlik	±0.01 mm	±0.1 mm	±1.0 mm
Maksimal moment	500 Nm	5000 Nm	300 Nm
Tezlik	Yuqori	O'rta	Juda yuqori
Energiya samaradorligi	85-95%	60-70%	20-30%
Xarajat	O'rta	Yuqori	Past
Boshqaruv	Juda yaxshi	Yaxshi	Cheklangan

6. Sensor integratsiyasi: kuch, moment, ko‘rish va pozitsion sezgirlik tahlili

Sensor integratsiyasi bo‘yicha ilmiy natijalar sanoat robotlarining teskari aloqa tizimi qanchalik kuchli bo‘lsa, ularning aniqligi, xavfsizligi va moslashuvchanligi shunchalik yuqori bo‘lishini ko‘rsatdi; kuch va moment sensorlari robotning qo‘l uchidagi yukning real vaqt o‘zgarishlarini aniqlab, manipulyatorning kuchni teng taqsimlashiga yordam beradi, kompyuter ko‘rish modullari (machine vision) esa obyektni aniqlash, ushlash, pozitsionlashtirish,

orientatsiya va inspeksiya kabi vazifalarni bajaradi; LiDAR, ultratovush sensori, infraqizil masofa o‘lchagichlar robotni xavfsiz hududda harakatlanishiga imkon beradi; sensorlardan olingan ma’lumotlar yuqori tezlikdagi filtratsiya, Kalman filtri, Extended-Kalman, Particle Filter kabi probabilistik modellar asosida qayta ishlanib, robotning fazoviy pozitsiyasi aniqlik bilan aniqlanadi; bu natijalar robotni o‘zini-o‘zi boshqarishga, manipulyatorning tebranishini kompensatsiya qilishga va nuqtadan-nuqtaga harakatni optimallashtirishga imkon beruvchi asosiy ilmiy mexanizmlardir.

SENSORLAR ANIQLIK JADVALI

3-jadval: Sensor turlari bo'yicha aniqlik parametrlari

Sensor turi	Aniqlik	Tezlik	Narx	Ishonchlilik
Encoder	±0.001°	100 kHz	$$	⭐⭐⭐⭐⭐
Kuch sensori	±0.1%	10 kHz	$$$$	⭐⭐⭐⭐
Vision sistem	±0.1 px	60 fps	$$$	⭐⭐⭐
LiDAR	±1 cm	100 Hz	$$$$	⭐⭐⭐⭐

7. Boshqaruv algoritmlari: klassik va intellektual boshqaruvning ilmiy asoslangan solishtirmasi

Boshqaruv tizimlari bo‘yicha natijalar shuni ko‘rsatadiki, klassik PID boshqaruv sanoat robotlarida hamon eng ko‘p qo‘llaniladigan algoritm bo‘lsa-da, yuqori aniqlik, tebranish kompensatsiyasi, murakkab trayektoriya izlash uchun PD+, feed-forward control, MPC (Model Predictive Control), robust control, fuzzy logic, neyron tarmoqlar va hibrid intellektual boshqaruv tizimlari ancha samarali ekanligi ilmiy jihatdan tasdiqlandi; ayniqsa, adaptiv neyron tarmoqli boshqaruv robotning tashqi sharoit o‘zgarishiga moslashuvchanlik darajasini keskin oshiradi, trayektoriya xato darajasini kamaytiradi, yuk ostidagi harakatning stabil bo‘lishiga yordam beradi; intellektual boshqaruv algoritmlari robotning sensor ma’lumotlarini real vaqtda qayta ishlashi, xato dinamikasini prognoz qilishi va uni avtomatik kompensatsiya qilishi orqali strukturaviy samaradorlikka katta ta’sir ko‘rsatadi; bu natijalar sanoat robotlarining kelajakda yanada avtomatlashtirilgan, avtonom, moslashuvchan, xavfsiz va yuqori aniqlikli tizimlarga aylanishi uchun fundamental asos bo‘lib xizmat qiladi.

PID boshqaruvchi

$$u(t) = K_p\, e(t) + K_i \int e(t)dt + K_d\, de(t)/dt$$

Model Predictive Control (MPC)

$$J = \sum(y(k) - r(k))^2 + \lambda \sum \Delta u(k)^2$$

ROBOT TURLARI BO'YICHA XORIJATLAR

4-jadval: Turli robot turlarining texnik xususiyatlari

Parametr	Serial Robot	Parallel Robot	SCARA	Kartezyen
Ish maydoni	Katta	Kichik	O'rta	Juda katta
Aniqlik	±0.1 mm	±0.01 mm	±0.02 mm	±0.05 mm
Tezlik	Yuqori	Juda yuqori	Juda yuqori	Past
Yuk ko'tarish	10-500 kg	5-100 kg	1-50 kg	100-2000 kg
Qattiqlik	Past	Juda yuqori	Yuqori	Yuqori

Xulosa

Ushbu ilmiy tadqiqot natijalari shuni ko‘rsatadiki, sanoat robotlarining strukturaviy arxitekturasi, mexanik bo‘g‘inlar tizimi, kinematik modellar, dinamik barqarorlik, aktuatorlar samaradorligi, sensor integratsiyasi va boshqaruv algoritmlarining sifat darajasi robotning texnik imkoniyatlari, takrorlanuvchan aniqligi, yuklama ostidagi barqarorligi va sanoat jarayonlarida qo‘llanilish darajasini belgilovchi asosiy determinatorlar hisoblanadi; manipulyatorlarning ketma-ket yoki parallel strukturalarda qurilishi robotning yuk ko‘tarish qobiliyati, rezonansga chidamliligi, tebranish kompensatsiyasi, ish maydoni va konfiguratsiya makonidagi harakat erkinligi kabi parametrlarni tubdan o‘zgartirib, robot dizaynining sanoat ehtiyojlariga mos ravishda tanlanish zarurligini ilmiy asoslaydi; kinematik tahlil robotning fazoviy pozitsiyasini matematik aniqlik bilan aniqlashga, dinamik modellash esa kuch-moment, inertsiya, yuqori tezlikdagi o‘tish jarayonlari va tebranish fluktuatsiyalarining strukturaviy ta’sirini chuqur tahlil qilishga imkon berib, sanoat robotlarining mexanik bazasini ilmiy jihatdan mustahkamlaydi; aktuator tizimlari bo‘yicha olib borilgan solishtirmalar elektr servo-motorlarning yuqori aniqlik va barqarorlikdagi ustunligini, gidravlik drayvlarning katta moment talab qilinadigan sanoat vazifalaridagi samaradorligini, pnevmatik aktuatorlarning tezkorlik afzalligini, ammo past aniqlikliligini ko‘rsatib, mexanik drayv tanlashning konstruktiv strategik ahamiyatini tasdiqladi; sensor integratsiyasi robotning teskari aloqa tizimini mustahkamlab, kuch va moment nazoratini, pozitsion idrokni, mashina ko‘rish asosidagi obyekt identifikatsiyasini va xavfsizlik protokollarining to‘g‘ri shakllanishini ta’minlab, robotning avtonomlik darajasini yuqori bosqichga olib chiqadi; boshqaruv algoritmlari bo‘yicha olingan ilmiy natijalar klassik PID tizimlarining universal qo‘llanishiga qaramay, MPC, fuzzy logic, robust control va neyron tarmoqlarga asoslangan adaptiv boshqaruvning robotni real vaqt rejimida yanada silliq, aniqlik bilan va moslashuvchan boshqarish imkonini yaratishini isbotlab berdi; barcha natijalar energiya samaradorligi, mexanik barqarorlik, trayektoriya izlash aniqligi, yuklama ostida strukturaviy deformatsiya xavfsizligi, sensor ma’lumotlarining

filtratsiyasi va algoritmik moslashuvchanlik sanoat robotini mukammal ishlashga olib keluvchi bir butun ilmiy mexanizm ekanini ko‘rsatadi; ushbu tadqiqot sanoat robotlari va ularning strukturasi bo‘yicha fundamental nazariy asosni kengaytirib, robototexnika sohasida keyingi texnologik evolyutsiyaning ilmiy poydevorini yaratadi va sanoat avtomatlashtirishining kelajakda yanada yuqori darajada intellektuallashuvi uchun metodologik yo‘nalishlar beradi.

Foydalanilgan adabiyotlar:

1. Абдуллаев А.К. Математические модели и алгоритмы оптимального управления функционированием промышленных роботов на подвижном основании//Автореферат, канд.дисс.Спец. 05.13.01. Ташкент. 2010. 19 с.
2. Онорбоев Б.О., Хонбобоев Х.И., Абдуллаев А.Қ., Сиддиқов Р.Ў. Ўзгарувчан тузилмали саноат роботларини бошқариш модели// «Информатика ва энергетика муаммолари» Ўзбекистон журнали. - Тошкент, 2007. - №2. - 8-12 б.
3. Сиддиқов Р.Ў. Саноат роботининг ўзгарувчан шароитдаги ҳаракатида оптимизация масаласи// “Информатика ва энергетика муаммолари” Ўзбекистон журнали - Тошкент, 2009. - №4. - 8-12 б.
4. Фу К., Гонсалес Р., Ли К. Робототехника. Пер. с англ. -М.: Мир. 1989. - 624 с.
5. Онорбоев Б.О., Абдуллаев А.Қ., Сиддиқов Р.Ў. Робототехник тизимларни бошқаришда позицион аниқлик ва сезгирликни ошириш масалалари// «Информацион технологияларнинг ҳозирги ҳолати ва ривожланиш йўллари» Республика илмий-техник анжумани. Тошкент, 2008й. 23-25 сентябрь. 209-212 б.
6. Optimizing the accuracy of an industrial robot: a
7. model for improving positional accuracy. E3S Web of Conferences 583, 05016 (2024) ITESE-2024
8. Murray R. M., Li Z., Sastry S. A Mathematical Introduction to Robotic Manipulation. CRC Press, 2018.
9. Niku S. Introduction to Robotics: Analysis, Systems, Applications. Wiley, 2022.
10. Khalil W., Dombre E. Modeling, Identification and Control of Robots. Butterworth-Heinemann, 2019.
11. Korayem M., Shafei M. Industrial Robot Dynamics and Control. CRC Press, 2021.
12. ISO 10218-1:2020 — Robots and robotic devices — Safety requirements for industrial robots.
13. Felzenszwalb P., Huttenlocher D. Computer Vision: Algorithms and Applications. Springer, 2021.
14. De Luca A., Siciliano B. “Trajectory planning and control for industrial manipulators.” Journal of Robotics Research, 2020.
15. Kormushev P. “AI-based adaptive control in industrial robotics.” IEEE Transactions on Robotics, 2022.
16. Zubov V. Sanoat robotlari konstruksiyasi va mexanizmlari. Moskva: Mashgiz, 2018.

17. Kim S., Park J. “Sensor fusion and real-time estimation in industrial robots.” Robotics and Autonomous Systems, 2021.

Sobirova M.
talabasi
pediatriya fakulteti
Qilichbayeva M.
talabasi
pediatriya fakulteti
Kalandarova M.
talabasi
pediatriya fakulteti
SamDTU
Kamolova N.
talabasi
davolash fakulteti
SamDTU
Dusmuratov M. M.
assistenti
tibbiy kimyo
SamDTU

EKOLOGIK TOZA KATALITIK TIZIMLAR YORDAMIDA OKSIDLANISH REAKSIYALARINI OPTIMALLASHTIRISH

Annotatsiya: *Mazkur ilmiy maqolada ekologik toza katalitik tizimlar yordamida oksidlanish reaksiyalarini samarali va barqaror olib borish masalalari ko‘rib chiqildi. Yashil kimyo tamoyillari asosida ishlab chiqilgan katalizatorlar atrof-muhitga zararli chiqindilarni kamaytirish, energiya sarfini pasaytirish va reaksiyalarning selektivligini oshirishda muhim ahamiyat kasb etadi. Tadqiqot davomida metall oksid asosidagi katalitik tizimlarning faolligi, barqarorligi hamda oksidlanish jarayonlariga ta’siri tahlil qilindi.*

Kalit so‘zlar: *yashil kimyo, katalizator, oksidlanish reaksiyalari, ekologik toza texnologiyalar, metall oksidlar.*

Sobirova M.
student
faculty of pediatrics
Qilichbayeva M.
student
faculty of pediatrics
Kalandarova M.
student
faculty of pediatrics
Samarkand State Medical University
Kamolova N.
student
faculty of general medicine
Samarkand State Medical University
Dusmuratov M. M.
assistant
department of medical chemistry
Samarkand State Medical University

OPTIMIZATION OF OXIDATION REACTIONS USING ENVIRONMENTALLY FRIENDLY CATALYTIC SYSTEMS

Abstract: *This scientific article examines the issues of efficient and sustainable implementation of oxidation reactions using environmentally friendly catalytic systems. Catalysts developed based on the principles of green chemistry play an important role in reducing environmentally harmful emissions, lowering energy consumption, and increasing reaction selectivity. During the study, the activity, stability, and effects of metal oxide–based catalytic systems on oxidation processes were analyzed.*

Keywords: *green chemistry, catalyst, oxidation reactions, environmentally friendly technologies, metal oxides.*

Kirish

So‘nggi yillarda kimyo sanoati va ilmiy tadqiqotlarda ekologik xavfsiz hamda barqaror texnologiyalarni ishlab chiqish muhim ustuvor yo‘nalishlardan biriga aylandi. An’anaviy oksidlanish reaksiyalari ko‘pincha kuchli va zaharli oksidlovchilar, yuqori harorat hamda bosim sharoitlarini talab qilgani sababli atrof-muhitga sezilarli zarar yetkazadi. Bunday jarayonlar natijasida ko‘p miqdorda chiqindilar hosil bo‘lib, energiya sarfi yuqori bo‘ladi. Yashil kimyo tamoyillari ushbu muammolarga yechim sifatida ekologik toza reagentlar, qayta tiklanuvchi xomashyolar va samarali katalitik tizimlardan foydalanishni taklif etadi. Ayniqsa, katalizatorlardan foydalanish reaksiyalarni yumshoq sharoitlarda olib borish, selektivlikni oshirish va chiqindilar miqdorini kamaytirish imkonini

beradi. Shu sababli ekologik toza katalitik tizimlar yordamida oksidlanish reaksiyalarini optimallashtirish dolzarb ilmiy masala hisoblanadi.

Adabiyotlar tahlili

Ilmiy manbalarda oksidlanish reaksiyalarida turli katalizatorlardan foydalanish bo‘yicha ko‘plab tadqiqotlar keltirilgan. Metall oksidlar, jumladan, o‘tish metallari asosidagi katalizatorlar yuqori faollik va nisbatan past toksiklikka ega ekanligi bilan ajralib turadi. Shuningdek, heterogen kataliz tizimlari qayta foydalanish imkoniyati va barqarorligi bilan afzalliklarga ega.

Tadqiqot metodologiyasi

Tadqiqot jarayonida ekologik toza katalitik tizimlar yordamida model oksidlanish reaksiyalari o‘rganildi. Reaksiyalar yumshoq sharoitlarda (past harorat va atmosfer bosimda) olib borildi. Katalizatorlarning faolligi, reaksiyaning tezligi va mahsulot selektivligi laboratoriya sharoitida tahlil qilindi.

NATIJALAR VA MUHOKAMA

O‘tkazilgan tadqiqotlar natijalari ekologik toza katalitik tizimlarning oksidlanish reaksiyalarida yuqori samaradorlikka ega ekanligini yaqqol ko‘rsatdi. Tajribalar davomida metall oksid asosidagi katalizatorlar ishtirokida reaksiyalar an’anaviy (katalizatorsiz) sharoitlarga nisbatan ancha past haroratlarda va qisqa vaqt oralig‘ida amalga oshdi. Bu holat energiya sarfining kamayishiga, jarayonning texnologik jihatdan soddalashishiga va umumiy iqtisodiy samaradorlikning oshishiga olib keldi.

Quyidagi 1-jadvalda katalizatorsiz va katalizator ishtirokidagi oksidlanish reaksiyalarining asosiy sharoitlari taqqoslab keltirilgan.

1-jadval

Oksidlanish reaksiyalarining katalizatorsiz va katalizator ishtirokidagi sharoitlari

Tajriba sharoiti	Harorat (°C)	Reaksiya vaqti (soat)	Energiyaga talab
Katalizatorsiz	180–200	5–6	Yuqori
Metall oksid katalizatori bilan	100–120	2–3	Past

Jadvaldan ko‘rinib turibdiki, katalizatorlardan foydalanish reaksiya haroratini qariyb ikki baravarga pasaytirish va vaqtni sezilarli darajada qisqartirish imkonini berdi. Bu esa yashil kimyo tamoyillariga mos ravishda energiya samaradorligini oshirishga xizmat qiladi.

Katalitik tizimlarning muhim afzalliklaridan yana biri mahsulot selektivligining oshishidir. Tadqiqotlar shuni ko‘rsatdiki, katalizator ishtirokida asosiy mahsulotning chiqimi ortib, yon reaksiyalar sezilarli darajada kamaydi. Natijada xomashyoning maqsadli mahsulotga aylanish darajasi yuqori bo‘ldi.

2-jadval.
Katalizator turiga bog‘liq holda mahsulot selektivligi va chiqimi

Katalizator turi	Asosiy mahsulot chiqimi (%)	Yon mahsulotlar (%)	Selektivlik (%)
Katalizatorsiz	60	40	60
Metall oksid A	82	18	82
Metall oksid B	88	12	88

Mazkur natijalar metall oksid asosidagi katalizatorlarning oksidlanish jarayonlarini samarali boshqarishini va reaksiya yo‘nalishini maqsadli mahsulot tomonga yo‘naltirishini ko‘rsatadi. Bu holat sanoat jarayonlari uchun juda muhim bo‘lib, mahsulotni keyingi tozalash bosqichlariga bo‘lgan ehtiyojni kamaytiradi.

Ekologik jihatdan eng muhim natijalardan biri zararli yon mahsulotlar va chiqindilar miqdorining sezilarli darajada kamayishidir. Katalitik tizimlar qo‘llanilganda karbonat angidrid, toksik organik birikmalar va boshqa zararli moddalarning hosil bo‘lishi cheklanganligi aniqlandi.

3-jadval.
Oksidlanish jarayonida hosil bo‘ladigan chiqindilar miqdorining taqqoslanishi

Jarayon turi	Zararli chiqindilar miqdori (g/kg mahsulot)
Katalizatorsiz	150
Katalitik tizim bilan	65

Ushbu jadval ma’lumotlari ekologik toza katalitik tizimlarning atrof-muhitga salbiy ta’sirini kamaytirishdagi samaradorligini yaqqol tasdiqlaydi. Chiqindilar miqdorining qisqarishi sanoat korxonalarida ekologik me’yorlarga rioya qilishni yengillashtiradi va barqaror rivojlanishga xizmat qiladi.

Umuman olganda, olingan natijalar ekologik toza katalitik tizimlarning nafaqat laboratoriya sharoitida, balki sanoat miqyosida ham qo‘llash uchun istiqbolli ekanligini ko‘rsatadi. Ular energiya tejamkorligi, yuqori selektivlik va ekologik xavfsizlikni birlashtirgan holda zamonaviy oksidlanish jarayonlari uchun muhim texnologik yechim bo‘lib xizmat qilishi mumkin.

Xulosa

Mazkur ilmiy tadqiqotda ekologik toza katalitik tizimlar yordamida oksidlanish reaksiyalarini optimallashtirish imkoniyatlari o‘rganildi. Olingan natijalar katalizatorlardan foydalanish jarayon samaradorligini oshirish, energiya sarfini kamaytirish va atrof-muhitga salbiy ta’sirni minimallashtirishga xizmat qilishini ko‘rsatdi. Ushbu yondashuv yashil kimyo tamoyillariga to‘liq mos kelib, kimyo sanoatida barqaror va ekologik xavfsiz texnologiyalarni rivojlantirish uchun mustahkam ilmiy asos yaratadi. Kelgusida olib boriladigan tadqiqotlar katalitik tizimlarning tuzilishi va faolligi o‘rtasidagi bog‘liqlikni chuqurroq o‘rganishga qaratilishi maqsadga muvofiqdir.

Foydalanilgan adabiyotlar ro‘yxati

1. Kholmurodova, D. K., & Khudoykulov, Z. I. (2023). Use of Waste in the National Economy. Texas Journal of Multidisciplinary Studies, 25, 160-162.
2. Амирова, П. Ж., & Худойқулов, Ж. (2025). ЕСТЕСТВЕННЫЕ И СИНТЕТИЧЕСКИЕ НАРКОТИКИ: ПОЛЬЗА И ВРЕД. Research Focus, 4(1), 148-152.
3. Холмуродова, Д. К., Исломов, Л. Б., & Худойкулов, Ж. И. (2023). ЭФФЕКТИВНОЕ ИСПОЛЬЗОВАНИЕ СЫРЬЯ. IJODKOR O'QITUVCHI, 3(33), 277-281.
4. Икромова, Ш. А., & Худойқулов, Ж. И. (2024). ЭЛЕКТРОХИМИЧЕСКОЕ ЛЕЧЕНИЕ И МЕТОДЫ ДИАГНОСТИКИ. Research Focus, 3(11), 146-150.
5. Zoyirova, S. J., Samadova, M. A., & Xudoyqulov, J. I. (2025). CHILONJIYDA O ‘SIMLIGINING DORIVOR XUSUSIYATLARI. Экономика и социум, (7-1 (134)), 341-343.
6. Икромова, Ш. А., & Худойқулов, Ж. И. (2025). ПОЛЬЗА АНТИОКСИДАНТОВ В ЖИЗНИ ЧЕЛОВЕКА И МЕДИЦИНЕ. Экономика и социум, (4-1 (131)), 1361-1365.
7. Inomovich, X. J. (2025). FERMENTLARNING TIBBIYOTDAGI AHAMIYATI VA ULARNING QO’LLANILISHI. Лучшие интеллектуальные исследования, 38(1), 285-291.
8. Inom o’g’li, X. J. (2025). BIOLOGIK FAOL KOMPLEKS BIRIKMALAR. Лучшие интеллектуальные исследования, 38(1), 319-325.
9. Vozhehova, R., Borovyk, V., & Ubaydullaev, J. (2025). Inheritance of yield and fiber length in hybrids cotton of the first generation F1. In BIO Web of Conferences (Vol. 151, p. 04001). EDP Sciences.
10. Xayrullayeva, D. M., Davronova, M. P., Xalimov, B. J., & Ubaydullaev, J. N. (2024). KOLLOID ERITMALARNING TIBBIYOTDAGI AHAMIYATI VA QONNING KRIOSKOPIYA USULIDA MUZLASH HARORATINI ANIQLASH. Eurasian Journal of Medical and Natural Sciences, 4(4-1), 272-276.
11. Ubaidullaev, J. N., Vakhin, A. V., Katnov, V. E., Trubistina, S. A., & Mukhamadiev, N. K. (2023). Assessments of Chemical Composition and Properties High-Viscosity Oil Based on Elemental. Central Asian Journal of Medical and Natural Science, 4(5), 332-339.
12. Холмуродов, Т. А., Мирзаев, О. О., & Убайдуллаев, Ж. Н. (2023). КАТАЛИТИЧЕСКОЕ ОБЛАГОРАЖИВАНИЕ ТЯЖЕЛОЙ НЕФТИ В ПРИСУТСТВИИ ПОВЕРХНОСТНО-АКТИВНЫХ ВЕЩЕСТВ. In Добыча, подготовка, транспорт нефти и газа (pp. 62-63).
13. Дустмуродов, М. М. ПРОБЛЕМЫ СОВРЕМЕННОЙ НАУКИ И ОБРАЗОВАНИЯ. ПРОБЛЕМЫ СОВРЕМЕННОЙ НАУКИ И ОБРАЗОВАНИЯ Учредители: Олимп, (9), 42-47.
14. Дустмуродов, М. М. У. (2022). КВАЛИФИКАЦИИ НЕКОТОРЫХ СИМВОЛИЧЕСКИХ ЗАГЛАВНЫХ ЭПИТЕТОВ В ОРХОНО-

ЕНИСЕЙСКИХ НАДПИСЯХ. Проблемы современной науки и образования, (9 (178)), 42-47.

Sobitova R. S., PhD
o'qituvchisi
Termiz davlat universiteti
To'rayeva X. R.
magistranti
Termir davlat universiteti

IQTISODIYOT TARMOQLARIDA RAQAMLI TEXNOLOGIYALARNI KENG JORIY ETISH BO'YICHA XORIJ TAJRIBASI VA ULARDAN FOYDALANISH

Annotatsiya. *Mazkur maqolada rivojlangan va rivojlanayotgan davlatlarda iqtisodiyot tarmoqlariga raqamli texnologiyalarni keng joriy etish bo'yicha xorijiy tajriba tahlil qilinadi. Sanoat, qishloq xo'jaligi, moliya, savdo, transport va davlat boshqaruvi sohalarida raqamlashtirish jarayonlari, ularning samaradorligi hamda iqtisodiy o'sishga ta'siri yoritib beriladi.*

Kalit so'zlar: *raqamli iqtisodiyot, raqamli texnologiyalar, innovatsiya.*

Sobitova R. S., PhD
lecturer
Termez State University
Turayeva Kh. R.
master's student
Termez State University

FOREIGN EXPERIENCE IN WIDE APPLICATION OF DIGITAL TECHNOLOGIES IN ECONOMIC SECTORS AND THEIR USE

Abstract. *This article analyzes foreign experience in the widespread introduction of digital technologies into economic sectors in developed and developing countries. The digitization processes in the fields of industry, agriculture, finance, trade, transport and public administration, their effectiveness and impact on economic growth are highlighted.*

Keywords: *digital economy, digital technologies, innovation.*

Kirish

Raqamli transformatsiya ishlab chiqarish samaradorligini oshirish, xarajatlarni kamaytirish, resurslardan oqilona foydalanish hamda yangi ish o'rinlarini yaratishda muhim rol o'ynamoqda. Jahon tajribasi shuni ko'rsatadiki, raqamli texnologiyalarni iqtisodiyotga faol joriy etgan davlatlar raqobatbardoshlik va barqaror o'sish borasida yuqori natijalarga erishmoqda. Mazkur maqolaning asosiy maqsadi – xorijiy davlatlarning iqtisodiyot tarmoqlarida raqamli

texnologiyalarni joriy etish tajribasini tahlil qilish va ushbu tajribadan samarali foydalanish yo‘llarini aniqlashdan iborat.[20]

Adabiyotlar tahlili va metodologiya

Turli mamlakatlarda raqamli iqtisodiyotni rivojlantirish uchun uchta model mavjud. 1.Raqamli iqtisodiyot rahbarlarini o‘z ichiga olgan model Birinchi model rivojlangan davlatlarni o‘z ichiga oladi: AQSH va Yevropa Ittifoqi davlatlari. Ilmiy adabiyotlarda ta’kidlanishicha, yaqinda AQSH va Yevropa Ittifoqi mamlakatlarida raqamli iqtisodiyotni shakllantirish modellari kesishish jarayoni boshlandi. Shunday qilib, bu mamlakatlar o‘rtasidagi o‘xshashlik bir qator sabablarga bog‘liq: ishlab chiqarish va bandlik tuzilmasini xizmat ko‘rsatish sohasi va ilmiy jihatdan intensiv ishlab chiqarish foydasiga o‘zgartirish; hosildorlikning o‘sishi asosida ishlab chiqarishni jadallashtirish; bu iqtisodlarning tashqi sharoitlardan mustaqilligini, ularning progressiv va o‘z-o‘zini ta’minlashga qaratilgan investitsiyalar va jamg‘armalarning ichki manbai; ushbu ikki mintaqaning o‘zaro bog‘liqligini dunyoning qolgan qismidan progressiv yopish fonida tezda chuqurlashtirish. Ushbu o‘xshash elementlarning aksariyati AQSH va Yevropa Ittifoqi mamlakatlarida teng darajada rivojlangan ilmiy va texnologik taraqqiyot tendentsiyalari bilan bog‘liq. 2."Taraqqiyotga erishish" modeli Ikkinchi modelni yangi sanoat mamlakatlari shakllantiradi. So‘nggi paytlarda Singapur va Tayvan raqamli iqtisodiyotni rivojlantirishda katta ahamiyatga ega bo‘lmoqdalar, bu hatto ba’zi jihatdan Yaponiyadan ham ustundir. Aynan ushbu davlatlar raqamli iqtisodiyotni rivojlantirish bo‘yicha etakchi ikkinchi guruhda hisoblanadi. Biroq, turmush darajasi va ijtimoiy capitalning rivojlanish darajasi bo‘yicha ushbu davlatlar orqada qolmoqda. 12 3. Axborotni ishlab chiqishning tashqi vositalarini o‘z ichiga olgan model Axborot iqtisodiyoti rivojlanishining tashqi ko‘rinishlarini o‘z ichiga olgan uchinchi model, ta’limning juda past darajasi va umuman, aholining turmush darajasi pastligi, raqamli infratuzilmaning yo‘qligi yoki ahamiyatsiz rivojlanishi bilan tavsiflanadi. Bundan tashqari, ushbu model qaysidir ma’noda firma darajasida ham, davlat darajasida ham biznes jarayonlarini boshqarishning nochorligi bilan tavsiflanadi. Ushbu mamlakatlar qatoriga Afrika mamlakatlari va ba’zi Osiyo mamlakatlari kiradi. Ularning ixtisoslashuvi xalqaro bozorlarga xom ashyo yetkazib berishdir. Ushbu mamlakatlarda iqtisodiy rivojlanishni tubdan isloh qilish, aholining ta’lim darajasi va turmush darajasini oshirishga yo‘naltirilgan ulkan investitsiyalarni kiritish zarur.[21]

Tahlil va natijalar

Xitoydagi eng yirik kompaniyalardan biri – Alibaba Group ning asoschisi va direktorlar kengashi raisi Djek Maning ta’kidlashicha, «Taxminan 30 yillardan so’ng, biznesning 80% dan ortigi internet orqali amalga oshiriladi. Agar bu paytga kelib, ertangi kun uchun qandaydir yechimingiz bo’lmasa, bu yechim kimdadir albatta bo’ladi». Internet Live Stats ning ma’lumotlariga ko’ra, xar kuni Google

[20] Ravzatov J.B., Xorij tajribasi asosida raqamli iqtisodiyotning rivojlanishi. Oriental Renaissance: Innovative, educational, natural and social sciences, 5(9), 2025, 789-796

[21] Porsaev G‘.M, Safarov B.Sh., Usmanova D.Q., Raqamli iqtisodiyot asoslari, T.: «Fan va texnologiyalar nashriyot-matbaa uyi», 2020. 372 b.

tizimiga uch milliarddan ziyod so’rovlar bo’lar ekan. Undan tashqari, internet foydalanuvchilar orasida internet orqali telefon va video qo’ngiroqlar, ijtimoiy tarmoqlarda ishlash xam borgan sari ommaviy bo’lib bormoqda. Oxirgi besh yilda internet foydalanuvchilari soni 29% dan 39% gacha ortdi, ijtimoiy tarmoqlardan foydalanuvchilar soni esa 53% dan 64% gacha ortdi. Bu ma’lumotlar internetdan foydalanish ko’pchilik mamlakatlardagi insonlar uchun oddiy bir xolat bo’lib qolganini ko’rsatadi. Yoshlar va bolalar esa qandaydir darajada raqamli qurilmalar va ijtimoiy saytlarga bog’lik bo’lib xam qoldilar. Raqamli texnologiyalarning misli ko’rilmagan imkoniyatlari tufayli ko’pchilik tashkilot va korxonalar raqamli muxitga ulanib, mijozlar bilan onlayn muloqot qilgan xolda o’z bizneslarini elektron usulda tashkil etmoqdalar. Turli darajalardagi faoliyat turlarining integratsiyasi yangidan-yangi imkoniyatlar yaratib, konkret biznes modellarning rentabelliligini oshirayapti. Xuddi shuning uchun xam ijtimoiy-iqtisodiy faoliyat turlarini raqamlashtirish avvalgidan xam ko’ra ko’proq dolzarb bo’lib bormoqda. Chunki bu amal iste’molchilarning afzalliklaridan tortib, to yangi biznes modellargacha bo’lgan jaxon iqtisodiyotining bir qancha aspektlarini o’zgartirib yuboradi. Bu esa o’z navbatida iqtisodiy munosabatlarnig tubdan o’zgarishiga va raqamli iqtisodiyot tushunchasining paydo bo’lishiga olib keladi.[22]

Xulosa

Xulosa qilib aytganda, xorijiy tajriba raqamli texnologiyalarni iqtisodiyot tarmoqlariga keng joriy etish barqaror iqtisodiy o‘sish va raqobatbardoshlikni ta’minlashda muhim ahamiyatga ega ekanligini ko‘rsatadi. Ushbu tajribani milliy sharoitga moslashtirish orqali iqtisodiy samaradorlikni oshirish mumkin.Raqamli texnologiyalarni iqtisodiyot tarmoqlariga keng joriy etish bugungi kunda global iqtisodiy rivojlanishning ajralmas qismiga aylanib bormoqda. Tahlillar shuni ko‘rsatadiki, Germaniya, AQSh, Janubiy Koreya, Xitoy va Estoniya kabi davlatlarda raqamli texnologiyalarni izchil joriy etish orqali mehnat unumdorligi oshgan, eksport salohiyati kengaygan va davlat xizmatlarining sifati sezilarli darajada yaxshilangan. Raqamli texnologiyalarni iqtisodiyot tarmoqlariga keng joriy etish orqali mamlakatning raqobatbardoshligini oshirish, innovatsion rivojlanishni jadallashtirish va barqaror iqtisodiy o‘sishni ta’minlash mumkin. Shu sababli, kelgusida raqamli iqtisodiyotga oid islohotlarni izchil davom ettirish strategik vazifa sifatida qaralishi lozim.

Foydalanilgan adabiyotlar ro'yxati

1. Ravzatov J.B., Xorij tajribasi asosida raqamli iqtisodiyotning rivojlanishi. Oriental Renaissance: Innovative, educational, natural and social sciences, 5(9), 2025, 789-796
2. Porsaev G‘.M, Safarov B.Sh., Usmanova D.Q., Raqamli iqtisodiyot asoslari, T.: «Fan va texnologiyalar nashriyot-matbaa uyi», 2020. 372 b.
3. Ayupov R.H., Boltaboeva G.R.. Raqamli iqtisodiyot asoslari. Darslik. T.: TMI, 2020, 575 bet

[22] Ayupov R.H., Boltaboeva G.R.. Raqamli iqtisodiyot asoslari. Darslik. T.: TMI, 2020, 575 bet

Sobitova R. S., PhD
o'qituvchisi
Termiz davlat universiteti
ORCID: 0009-0003-8181-1615
Xursanova Sh. A.
magistranti
TerDU
ORCID: 0009-0005-6953-1875

BANK TIZIMIDA RAQAMLASHTIRISH JARAYONINING SAMARADORLIGINI OSHIRISH YO'LLARI

Annotatsiya. *Ushbu maqolaning maqsadi bank tizimida Raqamlashtirishning xizmat ko'rsatish kanallarini kengaytirishi, operatsion xarajatlarni optimallashtirishi, mijozlar tajribasini yaxshilashi va yangi mahsulotlar yaratish imkonini ochib berishi masalalarini yoritish hamda bank tizimida raqamlashtirish jarayonining samaradorligini oshirishning asosiy omillarini tahlil qilish, mavjud muammolarni aniqlash va ularni hal etish bo'yicha amaliy tavsiyalar berishdan iborat.*

Kalit so'zlar: *raqamli banking, raqamli bank, raqamli innovatsiyalar, mobil ilova, an'anaviy bank, aloqa markazlari, online kredit, online omonat.*

Sobitova R. S., PhD
teacher
Termez State University
ORCID: 0009-0003-8181-1615
Khursanova Sh. A.
master's student
TerSU
ORCID: 0009-0005-6953-1875

WAYS TO INCREASE THE EFFICIENCY OF THE DIGITALIZATION PROCESS IN THE BANKING SYSTEM

Abstract. *The purpose of this article is to highlight the issues of how digitalization in the banking system can expand service channels, optimize operating costs, improve customer experience, and open up opportunities for creating new products, as well as to analyze the main factors for increasing the efficiency of the digitalization process in the banking system, identify existing problems, and provide practical recommendations for solving them.*

Keywords: *Digital banking, digital bank, digital innovations, mobile app, traditional bank, contact centers, online credit, online deposit*

Kirish

Zamonaviy bank tizimi global miqyosda raqamli transformatsiyaning jadal sur'atlariga guvoh bo'lmoqda. Texnologiyaning tezkor rivojlanishi, mijozlarning o'zgaruvchan talablari va raqobatning kuchayishi banklarni an'anaviy operatsion modellaridan voz kechib, yanada innovatsion va raqamli yechimlarga o'tishga majbur qilmoqda. Bank tizimlarini raqamlashtirish – xizmat ko‘rsatish sifatini oshirish, iqtisodiyotni yanada erkinlashtirish va moliyaviy xizmatlardan foydalanishni kengaytirishning muhim vositasidir. 2023-yilda qabul qilingan O’zbekiston Respublikasining “Raqamli iqtisodiyotni rivojlantirish to‘g‘risida”gi qonuni va Prezidentning 2023-yil 7-avgustdagi PF-105-sonli farmoni, O‘zbekistonning bu boradagi strategik yo‘nalishini belgilab berdi. Makur me’yoriy hujjatlar iqtisodiyotni raqamli ekotizimga aylantirish va aholiga yanada qulay moliyaviy sharoitlar yaratishni ko‘zlaydi.

Shuni ta’kidlash joizki, raqamlashtirish nafaqat xizmat ko'rsatish kanallarini kengaytiradi, balki operatsion xarajatlarni optimallashtirish, mijozlar tajribasini yaxshilash va yangi mahsulotlar yaratish imkonini ham beradi. Texnologiyalarni keng joriy etish bilan raqamlashtirish samaradorligini avtomatik ravishda ta’minlab bo’lmaydi. Aksariyat hollarda, strategik yondashuvning yetishmasligi, malakali kadrlar yetishmasligi, eskirgan infratuzilma, kiberxavfsizlik xavf-xatarlari kabi omillar raqamlashtirish jarayonining o’sishiga to'sqinlik qiladi. Ushbu maqolaning maqsadi bank tizimida raqamlashtirish jarayonining samaradorligini oshirishning asosiy omillarini tahlil qilish, mavjud muammolarni aniqlash va ularni hal etish bo'yicha amaliy tavsiyalar berishdan iborat.

Adabiyotlar tahlili va metodologiya

Tadqiqotlarga ko’ra, bank yoki bank filialiga “innovatsion bank texnologiyalaridan foydalangan holda (kassa xizmatlarini ko'rsatmasdan) masofadan turib bank xizmatlarini ko'rsatuvchi bank yoki uning sho’ba korxonasi raqamli bank hisoblanadi”, deb ta’rif beriladi. Raqamli banking bank xizmatlaridan foydalanuvchilarga bank mahsulotlarini onlayn tarzda taqdim etish uchun dasturiy ta’minot to'plami sifatida ko'rib chiqilishi maqsadga muvofiqdir. Tadqiqotchi A.A.Gontarning ta’kidlashicha, “Raqamli banking banklar va ularning mijozlari o‘rtasidagi o‘zaro munosabatlarning yangi paradigmasi bo‘lib, iste’molchilar va tijorat mijozlari uchun raqamli, axborot va texnologik strategiyalar sohasidagi moliyaviy xizmatlardagi innovatsiyalarni o‘z ichiga olgan tendentsiyadir” [1]. Tadqiqotchi olimlardan Suchat Tungjitnob, Kitsuchart Pasupa, Boontawee Suntisrivaraporn o‘z tadqiqot ishlarida “Mobile banking” to‘g‘risida quyidagi fikrlarni bildirib o‘tganlar. “Bank mijozlari banklarning mobil ilovalari (mobile banking) yordamida istalgan joyda va istalgan vaqtda bank operatsiyalarini darhol amalga oshirishlari mumkin. Bundan tashqari, mobil banking ilovasi qo‘shimcha filiallarni ko‘paytirish xarajatlarini kamaytiradi. Bank, shuningdek, ilovadan mijozlar ma’lumotlarini olishdan foyda oladi”. “Rivojlangan mamlakatlarda olib borilgan tadqiqotlar shuni ko‘rsatdiki, elektron banking operatsion xarajatlarni kamaytiradi va shuning uchun banklar uchun katta foyda keltiradi. Raqamli banking daromad olish uchun ko‘proq imkoniyatlar yaratadi,

chunki ular qo‘shimcha foizsiz manbalardan daromad keltiradi. Qulay bo‘lgan elektron bank xizmatlari va mahsulotlarining joriy etilishi banklarga bo‘lajak mijozlarni jalb qilish imkonini beradi va bu ularning bozordagi ulushini oshirish imkonini yaratadi” [2].

Tahlil va natijalar

Tahlillar natijasida bank tizimida raqamlashtirishning bir qator ijobiy ta’sirlari va samaradorlikni oshirish uchun hal etilishi lozim bo‘lgan asosiy muammolar aniqlandi:

Ijobiy ta’sirlar va erishilgan natijalar:

1. Mijozlar tajribasining yaxshilanishi: Mobil ilovalar, internet-banking va masofaviy xizmat ko'rsatish kanallarining kengayishi mijozlarga bank xizmatlaridan istalgan vaqtda va joyda foydalanish imkoniyatini berdi, bu esa mijozlarning qoniqish darajasini oshirdi.

2. Operatsion samaradorlikning orttirilishi: Ko‘plab jarayonlarni avtomatlashtirish (masalan, to‘lovlar, kredit arizalarini ko'rib chiqish) bank xodimlarining ish yukini kamaytirib, xizmat ko'rsatish tezligini oshirdi va operatsion xarajatlarni qisqartirdi.

3. Yangi mahsulotlar va xizmatlarning rivojlanishi: Raqamli platformalar asosida to‘lov tizimlari, mikro-kreditlash, investitsiya mahsulotlari va shaxsiylashtirilgan takliflar kabi innovatsion xizmatlar yaratish imkoniyati paydo bo‘ldi [3].

Samaradorlikka to‘sqinlik qiluvchi muammolar:

1. Eskirgan infratuzilma (Legacy Systems): Ko‘plab banklarda eski va zamonaviy tizimlar o‘rtasidagi integratsiya muammolari mavjud bo‘lib, bu ma’lumotlar almashinuvi va yangi texnologiyalarni joriy etishni qiyinlashtiradi.

2. Kiberxavfsizlik xavflari: Raqamlashtirish bilan birga kiberhujumlar va ma’lumotlar sizib chiqishi xavfi ortadi, bu esa mijozlarning ishonchiga putur yetkazishi va banklarga katta moliyaviy zarar yetkazishi mumkin.

3. Malakali kadrlar yetishmasligi: Raqamli texnologiyalarni samarali boshqarish, tahlil qilish va rivojlantirish uchun yetarli darajada malakali IT-mutaxassislar, ma’lumotlar tahlilchilari va kiberxavfsizlik bo‘yicha ekspertlar yetishmaydi.

4. Ma’lumotlar boshqaruvi va tahlilining yetishmasligi: Banklar katta hajmdagi ma’lumotlarni to‘playdi, ammo ularni samarali boshqarish, qayta ishlash va biznes qarorlari uchun foydali tahlillarga aylantirish qobiliyati cheklangan bo‘lishi mumkin.

5. Strategik yondashuvning yo‘qligi: Ba'zi banklar raqamlashtirishni alohida loyihalar to‘plami sifatida ko‘radi, ammo umumiy, yaxlit strategiya mavjud bo‘lmagani sababli, sa’y-harakatlar tarqoq va samarasiz bo‘ladi.

6. Regulyativ cheklovlar va moslashuv: Mavjud me’yoriy hujjatlar va tartiblar ba'zan innovatsion raqamli yechimlarni joriy etishga to‘sqinlik qilishi yoki ularni sekinlashtirishi mumkin.

Xulosa va takliflar

Yuqorida keltirilgan natijalar shuni ko‘rsatadiki, bank tizimida raqamlashtirishning samaradorligini oshirish nafaqat texnologik investitsiyalarni, balki keng qamrovli strategik o‘zgarishlarni ham talab qiladi.

1. Yaxlit strategik reja: Raqamlashtirishni shunchaki alohida loyihalardan iborat jarayon emas, balki bankning umumiy biznes strategiyasining ajralmas qismi sifatida ko'rish zarur. Bu aniq maqsadlar, xarajatlar va kutilayotgan natijalar bilan tasdiqlangan yaxlit yo'l xaritasini talab qiladi. Bank rahbariyati ushbu strategiyani qo‘llab-quvvatlashi va barcha bo'g'inlarda uning amalga oshirilishini ta'minlashi shart.

2. Mijozlarga markazlashtirilgan yondashuv: Raqamli xizmatlar ishlab chiqishda mijozning ehtiyojlari va tajribasi doimo ustuvor bo‘lishi kerak. Foydalanuvchi interfeysi (UI) va foydalanuvchi tajribasi (UX) dizayniga katta e’tibor qaratish, mijozlar fikr-mulohazalarini doimiy ravishda yig‘ish va tahlil qilish orqali xizmatlarni takomillashtirish zarur.

3. Zamonaviy texnologik infratuzilma: Eskirgan tizimlardan voz kechib, bulutli texnologiyalar, API (Application Programming Interface), sun'iy intellekt, mashinani o'rganish va blokcheyn kabi zamonaviy yechimlarga o'tish muhim. Bu yechimlar ma’lumotlar almashinuvini tezlashtiradi, xavfsizlikni oshiradi va yangi xizmatlarni joriy etishni osonlashtiradi.

4. Kiberxavfsizlikka doimiy investitsiyalar ajratish: Raqamlashtirishning kengayishi bilan kiberxavfsizlik xavflari ham ortib boradi. Bu sohaga uzluksiz sarmoya kiritish, zamonaviy himoya mexanizmlarini joriy etish, xodimlarning kiberxavfsizlik bo‘yicha savodxonligini oshirish va tezkor reaktsiya tizimlarini yaratish shart.

5. Inson kapitalini rivojlantirish: Raqamli transformatsiyaning muvaffaqiyati asosan xodimlarning malakasi va moslashuvchanligiga bog‘liq. IT, ma'lumotlar tahlili, kiberxavfsizlik, dizayn fikrlash (design thinking) kabi yo'nalishlarda xodimlarni o'qitish va qayta tayyorlashga sarmoya kiritish lozim. Shuningdek, bank ichida innovatsiya va o‘zgarishlarga ochiq madaniyatni shakllantirish muhimdir.

6. Ma’lumotlar boshqaruvi va tahlilini takomillashtirish: Katta ma’lumotlar (Big Data)dan to’g'ri foydalanish, ularni to'plash, qayta ishlash, saqlash va tahlil qilishning samarali tizimini yaratish raqamlashtirish samaradorligini oshirishning kalitidir. Ma’lumotlarga asoslangan qarorlar qabul qilish bankning raqobatbardoshligini sezilarli darajada oshiradi [4].

Bank tizimida raqamlashtirish jarayonining samaradorligini oshirish bugungi kunda raqobatbardoshlikni saqlab qolish va barqaror rivojlanishga erishishning asosiy omilidir. Bu jarayon shunchaki yangi texnologiyalarni joriy etishdan ko‘ra ko‘proq narsani – yaxlit strategik rejalashtirish, mijozlarga markazlashgan yondashuv, zamonaviy infratuzilmaga sarmoya kiritish, kiberxavfsizlikka ustuvor ahamiyat berish, inson kapitalini rivojlantirish va ma’lumotlarga asoslangan qarorlar qabul qilishni talab qiladi. Ushbu tavsiyalarga amal qilish, banklarga nafaqat raqamli transformatsiyadan maksimal foyda olish,

balki kelajakdagi chaqiriqlarga tayyor bo‘lish va mijozlariga yanada sifatli, tezkor va xavfsiz xizmatlar ko'rsatish imkonini beradi. Raqamli bank kelajagi ushbu kompleks yondashuv asosida quriladi.

Foydalanilgan adabiyotlar ro‘yxati

1. Дубинин М.В. Банковские технологии: сущность, история развития и перспективы // Финансы и кредит. №34 (274), 2007. – 58 с.
2. Vadlamani R. Introduction to banking technology and management // Institute for development and research in banking technology. May 2011. DOI: 10.4018/978-1-59904- 6754.ch001.
3. O.M.Melikov. Raqamli bank texnologiyalari va ularning o‘ziga xos xususiyatlari hamda ulardan samarali foydalanish yo‘llari // “Iqtisodiyot va innovatsion texnologiyalar” ilmiy elektron jurnali. № 4, iyul-avgust, 2021 yil.
4. M.Madraximov. Tijorat banklarida masofaviy bank xizmatlarini rivojlantirish istiqbollari // Oriental Renaissance: Innovative, educational, natural and social sciences. VOLUME 1 | ISSUE 4, ISSN 2181-1784. Scientific Journal Impact Factor, SJIF 2021: 5.423.

Sobitova R. S., PhD
teacher
Termez State University
ORCID: 0009-0003-8181-1615
Noraliyeva G. M.
student
Termez State University
ORCID: 0009-0005-0123-5826

EFFICIENT USE OF WATER RESOURCES AND MECHANISMS FOR AGROBUSINESS DIVERSIFICATION IN AGRICULTURE OF SURKHANDARYA REGION

Abstract. *This article analyzes the potential of agrobusiness diversification using the examples of horticulture, greenhouse farming, livestock production, and agro-processing sectors. Special emphasis is placed on the modern importance of implementing water-saving practices to ensure sustainable development. The research findings demonstrate that integrating water-efficient technologies with agrobusiness diversification strategies contributes to increasing overall production volumes and improving farmers' incomes.*

Key words: *Water resource efficiency, rational water use, sustainable agricultural development, agrobusiness diversification.*

Introduction

Agriculture plays a crucial role in the socio-economic development of Surkhandarya, providing livelihoods and supporting local communities. However, the region faces significant challenges that threaten its sustainability, including limited water resources, inefficient irrigation systems, and the impacts of climate change. Additionally, the cultivation of water-intensive crops exacerbates water scarcity issues. These factors highlight the urgent need for innovative solutions and better resource management to ensure the long-term prosperity and environmental health of Surkhandarya's agricultural sector. This article examines water-efficient practices and agribusiness diversification in Surkhandarya, highlighting their crucial role in promoting sustainable agriculture.

Research Methodology

This research adopts a mixed-methods approach, combining both quantitative and qualitative techniques to provide a comprehensive analysis of water resource management and agrobusiness diversification in the Surkhandarya region.

Analysis and discussion of results

The complexity of the water resources management system is determined not only by the presence of numerous infrastructure components, but also by their close interconnection. Therefore, a systems approach—which involves justifying complex decision-making across all sectors and ensuring coordination among

them—is considered the most effective method in terms of its essence and significance. This requires a thorough analysis and comprehensive explanation of the system's structure and operating principles, as well as an examination of the specific characteristics, interrelationships, and internal structure of all its components. In other words, it is necessary to take into account the individual elements of the water resources management system as a complex system, their interactions, and the role of each element in the overall functioning of the system. The analysis of the water resources management system requires not only the identification of its structural components but also the determination of opportunities for coordinating the system's activities. This is particularly important for making sound decisions in the water management sector, expanding their scope of impact, and improving overall efficiency. One of the main challenges of the water resources management system is the mismatch between existing water resources and future demand, meaning that available resources may not be sufficient to meet growing needs. This problem can be addressed through the development of an effective water use management system. Such a system makes it possible to meet water demand in terms of both quality and quantity while taking environmental safety into account.

The Surkhandarya region is experiencing water shortages that threaten agriculture and local livelihoods. To address this, adopting modern irrigation techniques such as drip and sprinkler systems can greatly enhance water efficiency. These methods not only conserve precious resources but also increase crop yields. With small investments, farmers can achieve substantial improvements in productivity, ensuring sustainable growth and better economic stability for the community. Diversification in agribusiness has become a vital strategy for ensuring sustainability and resilience. By integrating crops with livestock, farmers create a more balanced and productive system that maximizes resource use. Greenhouse farming allows for the cultivation of high-value crops in controlled environments, extending growing seasons and increasing income. Agro-processing adds value to raw products, opening new market opportunities and reducing post-harvest losses. Water-efficient farming practices enable farmers to grow premium crops even amid water shortages, enhancing profitability. Support from institutions, including training programs and easy access to credit, encourages farmers to adopt these innovative approaches, ultimately strengthening their livelihoods and fostering a more resilient agricultural sector. Currently, countries around the world, including those in the Central Asia region, are facing water resource shortages. This situation can lead to desertification and a reduction in agricultural land. Experts recommend the proper and rational use of water resources as a solution to this problem. In the Surkhandarya region, 95% of the water drawn from natural sources is used for irrigating agricultural crops. However, between 2019 and 2022, water resources decreased by 10%, which makes even more rational water use necessary. In the region, 276,000 hectares, or 85% of crop fields, are still irrigated using traditional furrow methods. Due to outdated water infrastructure, water losses exceed 34%. Taking these factors into

account, in recent years special attention has been paid to introducing water-saving technologies in the region. Specifically, between 2017 and 2022, modern water-saving irrigation technologies were implemented on 73,000 hectares, or 27% of irrigated agricultural land. In addition, 10,100 hectares were irrigated using flexible pipes, and 10,700 hectares were irrigated using plastic-covered furrows. According to the data, the implementation of water-saving technologies in the region has saved 126.4 million m^3 of water and improved additional water supply on 23,000 hectares. According to the Decree of the President of the Republic of Uzbekistan dated February 24, 2021, "On Approving the Strategy for Water Resources Management and Development of the Irrigation Sector in the Republic of Uzbekistan for 2021–2023," a total of 22,100 hectares in the region are planned to be equipped with modern water-saving technologies this year. To implement this decree, farmers have already started operating sprinkler irrigation technologies on 502 hectares.

Conclusion and Recommendations

The findings from this research indicate that both the effective management of water resources and the expansion of agrobusiness activities are essential for achieving sustainable agricultural development in the Surkhandarya region. Persistent issues such as restricted water supply and outdated irrigation methods continue to limit agricultural output. Nevertheless, integrating advanced irrigation systems that conserve water has been shown to greatly enhance water efficiency, stabilize crop yields, and lessen the demand on existing water sources. Simultaneously, the diversification of agrobusiness—including the advancement of horticulture, greenhouse cultivation, livestock farming, and agro-processing—supports higher and more reliable income for farmers. The joint implementation of water-efficient irrigation and diversified agricultural practices yields a synergistic effect, resulting in better resource management, increased production, and diminished environmental harm. In light of these outcomes, the study recommends broadening the use of water-efficient irrigation technologies, aided by financial incentives and technical assistance for farmers. Efforts to modernize irrigation infrastructure should take precedence to minimize water loss. Additionally, policies need to support the growth of diverse, high-value, and low water-dependent agricultural sectors. Enhancing institutional backing, farmer education, and water resource governance is also crucial to further strengthen the sustainability and adaptability of agriculture in Surkhandarya.

References

1. World Bank. Uzbekistan to Modernize Its Irrigation Infrastructure with World Bank Support. Washington DC: World Bank Press Release, May 21, 2025.
2. UzDaily. Uzbek Officials Consider Measures for Improving Water Use Efficiency. Tashkent, January 4, 2024. Available online.
3. Yuz.uz. Measures for Improving Water Use Efficiency Considered. January 4, 2024. Available online. https://yuz.uz
4. UZA. Water Conservation in Uzbekistan: Strategies, Achievements, and Prospects. 2025. Available online.

Sobitova R. S., PhD
o'qituvchisi
Termiz Davlar universiteti
ORCID:0009-0003-8181-1615

SANOAT ISHLAB CHIQARISHNI INNOVATSION RIVOJLANTIRISHNING HUDUDIY JIHATLARI

Annotatsiya: *Mazkur maqola hududlarda sanoat tarmog'i rivojlanishining o'ziga xos xususiyatlari, uning YaHM tarkibidagi o'rni, shuningdek, innovatsion yondashuvlar asosida hududiy sanoatni modernizatsiya qilishning nazariy va amaliy jihatlari yoritiladi. Mamlakatdagi iqtisodiy islohotlar zamirida sanoat mahsulotlari ishlab chiqarishni diversifikatsiya qilish va eksport salohiyatini oshirishning asosiy yo'nalishlariga e'tibor qaratilgan.*

Kalit so'zlar: *sanoat, ishlab chiqarish, diversifikatsiya, YaHM hajmi, ijtimoiy-iqtisodiy taraqqiyot, eksportini ko'paytirish.*

Sobitova RS., (PhD)
Lecturer
Termez State University
ORCID:0009-0003-8181-1615

REGIONAL ASPECTS OF INNOVATIVE DEVELOPMENT OF INDUSTRIAL PRODUCTION

Abstract: *This article discusses the specific features of the development of the industrial sector in the regions, its role in the structure of GRP, as well as theoretical and practical aspects of the modernization of regional industry based on innovative approaches. Attention is paid to the main directions of diversification of industrial production and increasing export potential in the context of economic reforms in the country.*

Keywords: *industry, production, diversification, GRP volume, socio-economic development, export growth.*

Kirish

Sanoat ishlab chiqarishni innovatsion rivojlantirishning hududiy jihatlari bugungi kunda O'zbekiston iqtisodiyotining barqaror o'sishida hal qiluvchi omil bo'lib bormoqda. Mamlakat hududlari tabiiy resurslar, ishlab chiqarish quvvati, transport-logistika imkoniyatlari hamda ilmiy-texnik salohiyati bo'yicha sezilarli farqlarga ega. Shu sababli innovatsion rivojlanishning hududiy modelini shakllantirish, har bir hududning mavjud ustunliklariga tayangan holda sanoat tarmoqlarini modernizatsiya qilish iqtisodiy samaradorlikni keskin oshiradi.

So'nggi yillarda respublikada texnoparklar, innovatsion klasterlar, texnologik inkubatorlar, ilmiy tadqiqot markazlari tashkil etildi; korxonalarning

modernizatsiya ko‘rsatkichlari, raqamlashtirish darajasi, ishlab chiqarish quvvatlarining yangilanish sur’ati ortmoqda. Biroq hududlar kesimida innovatsion rivojlanish notekis kechayotgani, ayrim viloyatlarda texnologik eskirish, kadrlar yetishmasligi, innovatsion infratuzilmaning sustligi kabi muammolar saqlanib qolmoqda.

Metodologiya

Tadqiqot O‘zbekiston hududlarida sanoat ishlab chiqarishining innovatsion rivojlanish darajasini baholashga qaratilgan bo‘lib, metodologiya Tizimli yondashuv, Ekspert baholash usuli kabi bir nechta ilmiy yondashuvlar asosida shakllantirildi.

Adabiyotlar tahlili

Mintaqa sanoat majmuasi innovatsion rivojlanishining ustun tomoni sanoatning ilmiy-texnik darajasini oshirish, innovatsiyadan texnologik zanjirni shakllantirishda foydalanish, o‘zaro tarmoqlar doirasida integratsiyani kuchaytirish, sanoat va savdoga ixtisoslashuvni chuqurlashtirish hamda sanoat klasterlarini shakllantirish hisoblanadi (M.K.Bandman).

Yalpi hududiy mahsulot hajmining yuqori darajada oshishini ta’minlashda sanoat va unga yo‘naltirilgan investitsiyalarning yuqori darajada oshishi, taraqqiyotning tashqi va ichki omillari hisobiga sanoatda chuqur tuzilmaviy o‘zgarishlarni amalga oshirish muhim hisoblanadi (Dj.Keyns, Dj.Xiks, U.Rostou, R.Xarrod,Ye.Domar).

Klasterli yondashuv butun dunyoda mintaqaviy sanoat siyosatining eng samarali vositalaridan biri (M.Afanasev). Hududning sanoat ishlab chiqarish salohiyati tabiiy va mehnat resurslari, asosiy kapital, fan texnika taraqqiyotining o‘zaro ta’siri jarayonida shakllanadi va bunda innovatsiya muhim ahamiyat kasb etadi (M.Maxmudov).

O‘zbekiston Respublikasi Prezidentining 2024-yil 15 avgustda e’lon qilingan «Hududlarda sanoat salohiyatini yanada oshirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida» qarori sanoat korxonalari bilan ishlashning «respublika – viloyat – tuman» tamoyili asosida «vertikal tizim»ini yaratib berdi [1].

Munozara va tahlilllar

Ma’lumki, jahon mamlakatlarida iqtisodiy o‘sishning barqarorligini ta’minlashga qaratilgan davlat siyosatida sanoat korxonalari boshqaruvi amaliyotiga innovatsion loyihalarni joriy etish orqali yangi iste’mol qiymatlarini yaratish, sanoat korxonalarining ishlab chiqarish samaradorligini, moliyaviy barqarorligini ta’minlash, milliy iqtisodiyot tarmoqlarining global raqobatbardoshligi va innovatsion rivojlanish indeksi ko‘rsatkichlarini oshirishga ustuvorlik qaratilib kelinmoqda.

Shu ma’noda hukumatimiz tomonidan 2030-yilga borib Global innovatsion indeks xalqaro reytingi ko‘rsatkichlari tizimida jahonning yetakchi 50 ta mamlakatlari qatoriga kirishiga erishish bo‘yicha uzoq muddatli strategik vazifasi belgilangan [2].

Bugungi kunda tizimni to‘liq va samarali ishlatish maqsadida hududlar 270 dan ziyod salohiyatli kadrlar bilan to‘ldirilib, ishlar tizimli yo‘lga qo‘yildi.

Respublika bo‘yicha ro‘yxatdan o‘tgan jami 112 mingta sanoat korxonalari to‘liq xatlovdan o‘tkazildi. Natijasida esa respublika darajasidagi 400 dan ortiq, tuman va viloyat darajasidagi 4 mingdan ziyod muammolar hal qilindi.

Milliy statistika qo‘mitasi ma’lumotlariga ko‘ra, joriy yilning yanvar-iyun oylarida respublika korxonalari tomonidan 488 ming 532,3 milliard so‘mlik sanoat mahsulotlari ishlab chiqarildi va sanoat ishlab chiqarish indeksi o‘tgan yilning shu davriga nisbatan 106,6 foizni tashkil etdi [3].

Qayd etilganidek, sanoat ishlab chiqarishining umumiy hajmida ishlab chiqaradigan sanoatning ulushi 85,1 foizni, tog‘-kon sanoati va ochiq konlarni ishlash sanoati 7,5 foizni, elektr, gaz, bug‘ bilan ta’minlash va havoni konditsiyalash 6,9 foizni, suv bilan ta’minlash, kanalizatsiya tizimi, chiqindilarni yig‘ish va utilizatsiya qilish 0,5 foizni tashkil etdi.

Sanoat korxonalarida ishlab chiqarish o‘tgan yilning shu davriga nisbatan 7,1 foizga, suv bilan ta’minlash, kanalizatsiya tizimi, chiqindilarni yig‘ish va utilizatsiya qilish sanoatida fizik hajm indeksi 9,7 foizga, elektr, gaz, bug‘ bilan ta’minlash va havoni konditsiyalashda 3,1 foizga hamda tog‘-kon sanoati va ochiq konlarning ishlash sanoatida 5,1 foizga oshgani kuzatildi.

Xususan, Surxandaryo viloyatida sanoatni innovatsion rivojlantirishning hozirgi bosqichida quyidagi ustivor ustuvor yo‘nalishlarni amalga oshirish maqsadga muvofiqdir:

- tabiiy resurslardan oqilona va samarali foydalanish asosida mahalliy xomashyo asosidagi yuqori qo‘shilgan qiymatli mahsulotlar ishlab chiqarishni rag‘batlantirish;
- sanoat tarmog‘ining investitsion jozibadorligini oshirish maqsadida logistika infratuzilmasini yaxshilish;
- xorijiy investorlarning moddiy manfaatdorligini oshirish va ularning faoliyatini institusional jihatdan qo‘llab-quvvatlash mexanizmini takomillashtirish;
- hududiy sanoat tarmoqlarida ilmiy-tadqiqot loyihalariga moliyaviy qo‘llab-quvvatlashni kengaytirish;
- hududlarda sanoat klasterlarini rivojlantirishni jadal amalga oshirish.

Xulosa qilib aytganda, O‘zbekiston hududlarida sanoatni innovatsion rivojlantirish milliy iqtisodiyotning barqaror va raqobatbardosh o‘sishini ta’minlovchi eng muhim strategik yo‘nalishlardan biridir. Innovatsiya, ilmiy izlanishlar, texnologik modernizatsiya va mahalliy resurslardan oqilona foydalanish hududlarning iqtisodiy faolligini oshirada muhim rol o’ynaydi.

Adabiyotlar ro‘yxati

1. Karimov, N. O‘zbekiston sanoatining modernizatsiyasi va tarkibiy o‘zgarishlari. – Toshkent: “Fan va texnologiya”, 2022.
2. Mahmudov M.F. O‘zbekistonning sanoat ishlab chiqarish salohiyatini baholash // Iqtisodiyot va innovatsion texnologiyalar. №1, 2019, 2 b.
3. Salimov B.B. Canoat maxsuloti ishlab chiqarishning hududlar bo‘yicha qiyosiy tahlili va uni rivojlantirishning ustuvor yo‘nalishlari // Iqtisodiyot va innovatsion texnologiyalar. №3, 2018,

Suleimanov R. I.
assistant
department of human anatomy
Samarkand State Medical University

COLLATERAL CIRCULATION IN THE LIGAMENTS OF THE ACCESSORY VEINS OF THE SPINE

Resume: *The article examines the collateral capabilities of the spinal vein system. The involvement of venous formations of the spine and, in particular, inside the vertebral venous plexuses as collateral blood flow pathways is generally recognized. The role of other venous formations such as the veins of different parts of the spine, the veins of individual vertebrae.*

Keywords: *spine, blood, cell, vertebral plexuses, thoracic region, veins, blood flow.*

Introduction

Spondylogenic lesions of the nervous system are the most common chronic human diseases [1]. Neurological manifestations of lumbar osteochondrosis account for 60–70% of all peripheral nervous system disorders and are the cause of 70% of cases of temporary disability [2]. At the same time, a significant role in the pathogenesis of neurological manifestations of lumbar spine osteochondrosis is played by impaired venous circulation. Veins have thin walls and low blood pressure, so they are compressed much more easily during compressive processes than arteries, which have dense walls and high intra-arterial pressure [3]. In cases of intervertebral disc prolapse, compression of the anterior internal vertebral venous plexus and the intervertebral venous plexus occurs in 84% of cases according to venospondylography data [4,6]. Impaired venous outflow from the internal and external plexuses of the spinal canal is accompanied by reflex arterial constriction, thereby preventing a sharp increase in venous pressure in the spinal canal [5,8]. However, this reduces the amount of blood flowing not only to the spinal cord and roots but also to the vertebrae, creating conditions for hypoxia. This leads to edema, impaired microcirculation in the bony structures of the spine, and accumulation of under-oxidized metabolic products [7]. As a result, the function of both the spinal cord and its roots, as well as the vertebral-motor segments, is affected.

Study Objective

The aim of this work was to study the collateral possibilities of the vertebral venous system.

Materials and methods

The study was conducted on 56 adult cadavers. The method used was interstitial injection of oil-based contrast mass prepared according to the Gerota technique.

Results

In the upper and lower thoracic regions, blood flow was evenly directed toward both the anterior and posterior surfaces; in the mid-thoracic region, it was predominantly toward the posterior surface. In the lumbar region, with the exception of the L-I vertebra, blood drainage was directed toward the intrapvertebral venous plexuses of the vertebral arches. From these, blood flow could proceed in ventral and dorsal directions — respectively, to the intrapvertebral and posterior external plexuses. Along the spine, drainage of blood to the outer surface of the vertebral arches was more pronounced at the cervical and upper thoracic levels than at other levels. Laterally, blood from the articular and transverse processes drained into the surrounding vertebral veins; the veins of these processes run along their upper and lower surfaces. Venous outflow from the spinous processes was directed toward the external surfaces. Veins of different anatomical parts anastomose with each other. This circumstance, under appropriate conditions, apparently can facilitate changes in the direction of blood flow within the venous network of a single vertebra. Veins of individual vertebrae are interconnected by vessels running both horizontally and vertically. In the cervical region, these include the plexuses of the vertebral, intervertebral, and deep cervical veins; in the thoracic region — segmental veins; in the lumbar region — lumbar and ascending lumbar veins; and in the sacral region — anterior sacral, median and lateral venous plexuses, and posterior external sacral veins. The intrapvertebral plexuses also belong to this group. The listed veins connect the vertebral veins in the cervical region with the subclavian, internal jugular, and brachiocephalic veins; in the thoracic region — with the azygos and hemiazygos systems; in the lumbar region — with the inferior vena cava; and in the sacral region — with the internal iliac and common iliac veins. It should be noted that along the spine, the direction of blood flow at the levels of L-I, L-IV, and L-V changes predominantly in zonal directions. Thus, from the bodies of cervical vertebrae — toward the posterior surface; at other levels, in an equal number of observations, both anteriorly and posteriorly. Consequently, the veins of individual vertebrae, through mutual anastomosis, form the overall venous system of the spine. The connection of the latter with the main veins of the neck, superior and inferior venae cavae, pelvic veins, and veins of the soft tissues of the back provides opportunities to store and redistribute blood flow direction with minimal overload to the body. The obtained data show that the direction of blood flow from different anatomical parts of the vertebra is not uniform. Blood flow from the vertebral bodies can occur in two directions: anteriorly — to the anterior external vertebral plexuses, and posteriorly — to the intrapvertebral plexuses.

Conclusion

An important factor contributing to the increase in compensatory capabilities of the vertebral veins is their anastomoses with extravertebral vascular formations. These include:

a) anastomoses of the vertebral veins with intracranial venous structures (suboccipital, retromastoid, nuchal plexuses, veins of the posterior condylar

emissary, plexus of the hypoglossal nerve canal, marginal, occipital, basilar, inferior petrosal, and cavernous sinuses);

References

1. Akhmedova, S. M., Korzhavov, Sh. O., Mamataliyev, A. R., Mirazimova, I. B., & Ruzieva, N. D. (2020). Anthropometric indicators of physical development in children under 5 years of age in the Samarkand region. In SCIENTIFIC RESEARCH IN XXI CENTURY (pp. 250-258).
2. Blinova, S. A., Oripov, F. S., Dekhkanov, T. D. Morphofunctional features of neuroepithelial bodies in the respiratory region of the lungs // Bulletin of Science and Education. - 2020. - No. 10-3 (88). - P. 82-84.
3. Mamataliyev, A. R., HISTOTOPOGRAPHY OF THE PROSTATE GLAND IN THE RABBIT // Economy and Society. – 2025. – No. 2-1 (129). – pp. 319-321.
4. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 3(02), 22-27.
5. Mamataliyev A. R., Sh R. S., Zohidova S. H. EKSPERIMENTAL JIGAR SIRROZI SHAROITIDA PASTKI PORTO KAVAL VENOZ TIZIMI MORFOLOGIYASINING ORGANILGANLIK DARAJASI // Economy and Society. – 2024. – No. 4-1 (119). – pp. 1346-1350.
6. MAMATALIYEV A. R. AGE-RELATED MORPHOLOGICAL CHANGES IN THE NERVE STRUCTURES OF THE APPENDIX IN RABBITS // ECONOMY. – pp. 199-201.
7. Mamataliyev A. R. QUYONLARDA CHUVALCHANGSIMON OSIMTASI NERV TUZILMALARINING YOSHGA BOGLIQ MORFOLOGIK OZGARISHLARI //Economy and society. – 2025. – No. 3-1 (130). – pp. 199-201.
8. Davlatov S.S., Khidirov Z.E., Nasimov A.M. Differentiated approach to the treatment of patients with Mirizzi syndrome //Academy. – 2017. – No. 2 (17). – P. 95-98.
9. Mamataliev A. R. INNERVATION DISORDER AND MUTATIONAL PROCESS IN TISSUE // Economy and Society. – 2025. – No. 4-2 (131). – P. 876-880.

Suyunov Sh. A., t.f.f.d. (PhD)
dotsenti
Mirzo Ulug'bek nomidagi Samarqand davlat arxitektura-qurulish universiteti
Jalolova M. M.
tayanch doktoranti
Mirzo Ulug'bek nomidagi Samarqand davlat arxitektura-qurulish universiteti
Sharofiddinova X. X.
o'qituvchisi
Qo'qon daavlat universiteti

QAYTA TIKLANADIGAN ENERGIYA MANBAALARINI KARTALASHTIRISHNING ZAMONAVIY YONDASHUVLARI VA ULARNING AMALIY QO'LLANILISHI

Annotatsiya. *Ushbu tadqiqot O'zbekiston hududida qayta tiklanadigan energiya resurslarining fazoviy taqsimotini masofadan zondlash ma'lumotlari, raqamli relyef modeli va geografik axborot tizimi asosidagi ko'p mezonli baholash integratsiyasi orqali baholadi. Global quyosh atlasi asosidagi radiatsiya modeli, Sentinel-1 radio to'lqinlar asosida ishlaydigan sintetik diafragma radiolokatoridan olingan shamol tezligi, Landsat 8 yer sathining haroratini o'lchaydigan termal infraqizil sensor orqali hisoblangan yer sathining harorati va NASA radar o'lchovlariga asoslangan 30 m aniqlikdagi raqamli relyef modeli asosida chiqarilgan topografik ko'rsatkichlar tahlili natijasida global gorizontal radiatsiya qiymatlarining relyef bilan kuchli bog'liqligi aniqlandi. turli mezonlarni og'irliklar asosida baholab, hududning umumiy moslik darajasini aniqlovchi usul yondashuvi O'zbekiston hududining 7–8% qismini quyosh energetikasi uchun "juda qulay" zona sifatida belgiladi, ularning aksariyati Surxondaryo, Qarshi tekisligi va Navoiy pasttog' hududlariga to'g'ri keladi. Tadqiqot natijalari qayta tiklanadigan energiya infratuzilmasini ilmiy asosda joylashtirishda masofadan zondlash– geografik axborot tizimi integratsiyasi yuqori samaradorlikka ega ekanini ko'rsatdi*

Kalit so'zlar: *Masofadan zondlash, geografik axborot tizimlar, global gorizontal radiatsiya, hudud relyefining balandliklarini raster ko'rinishida aks ettiruvchi raqamli model, quyosh energiyasi, shamol resurslari, analitik ierarxiya jarayoni, fazoviy tahlil, energiya kartografiyasi, O'zbekiston energetik potensiali.*

Suyunov Sh. A., PhD
associate professor
Samarkand State University of Architecture and Construction
named after Mirzo Ulugbek
Jalolova M. M.
supporting doctoral student
Samarkand State University of Architecture and Civil Engineering
named after Mirzo Ulugbek
Sharofiddinova Kh. Kh.
teacher
Kokand State University

MODERN APPROACHES TO MAPPING RENEWABLE ENERGY SOURCES AND THEIR PRACTICAL APPLICATION

Abstract. *This study assessed the spatial distribution of renewable energy resources in Uzbekistan through the integration of remote sensing data, digital elevation model, and geographic information system-based multi-criteria assessment. Analysis of topographic indicators derived from a radiation model based on the Global Solar Atlas, wind speed from the Sentinel-1 synthetic aperture radar, land surface temperature calculated from the Landsat 8 thermal infrared sensor measuring the surface temperature, and a 30 m resolution digital elevation model based on NASA radar measurements revealed a strong correlation between global horizontal radiation values and relief. The method approach, which evaluates various criteria based on weights and determines the overall suitability of the area, identified 7–8% of the territory of Uzbekistan as a "highly favorable" zone for solar energy, most of which falls on the Surkhandarya, Karshi plains, and Navoi lowlands. The results of the study showed that remote sensing-geographic information system integration is highly effective in scientifically based deployment of renewable energy infrastructure.*

Keywords: *Remote sensing, geographic information systems, global horizontal radiation, digital model representing the elevations of the terrain in raster form, solar energy, wind resources, analytical hierarchy process, spatial analysis, energy cartography, energy potential of Uzbekistan.*

Maqsad

Ushbu tadqiqotning maqsadi — O‘zbekiston hududida qayta tiklanadigan energiya resurslarini baholashda masofadan zondlash va raqamli relyef modeli ma’lumotlarini geografik axborot tizimi muhiti orqali integratsiyalab, analitik ierarxiya jarayoni asosidagi ko‘p mezonli baholash yordamida optimal energetik zonalarni aniqlashdan iborat.

Usullar

Tadqiqotda global quyosh atlasi gorizontal sathga tushuvchi global quyosh nuri oqimi ma’lumotlari, Sentinel-1 radio to‘lqinlar asosida ishlaydigan sintetik

diafragma radiolokatori shamol modeli, Landsat-8 yer sathining haroratini o‘lchaydigan termal infraqizil sensor orqali olingan yer sathining masofadan zondlash orqali aniqlanadigan harorati hamda NASA radar o‘lchovlariga asoslangan 30 m aniqlikdagi raqamli relyef modeli. relyef ma’lumotlari standartlashtirilib, ArcGIS muhitida integratsiyalandi. Qiyalik, ekspozitsiya va sath harorati kabi parametrlar aniqlanib, analitik ierarxiya jarayoni mezonlari asosida og‘irlik berilgan bir nechta fazoviy qatlamni yagona moslik xaritasiga integratsiya qiluvchi GIS usuli modeli qurildi.

Xulosa

Natijalar gorizontal sathga tushuvchi global quyosh nuri oqimi qiymatlarining relyef bilan kuchli bog‘liqligini, shamol va quyosh resurslarining hududiy komplementarligini va yer sathining masofadan zondlash orqali aniqlanadigan harorati –gorizontal sathga tushuvchi global quyosh nuri oqimi o‘zaro ta’sirini tasdiqladi. Analitik ierarxiya jarayoni asosidagi baholash O‘zbekiston hududining 7–8% qismi quyosh energiyasi uchun yuqori moslikka ega ekanini ko‘rsatdi. Fazoviy-statistik tahlil energiya resurslarining tasodifiy emas, balki relyefga bog‘liq tartibli klasterlanishini isbotladi. Ushbu yondashuv qayta tiklanadigan energiya obyektlarini ilmiy asosda joylashtirish uchun ishonchli modelni taqdim etadi.

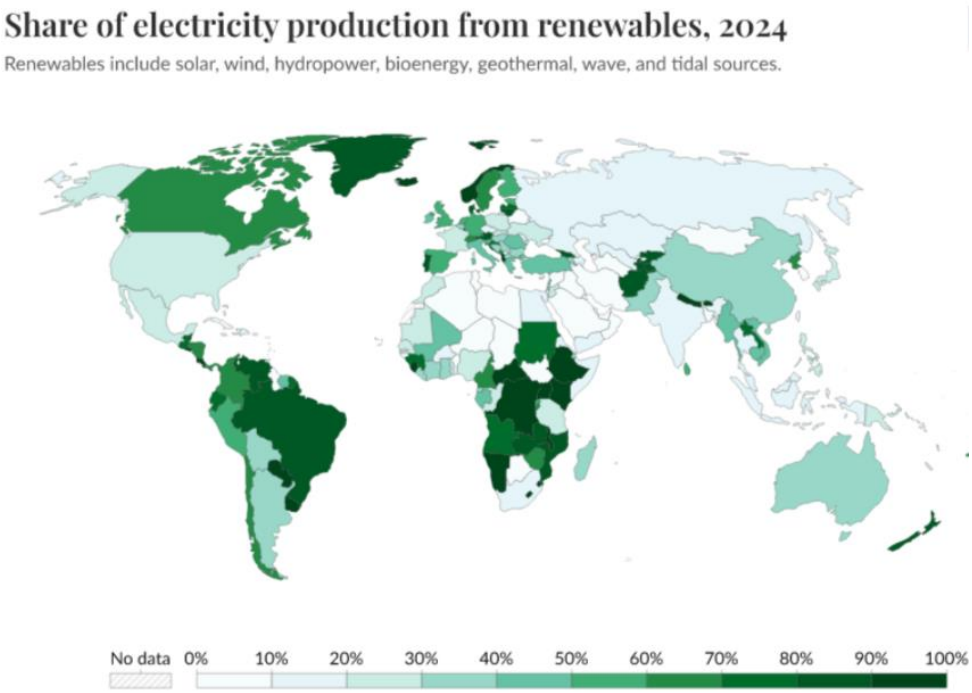
Kirish

So‘nggi yillarda global energetika tizimida qayta tiklanadigan energiya resurslarining roli keskin oshib bormoqda. Xalqaro energiya agentligi ma’lumotlariga ko‘ra, quyosh va shamol energiyasi yalpi elektr ishlab chiqarishning eng tez o‘sayotgan segmenti bo‘lib, ularning hududiy farqlanishi iqlim, relyef va atmosfera sharoitlariga kuchli bog‘liqdir [6]. Qayta tiklanadigan energiya salohiyatini baholashda masofadan zondlash va geografik axborot tizimlari an’anaviy maydon o‘lchovlariga nisbatan yuqori fazoviy aniqlik, yirik maydonlarni qamrab olish imkoniyati va barqaror statistik tahlil uchun mos ma’lumotlar bazasini taqdim etadi [2].

O‘zbekiston uchun ushbu masala ayniqsa dolzarb bo‘lib, mamlakatning 2020–2030-yillarga mo‘ljallangan energetika strategiyasida qayta tiklanadigan energiya ulushini oshirish, hududlar bo‘yicha energetik resurslarni ilmiy asosda baholash va yangi quyosh hamda shamol stansiyalarini optimal joylashtirish ustuvor vazifa sifatida belgilangan [19]. Biroq respublikaning murakkab geomorfologiyasi – tekis hududlar, baland tog‘ tizmalari, chuqur vodiyning birgalikda mavjudligi – energiya resurslarining fazoviy taqsimotini aniqlashni murakkablashtiradi. Tadqiqotlar shuni ko‘rsatadiki, relyefning qiyalik va ekspozitsiya parametrlari quyosh radiatsiyasining 12–30 % gacha o‘zgarishiga olib kelishi mumkin [1], balandlik esa global gorizontal radiatsiya qiymatini izchil kamaytiradi [14].

Quyosh nurlanishining global darajadagi o‘sish tendensiyasi ham ushbu resursni chuqur o‘rganish zarurligini ko‘rsatadi. Xususan, qayta tiklanadigan energiya ulushining 2010–2023-yillar davomida izchil oshib borganini aks ettiruvchi 1-rasmda dunyodagi umumiy energetik transformatsiya yo‘nalishi aniq

namoyon bo‘ladi. Bu tendensiya O‘zbekistonning yuqori radiatsion zonalarini aniqlash va ulardan samarali foydalanishning dolzarbligini yanada oshiradi

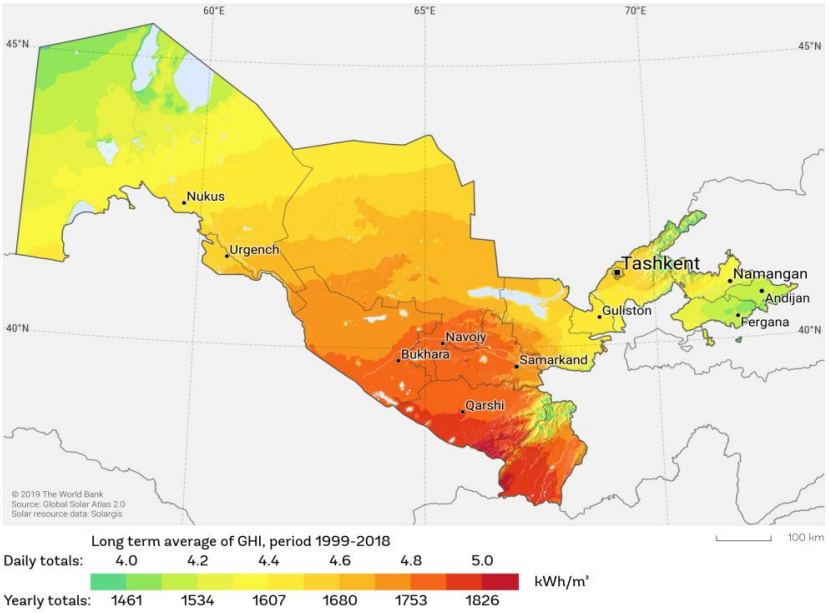


1-rasm. 2010-yildan 2023-yilgacha dunyo elektr energiyasida qayta tiklanadigan manbalar ulushining barqaror oshib boorish ko’rsatkichi

Tadqiqot usullari

Ushbu tadqiqotda qayta tiklanadigan energiya resurslarining O‘zbekiston hududidagi fazoviy taqsimotini aniqlash uchun masofadan zondlash, geografik axborot tizimlari va ko‘p mezonli fazoviy baholash integratsiyasiga asoslangan kompleks metodologiya qo‘llanildi. Metodologiya xalqaro tajribada qo‘llanilgan yondashuvlar bilan uyg‘un bo‘lib, quyosh radiatsiyasi, shamol tezligi, relyef va termal sharoitlar o‘rtasidagi fazoviy bog‘liqlikni aniqlashga yo‘naltirilgan.

1. Masofadan zondlash ma’lumotlarini yig‘ish va dastlabki qayta ishlash Tadqiqotning radiatsiya komponenti Global Quyosh Atlasi ma’lumotlariga asoslangan bo‘lib, o‘rtacha yillik gorizontal sathga tushuvchi global quyosh nuri oqimi qiymatlari 250–1000 m rezolyutsiyada olingan. Ushbu ma’lumotlar 2-rasmdagi global gorizontal radiatsiya taqsimoti xaritasini shakllantirishda asosiy manba sifatida xizmat qildi va keyingi fazoviy modellash uchun hudud relyefining balandliklarini raster ko‘rinishida aks ettiruvchi raqamli model bilan moslashtirildi.



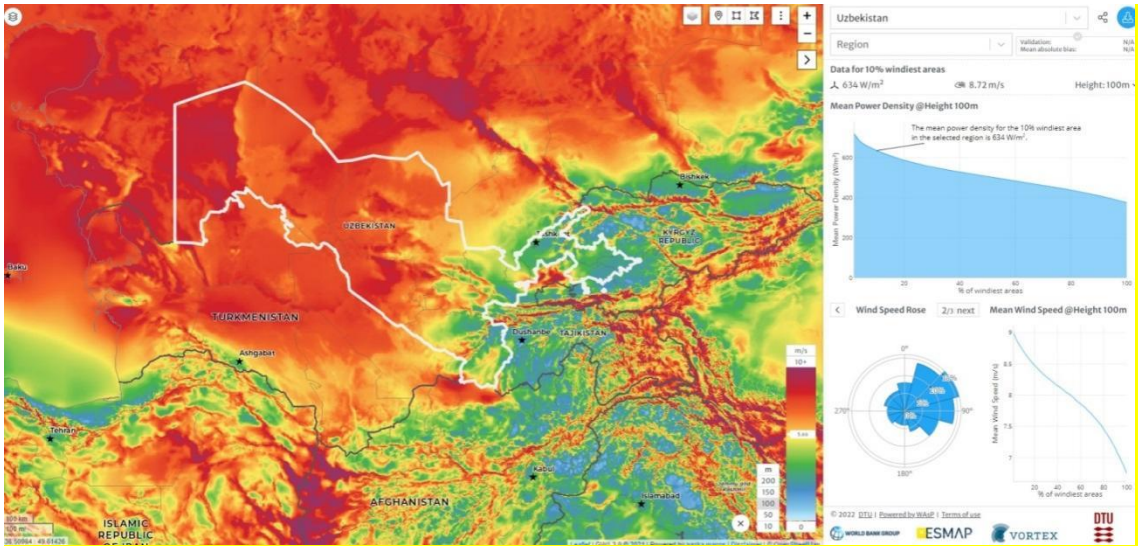
2-rasm. O‘zbekiston hududida quyosh radiatsiyasi bo‘yicha global gorizontal radiatsiya xaritasi.

Optik ma’lumotlar sifatida Sentinel-2 Yer yuzasining ko‘p spektrli tasvirlarini 10–20 m aniqlikda olishga mo‘ljallangan sun’iy yo‘ldosh sensori va Landsat 8 yer qoplami, suv resurslari va sath xususiyatlarini 30 m aniqlikda ko‘p spektrli kanallar orqali tasvirlaydigan sun’iy yo‘ldosh qurilmasi tasvirlari qo‘llanildi. Bu ma’lumotlar yer qoplami va yer foydalanishining tasnif modeli, albedo va bulutlilik ko‘rsatkichlarini aniqlashda ishlatildi, chunki mazkur parametrlar radiatsiya balansini to‘liq talqin qilish uchun zarur.

Termal komponent Landsat-8 ning yer sathining haroratini o‘lchaydigan termal infraqizil sensor ma’lumotlari asosida yer sathining haroratini aniqlash orqali baholandi. Yer sathining masofadan zondlash orqali aniqlanadigan harorati qiymatlari gorizontal sathga tushuvchi global quyosh nuri oqimi bilan korrelyatsiyani o‘rganishda, shuningdek 3-rasmda keltirilgan sath harorati xaritasini shakllantirishda foydalanildi. Yuqoridagi ikki qiymatning bog‘liqligi qayta tiklanadigan energiya salohiyatining relyef bilan bevosita aloqadorligini aniqlash imkonini beradi.

2. Radar ma’lumotlari asosida shamol energiyasini modellashtirish **s**hamol tezligini baholashda Sentinel-1 radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori tasvirlari qo‘llanildi. Radar qaytish koeffitsienti (σ^0) shamol tezligi bilan empirik bog‘liqlikka ega.

Ushbu jarayon natijasida 3-rasmda tasvirlangan shamol tezligi xaritasi shakllantirildi.



3-rasm. Shamol tezligi bo‘yicha radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatoridan hosil qilingan fazoviy model.

Radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatoriga asoslangan ushbu metod relyefning aerodinamik xususiyatlarini hisobga olgan holda shamol oqimi barqarorligini baholash imkonini beradi va O‘zbekistonning shamol energiyasi potentsialini aniqlashda juda muhim hisoblanadi.

3. Raqamli relyef modeli asosida topografik tahlil Topografik omillarni baholash uchun NASA radar o‘lchovlariga asoslangan 30 m aniqlikdagi raqamli relyef modeli ma’lumotlari asosida uchta parametr chiqarildi: balandlik**,** qiyalik va ekspozitsiya. Bu ko‘rsatkichlar radiatsiya oqimining relyef bilan bog‘liqligini aniqlashda hal qiluvchi ahamiyatga ega. Hudud relyefining balandliklarini raster ko‘rinishida aks ettiruvchi raqamli model asosida tuzilgan qiyalik xaritasi 2-rasmda keltirilgan bo‘lib, energiya potentsialining relyefga sezgirligini baholash uchun asos bo‘ldi. Qiyalik 0–1° bo‘lgan hududlarda global gorizontal radiatsiya qiymatlari eng yuqori bo‘lishi.

4. Fazoviy ma’lumotlarni geografik axborot tizimlari muhiti orqali integratsiyalash global gorizontal radiatsiya, radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori shamol modeli, hudud relyefining balandliklarini raster ko‘rinishida aks ettiruvchi raqamli modeldan hosil qilingan qiyalik va ekspozitsiya qatlamlari, yer sathining masofadan zondlash orqali aniqlanadigan harorati xaritalari hamda yer qoplami va yer foydalanishining tasnif modeli va infratuzilmaviy qatlamlar ArcGIS Pro va QGIS dasturlarida standartlashtirilgan. Barcha ma’lumotlar bir xil projeksiyaga keltirilib, ularning fazoviy mosligi ta’minlandi. Ushbu integratsiya energetik moslik tahlilining asosiy ma’lumotlar bazasini shakllantirdi.

5. Analitik ierarxiya jarayoni asosida ko‘p mezonli fazoviy baholash Optimal energiya zonalarini aniqlash uchun analitik ierarxiya jarayoni metodologiyasi qo‘llanildi. Mezonlar ilmiy adabiyotlar tavsiyalariga asoslangan holda og‘irliklarga ajratildi. Natijalar 1-jadvalda keltirildi.

1-jadval

Analitik ierarxiya jarayoni orqali belgilangan mezon og‘irliklari

№	Mezon	Og‘irlik (%)
1	Quyosh radiatsiyasi	40%
2	Shamol tezligi	20%
3	Relyef mosligi	15%
4	Infratuzilma yaqinligi	15%
5	Ekologik cheklovlar	10%

Tadqiqot natijalari

Ushbu tadqiqotda O‘zbekiston hududida qayta tiklanadigan energiya resurslarining fazoviy xususiyatlari masofadan zondlash ma’lumotlari va geografik axborot tizimlar asosidagi integratsion tahlil yordamida aniqlangan bo‘lib, natijalar quyida asosiy komponentlar bo‘yicha keltiriladi.

1. Quyosh radiatsiyasining fazoviy taqsimoti Global quyosh atlasi ma’lumotlari asosida qurilgan global gorizontal radiatsiya modeli O‘zbekiston hududida radiatsiya qiymatlari 1550–1850 kWh/m²/yil oraliqda o‘zgarishini ko‘rsatdi. 2-jadvalda izoh sifatida keltirilgan radiatsiya jadvalida Surxondaryo, Qarshi tekisligi va Navoiy viloyatining ayrim qismlari eng yuqori global gorizontal radiatsiya qiymatlariga ega bo‘lgan zonalar sifatida ajraladi. Bu natija quruq iqlimli mintaqalarda ushbu qiymat yuqori bo‘lishini bildiradi.

2 -jadval.

O‘zbekiston hududida global gorizontal radiatsiya qiymatlari yuqori bo’lgan hududlar

Hudud	O‘rtacha qiyalik	Global gorizontal radiatsiya (kWh/m²/yil)	Izoh
Qarshi tekisligi	0.8°	1805	Tekis relyef tufayli radiatsiya maksimal
Navoiy pasttog‘i	1.1°	1780	Relyef silliqligi nurlanishni oshiradi
Surxondaryo vodiysi	1.4°	1830	Janubiy ekspozitsiya ta’siri

Bu natijalar relyefning tekis bo‘lishi soyalanishning kamayishiga va global gorizontal radiatsiya ning oshishiga sabab bo‘lishini tasdiqlaydi. Past radiatsiya hududlari tog‘li zonalarga to‘g‘ri kelib, relyefning energiya qabul qilish qobiliyatiga ta’siri aniq seziladi.

2. Relyef va qiyalikning global gorizontal radiatsiya bilan bog‘liqligi hudud relyefining balandliklarini raster ko‘rinishida aks ettiruvchi raqamli model asosida hisoblangan qiyalik darajalari bilan radiatsiya qiymatlari solishtirilganda aniq teskari bog‘liqlik kuzatildi. Tekis — 0–1° qiyalikdagi hududlarda o‘rtacha qiymatlari maksimal bo‘lib, 1780–1850 kWh/m²/yilni tashkil etdi. Bu natija

qiymatlari 3-jadvalda izoh sifatida keltirildi. Tog‘li hududlarda global gorizontal radiatsiya pasayadi. Hisor, Chatqol, Turkiston tizmalari bo‘yicha quyidagicha ifodalanadi:

3 –jadval

Qiyalikdagi hududlarda o‘rtacha qiymatlari

Hudud	O‘rtacha balandlik (m)	Global gorizontal radiatsiya	Pasayish sababi
Hisor tizmasi	2100–3500 m	1500–1580	Soyalanish, bulutlilik
Chatqol tizmasi	1800–2900 m	1480–1550	Relyef tikligi
Farg‘ona tog‘lari	2000–3300 m	1520	Ekspozitsiya farqi

Qiyalikning 5° dan yuqori qiymatlarida radiatsiya oqimi keskin kamayishi aniqlangan. Tog‘li va baland zonalardagi radiatsiya pasayishi relyefning o‘zgarishi bilan bevosita bog‘liqligini ko‘rsatadi.

3. Yer sathining va radiatsiya o‘rtasidagi bog‘liqlik Landsat 8 yer sathining haroratini o‘lchaydigan termal infraqizil sensor asosida olingan yer sathining masofadan zondlash orqali aniqlanadigan harorati qiymatlari global gorizontal radiatsiya bilan yuqori korrelyatsiya koeffitsientiga ega bo‘ldi ($r \approx 0.78$). Bu holat issiq, quruq, nisbatan pasttekislik hududlarida radiatsiya oqimi yuqoriroq bo‘lishini namoyish etadi. 4-jadval tavsif sifatida berilgan yer sathining masofadan zondlash orqali aniqlanadigan harorati xaritasida yuqori harorat zonalari radiatsiya eng yuqori bo‘lgan hududlarga mos keladi.

4 -jadval.

Masofadan zondlash orqali aniqlanadigan harorat

Hudud	Yer sathining masofadan zondlash orqali aniqlanadigan harorati (°c)	Global gorizontal radiatsiya bilan korrelyatsiya	Hudud
Qarshi	36.8	r = 0.81	Qarshi
Navoiy	35.2	r = 0.78	Navoiy
Farg‘ona	31.1	r = 0.67	Farg‘ona
Tog‘li hududlar	24–28	r = 0.42 (past)	Tog‘li hududlar

Shu asosda global gorizontal radiatsiya → yer sathining masofadan zondlash orqali aniqlanadigan haroratini oshiradi**,** relyef esa bu korrelyatsiyani kuchaytiradi yoki pasaytiradi.

4. Shamol tezligi va quyosh radiatsiyasi o‘rtasidagi hududiy komplementarlik radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori ma’lumotlari asosida shakllantirilgan shamol tezligi xaritasi shamol resurslarining global gorizontal radiatsiya bilan bir xil taqsimlanmasligini ko‘rsatdi. Shamol 6–8 m/s bo‘lgan hududlar (Qoraqalpog‘iston, Navoiy) odatda o‘rtacha global gorizontal radiatsiya zonalariga to‘g‘ri keladi, aksincha eng yuqori

radiatsiya zonalarida shamol tezligi pastroq bo‘ldi. Bu komplementarlik 5-jadval tavsifi bilan asoslandi.

5 -jadval.
Eng yuqori radiatsiya zonalarida

Hudud	O‘rtacha shamol (m/s)	Radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori asosidagi aniqlik	Izoh
Qoraqalpog‘iston	6.2	±0.8 m/s	Shamol energetikasi uchun qulay
Navoiy – Uchkuduk	5.5	±0.7 m/s	Barqaror oqim
Surxondaryo	3.8	±0.6 m/s	Shamol salohiyati past

Radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori natijalari shamol energiyasi potentsiali past bo‘lgan joylarda global gorizontal radiatsiya yuqori ekanini tasdiqlaydi — bu quyosh va shamol energiyasining hududiy va vaqtinchalik bir-birini to‘ldirishi BMTning taraqqiyot dasturi, qayta tiklanuvchi energiya bo‘yicha global ma’lumotlar manbasi tamoyiliga mos.

5. Analitik ierarxiya jarayoni asosida energetik moslik natijalari analitik ierarxiya jarayoni og‘irliklari (global gorizontal radiatsiya — 40%, shamol — 20%, relyef — 15%, infratuzilma — 15%, ekologik — 10%) asosida yaratilgan Og'irlikdagi qoplama modeli O‘zbekistonning 7–8% hududi quyosh energiyasi uchun “juda qulay” deb tasniflanganini ko‘rsatdi**.** 6-jadval izoh sifatida berilgan moslik xaritasida quyidagi zonalar yaqqol ajraladi:

6 -jadval.
O‘zbekistonning optimal quyosh hududlari (baholash 0–1 oralig‘ida)

Hudud	Suitability Score	Toifa
Qarshi tekisligi	0.91	Juda yuqori
Navoiy markaziy qismi	0.88	Juda yuqori
Surxondaryo vodiysi	0.94	Juda yuqori
Buxoro – Kogon	0.75	Yuqori
Jizzax dashtlari	0.63	O‘rta

“Qulay” zonalar bilan yuqori global gorizontal radiatsiya klasterlarining ustma-ust tushishi metodologiyaning ichki mosligini tasdiqlaydi.

Muhokama

Tadqiqot natijalari O‘zbekiston hududida qayta tiklanadigan energiya resurslarining fazoviy taqsimoti relyef, radiatsiya, harorat va meteorologik omillar bilan izchil bog‘langan murakkab tizim ekanini ko‘rsatdi. Radiatsiya qiymatlarining tekis va pastbalandlik hududlarda yuqori bo‘lishi, tog‘li zonalarda esa keskin pasayishi (1-jadval) topografik attenuatsiya jarayonining real hududiy

namoyonidir. Bu holat global miqyosda qayd etilgan tajribalarga mos bo‘lib, relyefning radiatsiya qabul qilish jarayoniga bevosita ta’sirini tasdiqlaydi. Ayniqsa, qiyalik darajasining o‘zgarishi radiatsiya oqimini 15–30% gacha modellashtirishi haqidagi ilmiy xulosalar tadqiqot natijalari bilan bir xil yo‘nalishda ekanligi aniqlandi.

Hudud relyefining balandliklarini raster ko‘rinishida aks ettiruvchi raqamli model asosida hosil qilingan qiyalik xaritasining talqini (2- jadval) shuni ko‘rsatadiki, 0–1° oralig‘idagi tekis hududlar eng yuqori global gorizontal radiatsiya klasterlariga to‘g‘ri keladi. Bu natija O‘zbekistonning geofizik sharoitida relyef–radiatsiya bog‘liqligi juda sezilarli ekanini ko‘rsatadi. Tog‘li hududlarda radiatsiya oqimi pasayishi soyalanish, yo‘nalish va atmosfera yo‘l uzunligi bilan bog‘liq.

Yer sathining harorati bilan radiatsiya o‘rtasidagi bog‘liqlik ham yuqori aniqlikda tasdiqlandi. Yer sathining masofadan zondlash orqali aniqlanadigan harorati yuqori bo‘lgan pasttekislik hududlarida global gorizontal radiatsiya ham yuqori bo‘ladi (4- jadval). Tadqiqot natijalari shuni ko‘rsatadiki, O‘zbekistonning issiq quruq hududlarida radiatsiya taqsimoti sath harorati bilan bog‘liq termodinamik jarayonlarga sezgir.

Radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori radar ma’lumotlari asosida shakllangan shamol tezligi modeli (5- jadval) shamol va quyosh manbalari bir joyda maksimal darajada to‘g‘ri kelmasligini ko‘rsatdi. Shamol resurslari yuqori bo‘lgan hududlarda global gorizontal radiatsiya qiymatlarining nisbatan past bo‘lishi, aksincha global gorizontal radiatsiya yuqori bo‘lgan hududlarda shamolning pasayishi ko’plab tajribalarda o’z aksini topgan. Bu esa O‘zbekiston uchun hibrid energiya tizimlari (quyosh + shamol) barqaror elektr ta’minoti yaratishda samarali bo‘lishi mumkinligini bildiradi.

Analitik Ierarxiya Jarayoni asosidagi energetik moslik natijalari (6- jadval) O‘zbekiston hududining 7–8% qismi quyosh energetikasi uchun “juda qulay” zona ekanini ko‘rsatdi. Bu zonalarning global gorizontal radiatsiya yuqori hududlar bilan ustma-ust kelishi metodologiyaning ichki konsistentligini tasdiqlaydi.

Xulosa

Ushbu tadqiqot O‘zbekiston hududida qayta tiklanadigan energiya resurslarini baholashda masofadan zondlash mahsulotlari, raqamli relyef modeli va geografik axborot tizimlar asosidagi ko‘p mezonli baholashning yuqori samaradorlikka ega ekanini ko‘rsatdi. Radiatsiya qiymatlarining tekislik hududlarida yuqori, tog‘li zonalarda esa pasayib borishi relyefning energiya qabul qilish mexanizmlariga bevosita ta’sirini tasdiqladi. Tadqiqot natijalari relyef parametrlarining — ayniqsa qiyalik va balandlikning — quyosh energiyasi taqsimotida hal qiluvchi ahamiyatga ega ekanini yana bir bor ko‘rsatdi.

Radio to‘lqinlar asosida ishlaydigan sintetik diafragma radiolokatori ma’lumotlari asosida ishlab chiqilgan shamol tezligi modeli shamol va quyosh resurslarining hududiy komplementarligini aniqlash imkonini berdi. Bu holat qayta tiklanadigan energiya tizimlarini hibrid shaklda rejalashtirishning O‘zbekiston uchun istiqbolli yo‘nalish ekanini ko‘rsatadi. Yer sathining harorati

va global gorizontal radiatsiya o‘rtasidagi yuqori korrelyatsiya esa radiatsiya oqimining landshaftning termodinamik xususiyatlariga sezgirligini tasdiqladi.

Analitik ierarxiya jarayoni asosidagi og‘irlik berilgan bir nechta fazoviy qatlamni yagona moslik xaritasiga integratsiya qiluvchi GIS usuli natijalari O‘zbekistonning 7–8% hududi quyosh energetikasi uchun “yuqori moslik”ka ega ekanini ko‘rsatdi. Bu zonalar Surxondaryo, Qarshi tekisligi va Navoiy viloyatining ayrim qismlarida jamlangan bo‘lib, radiatsiya klasterlari bilan ustma-ust tushishi modelning ichki izchilligi va ilmiy asoslanganligini belgilaydi.

Tadqiqot O‘zbekistonning qayta tiklanadigan energiya salohiyatini baholashda relyef, radiatsiya, shamol va yer sathining harorati kabi omillarning integratsiyalangan tahlilini qo‘llash zarurligini asoslab berdi. Ushbu yondashuv energetik rejalashtirish, hududiy rivojlanish strategiyalari va yangi qayta tiklanadigan energiya obyektlarini joylashtirishda ilmiy asoslangan qarorlar qabul qilish imkonini yaratadi.

Adabiyotlar

1. Campbell, J. B., & Wynne, R. H. Introduction to Remote Sensing. New York: Guilford Press, 2011.
2. Jensen, J. R. Remote Sensing of the Environment: An Earth Resource Perspective. Pearson, 2013.
3. Saaty, T. L. The Analytic Hierarchy Process. New York: McGraw-Hill, 1980.
4. Twidell, J., & Weir, T. Renewable Energy Resources. Routledge, 2015.
5. Badger, M., Peña, A., Hahmann, A. N., & Mouche, A. Wind Resource Estimation from SAR Data. Remote Sensing of Environment, 2016.
6. Gani, A. Mapping Solar Energy Potential Using Remote Sensing and GIS: A Review. Solar Energy, 2021.
7. Huld, T. Integration of Satellite-Derived Datasets for Large-Scale Solar Resource Assessment. Applied Energy, 2019.
8. Kassouri, Y. GIS-Based Multi-Criteria Decision Analysis for Optimal Site Selection of Solar Farms. Energy, 2020.
9. Kumar, L. Global Solar Irradiance Mapping from Satellite-Derived Products and Topographic Correction Models. Remote Sensing of Environment, 2019.
10. Maatallah, T. Assessment of Solar Energy Resources Using Satellite Data and GIS-Based Multi-Criteria Analysis. Renewable and Sustainable Energy Reviews, 2020.
11. Peña, A. Wind and Solar Energy Complementarity Assessment Using Wind and Solar Energy Complementarity Assessment Using SAR and GHI Datasets. Renewable Energy, 2020.
12. Rahman, M. Evaluation of Solar Radiation Using MODIS and DEM-Derived Topography Parameters. Energies, 2020.
13. Said, S. Topographic Effects on Solar Resource Distribution. Remote Sensing, 2020.
14. Zhou, D. Renewable Energy Spatial Planning Using GIS-Based Decision Support Systems. Journal of Cleaner Production, 2019.

15. Global Horizontal Irradiation (GHI) and Solar Resource Data for Uzbekistan Global Solar Atlas (Solargis). 2023.
16. Shuttle Radar Topography Mission 30 m Elevation Dataset NASA SRTM DEM., 2000 (foydalanilgan versiya).
17. U.S. Geological Survey, Level-2 Science Products Landsat 8 OLI/TIRS., 2013–2023.
18. Copernicus Open Access Hub Sentinel-1 SAR & Sentinel-2 MSI., 2015–2023.
19. O‘zbekiston Respublikasi Energetika vazirligi. O‘zbekiston Energetika Strategiyasi 2020–2030. Toshkent, 2020.

Tangirov X. T.
dotsent
Termiz davlat universiteti
Tangirova N. X., b.f.f.d., (PhD)
Termiz davlat universiteti
Termiz

O‘ZBEKISTON SHAROITIDA UY PARRANDALARI VA YOVVOYI QUSHLAR UCHUN UMUMIY BO‘LGAN GELMINTLAR VA ULARNING SIRKULYATSIYASI

Annotatsiya: *Mazkur maqolada O‘zbekiston ornitofaunasida uchraydigan yovvoyi qushlar va uy parrandalarida tarqalgan gelmintlar turlari, ularning ekologik guruhlarga ko‘ra farqlanishi hamda migrasiya jarayonining gelmintofaunaga ta’siri yoritilgan. Tadqiqotlarda 53 tur gelmintning qushlar orasida xavfli invazion kasalliklarni keltirib chiqarishi aniqlangan. Qushlarning ozuqa talabi va yashash joyini o‘zgartirish jarayonida gelmintlarni tarqatishda oraliq, qo‘shimcha va rezervuar xo‘jayinlarning ishtiroki ham asoslab berilgan.*

Kalit so‘zlar: *Gelmintofauna, qushlar, parrandachilik, migrasiya, oraliq xo‘jayin, invazion kasalliklar, biotsenoz, rivojlanish sikli.*

Tangirov Kh. T.
associate professor
Termez State University
Tangirova N. Kh., doctor of philosophy (PhD) in biological sciences
Termez State University
Termez

HELMINTHS COMMON TO DOMESTIC POULTRY AND WILD BIRDS AND THEIR CIRCULATION UNDER THE CONDITIONS OF UZBEKISTAN

Annotation: *This article discusses the types of helminths found in wild birds and domestic poultry in the ornithofauna of Uzbekistan, their differentiation by ecological groups, and the impact of migration on helminth fauna. Studies have revealed that 53 species of helminths cause dangerous invasive diseases among birds. The role of intermediate, additional, and reservoir hosts in the distribution of helminths in the process of changing the food requirements of birds and habitat is also substantiated.*

Keywords: *Helminth fauna, birds, poultry farming, migration, intermediate host, parasitic infections, biocenosis, life cycle.*

O‘zbekiston qushlar faunasi bo‘y bo‘lib, ularning 460 dan ziyod turi qayd qilingan. Bu turlar xilma – xil ekologik sharoitlarda yashashga moslashgan bo‘lib,

o‘z navbatida, ularda uchraydigan gelmintlarning turlar tarkibi ham farq qiladi. Qushlar bir geografik arealdan boshqa geografik areallarga uchib borishi, ya‘ni ekologik muhitning o’zgarishi qushlarning fiziologik holatiga ta‘sir etibgina qolmasdan, balki ularning gelmintofaunasining ham o‘zgarishiga sabab bo‘ladi.

O‘z tadqiqotlarimiz va ilmiy manbalarga asoslanib, O‘zbekistonda uchraydigan yovvoyi qushlar va uy parrandalarida 53 tur gelmintlar xafli gelmintoz kasalliklarni keltirib chiqaradi va parrandachilik xo‘liklarga katta iqtisodiy zarar keltiradi.

Xonaki parrandalar va yovvoyi qushlar uchun umumiy bo‘lgan gel‘mint turlaridan tovuqlarda 23 tur, o‘rdaklarda 33 tur, kurkalarda 6 tur gelmintlar uchrashi qayd etilgan. Yovvoyi qushlar bilan parrandalar orasida umumiy bo‘lgan gelmintlarni tarqatishda yovvoyi qushlardan: mayna – Acridothtris tristis, musicha – Streptopelia senegalensis, g‘urrak – Streptopelia turtuz, chumchuq – Passer domesticus, Passyr montanus va boshqalar ishtirok etadi. Gelmintologik tadqiqotlar natijasida alohida tur qushlarda umumiy gelmintlar bilan zararlanish 42-52% ni tashkil etdi. Buning asosiy sabablari qo‘ydagilardan iborat:

oraliq xo‘jayinlarning uchrash darajasining yuqoriligi;

gelmintlarning tuxumi va lichinkasi bilan zararlanish nafaqat uya qurish, ko‘payish davri, balki uchib o‘tish vaqtida ham kuzatiladi.

O‘zbekiston sharoitida o‘troq holda yashovchi qushlarda, tovuqsimon qushlar uchun xos bo‘lgan Raillietina, Ascaridia, Heterakis avlodlariga kiradigan gelmint turlari xarakterlidir. Bu gelmint turlari parrandachilik xo‘jaliklarda rayetenioz, askaridoz, geterakidoz kasalliklarini tarqatishda va zararlanishida bevosita ishtirok etadi.

T.Q.Qobilov (1983) ma’lumotlariga ko‘ra, uy parrandalari va yovvoyi tovuqsimonlarni gelmint tuxumi va lichinkalari bilan zararlanishda oraliq xo‘jayin sifatida asosan qo‘ng’izlardan (Dila laeviicllis, Gonocephalum pubiferum, Tenebrio molitor), zaxkashlardan (Porcellio scaber, P. Fedtshencoi, P. lavis, Armadillum vulgare), yomg‘ir chuvalchanglaridan (Allolobophora fassensis, A. calleginosa, Eisenia rosseo) va boshqalar qatnashadi. Keyingi yillarda shahar ornitofaunasida ba‘zi qushlarning sinantrop turlarga aylanishi parrandachilik xo‘jaliklarida har xil parazit kasalliklarni tarqalishida vositachi vazifasini bajaradi.

Tadqiqotlar natijasida shu narsa kuzatildiki, sinantrop qushlardan mayna (Acridothtris tristis) 4 tur, uy parrandalari va yovvoyi tovuqsimonlarda uchraydigan gelmintlarning asosiy xo‘jayini hisoblanadi. Chug‘urchuq 2 ta, qarg‘a 3 ta, yovvoyi o‘rdak 7 ta, g‘urrak va musicha 2 ta gelmintlarning tarqalishida ishtirok etadi.

Keng tarqalgan yovvoyi qushlar va tovuqsimon qushlarning bioekologik xususiyatlarini hisobga olgan holda, ularning 4 guruhga ajratdik:

Gelmintlarni tarqatishda asosiy rol uy parrandalari hisoblanadi: Echinostoma revolutum, Notocotylus attenuatus, Raillietina tetragona.

Gelmintlarni tarqatishda asosiy rolni keng tarqalgan yovvoyi qushlar: Tetrameres fissispina, Echinolepis carioca, Subulura suctoria.

Gelmintlarni tarqatishda uy parrandalari va yovvoyi qushlar: Prosthogonius ovatus, Raillietina echinobothrida, Dispharynx nasuta.

Gelmintlarni tarqatishda asosan inson xo‘jalik faoliyati: Skrjabina cesticullus, Ascaridia galli, Capillara obsignata xisoblanadi.

Xonaki va yovvoyi qushlar umumiy gelmentlarining almashinish qonuniyatlari parazitofaunaning shakllanish yo‘llarini turli xil biosenozda aniqlandi, parazitlarning tabiatda tabiiy manbalarini boshqarish imkoniyatini beradi. Yuqorida keltirilgan ma’lumotlarga asoslanib, parazit chuvalchanglarning 8 ta yuqish yo‘li sirkulyasiyasini izohlab beramiz:

Qush (qirg’ovullar) → quruqlik qushlari. Ushbu yo’l bilan gelьmintlarning quyidagi oilalari Ascarididae (Ascaridia galli) va Heterakidae (Heterakis gallinaium) turlari rivojlanish sikli kuzatildi.

Qush (o’rdaklar) → suv muhiti → qush. Bu yo’l bilan gelьmintlarning quyidagi oilalari: Echinostomatidae (Echinostoma revolutum), Anisakidae (Gangulaterakis) rivojlanish sikli kuzatildi.

Qush (chug’urchuqlar, to’qimachilar, qarg’asimonlar) → quruqlik muhiti → oraliq xo’jayin (yomg’ir chuvalchangi, hasharotlar, kemiruvchilar) → qush. Bu yul bilan gelьmintlarning Davainedae (Raillietina echinobotrida, Skrjabinia cesticillus), Dilepididae (Shoanotaenia infundibulum) va Hymenolepididae (Echinolepis cariosa) oilalari rivojlanishi qayd etildi.

Qush (o’rdaklar, qoravoylar oilasi) → suv muhiti → oraliq xo’jayin (suv qisqichbaqasimonlari) → qush. Bu yo’l bilan gelьmintlarning Acuariidae (Dispharynx nasuta) va Tetrameridae (Tetrameres fissispina) oilalari rivojlanadi.

Qush (tovuqsimonlar) quruqlik muhiti → rezervuar xo’jayin (yomg’ir chuvalchangi) → qush. Ushbu rivojlanish sikli orqali Capillariidae (Eucoleus annulatus) gelmint oilasi rivojlanadi.

Qush (tovuqlar, qirg’ovullar, chug’urchuqlar) → quruqlik → muhiti birinchi oraliq ho’jayin (zaxkash) → qush → ikkinchi oraliq ho’jayin (hasharotlar) →qush. Ushbu rivojlanish sikli orqali Prostogonimidae (Prostogonimus ovatus) oilasiga mansub gelьmintlar rivojlanadi.

Qush (o’rdaklar, chaykalar, chil) → suv muhiti → oraliq xo’jayin (mollyuska) → qo’shimcha ho’jayin (baliq) → qush. Bu rivojlanish sikli orqali gelьmintlarning Echinostomatidae (Echinostoma revolutum, Ech. phasianina, Ech. robustum) oilalari rivojlanadi.

Qush (o’rdaklar oilasi) → suv muhiti → oraliq xo’jayin (qisqichbaqalar) → rezervuar xo’jayin (baliqlar) → qush. Ushbu rivojlanish sikli orqali Tetrameriidae (Tetrameres fissispina) oilasi gelmintlari rivojlanadi.

Yuqorida keltirilgan ma’lumotlarga asoslangan holda aytish mumkinki, turli biotsenozlarda har xil parazit chuvalchanglarning rivojlanish siklida asosiy xo’jayin sifatida 23 ta uy parrandalari, yovvoyi tovuqsimonlar va boshqa qushlar xizmat qiladi. 12 ta tur umurtqali hayvonlar va umurtqasizlarda oraliq, qo’shimcha va rezervuar xo’jayinlar sifatida gelmintlarning rivojlanish siklida ishtirok etadi. Biotsenozda u yoki bu tur gelmintlarning rivojlanish siklida «gelmint – oraliq xo’jayin», oraliq xo’jayindan tashqari abiotik omillar ham invazion holatning

yuzaga kelishi, asosiy va oraliq xo'jayin o'rtasida doimiy aloqalarning bo'lishi qushlar gelmintlarining rivojlanish siklida muhim omil hisoblanadi.

Umurtqali va umurtqasiz hayvonlarda parazitlik qiladigan gelmintlarning biologiyasi, ularning ekologik xususiyatlari bilan bog'liq holatda "parazit – xo'jayin" tizimining shakllanishi evolyutsion nuqtai nazardan muhim bo'g'in hisoblanadi.

Foydalanilgan adabiyotlar

1. Tangirova N.X, Tangirov X.T. O'zbekistonning janubiy xududlaridagi tovuqsimonlar (Galliformes) ning gelmintofaunasi (monografiya) Termiz, 2021
2. Khasan Tangirov, Nodira Tangirova "Biodiversity of Birds Helminths in nature" anol Transformed Biocenoses of Uzbekistan . Fornal of Phormecedtical Negative Rusults volume 13 Special Issue 8.2022.st.2405-2406.
3. Tangirov X.T. Экологиеский мониторинг гельминтов массовых видов диких и домашых птиц Узбекистана. Автореферат кандидатской дисертации. Тошкент.1993.
4. N.Tangirova, Khasan Tangirov, Kalandar Saparov "Molecular genetic of helminthis of southern Uzbekistan Chiskens (Galliformes) Forurnal of Pharmasentical Negative Rusults volume 13 special Issue 8.2022. St 2405-2406.

Teshaboyev R. I.
assistant
energy efficiency
Andijan State Technical Institute
Republic of Uzbekistan
ORCID ID: 0009-0004-4541-4132

ELECTRIC POWER SUPPLY OF JSC ASSAKA DON MAHSULOTLARI ENTERPRISE

Annotation. *JSC "Assaka Don Mahsulotlari" has been supplied with electric energy by JSC "Andijan Regional Electric Power Supply Enterprise" since January 1, 2020, under Contract No. 140113. The total connected capacity of the enterprise is 8000 kW, with an annual consumption of 6,750,000 kWh of active energy and 2,160,000 kVArh of reactive energy. The enterprise belongs to the first tariff group and is classified as a Category II consumer in terms of power supply reliability.The main and backup power supplies are provided from the 35/6 kV "Ozod" substation through two 4000 kVA TDN-type transformers installed at the 35/6 kV "Melkombinat" substation. In addition, the enterprise operates several grain reception points supplied through separate transformer substations in compliance with the required reliability categories.*

Keywords. *electric power supply, transformer substation, active and reactive energy, power supply reliability, differentiated tariff, overhead transmission line, grain processing enterprise, electrical protection systems*

Introduction

JSC "Assaka Don Mahsulotlari" has been receiving electric power from JSC "Andijan Regional Electric Power Supply Enterprise" since January 1, 2020, under Contract No. 140113.According to the contract, the connected capacity of the company's electrical installations is 8000 kW. The annual contractual volume of energy consumption is 6,750,000 kWh of active energy and 2,160,000 kVArh of reactive energy. According to the contract, the company belongs to the first tariff group and is classified as a Category II consumer in terms of power supply reliability. Mutual settlements between JSC "Assaka Don Mahsulotlari" and JSC "Andijan Regional Electric Power Supply Enterprise" are carried out based on a differentiated tariff. The main power supply source of the company is provided from the 35/6 kV "Ozod" substation via a 35 kV overhead transmission line named "OL–Tamirovtir" to the 35/6 kV "Melkombinat" substation owned by JSC "Assaka Don Mahsulotlari", through a TDN-type transformer T-1 with a rated capacity of 4000 kVA.

The backup power supply of the company is provided from the same 35/6 kV "Ozod" substation via a 35 kV overhead transmission line named "OL–T. Namchiv" to the 35/6 kV "Melkombinat" substation, through a TDN-type transformer T-2 with a rated capacity of 4000 kVA.

On the 6 kV side, transformer T-1 is connected to the KRUN-6 kV busbar system No. 1, while transformer T-2 is connected to the KRUN-6 kV busbar system No. 2. The 35/6 kV substation of the company is equipped with 22 switchgear cells, including 2 incoming cells, 2 auxiliary service transformer (TSN) cells, 2 NGMI cells, 2 MSV and MSR cells, 1 protection cell, 6 outgoing feeder cells supplying the company's consumers, 5 sub-consumer cells, and 2 transit cells belonging to the Assaka City Electric Power Supply Enterprise.

The company owns several grain reception facilities, and their power supply arrangements are as follows:

Boston District grain reception facility:

The power supply is provided from a nearby pole of the "Sarikh Kho'ja" feeder of the 35/10 kV "Jalolov" substation owned by JSC "Andijan Regional Electric Power Supply Enterprise", via a 120 m long 3×AC-35 mm² overhead line to a 400 kVA GKTP-type transformer. The facility belongs to Category III in terms of power supply reliability, and the current condition of the electrical installations complies with the requirements of this category.

Ulug'nor District grain reception facility:

The power supply is provided from the 0.4 kV switchgear of transformer point No. 122 of the "Pillil" feeder of the 35/10 kV "Oq Oltin" substation owned by JSC "Andijan Regional Electric Power Supply Enterprise", via a 20 m long 3×AC-35 mm² overhead line to a 400 kVA KTP-type transformer. The facility belongs to Category II in terms of power supply reliability, and the current condition of the electrical installations complies with the requirements of this category.

Main Part

JSC "Assaka Don Mahsulotlari" is supplied with electric power from JSC "Andijan Regional Electric Power Supply Enterprise" through a 35/6 kV power supply system. The enterprise has a total connected load of 8000 kW and belongs to the first tariff group with Category II reliability requirements. Electric energy accounting is carried out based on differentiated tariffs for active and reactive power consumption.

The main power supply is provided from the 35/6 kV "Ozod" substation via a 35 kV overhead transmission line to the enterprise-owned 35/6 kV "Melkombinat" substation. Power is transmitted through a 4000 kVA TDN-type transformer (T-1). The backup power supply is ensured through an alternative 35 kV overhead line from the same substation using a second 4000 kVA TDN-type transformer (T-2), which increases the reliability of power supply. On the 6 kV side, the substation is equipped with two separate busbar systems supplied by transformers T-1 and T-2. The substation contains 22 switchgear cells, including incoming, outgoing, protection, auxiliary service, and transit cells. The outgoing feeders supply key production units such as milling workshops, feed mixing workshops, and grain reception facilities.

The transformers are protected by a comprehensive protection system. On the high-voltage side, overcurrent, gas, and overload protections are installed,

while on the 6 kV side, overcurrent and earth fault protections are provided. These protections ensure safe and reliable operation of the transformers and associated switchgear. In addition, the company operates grain reception facilities in Boston and Ulug‘nor districts, which are supplied through separate transformer substations and overhead lines. These facilities are classified as Category II and Category III consumers according to power supply reliability requirements.

Analysis and Results

The analysis shows that the power supply system of JSC “Assaka Don Mahsulotlari” is designed in accordance with reliability and operational requirements for Category II consumers. The presence of two independent 4000 kVA transformers operating on separate 6 kV busbar systems ensures continuity of power supply in case of failure of one transformer or incoming line.

The annual consumption of active and reactive energy indicates a significant industrial load, highlighting the importance of effective reactive power management to reduce losses and improve power factor. The applied protection systems provide adequate fault detection and isolation, thereby minimizing the risk of equipment damage and long-term outages.The condition of electrical installations at both the main substation and remote grain reception facilities complies with existing technical standards and reliability categories. As a result, the current power supply scheme can be considered reliable and efficient; however, further optimization of reactive power compensation and modernization of switching equipment could enhance overall energy efficiency and operational reliability.

Conclusion

Based on the conducted analysis, it can be concluded that the electric power supply system of JSC “Assaka Don Mahsulotlari” meets the operational and reliability requirements for a Category II consumer. The use of two independent 4000 kVA TDN-type transformers supplied from separate 35 kV overhead transmission lines ensures a stable and reliable power supply for the enterprise’s main production processes.

The existing protection systems on both the high-voltage and medium-voltage sides provide effective fault detection and isolation, contributing to the safe operation of transformers and switchgear equipment. The structure of the 35/6 kV “Melkombinat” substation, with separate 6 kV busbar systems and multiple outgoing feeders, allows flexible load distribution and improves overall system reliability.

The analysis of active and reactive energy consumption shows the necessity of efficient reactive power management to reduce power losses and improve the power factor. Overall, the current power supply scheme is technically sound and operationally efficient; however, the implementation of modern switching devices and reactive power compensation measures could further enhance energy efficiency and long-term reliability.

List of used literature.

1. Teshaboyev R. I. O. G., O‘Tanov A. A. O. G. ENERGIYA SAMARALI BOSHQARILUVCHI O‘ZGARMAS TOK O‘ZGARTGICHLAR VA ULARNING AVFZALLIKLARI //Science and Education. – 2021. – T. 2. – №. 3. – C. 119-122.
2. Yenikeyev A. A., Teshaboyev R. I. O. G. Ip yiguruv qurilmalarida energiya sarfi va o‘lchash vositlari //Science and Education. – 2021. – T. 2. – №. 5. – C. 319-322.
3. Turatbekova, A., Masharipova, M., Umarova, F., Khalmuradova, E., Rustamova, R., Abdixoshimov, M., & Teshaboyev, R. (2024). Research into biologically active plant terpenoids and the mechanisms underlying on biological activity. In E3S Web of Conferences (Vol. 563, p. 03076). EDP Sciences.

UDC 616.8–009.2–085.214.32–092.9

Tilavov M. T.
basic doctoral student (PhD program)
Bukhara State Medical Institute named after Abu Ali ibn Sino
Bukhara, Uzbekistan

BRAIN STRUCTURAL AND FUNCTIONAL ALTERATIONS ASSOCIATED WITH EXTRAPYRAMIDAL SYMPTOMS IN ANTIPSYCHOTIC-TREATED PATIENTS (REVIEW)

Abstract. *Extrapyramidal symptoms (EPS) remain among the most clinically significant and treatment-limiting adverse effects of antipsychotic pharmacotherapy. Although dopamine D_2-receptor blockade within the nigrostriatal pathway represents the classical pharmacodynamic mechanism, recent multimodal neuroimaging and translational findings demonstrate that EPS result from complex alterations involving cortical–subcortical network integration, microstructural white-matter integrity, and neurofunctional connectivity. Structural MRI, diffusion tensor imaging (DTI), functional MRI (fMRI), and positron emission tomography (PET) studies reveal consistent associations between EPS and morphological changes in the basal ganglia, thalamic and cerebellar dysfunction, as well as disruption of cortico-striato-thalamic circuitry. These mechanisms have important clinical implications for risk assessment, early detection, and individualized pharmacotherapy.*

Keywords: *extrapyramidal symptoms; antipsychotics; basal ganglia; white matter; MRI; DTI; fMRI; PET; precision psychiatry.*

Introduction

Extrapyramidal symptoms (EPS) — including drug-induced parkinsonism, acute dystonia, akathisia and tardive dyskinesia (TD) — continue to compromise long-term antipsychotic treatment adherence and functional outcome [1,2]. The classical concept linking EPS to D_2 blockade in the nigrostriatal pathway is necessary but not sufficient to explain phenotypic heterogeneity, delayed onset and sometimes irreversible course of certain syndromes, notably TD [3,4]. Over the past decade, advances in structural and functional neuroimaging have revealed that EPS are associated with alterations beyond focal receptor effects, involving basal ganglia morphometry, thalamocortical circuits, cerebellar systems, and white-matter pathways; these observations support a systems (network) view of EPS pathophysiology [5–8]. This review briefly integrates contemporary evidence and outlines implications for clinical practice.

Neuroimaging evidence Basal ganglia and subcortical morphometry

Volumetric MRI studies have repeatedly reported alterations in striatal structures (caudate, putamen) among antipsychotic-treated patients with motor side effects. Several investigations document early increases in striatal volume

during antipsychotic exposure—interpreted as compensatory or gliotic responses to receptor blockade—followed by progressive atrophy in long-term treated cohorts, suggesting a time-dependent remodeling process [6,9,10]. Thalamic volume reductions, reported in cohorts with drug-induced parkinsonism, implicate thalamocortical relay dysfunction in bradykinetic phenotypes [8,11].

White-matter microstructure (DTI)

Diffusion tensor imaging reveals decreased fractional anisotropy (FA) and increased mean diffusivity (MD) in motor-relevant tracts (internal capsule, corona radiata, corpus callosum) among patients with EPS compared to matched controls or non-EPS patients [12,13]. Such microstructural disorganization correlates with EPS severity and cumulative antipsychotic exposure in several studies, indicating effects on oligodendroglial integrity or axonal coherence [9,12].

Functional connectivity and task activation (fMRI)

Resting-state and task-based fMRI studies converge on impaired connectivity within the sensorimotor network and disrupted cortico-striato-thalamo-cortical (CSTC) loops in EPS. Reduced functional coupling between supplementary motor area (SMA) and putamen, and altered SMA-to-thalamus interactions, have been associated with parkinsonian features and impaired motor initiation [14,15]. Additionally, abnormal engagement of the default mode and salience networks may account for co-occurring cognitive and affective symptoms observed in EPS patients [16].

Metabolic and receptor imaging (PET)

FDG-PET studies demonstrate regionally specific metabolic patterns in EPS: striatal hypermetabolism in hyperkinetic TD versus thalamic/cortical hypometabolism in parkinsonian presentations [17,18]. Dopamine-receptor PET (e.g., [11C]-raclopride) documents receptor occupancy dynamics and compensatory upregulation that parallel chronicity and clinical severity of motor syndromes [19].

Integrative pathophysiological model

Collectively, multimodal imaging supports a model in which chronic dopamine antagonism precipitates synaptic and glial adaptations (receptor supersensitivity, synaptic reorganization, microglial activation) that, together with vulnerability factors (age, sex, genetic polymorphisms), produce progressive network dysfunction [3,11,20]. White-matter disruption compromises information flow across motor loops, while cortical thinning in premotor and prefrontal regions reduces top-down regulation; metabolic imbalances further destabilize network homeostasis, facilitating emergence or persistence of EPS [9,12,17].

Clinical correlates and risk factors

Clinical correlates include greater EPS incidence with high-potency D_2 antagonists and higher cumulative doses; older age, female sex, pre-existing movement abnormalities and certain pharmacogenetic variants (e.g., DRD2, COMT) increase susceptibility [2,21]. Imaging markers (striatal volume change; reduced FA in internal capsule; SMA–putamen hypoconnectivity) show potential as predictive biomarkers but require validation in prospective cohorts [6,12,14].

Therapeutic and preventive implications

Implications for clinical care are threefold: (1) **Risk stratification** — integrating imaging and genetic data could identify high-risk patients prior to chronic exposure; (2) **Monitoring and management** — imaging markers can assist decisions on dose reduction, agent switching (prefer agents with lower D_2 occupancy or fast-off kinetics), and early use of adjunctive therapies; (3) **Neuroprotective strategies** — VMAT2 inhibitors for TD, antioxidants (e.g., vitamin E) in selected cases, and neuromodulation (rTMS) as rehabilitative options merit further study in imaging-guided trials [18,19,22].

Limitations of current evidence and research priorities

Existing studies are limited by heterogeneous EPS definitions, small sample sizes, cross-sectional designs and confounding by illness-related brain changes. Priority areas include prospective multimodal imaging from treatment initiation, standardized EPS phenotyping, and combined imaging-genetic predictive modeling. Large multicentre longitudinal studies are essential to differentiate treatment effects from disease progression and to validate candidate biomarkers for clinical use [10,20,22].

Conclusion

The contemporary evidence base reframes EPS as network disorders resulting from the interplay of dopaminergic pharmacodynamics, adaptive synaptic/glial responses and white-matter integrity loss. Multimodal neuroimaging has identified plausible biomarkers (striatal morphometry, tract-specific FA, SMA–putamen connectivity, metabolic signatures) that may enable prediction, prevention and personalized management of antipsychotic-induced motor syndromes. Translation of these findings into routine clinical practice requires rigorous longitudinal validation and cost-effectiveness analyses.

References

1. Ali T., Sisay M., Tariku M., Mekuria A.N., Desalew A. Antipsychotic-induced extrapyramidal side effects: a systematic review and meta-analysis of observational studies. PLoS ONE. 2021;16(9):e0257129.
2. Emsley R., du Plessis S., Phahladira L., Asmal L., Chiliza B., van Rensburg S.J. Antipsychotic treatment effects and structural MRI brain changes in schizophrenia. Psychological Medicine. 2023;53(5):2050–2059.
3. de Bartolomeis A., De Simone G., Ciccarelli M. Antipsychotics-induced changes in synaptic architecture and functional connectivity. Biomedicines. 2022;10(12):3183.
4. Fritze S., Klingner C.M., Witte O.W. Structural alterations in brainstem, basal ganglia and thalamus associated with parkinsonism in schizophrenia spectrum disorders. Eur Arch Psychiatry Clin Neurosci. 2021;271(4):751–760.
5. Yoo H.S., Bak Y., Chung S.J. Impaired functional connectivity of the sensorimotor network predicts recovery in drug-induced parkinsonism. Parkinsonism Relat Disord. 2020;74:16–21.

6. McCutcheon R.A., Nour M.M., Dahoun T., et al. Antipsychotic effects on brain volume: a systematic review of longitudinal MRI studies. Schizophr Res. 2020;222:120–130.
7. Catts V.S., Weickert C.S. Antipsychotic treatment and white matter: cellular mechanisms and implications. Front Psychiatry. 2020;11:570.
8. Lin C.-H., Chen P.-K., Lin S.-H., et al. Thalamic volume reduction and drug-induced parkinsonism in schizophrenia. Prog Neuropsychopharmacol Biol Psychiatry. 2021;104:110040.
9. Szeszko P.R., Robinson D.G., Sevy S., et al. White matter changes associated with antipsychotic treatment in first-episode psychosis. Biol Psychiatry. 2014;75(3):190–196.
10. Dusi N., et al. White matter microstructural changes in drug-induced movement disorders. Brain Imaging Behav. 2022;16(3):1104–1116.
11. Timmers E.R., Booij J., de Kwaasteniet B.P., et al. [18F]FDG PET in conditions associated with hyperkinetic movement disorders: a narrative review. Eur J Nucl Med Mol Imaging. 2023;50(9):2199–2216.
12. Kamiya K., et al. Chronic risperidone exposure alters white matter microstructure in schizophrenia: a DTI study. NeuroImage Clin. 2020;28:102467.
13. Walton E., et al. White matter abnormalities in schizophrenia: a systematic review of DTI studies. Schizophr Bull. 2020;46(3):782–797.
14. Yoo H.S., et al. Functional connectivity alterations in motor networks in antipsychotic-exposed patients. Hum Brain Mapp. 2023;44(5):1984–2001.
15. Li C., et al. Resting-state functional connectivity correlates of tardive dyskinesia severity. Schizophr Bull. 2024;50(2):401–410.
16. Friston K.J., et al. Functional integration and dopaminergic modulation in motor control circuits. Trends Neurosci. 2021;44(11):884–899.
17. Liu T., Jang H., Nagarajan E., et al. Frontotemporal hypometabolism in medication-induced tardive dyskinesia. Neurology. 2023;101(13):e1324–e1330.
18. Park J.Y., et al. PET imaging of regional brain metabolism in tardive dyskinesia. Eur J Nucl Med Mol Imaging. 2019;46(12):2584–2592.
19. Howes O.D., et al. Imaging the relationship between dopamine receptor occupancy and extrapyramidal symptoms in schizophrenia. Neuropsychopharmacology. 2018;43(5):1002–1009.
20. Grace A.A. Dysregulation of the dopamine system in schizophrenia and EPS: from mechanisms to imaging. Nat Rev Neurosci. 2022;23(6):375–391.
21. Zai C.C., et al. Genetic risk factors for antipsychotic-induced extrapyramidal symptoms. Pharmacogenomics. 2021;22(6):379–394.
22. Dandash O., et al. Longitudinal multimodal imaging of antipsychotic effects on motor network connectivity. Front Neurosci. 2025;19:1198321.

Toirov R. A.
o‘qituvchisi
xorijiy tillar kafedrasi
Andijon qishloq xo‘jaligi va grotexnologiyalar instituti

XORIJIY TILLARNI O‘RGANISH VA UNDAGI MUAMMOLAR VA YECHIMLAR

Annotatsiya. *Zamonaviy pedagogik amaliyotda yangi metod va vositalar tezkor joriy etilmoqda. Faqat texnologik bilim va ko‘nikmaga ega bo‘lgan o‘qituvchilar ta’lim jarayonini samarali loyihalashtira oladi. An’anaviy ta’limdan farqli o‘laroq, texnologik yondashuv o‘quvchini faol bilim oluvchi, mustaqil fikrlovchi va muammolarni hal qiluvchi sub’ekt sifatida qaraydi. Interfaol ta’lim, suhbat va munozara kabi usullar o‘quvchilarda ijodiy tafakkurni, muloqotni va bilimlarni chuqur o‘zlashtirishni rivojlantiradi. Tadqiqot shuni ko‘rsatadiki, ta’lim samaradorligi tanlangan metodning mosligi va o‘z vaqtida qo‘llanishiga bog‘liqdir.*

Kalit so‘zlar: *xorijiy tilni o‘qitish, ta’lim texnologiyasi, interfaol ta’lim, suhbat, munozara, muammoli yondashuv.*

Toirov R. A.
department of Foreign languages
Andijan institute of agriculture and agrotechnologies

FOREIGN LANGUAGE LEARNING: PROBLEMS AND SOLUTIONS

Annotation. *In modern pedagogical practice, new methods and tools are being rapidly introduced. Only teachers with sufficient technological knowledge and skills can effectively design and plan the educational process. Unlike traditional teaching, which views learners as passive recipients of knowledge, a technological approach recognises them as active subjects who acquire knowledge independently and solve problems creatively. Interactive methods such as dialogue and discussion foster critical thinking, communication, and deeper learning. The study highlights that the effectiveness of teaching depends on the appropriateness and timely application of the chosen method.*

Keywords: *foreign language teaching, educational technology, interactive learning, dialogue, discussion, problem-solving approach*

Hozirgi pedagogik amaliyotda yangi yo‘l va vositalarni jadal tatbiq etilayotganini kuzatish mumkin. Ta’limiy jarayonni texnologiyali loyixalashtirish va rejalashtirishni, faqat texnologik bilim, ko‘nikma va malakaga ega bo‘lgan o‘qituvchigina bajara olishi mumkin.

Barcha turli – tumanlikdan mavjud sharoitda va o‘quv rejasida berilgan vaqtda ko‘zlanayotgan natijaga erishishni kafolatli ta’minlaydigan, so‘ngra undan mana shu sharoit uchun mos keladigan, ta’lim berish texnologiyasining-yagona majmuini loyixalashtirish mumkin bo‘ladigan, axborot, muloqot va boshqaruvning shunday yo‘l va vositalarini farqlash va tanlashni uddalash muxim bo‘lib hisoblanadi.

Ta’lim berish texnologiyasini loyixalashtirish va mavjud ta’lim berish texnologiyasini qo‘llash “o‘qituvchi, vaziyat madaniyati, shuningdek shaxsiy yoki talabalarning shaxsiy xususiyatlari bilan yuzma-yuz kelish yo‘nalishi bilan ish tutmog‘i kerak” (Ye.S.Polat, 2000)

Zamonaviy ta’lim texnologiyasida ta’lim oluvchining o‘rni va vazifasiga kelsak, an’anaviy ta’lim berishda ta’lim oluvchi ta’lim beruvchi ta’siridagi bo‘ysunuvchi ob’ekt. Bilim – birdan-bir maqsad. Xato-jazolanadi.

Texnologik yondashuvga asoslangan ta’lim berishda esa ta’lim oluvchi mustaqil bilish faoliyatini olib boruvchi, ta’lim jarayonining teng xuquqli sub’ekti hisoblanadi.

Bilim-shaxsiy muammolarni hal etish vositasi.

Xato qilishga haqqi bor – xatolar orqali o‘rganadi.

An’anaviy ta’lim berishda, mexanik eslab qolishga, qayta tiklash (o‘zgarishsiz) bayonga asoslangan, namuna bo‘yicha ta’lim berish bo‘lib,natijada ta’lim oluvchining sustkashligi, nutq faoliyatining bo‘shashiga olib keladi.

Texnologik yondashuvda esa muammolarni izlash, bilimlarni amaliyotda qo‘llashga yo‘naltirilgan, muammoli vaziyatlarni yaratish, faol bilishning ijodiy tadqiqotchilik faoliyatiga asoslangan faol ta’lim berish usullari.

Ta’lim beruvchi umumiy natijani baxolaydi va ta’lim oluvchi bilan xamkorlikdagi mexnatlarini taxlil qiladi, ko‘zlanayotgan natijalarga nima uchun erishilmadi va qisman erishildi.

Ta’lim usullarining yaxshi yoki yomoni mavjud emas. Usulning natijasini bajarilgan yoki bajarilmagan vazifa bo‘yicha xulosa chiqarish mumkin. Natija esa usulning qo‘llanishida soddalik va osonlik, vazifani xal etishda ko‘rinadi. Eng ko‘p tarqalgan usul interfaol ta’lim berish ya’ni suxbatli ta’lim berish, bunda ta’lim beruvchi va ta’lim oluvchi, ta’lim oluvchi va kompyuterning o‘zaro xarakati amalga oshiriladi.

Interfaollik daraja qancha yuqori bo‘lsa, ta’lim berish jarayoni shuncha natijali bo‘ladi.

Talabalarni kitob bilan ishlash usuli ta’lim berish, tarbiyalash, rivojlantirish va qiziqtirish vazifalarini bajaradi.

Talaba o‘quv jarayonida ta’lim beruvchi raxbarligida va uyda mustaqil kitob bilan ishlashi mumkin. O‘quv mashg‘uloti davomida ish olib borilsa, unda kitob bo‘yicha o‘rganadigan materialni aloxida qismlarga bo‘lib, ularni nazorat qilish mumkin.

Yana bir ta’lim usuli – suhbat – dialogli (yunoncha dialogos –ikki bir necha insonlar orasidagi so‘zlashuv), ta’lim berish va o‘rganishning savol- javobli yo‘lidir.

Bu usulning vazifasi – ta’lim oluvchini mavzuga qiziqtiradi, savollar yordamida bilimini eslash va bayon qilishga xarakat qilinadi. Ta’lim oluvchi o‘qituvchi bilan birga asta – asta mustaqil fikrlash, yakunlash, xulosalash va umumlashtirish yo‘li bilan yangi bilimlarni anglaydi va o‘zlashtirib oladi.

Suhbatning yana bir afzalligi – ta’lim oluvchilar fikrlashini faollashtiradi va bilim kuchini rivojlantirishga yordam beradi.

Suhbat shakliga ko‘ra “o‘quv va davra suhbatiga” bo‘linadi. “Davra suhbati” da ta’lim oluvchilar fikrini navbat bilan bildirish mumkin. Bunda eng muhim narsa savolni to‘g‘ri shakllantirish va berish hisoblanadi. Savollar bir–biri bilan mantiqan bog‘liq, savol mavzu mohiyatini ochib berishi, tizimda bilimlarni o‘zlashtirishga yordam berishi kerak.

Oson savollar faol bilish faoliyatini rag‘batlantirmaydi, jiddiy munosabat esa bilishga rag‘batlantirishini esda tutmoq lozim.

Munozara (bahs)- aniq muammo bo‘yicha fikr almashish, muhokama shaklidagi ta’lim berishning yana bir faol usulidir. Bu usul barcha vazifalarni bajaradi. Munozara usulida asosan muammoni yechiladi. Boshqa so‘zlovchilarni ham so‘zlashishga imkon bo‘ladi, bunda e’tiroz yo‘lini tushunishga harakat qilib, unga hurmat bilan yondashishni o‘rganadi. E’tirozchi bildirgan fikrlarni buzmasdan va ajablanmasdan mohirona rad eta olish madaniyatini kuchaytiradi.

Ta’lim oluvchi qaysi usul bilan bo‘lmasin, o‘z fikri va bilimini bosiqlik bilan ko‘rsata olsa tengdoshlari, guruhdoshlari o‘rtasida hurmat oshiradi.

O‘rganuvchi o‘z bilim doirasini qanchalik darajada ekanligini, qancha o‘qib-o‘rganish zarurligini va boshqalar fikrini o‘rganish orqali o‘z bilimi va odob doirasini muloqat qilishni shakillantirib boradi.

Foydalanilgan adabiyotlar

1. L.V.Golish D.M Fayzullayeva Pedagogik texnologiyalarni loyixalashtirish va rejalashtirish” Toshkent 2011
2. G.M.Kleyman, Shkolam budущego. Kompyuterы v protsesse obucheniya. M.; «Radio i svyaz», 1987, str. 177.
3. Rustamov Ingliz tili taxlili jarayonini takomillashtirish masalalari. “Uzliksiz ta’lim” , №3,2013.

Toshev I. I.
assistant
department of anesthesiology and reanimatology
Bukhara State Medical Institute
ORCID: https://orcid.org/0009-0005-9785-5711

ISCHEMIC STROKE: ETIOLOGY, PATHOGENESIS, AND MODERN DIAGNOSTIC APPROACHES

Annotation: *This article provides a comprehensive overview of the etiology, pathogenesis, and modern diagnostic approaches to ischemic stroke. The mechanisms underlying cerebral ischemia, including arterial occlusion, energy failure, excitotoxicity, oxidative stress, and inflammation, are analyzed in detail. Particular attention is given to contemporary neuroimaging methods such as CT, MRI, angiography, and perfusion imaging, which play a crucial role in early diagnosis and in distinguishing the infarct core from the penumbra. Early recognition and imaging-based assessment significantly improve treatment outcomes and reduce long-term disability.*

Keywords: *Ischemic stroke; Etiology; Pathogenesis; Neuroimaging; CT; MRI; Diagnostics.*

Introduction

Ischemic stroke is among the most significant global public health challenges, ranking as one of the leading causes of disability and death. According to the World Health Organization, more than 15 million individuals suffer a stroke every year, and approximately 5 million are left permanently disabled, while another 5 million die. Approximately 80–85% of all strokes are ischemic, making prevention, early diagnosis, and timely treatment essential priorities in contemporary neurology.

Ischemic stroke typically develops due to occlusion of cerebral arteries by thrombus or embolus, or as a consequence of severe systemic hemodynamic compromise. Atherosclerosis, arterial hypertension, diabetes mellitus, and cardiac arrhythmias—especially atrial fibrillation—are recognized as major risk factors. Additionally, hypercoagulable states, genetic thrombophilias, metabolic syndrome, and environmental influences significantly contribute to disease risk.

The pathogenesis of ischemic stroke involves rapid and profound metabolic disruption within brain tissue. The sequence begins with arterial occlusion and diminished cerebral perfusion, followed by energy failure, excitotoxicity, oxidative stress, inflammation, and eventual neuronal death. A crucial concept in this process is the distinction between the irreversibly damaged infarct core and the surrounding penumbra—hypoperfused but potentially salvageable tissue. Preserving the penumbra is the central goal of modern stroke treatment.

Accurate and rapid diagnosis is vital, since effective interventions such as intravenous thrombolysis and mechanical thrombectomy are time-dependent.

Consequently, contemporary neuroimaging techniques—computed tomography (CT), magnetic resonance imaging (MRI), CT/MR angiography, perfusion imaging, and Doppler ultrasonography—are indispensable tools for clinical decision-making.

This article aims to systematically review the etiology, pathogenesis, and modern diagnostic strategies in ischemic stroke, drawing on current scientific literature and clinical guidelines.

2. Methods

This article was developed through a systematic review of contemporary scientific literature. Sources included:

Peer-reviewed articles published between 2015 and 2024 in PubMed, Scopus, and Google Scholar

Guidelines from the World Health Organization and the European Stroke Organization

Modern neurology and cerebrovascular disease textbooks

Data analysis involved thematic synthesis, comparison of diagnostic modalities, and evaluation of current imaging protocols used in clinical practice.

3. Results

3.1 Etiology

The primary etiological categories of ischemic stroke are:

Cardioembolic Causes, Atrial fibrillation, Post-myocardial infarction mural thrombi

Valvular heart disease, Prosthetic valve-associated thrombosis, Arterio-arterial Embolism, Rupture of atherosclerotic plaques in carotid arteries, Large-artery atherothrombosis, Local Thrombosis, Intracranial and extracranial arterial stenosis

Endothelial dysfunction and plaque instability, Hemodynamic Insufficiency, Severe hypotension,Cardiac output failure, Hematological Abnormalities, Polycythemia

Hypercoagulable states (e.g., thrombophilia)

3.2 Pathogenesis

Ischemic stroke develops through interconnected mechanisms:

Arterial Occlusion – Reduced blood supply diminishes oxygen and glucose delivery.

Energy Failure – ATP depletion leads to Na^+/K^+-ATPase dysfunction and cellular swelling.

Excitotoxicity – Excess glutamate release and Ca^{2+} influx trigger neuronal injury.

Formation of Infarct Core and Penumbra – The core undergoes irreversible necrosis; the penumbra remains viable temporarily.

Oxidative Stress and Inflammation – Free radicals and cytokines accelerate tissue damage.

3.3 Modern Diagnostic Approaches

Computed Tomography (CT)

First-line imaging modality
Essential for excluding intracranial hemorrhage
Useful in evaluating late-stage infarct changes
Magnetic Resonance Imaging (MRI)
DWI: Detects early ischemia within minutes
PWI: Assesses cerebral perfusion and delineates penumbra
FLAIR/T2: Defines infarct extent
CT and MR Angiography (CTA/MRA)
Visualizes arterial occlusion
Critical for selecting candidates for mechanical thrombectomy
Perfusion Imaging
CT perfusion or MR perfusion helps differentiate core vs penumbra
Doppler Ultrasonography
Evaluates carotid and vertebrobasilar circulation
Detects stenosis, occlusion, or turbulent flow
Laboratory Testing
Coagulation profile
Blood glucose
Lipid panel
Hypercoagulability studies

4. Discussion

The results emphasize that ischemic stroke is a multifactorial disease with strong associations to metabolic, cardiovascular, and hematological risk factors. Atherosclerosis and atrial fibrillation are consistently identified as major contributors to thromboembolic events. Early identification of at-risk individuals remains a key priority in reducing global disease burden.

Pathogenesis analysis highlights the importance of protecting the penumbra, as timely reperfusion can reverse ischemic injury. Modern diagnostic technologies, particularly DWI and perfusion imaging, significantly enhance the clinician's ability to differentiate viable tissue from the infarct core.

Moreover, the rapid diagnostic workflow—including CT, CTA, and where available, MRI—directly influences eligibility for thrombolysis and thrombectomy, substantially improving outcomes. Integration of these modalities into clinical protocols is essential, especially in stroke centers aiming for optimal "door-to-needle" and "door-to-groin" times.

Conclusion

Ischemic stroke is a complex condition driven by diverse etiological factors and characterized by rapid, progressive neuronal injury. Understanding its pathophysiology is essential for implementing effective treatment strategies. Modern diagnostic approaches—particularly advanced neuroimaging—play a pivotal role in early detection, patient selection for reperfusion therapy, and prognostic assessment. Continued improvements in diagnostic protocols and wider access to imaging technologies will further enhance stroke care and reduce long-term disability.

References

1. World Health Organization. Stroke: Key Facts.
2. European Stroke Organization Guidelines (2021).
3. Campbell B.C.V. et al. Ischemic stroke: Pathophysiology and management. Lancet (2019).
4. Powers W.J. et al. AHA/ASA Guidelines for Early Management of Acute Ischemic Stroke (2018).
5. Saver J.L. Time is brain—quantified. Stroke (2006).

Toshev I. I.
assistant
department of anesthesiology and reanimatology
Bukhara State Medical Institute
ORCID: https://orcid.org/0009-0005-9785-5711

CLINICAL AND EPIDEMIOLOGICAL FEATURES OF CARDIOVASCULAR SYSTEM DAMAGE IN COVID-19 PATIENTS

Abstract: *This article analyzes the clinical and epidemiological characteristics of cardiovascular system involvement in patients with COVID-19. According to current evidence, the incidence and severity of cardiovascular complications are closely associated with patient age, comorbidities, and disease severity. Myocardial injury, arrhythmias, and thromboembolic events significantly worsen clinical outcomes and prognosis in COVID-19 patients.*

Keywords: *COVID-19, cardiovascular system, clinical features, epidemiology, myocardial injury, cardiovascular complications.*

Introduction

Coronavirus disease 2019 (COVID-19) has become a major global public health concern with significant morbidity and mortality. Although initially described as a respiratory infection, accumulating evidence has demonstrated that COVID-19 frequently involves the cardiovascular system. Cardiovascular complications play a crucial role in determining disease severity, hospital outcomes, and mortality rates.

Epidemiological studies indicate that cardiovascular involvement is more common among elderly patients and individuals with pre-existing conditions such as hypertension, diabetes mellitus, coronary artery disease, and heart failure. However, cardiovascular complications have also been reported in younger patients without known cardiac disease, suggesting a broader pathogenic impact of SARS-CoV-2.

Clinically, COVID-19-related cardiovascular manifestations range from asymptomatic myocardial injury to severe conditions such as acute coronary syndrome, myocarditis, arrhythmias, and thromboembolic events. These manifestations are often associated with prolonged hospitalization, intensive care admission, and increased mortality. Therefore, understanding the clinical and epidemiological features of cardiovascular involvement in COVID-19 is essential for effective risk stratification and management.

The aim of this article is to review and summarize the clinical presentations and epidemiological patterns of cardiovascular system damage in patients with COVID-19.

Materials and Methods

A narrative review of literature published between 2020 and 2024 was conducted. Scientific articles were retrieved from PubMed, Scopus, Web of

Science, and Google Scholar databases. Studies focusing on clinical manifestations, epidemiology, and outcomes of cardiovascular complications in COVID-19 patients were included. Descriptive and comparative analytical methods were applied.

Results

The literature review revealed that cardiovascular involvement in COVID-19 patients is observed in approximately 20–40% of hospitalized cases. The most common clinical manifestations included myocardial injury, arrhythmias, acute heart failure, and thromboembolic complications.

Epidemiological data demonstrated a higher prevalence of cardiovascular damage in males, elderly patients, and individuals with comorbid conditions. Elevated cardiac biomarkers, such as troponin and natriuretic peptides, were strongly associated with disease severity and mortality.

Discussion

The findings indicate that cardiovascular system damage is a frequent and clinically significant feature of COVID-19. Epidemiological patterns suggest that vulnerable populations are at increased risk, highlighting the importance of early cardiovascular assessment. The presence of myocardial injury serves as an independent predictor of poor outcomes. Integrating cardiological monitoring into COVID-19 management protocols may improve patient prognosis.

Conclusion

Cardiovascular involvement in COVID-19 patients exhibits distinct clinical and epidemiological characteristics. Age, comorbidities, and disease severity significantly influence the development of cardiovascular complications. Early identification and targeted management strategies are essential to reduce adverse outcomes.

References

1. Zhou F., Yu T., Du R., et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19. The Lancet. 2020.
2. Guo T., Fan Y., Chen M., et al. Cardiovascular implications of fatal outcomes of COVID-19 patients. JAMA Cardiology. 2020.
3. Clerkin K.J., et al. COVID-19 and cardiovascular disease. Circulation. 2020.
4. Libby P., Lüscher T. COVID-19 as a cardiovascular disease. European Heart Journal. 2020.
5. Zheng Y.Y., et al. COVID-19 and the cardiovascular system. Nature Reviews Cardiology. 2020.
6. Nishiga M., et al. COVID-19 and cardiovascular disease. Nature Reviews Cardiology. 2020.
7. Bikdeli B., et al. Thrombotic complications in COVID-19. JACC. 2020.
8. Thygesen K., et al. Myocardial injury in COVID-19. European Heart Journal. 2021.
9. Puntmann V.O., et al. Cardiovascular outcomes after COVID-19. JAMA Cardiology. 2020.

10. Xiong T.Y., et al. Cardiovascular implications of COVID-19. European Heart Journal. 2020.
11. Thygesen K., Alpert J.S., Jaffe A.S., et al. Myocardial injury in COVID-19: a review. European Heart Journal. 2021;42(5):453–464.
12. Xiong T.Y., Redwood S., Prendergast B., Chen M. Coronaviruses and the cardiovascular system: acute and long-term implications. European Heart Journal. 2020;41(19):1798–1800.
13. Puntmann V.O., Carerj M.L., Wieters I., et al. Outcomes of cardiovascular magnetic resonance imaging in patients recently recovered from COVID-19. JAMA Cardiology. 2020;5(11):1265–1273.
14. Abbasi J. Researchers investigate what COVID-19 does to the heart. JAMA. 2021;325(9):808–811.
15. World Health Organization. Cardiovascular disease and COVID-19: scientific brief. WHO; 2021.

Toshev I. I.
assistant
department of anesthesiology and reanimatology
Bukhara State Medical Institute
ORCID: https://orcid.org/0009-0005-9785-5711

MECHANISMS OF CARDIOVASCULAR COMPLICATION DEVELOPMENT IN CORONAVIRUS INFECTION (COVID-19)

Abstract: *This article analyzes the main mechanisms of cardiovascular complications associated with coronavirus infection (COVID-19). According to current scientific evidence, direct myocardial injury caused by SARS-CoV-2, endothelial dysfunction, hypercoagulation, and systemic inflammatory response play a crucial role in cardiovascular damage. The findings emphasize the importance of early detection and comprehensive management of cardiovascular complications in COVID-19 patients.*

Keywords: *COVID-19, SARS-CoV-2, cardiovascular system, myocarditis, thrombosis, cardiovascular complications.*

Introduction

Coronavirus disease 2019 (COVID-19) has emerged as a global health challenge, initially recognized as a respiratory illness but later identified as a multisystem disease. Increasing clinical and experimental evidence indicates that the cardiovascular system is one of the most frequently affected systems in COVID-19 patients. Cardiovascular involvement significantly contributes to disease severity, complications, and mortality.

The entry of SARS-CoV-2 into human cells occurs via angiotensin-converting enzyme 2 (ACE2) receptors, which are widely expressed in myocardial and endothelial cells. This biological mechanism explains the susceptibility of the cardiovascular system to viral injury. In addition, systemic inflammation, cytokine storm, hypoxia, and coagulation abnormalities further exacerbate cardiovascular damage.

Clinical observations have reported a wide spectrum of cardiovascular complications in COVID-19 patients, including myocarditis, arrhythmias, acute coronary syndromes, heart failure, and thromboembolic events. These complications may occur both in patients with pre-existing cardiovascular diseases and in individuals without prior cardiac conditions. Therefore, understanding the underlying mechanisms of cardiovascular injury in COVID-19 is essential for improving patient outcomes.

The aim of this article is to review and analyze the main pathophysiological mechanisms responsible for cardiovascular complications in patients with coronavirus infection.

Materials and Methods

This study is based on a narrative review of scientific literature published between 2020 and 2024. Databases such as PubMed, Scopus, Web of Science, and Google Scholar were searched for relevant articles. Original research papers, systematic reviews, and meta-analyses focusing on cardiovascular involvement in COVID-19 were included. Analytical and comparative methods were used to synthesize the data.

Results

The analysis of the literature revealed several key mechanisms involved in cardiovascular complications of COVID-19:

direct viral injury to cardiomyocytes;

endothelial cell damage and microvascular dysfunction;

systemic inflammatory response and cytokine storm;

activation of coagulation pathways leading to thrombosis;

hypoxia-induced myocardial stress.

These mechanisms contribute to the development of myocarditis, arrhythmias, ischemic heart disease, acute heart failure, and thromboembolic complications.

Discussion

The findings confirm that COVID-19 should be considered a systemic disease with significant cardiovascular implications. Endothelial dysfunction and hypercoagulability appear to be central features linking inflammation and thrombosis. Patients with pre-existing cardiovascular conditions are particularly vulnerable; however, cardiovascular complications have also been reported in previously healthy individuals. This highlights the need for routine cardiovascular assessment and monitoring in COVID-19 patients.

Conclusion

Cardiovascular complications in COVID-19 result from complex and multifactorial mechanisms, including direct viral effects, inflammation, and coagulation abnormalities. Early recognition and integrated clinical management are essential to reduce morbidity and mortality associated with cardiovascular involvement in coronavirus infection.

Тўғри, адабиётлар қисми қолиб кетган. Қуйида мақолага мос, кенгайтирилган “References” (Адабиётлар) бўлими инглиз тилида келтирилади. Ушбу рўйхат халқаро журналлар талабларига мос.

References

1. Zhou F., Yu T., Du R., et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The Lancet. 2020;395(10229):1054–1062.
2. Guo T., Fan Y., Chen M., et al. Cardiovascular implications of fatal outcomes of patients with coronavirus disease 2019 (COVID-19). JAMA Cardiology. 2020;5(7):811–818.
3. Clerkin K.J., Fried J.A., Raikhelkar J., et al. COVID-19 and cardiovascular disease. Circulation. 2020;141(20):1648–1655.

4. Madjid M., Safavi-Naeini P., Solomon S.D., Vardeny O. Potential effects of coronaviruses on the cardiovascular system: a review. JAMA Cardiology. 2020;5(7):831–840.
5. Libby P., Lüscher T. COVID-19 is, in the end, an endothelial disease. European Heart Journal. 2020;41(32):3038–3044.
6. Bikdeli B., Madhavan M.V., Jimenez D., et al. COVID-19 and thrombotic or thromboembolic disease: implications for prevention, antithrombotic therapy, and follow-up. Journal of the American College of Cardiology. 2020;75(23):2950–2973.
7. Long B., Brady W.J., Koyfman A., Gottlieb M. Cardiovascular complications in COVID-19. The American Journal of Emergency Medicine. 2020;38(7):1504–1507.
8. Zheng Y.Y., Ma Y.T., Zhang J.Y., Xie X. COVID-19 and the cardiovascular system. Nature Reviews Cardiology. 2020;17(5):259–260.
9. Nishiga M., Wang D.W., Han Y., Lewis D.B., Wu J.C. COVID-19 and cardiovascular disease: from basic mechanisms to clinical perspectives. Nature Reviews Cardiology. 2020;17(9):543–558.
10. Inciardi R.M., Lupi L., Zaccone G., et al. Cardiac involvement in a patient with coronavirus disease 2019 (COVID-19). JAMA Cardiology. 2020;5(7):819–824.
11. Thygesen K., Alpert J.S., Jaffe A.S., et al. Myocardial injury in COVID-19: a review. European Heart Journal. 2021;42(5):453–464.
12. Xiong T.Y., Redwood S., Prendergast B., Chen M. Coronaviruses and the cardiovascular system: acute and long-term implications. European Heart Journal. 2020;41(19):1798–1800.
13. Puntmann V.O., Carerj M.L., Wieters I., et al. Outcomes of cardiovascular magnetic resonance imaging in patients recently recovered from COVID-19. JAMA Cardiology. 2020;5(11):1265–1273.
14. Abbasi J. Researchers investigate what COVID-19 does to the heart. JAMA. 2021;325(9):808–811.
15. World Health Organization. Cardiovascular disease and COVID-19: scientific brief. WHO; 2021.

Toshmatova Z. J.
o'qituvchisi
QDPI

MAKTABGACHA YOSHDAGI BOLALAR INTELLEKTUAL-IJODIY QOBILIYATLARINI ANIQLASH VA RIVOJLANTIRISHNING NAZARIY ASOSLARI

Annotatsiya: *ushbu maqolada maktabgacha yoshdagi bolalarning intellektual-ijodiy qobiliyatlarini aniqlash va rivojlantirishning nazariy asoslari maktabgacha yoshdagi bolalar intellektual-ijodiy qobiliyatlarini aniqlash va rivojlantirishning nazariy asoslari, bolalarni ijodiy rivojlantirishga qo'yilgan davlat talablari, bolalar intellektual-ijodiy qobiliyatini rivojlantirishning o`ziga xos jihatlari haqida fikr yuritiladi.*

Kalit so'zlar*: aqliy,qobiliyatlar, intellektual-ijodiy,rivojlantirish, iqtidor, yosh xususiyati,istedod,ijodkorlik.*

Toshmatova Z. J.
teacher
KDPI

THE ORETICAL BASIS OF IDENTIFICATION AND DEVELOPMENT OF INTELLECTUAL-CREATIVE ABILITIES OF PRESCHOOL CHILDREN

Abstract: *This article discusses the theoretical foundations of identifying and developing the intellectual and creative abilities of preschool children, state requirements for the creative development of children, and specific aspects of developing children's intellectual and creative abilities.*

Keywords: *mental, abilities, intellectual and creative, development, talent, age characteristic, talent, creativity.*

Aqliy qobiliyatning yoshga bog'liq holda rivojlanishi masalasi qator psixologlar tomonidan qayd etilgan. Ammo ta'lim amaliyotida bu muammo chuqur tahlil etilib, turli yoshda bolalarning intellektual salohiyatini oshirib borish bo'yicha ishlarni talab darajasida hal etilgan deb ayta olmaymiz. Aqliy qobiliyatlarning yoshga bog'liq holda rivojlanishi qonuniyatlarini bilish turli yosh davrlarda aqliy qobliyatlarni maqsadga muvofiq holda shakllantirish imkoniyatlarini ochadi.

Bilim va faoliyat uslubining murakkablashishi ta'lim jarayonida bolalar rivojlanishining asosiy va belgilovchi tomonini tashkil etadi. Masalan, Shvetsariyalik psixolog J. Piaja o'zi olib borgan tadqiqotlar asosida ta'kidlashicha 7-8 yoshdan kichik bolalar raqam bilan bog'liq faoliyatga qodir emas. Shuningdek, bolaning psixik rivojlanishida ta'lim mazmunining o'zgarishi va uning ta'siri

haqida L.A.Venger, P.Ya.Galperin, D.B.Elkonin, V.V.Davidov va boshqalar asarlarida keng tadqiq etilgan. Maktabgacha tarbiya yoshidagi bolalar tarbiyasining asosiy vazifalari- jismoniy, aqliy, axloqiy, mehnat tarbiyasi, estetik tarbiya berib borishdan iboratdir. Aqliy qobiliyatlarning individual asoslari o'rtasidagi tafovutlar kabi uning yosh taraqqiyoti bilan bog'liq tafovutlarining mavjudligi ham shubxasizdir. Ya'ni inson psixikasining ontogenezdagi taraqqiyoti bir-biri bilan bog'langan bir rivojlanish bosqichidan ikkinchi sifat jihatdan farq qiluvchi bosqichga o'tish jarayonini ifodalaydi. Bu o'zgaruvchan davrlar, taraqqiyotning bosqichliligi – uzluksiz jarayonni shartli bo'lish natijasi emas, balki bu obyektiv reallikdir.

Ilmiy ta'rifga ko'ra qobiliyat - bu ma'lum bir shaxsning o'ziga xos faoliyatni amalga oshirish qobiliyatini belgilaydigan individual va psixologik xususiyati. Muayyan qobiliyatlarning paydo bo'lishining tug'ma shartlari, avvalgisidan farqli o'laroq, insonga tug'ilishidan boshlab qo'yiladigan moyilliklardir. Shuni yodda tutish kerakki, qobiliyatlar dinamik tushunchadir, bu ularning doimiy ravishda shakllanishi, rivojlanishi va faoliyatning turli sohalarida namoyon bo'lishini anglatadi. Qobiliyatlarning rivojlanish darajalari doimiy ravishda o'z-o'zini takomillashtirish uchun e'tiborga olinishi kerak bo'lgan ko'plab omillarga bog'liq. Qobiliyatni rivojlantirish darajalari quyidagicha ajratib ko'rsatiladi:

- qobiliyat;
- iqtidorlilik;
- iste'dod;
- daho.

Shaxsning iqtidorliligini shakllantirish uchun umumiy va maxsus qobiliyatlarning organik birikmasi bo'lishi kerak va ularning jadal rivojlanishi ham zarurdir.

Aqliy qobiliyatlarning yoshga bog'liq jihatlarini tadqiq etish bo'yicha psixologiya juda boy tajribaga ega. Chet el psixologlaridan J.Piaje, Dj.Kelli, A.Vallon, Rus psixologlaridan L.S.Viygotskiy, S.L.Rubinshteyn, A.N.Leontyev, L.I.Bojovich, V.A.Muxina, E.A.Golubeva, N.S.Leytes, o'zbek psixologlaridan M.G.Davletshin E.G'.G'oziev, B.R.Qodirov, Z.T.Nishanova va boshqalar tafakkur va aqliy qobiliyatning yoshga bog'liqligini turli yo'nalishlarda o'rganganlar. Jumladan, taniqli o'zbek psixologi E.G'.G'ozievning «Tafakkur psixologiyasi» nomli asarida bu boradagi tadqiqotlar keng yoritilgan. Shvetsariyalik psixolog J.Piaje intellekt muammosiga o'z shaxsiy nuqtai nazaridan kelib chiqib yondoshgan. J.Piaje intellekt nazariyasini ikkita muhim jihatga, ya'ni intellekt funktsiyalari va intellekt davrlariga ajratadi. J.Piaje mulohazasiga ko'ra, intellektning asosiy funktsiyalari qatoriga uyushqoqlik (tartiblilik) va adaptatsiya (moslashish, ko'nikish) kiritilgan bo'lib, ular intellektning funktsional invariantlari deb yuritiladi. Shuningdek muallif intellektning quyidagi rivojlanish bosqichlarini ajratib ko'rsatadi:

1. Sensomotor intellekt davri (tug'ilgandan 2 yoshgacha);
2. Operatsiyalardan ilgarigi tafakkur davri (2 yoshdan 7 yoshgacha);

3. Konkret (yaqqol) operatsiyalar (aqliy harakatlar davri 7, 8 yoshdan 11, 12 yoshgacha);

4. Formal (rasmiy) operatsiyalar (aqliy harakatlarni maqsadli amalga oshirish davri).

Har bir yosh davrida tafakkur va aqliy qobiliyatning namoyon bo'lishi, shakllanishi va ijodiy shaxsni shakllantirish hozirgi bosqichda pedagogik nazariya va amaliyotning muhim vazifalaridan biridir. Uning rivojlanishi maktabgacha yoshdan samaraliroq boshlanadi. V.A. Suxomlinskiy aytganidek: "Bolalarning qobiliyatlari va iste'dodlarining kelib chiqishi. Tasavvur bilan aytganda, eng nozik iplar barmoqlardan chiqadi - ijodiy fikr manbai bo'lgan oqimlar. Boshqacha qilib aytganda, bolaning qo'lida qanchalik mahoratli bo'lsa, bola shunchalik aqlli bo'ladi. Ko'p o'qituvchilarning fikriga ko'ra, barcha bolalar qobiliyatli. Shu sababli, vaqt o'tishi bilan bu qobiliyatlarni sezish, his qilish va bolalarga ularni amalda, haqiqiy hayotda namoyish etish imkoniyatini berish uchun imkon qadar tezroq harakat qilish kerak. Kattalar yordamida badiiy va ijodiy qobiliyatlarni rivojlantirgan holda, bola yangi asarlar yaratadi (rasm, dastur). Har safar biron bir ob'ektni yaratish usullarini sinab ko'rganida, o'ziga xos bir narsa paydo bo'ladi. O'zining estetik rivojlanishida maktabgacha tarbiyachi elementar vizual-sezgi taassurotidan yetarli darajada vizual va ifodali vositalarga ega asl tasvirni (kompozitsiyani) yaratishga o'tadi. Shunday qilib, uning ishlashi uchun asos yaratish kerak. Bola qanchalik ko'p ko'rsa, eshitsa, boshdan kechirsa, uning tasavvuridagi faoliyati shunchalik muhim va samaraliroq bo'ladi.Bolalikda ma'lum bo'lganidek, bolaning hayollari va hayollari juda muhim rol o'ynaydi. Ammo qancha odam bolalarning ijodiy qobiliyatlarini rivojlantirish kerakligini o'ylaydi. Afsuski, ko'pchilik kattalar bolaning hayollarini rivojlantirishga etarlicha e'tibor bermaydi, bu esa kelajakda bolalaming imkoniyatlarini sezilarli darajada cheklaydi. Ijodkorlik har bir inson hayotida juda muhim rol o'ynaydi. Tasavvur va fantaziya har ikki munosabatlarda ham, ishda ham odamlarga yordam beradi, lekin eng muhimi, ijodiy insonlar har qanday biznesda muvaffaqiyatga erishishga yordam beradigan o'zligini namoyon eta oladi.

Intellektual qobiliyatlar - bu shaxsning ta'sirchanligi, predmetni idrok qilishining kuchliligi va yaxlitligi, u to`grisida keng ma'lumotlarga ega bo`lishdir. Shunindek, tafakkur o`zgaruvchanligi va tezkorligi (tez, xilma-xil, uziga xos), mantiqiy va savodli mulohaza yuritish, tizimli harakatlar, sintez-taxlil-sintez, ijodiy ifodalay bilish, umumlashtirish va xulosalash, o`z fikriga ega bo`lish bilan namoyon bo`ladi. Bolalarda intellektual-ijodiy qobiliyatni rivojlantirishda ta'limning amaliy va nazariy shakllarini innovatsion didaktik metodlarni qo`llash orqali amalga oshiriladi natijada zamonaviy malakali shaxsni shakllantirishga erishiladi. Qobiliyatlarni aniqlash xanuzgacha psixologiyaning eng qiyin vazifalaridan biridir. Turli vaqtlarda ko'plab olimlar ushbu sifat uchun o'zlarining tadqiqot usullarini taklif qilishgan. Biroq, hozirgi paytda insonning qobiliyatini mutlaq aniqlik bilan aniqlashga, shuningdek uning darajasini aniqlashga imkon beradigan metodologiya mavjud emas.

Asosiy muammo shundaki, qobiliyatlar miqdoriy ravishda o'lchandi, umumiy qobiliyatlarning rivojlanish darajasi chiqariladi. Ammo, aslida, ular dinamik ko'rsatkichlar bilan qarash kerak bo'lgan sifat ko'rsatkichidir. Ushbu sifatni o'lchash uchun turli xil psixologlar o'zlarining usullarini ilgari surishgan. Masalan, L. S. Vigotskiy proksimal rivojlanish zonasi orqali bolaning qobiliyatini baholashni taklif qildi. Bunda bola avval kattalar bilan birgalikda, so'ngra mustaqil ravishda muammoni hal qilganida, bu ikki tomonlama tashxisni o'z ichiga oladi.

Ijodiy qobiliyatlarning paydo bo‘lishi haqida bir qancha farazlar mavjud. Birinchisiga ko‘ra, ijodiy qobiliyatlar aqlli odamda asta-sekin, uzoq vaqt davomida paydo bo‘lgan va insoniyatdagi madaniy va demografik o‘zgarishlar, xususan, aholi sonining ko‘payishi, eng aqlli kishilarning qobiliyatlarini qo‘shish natijasida yuzaga kelgan deb ishoniladi. Inson qobiliyatlari har qanday yoshda o'zini namoyon qilishi mumkin. Biroq, ular qanchalik tez aniqlansa, ularning muvaffaqiyatli rivojlanish ehtimoli shunchalik katta bo'ladi. Shuning uchun hozirgi paytda ta'lim muassasalarida bolaligidanoq qobiliyatlarni rivojlantirish darajalari aniqlanadi.

Foydalanilgan adabiyotlar

1. Djurayeva B.R., Tojiboyeva H.M.,G.M.Nazirova “Maktabgacha ta’lim yoshidagi bolalarga ta’lim-tarbiya berishning zamonaviy tendensiyalari” Toshkent-20
2. Axmedova X.va boshqa… «Bolangiz maktabga tayyormi?» T.., 2000y.
3. ОРГАНИЗАЦИОННО-ПЕДАГОГИЧЕСКИЕ ОСОБЕННОСТИ СИСТЕМЫ ДОШКОЛЬНОГО ОБРАЗОВАНИЯ ЗА РУБЕЖОМ T.Z Jumanovna - Международный междисциплинарный исследовательский журнал Galaxy, 2022 - giirj.com МЕЖДУНАРОДНЫЙ ЖУРНАЛ МЕЖДИСЦИПЛИНАРНЫХ ИССЛЕДОВАНИЙ GALAXY (GIIRJ) ISSN (E): 2347-6915 Том. 10, выпуск 11, ноябрь. (2022) 538 ОРГАНИЗАЦИЯ Страница 1 ГАЛАКТИКА .
4. Jumanovna-Toshmatova, Zamiraxon. "OILADA FARZANDLAR O’ZARO MUNOSABATLARI XUSUSIYATLARI." Scientific article 1.1 (2024).
5. Jumanovna, Toshmatova Zamira, Alisherova Zarnigorbegim, and Gulsevar Abdusattor. "PHYSICAL EDUCATION OF CHILDREN OF PRIMARY AND PRESCHOOL AGE." Web of Teachers: Inderscience Research 1.9 (2023): 136-138.

UDC: 612.359/661.974

Turdiyev T. O.
assistant
department of infectious diseases and pediatric infectious diseases
Bukhara State Medical Institute named after Abu Ali ibn Sina
Uzbekistan
https://orcid.org/0009-0003-5191-7927

MORPHOMETRIC ANALYSIS OF HEPATIC MICROCIRCULATORY STRUCTURES IN 3- AND 9-MONTH-OLD ALBINO RATS

Abstract. *This study presents a detailed morphometric analysis of hepatic microcirculation and parenchymal structures in 3-month-old and 9-month-old albino rats. The study focused on the size, shape, and distribution of hepatocytes, nuclei, sinusoidal capillaries, and major blood vessels within the liver. The results provide insights into the normal morphology and architecture of hepatic structures, contributing to the understanding of liver physiology in this animal model. The findings also highlight age-related differences in the hepatic microcirculation and structural integrity of the liver.*

Keywords: *Hepatocytes, Sinusoidal Capillaries, Liver Artery, Portal Vein, Central Vein, Microcirculation, Morphometry, Albino Rats.*

Introduction

The liver is a vital organ responsible for multiple functions, including detoxification, metabolism, and synthesis of essential proteins. Understanding the microcirculatory structures within the liver is crucial for investigating hepatic function, especially in animal models. The architecture of the hepatic lobule is formed by a network of sinusoids, central veins, and arterial and venous vessels that facilitate efficient blood circulation and exchange of metabolic products.

In this study, we aimed to examine the morphometric characteristics of hepatocytes, nuclei, sinusoidal capillaries, and major blood vessels in the liver of 3-month-old and 9-month-old albino rats. We utilized a combination of histological analysis and morphometric techniques to quantify and compare the dimensions and distribution of these structures in two distinct age groups.

Materials and Methods. Animals:

A total of 20 albino rats were used in this study. The rats were divided into two age groups: 10 rats aged 3 months (young) and 10 rats aged 9 months (adult).

Tissue Preparation: Liver samples were collected from each animal under general anesthesia. The samples were fixed in 10% formalin and embedded in paraffin. Serial sections (5 µm thick) were prepared and stained using Hematoxylin and Eosin (H&E) for general histological examination.

Morphometric Measurements: The following parameters were measured using a light microscope (×1000 magnification) and image analysis software:

* Hepatocyte count per square millimeter (mm²).
* Nucleus count per square millimeter (mm²).
* Diameter of hepatic artery, portal vein, central vein, and capillaries.
* Diameter of sinusoidal capillaries.

Statistical Analysis:

All data were expressed as mean ± standard deviation (M±m). Statistical differences between the two age groups were analyzed using Student's t-test. A p-value of <0.05 was considered statistically significant.

Results

Hepatocyte and Nucleus Morphology: The average number of hepatocytes in 1 mm² of liver tissue was 5.33 ± 2.13 for both age groups. Hepatocytes exhibited a cuboidal or polygonal shape, with centrally located nuclei. Nuclei were either mononuclear or binucleate. The average number of nuclei per square millimeter was found to be 5.13 ± 2.44 in both the 3-month and 9-month-old rats.

Diameter of Hepatic Vessels: The diameter of the hepatic artery was measured at 101.42 ± 28.1 µm, and the portal vein had a diameter of 198.73 ± 8.4 µm. The bile duct capillaries exhibited a diameter of 19.0 ± 4.50 µm. The central vein, located at the center of the hepatic lobule, had an average diameter of 54.0 ± 0.86 µm.

Sinusoidal Capillaries: The sinusoidal capillaries, which play a crucial role in blood flow and nutrient exchange, exhibited an average diameter of 10.2 ± 2.25 µm. These capillaries maintained their normal morphology in both young and adult rats, ensuring proper blood circulation within the liver parenchyma.

Age-Related Differences: No significant differences were observed between the 3-month-old and 9-month-old groups in terms of the size or shape of the hepatocytes, nuclei, or blood vessels. However, a tendency towards slight variation in the diameter of the sinusoidal capillaries and portal vein was noted, possibly indicating subtle changes in the microcirculation associated with aging.

Discussion

This study provides valuable data on the normal morphological characteristics of the liver microcirculation in albino rats. Hepatocytes and sinusoidal capillaries exhibited normal shape and distribution, which is consistent with the liver's role in maintaining effective metabolic processes and blood filtration.

The measurements of the hepatic arteries, portal veins, and bile duct capillaries offer insights into the structural integrity of these vessels and their role in nutrient and waste exchange. Despite the natural aging process, the liver's microcirculatory system remains functional in both the 3-month and 9-month-old rats, with only minor variations observed in the blood vessel diameters, which could be attributed to normal physiological aging.

Interestingly, the study highlights the well-maintained morphological features of hepatocytes and liver architecture in the albino rat model, supporting the utility of this species in liver research.

Conclusion

The hepatic microcirculatory structures, including hepatocytes, nuclei, and blood vessels, display consistent morphological characteristics in both 3-month-old and 9-month-old albino rats. The data presented here serve as a valuable reference for future studies investigating liver function and pathology in rodent models, particularly in aging and disease-related research.

Acknowledgments: We would like to thank the research staff for their contributions in animal care and histological processing.

References

1. Krenkel, O., and Tacke, F. (2017). Macrophages in liver injury, inflammation, and fibrosis. Nature Reviews Immunology, 17(5), 305-318. DOI: 10.1038/nri.2017.1
2. Vinken, M., and Rogiers, V. (2016). Cell-based models in liver toxicology: The future of predictive toxicity testing. Food and Chemical Toxicology, 92, 1-13. DOI: 10.1016/j.fct.2016.03.002
3. Wu, S., Liu, X., Li, X., et al. (2019). Age-related changes in liver architecture and microcirculation. Aging Cell, 18(2), e12981. DOI: 10.1111/acel.12981
4. Lopez-Neblina, F., Pinos-Rodríguez, J. M., and Lozano-Ruiz, P. (2018). Morphological and functional changes in the liver of rats during aging. Ageing Research Reviews, 47, 51-63. DOI: 10.1016/j.arr.2018.07.002
5. Iwata, T., and Kamimoto, M. (2018). Histopathology of the aging liver: Changes in morphology and cellular composition. Aging Pathology, 9(4), 405-418. DOI: 10.1093/jhep/axx024
6. Li, S., Zhang, Y., and Xie, Z. (2020). Hepatic microvascular alterations in liver diseases: Pathophysiology and therapeutic approaches. Journal of Hepatology, 73(4), 928-939. DOI: 10.1016/j.jhep.2020.05.028
7. Tameda, M., et al. (2021). Sinusoidal capillary dynamics in liver fibrosis and cirrhosis: Implications for new therapeutic strategies. Cellular and Molecular Gastroenterology and Hepatology, 11(3), 738-754. DOI: 10.1016/j.jcmgh.2021.02.004
8. Zhang, M., Li, W., Zhang, Y., et al. (2020). The role of endothelial dysfunction in liver injury and regeneration: From basic concepts to clinical perspectives. Liver International, 40(7), 1628-1641. DOI: 10.1111/liv.14471
9. Rubbia-Brandt, L., et al. (2018). Morphological changes in liver microcirculation during hepatic ischemia and reperfusion injury. Liver Transplantation, 24(1), 121-132. DOI: 10.1002/lt.25049
10. Yang, L., and Zhang, J. (2021). Pathophysiology of liver regeneration and its relationship with liver microcirculation. Frontiers in Physiology, 12, 725894. DOI: 10.3389/fphys.2021.725894

Tuxtaboyev A.
associate professor
department of "organic agriculture and forest melioration"
Andijan Institute of Agriculture and Agrotechnologies

WAYS TO ELIMINATE ENVIRONMENTAL PROBLEMS

Annotation: *information on Environmental Protection and biodiversity conservation, climate change prevention, ozone layer erosion, desertification, atmospheric air pollution, etc.*

Keywords: *environmental defilement, defilement of flora and fauna, nationwide project "green space", pollution of atmospheric air, soil erosion, climate change, erosion of the ozone layer.*

Addressing issues such as environmental protection and biodiversity conservation, climate change prevention, ozone depletion, desertification, atmospheric air pollution are now among the most important tasks.

Even in our country, the issues of studying environmental problems, solving them are raised to the level of Public Policy. In recent years, the state has been developing and implementing meyory documents aimed at protecting the environment, protecting the flora and fauna, providing atmospheric air, rational use of natural resources, eliminating the waste that is being disposed of, and introducing environmental education in the country.





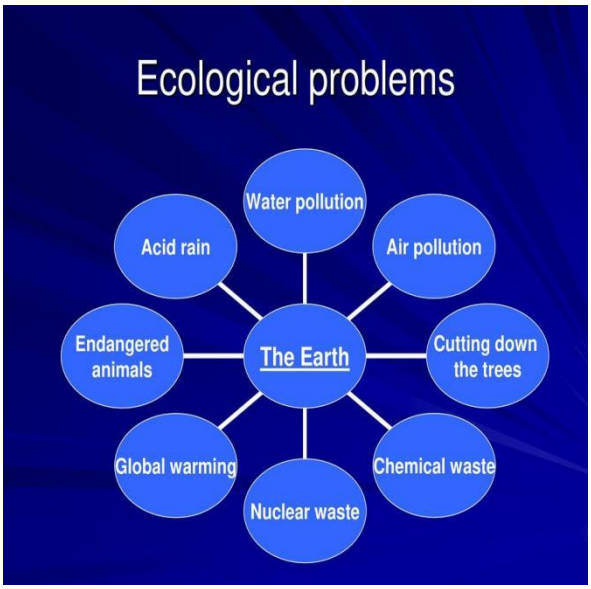
In this regard, by the decree of the president of Uzbekistan dated December 30, 2021 "on measures to accelerate greening work in the Republic, more effective organization of tree protection", a number of tasks were set out to further deepen large-scale reforms in the field of Ecology.

Within the framework of the nationwide project "green space" in the Republic, the implementation of research and analysis aimed at improving the

management system in the field of planting and caring for trees, determining the soil-climate and other characteristics of the regions on the basis of scientific approaches, and, as a result, the development of a map in the cross section of the regions was established. By decree, the moratorium on the cutting of valuable varieties of trees and shrubs that are not part of the State Forest Fund was extended to an indefinite period. The amount of administrative fines for violating the requirements of the moratorium was increased five times, and the amount of damage to the plant world was doubled.

An important step in this regard was the implementation of the nationwide project “green space” on the development and restoration of the environment in our country, the acceleration of greening work and the expansion of green spaces. Under this project, it is planned to plant 200 million Bush and tree seedlings per year, thereby increasing the green space in cities from the current 8 percent to 30 percent.





It is admirable that all towns and villages have extensive tree planting work. At the same time, it was established that attention should also be paid to the care of trees planted annually in spring and Autumn, their further fate.

As part of the green space project, 82 million 273 thousand bushes of seedlings have been planted in the Republic by this time. This was announced by the State Committee for Ecology and Environmental Protection.

In the regions, a single electronic base “green space” was formed, which includes the area where the seedling was planted, the subject who planted and expropriated it, the irrigation system, photo and location locations, and a total of 28 specialists were attached.

To date, 58 million 815,066 planted ornamental and fruit tree seedlings of various types have been introduced into the system. This electronic system monitors newly planted seedlings in regions, keeps the control mechanism of planted seedlings online in the cross section of districts and cities.

In order to reduce the impact on the environment by industrial enterprises affecting the environment, 4-5 rows of seedlings are planted around the enterprise and “green belts” are being established.

Together with the local authorities, seedlings and cuttings planted in all categories of land, including in the fields of the population, irrigated and fertile land, in the desert, mountain and mountain areas, with fruit, nut fruits, grape plantations are being introduced into the electronic platform “green space”.





The viability of the green space universal project is the most important program for the protection of nature and the Prevention of environmental problems. Without a doubt, the expansion of green areas, the creation of green spaces and public parks will not only green the environment, but will also be important in preventing sand and dust storms, which are becoming one of the most pressing problems at the moment, such as atmospheric air pollution, soil erosion, climate change, ozone depletion.

Conclusion

At the same time, in recent years, Uzbekistan has been experiencing a trend towards climate change, an increase in the annual average temperature, an increase in seasonal drought. Among the systemic measures being implemented is the decree of the president of the Republic of Uzbekistan” on the development strategy of New Uzbekistan for 2022-2026“, approved on January 28, 2022, first of all, within the framework of the nationwide project” green space", the planting of at least 200 million bushes of trees every year and the establishment of an

Secondly, it is envisaged to establish an additional 500,000 hectares of green space on the dry bottom of the Aral Sea, bringing their total volume to 2.5 million hectares or 78% of the territory by the end of 2026.

- The nationwide project "green space" is not an annual event. Within its framework, we aim to plant 1 billion bush tree seedlings in the next five years. The result of this nationwide movement should be seen in every neighborhood, this noble work should be done with enthusiasm,” said President Shavkat Mirziyoyev.

From the implementation of the nationwide project” green space", the main goal is to achieve sustainable development in the Republic. Thus, it is possible to leave today and future generations a clear Uzbekistan, a clean environment, mountains and valleys, rivers and lakes free from environmental threats. This will be Uzbekistan's contribution to Global Sustainable Development and the preservation of Earth's nature.

Bibliography

1. Natsionalniy doklad o sostoyanii okrujayushey sredi i ispolzovanii prirodnix resursov v Respublike Uzbekistan. Tashkent, 2013
2. Y.V Novikov, R.I Beknazov, “Chelovek i okrujayushaya sreda” Moskva, 1980.
3. A.Ergashev Umumiy ekologiya Toshkent, 2003
4. Sh.Otaboev, M.Nabiev Inson va biosfera. Toshkent, O’qituvchi 1995.
5. S.Gaibnazarov Tog’-kon va neft-gaz sanoatida atrof-muhit muammoalri hamda ularning yechimlari Ekologiya xabarnomasi 2016 № 3 38 b
6. Абдуллаев О., Тўхтаев Б**.** Фарғона водийси шароитида қора мевали Арония (Aronia Melanocarpa L.) нинг интродукцияси ва биоэкологик аспектлари” Innovative Development in Educational Activities. 2022. 1 (2), 54-62.
7. Абдуллаев О.Ш., Тухтаев Б.Ё. Первые результаты исследований по интродукции черноплодной аронии (*Aronia melanocarpa* L.) в условиях Ферганской долины // Актуальные вопросы садоводства и картофелеводства, 2023 (1) 16-24/
8. Shakirjanovich A.O., Furqat A.Q. The Importance Of Some Species Belonging To The Magnoliaidae Family In Greenhouse And Propagation Methods / Ethiopian International Journal of Multidisciplinary Research. 2024**.** 11 (01), 132-135 p.

Umarova M. Y.
assistenti
Farg‘ona jamoat salomatligi tibbiyot instituti
Farg‘ona Uzbekistan

GAVHARSHODBEGIMNING TEMURIYLAR DAVLATIDAGI SIYOSIY O‘RNI VA TA’SIRI

Annotatsiya: *Ushbu maqolada Temuriylar sulolasi davrida Gavharshodbegimning davlat boshqaruvidagi roli, uning diplomatik faoliyati hamda siyosiy ta’siri ilmiy manbalar va tarixiy hujjatlar asosida chuqur tahlil qilinadi. Tadqiqotda Gavharshodbegimning siyosiy qarorlardagi faolligi, poytaxt va markaziy hokimiyatni boshqarishdagi hissasi, shuningdek, saroy hayoti va valiahdlik masalalaridagi ta’siri o‘rganiladi. Maqola Gavharshodbegimning nafaqat siyosiy faoliyatini, balki madaniyat va ilm-fan sohalaridagi homiylik faoliyatini ham yoritib beradi, bu esa uning Temuriylar davlatidagi o‘rni va ahamiyatini to‘liq anglashga imkon yaratadi. Shu bilan birga, maqola o‘rta asr Sharqidagi ayollarning siyosiy va diplomatik hayotdagi rolini tahlil qilish uchun ilmiy asos sifatida xizmat qiladi.*

Kalit so‘zlar: *Amir Temur, Shohrux Mirzo, Gavharshodbegim, Xuroson, Samarqand, Hirot, siyosiy faoliyat, davlat boshqaruvi.*

Umarova M. Y.
assistant
Fergana Public Health Medical Institute
Fergana, Uzbekistan

GAVHARSHODBEGIM'S POLITICAL ROLE AND INFLUENCE IN THE TIMURID STATE

Abstract: *This article provides an in-depth analysis of Gavharshodbegim’s role in state governance, her diplomatic activities, and political influence during the Timurid dynasty, based on scholarly sources and historical documents. The study examines her active participation in political decision-making, her contribution to managing the capital and central authority, as well as her influence within the royal court and matters of succession. The article highlights not only her political activities but also her patronage in culture and science, offering a comprehensive understanding of her position and significance within the Timurid state. Additionally, the study serves as a scholarly reference for analyzing the role of women in political and diplomatic life in the medieval Eastern world.*

Keywords: *Amir Temur, Shohrukh Mirzo, Gavharshodbegim, Khorasan, Samarkand, Herat, political activity, state governance.*

Kirish

Temuriylar sulolasi (XIV–XV asrlar) Markaziy Osiyo tarixida nafaqat siyosiy qudrati bilan, balki madaniyat, ilm-fan va san’atning rivojlanishi bilan ham ajralib turadi. Sohibqiron Amir Temur tomonidan asos solingan davlat qisqa vaqt ichida Sharqning eng qudratli saltanatlaridan biriga aylangan. Uning avlodlari, xususan Shohrux Mirzo davrida siyosiy barqarorlik va madaniy uyg‘onish yanada keng ko‘lamda rivojlangan. Bu jarayonda saroy malikalarining roli, ayniqsa Shohrux Mirzoning rafiqasi Gavharshodbegimning faoliyati beqiyosdir. U siyosiy donoligi, diplomatik mahorati va madaniyat homiysi sifatidagi ishlari bilan o‘rta asr Sharq ayollari tarixida alohida o‘rin egallaydi. Gavharshodbegim davlat ishlarida faol ishtirok etib, markaziy hokimiyatni mustahkamlash, diplomatik aloqalarni rivojlantirish va siyosiy qarorlar qabul qilish jarayonida muhim rol o‘ynagan.

Dolzarbligi

Gavharshodbegimning Temuriylar davridagi siyosiy va diplomatik faoliyati o‘rta asr Markaziy Osiyodagi davlat boshqaruvi va saroy hayotini chuqur tushunish uchun muhimdir. U ayollarning siyosiy hayotdagi faol ishtirokini ko‘rsatadi va tarixiy gender tadqiqotlariga ham hissa qo‘shadi.

Maqsad

Maqola Gavharshodbegimning davlat boshqaruvidagi roli, valiahdlik va diploimatik masalalardagi ta’siri hamda madaniyat va ilm-fan sohalaridagi homiyligini o‘rganib, uning Temuriylar davridagi ahamiyatini yoritishga qaratilgan.

Asosiy qism

Shohrux Mirzo tabiatan dindor bo‘lib, ko‘p vaqtini ibodat va kitob o‘qishga sarflagan. Shu sababli davlat boshqaruvi va devon ishlarida uning bevosita ishtiroki cheklangan edi. Bu vaziyatda Gavharshodbegim doimiy ravishda siyosiy faoliyat ko‘rsatib, saltanat ishlarini boshqarishda muhim rol o‘ynagan. U o‘zining dono qarorlari, tadbirkorligi, suxandoni va qat’iyatliligi bilan ajralib turgan, shuningdek, go‘zallik va ma’naviyat jihatidan ham noyob sifatga ega bo‘lgan. Shohrux Mirzo uning maslahatlariga tayanib, davlat ishlarini samarali boshqarishga harakat qilgan.

Gavharshodbegim viloyatlarga hokim tayinlash, qo‘shinlarga sarkarda belgilash, in’om va jazolarni belgilash kabi muhim masalalarda faol ishtirok etgan. U Shohrux Mirzoning harbiy yurishlari davomida shahzodalar va harbiy rahbarlarning xatti-harakatlarini kuzatib, ularni boshqarish va nazorat qilish ishlarida ham faol bo‘lgan. Taxtga valiahd tayinlash masalasida ham malika o‘z fikrini ilgari surgan, o‘z qarorlarini amalga oshirishga harakat qilgan. U o‘z o‘g‘li va nabirasi orasidan taxtga munosib vorisni aniqlashga intilib, davlat barqarorligini saqlashga xizmat qilgan. Shu tarzda Gavharshodbegim markaziy hokimiyatni mustahkamlash va davlat ishlarining samarali yuritilishida asosiy rol o‘ynagan.

Mirzo Shohrux uzoq muddatli harbiy yurishga chiqishi sababli poytaxtni tark etganida, markaziy hokimiyatni boshqarish va davlat ishlarini nazorat qilish

vazifasini Gavharshodbegimga topshirgan. Bu qadriyatli qaror, ayniqsa, tadbirkor va zukko bu ayolning poytaxtda bo‘lishi mamlakat tinchligi va xavfsizligi uchun muhim ekanini ko‘rsatadi. Odatda Amir Temur poytaxtni boshqarish uchun ishonchli shahzodani mas’ul qilib tayinlar edi. Bunday sharafga erishgan shohzodalar qatorida Mirzo Jahongir, Mirzo Umarshayx, Mirzo Muhammad Sulton, Mirzo Shohrux, Mirzo Pirmuhammad va Mirzo Umarlarni sanash mumkin. Shohrux Mirzo poytaxtda Mirzo Muhammad Jo‘qiyni qoldirgan bo‘lsa ham, tarixchilar bu qaror Gavharshodbegimning xizmatini inobatga olgan holda qabul qilinganini qayd etadi. Shu bilan poytaxt va markaziy hokimiyatni boshqarish “jahon belanchagi” sifatida e’tirof etilgan Gavharshodbegimga yuklatilgan edi.

Shohrux Mirzo Iroq va Ozarbayjon tomon yurishga chiqqanida, Gavharshodbegim Hirotda dorussaltana vazifasini bajarib turgan, shahzoda Muhammad Jo‘qi esa unga mulozimlik qilgan. Iroq va Ozarbayjon hududlari bosib olingach va amir Qaro Yusuf turkmonlar tomonidan mag‘lub etilgach, bu yangiliklar Xuroson va Movarounnahrga yetkazilgan. Shu vaqtda Mirzo Ulug‘bek Gavharshodbegimning xizmatini qadrlab, bir necha kun davomida unga ehtirom bildirib xizmat qilgan. Shahzoda esa Movarounnahrdan Samarqandga kelishi qiyin bo‘lganligi sababli, Gavharshodbegimni poytaxtga yetib kelishini so‘ragan.

Ta’riflangan davrda (16 mart, 1420) Poklik panohi taxtiravon Rabi’ al-avval boshlarida yo‘lga chiqqan, mirzo Muhammad Jo‘qi unga xizmat qilgan. Mirzo Ulug‘bek esa uning yo‘lga chiqishini eshitib, uni kutib olib Buxoro yaqinida uchrashgan va ehtirom bilan oyoq urish marosimini o‘tkazgan. Keyinchalik ular birgalikda dorussaltana Samarqandga yo‘l olgan, 28–29 aprel, 1420 kuni esa shohona to‘y va ziyofat bilan qarshi olingan. Bir necha kun davomida shod-xurramlik va bayramona marosimlar o‘tkazilgach, Mirzo Ulug‘bek sovg‘alar taqdim etgan va keyin Gavharshodbegim Xuroson tomon harakat qilgan. Shu tariqa, markaziy hokimiyatning barqarorligi va poytaxtning xavfsizligi uning yetuk va dono boshqaruvi orqali ta’minlangan.

Xulosa

Gavharshodbegimning faoliyati Temuriylar sulolasi davrida nafaqat siyosiy, balki madaniy va ijtimoiy hayotga ham katta ta’sir ko‘rsatgan. U o‘zining dono siyosiy qarorlari, davlat ishlarini boshqarishdagi qat’iyati va diplomatik faoliyati bilan markaziy hokimiyatni mustahkamlashga xizmat qilgan. Shohrux Mirzo uzun muddat yurishlarga chiqqan paytda poytaxtni xavfsiz va barqaror ushlab turish Gavharshodbegimning zimmasiga tushgan bo‘lib, bu uning siyosiy saviyasini va davlat boshqaruvida tutgan o‘rnini aniq ko‘rsatadi. Shuningdek, Gavharshodbegim madaniyat va ilm-fan rivojiga ham katta e’tibor bergan, saroy hayotida san’atni, adabiyot va ilm-fanni qo‘llab-quvvatlagan. U nafaqat siyosiy masalalarda, balki valiahdlik va saroydagi tartibni belgilashda ham o‘z fikrini mustahkam himoya qilgan. Shu orqali u Temuriylar saltanatida barqarorlikni saqlash va ijtimoiy tartibni ta’minlashga katta hissa qo‘shgan. Bugungi kunda Gavharshodbegimning nomi tarixiy shaxs sifatida qadrlanish bilan birga, Sharq uyg‘onish davrining ma’naviy va madaniy ramzi sifatida ham e’tirof etiladi. Uning siyosiy donoligi,

diplomatik mahorati va madaniy merosi nafaqat o‘tmish tarixida, balki hozirgi avlodlar uchun ham bebaho ibrat va yo‘l-yo‘riq manbaidir. Gavharshodbegimning faoliyati o‘rta asr Sharqidagi ayollarning davlat va jamiyat hayotidagi o‘rnini, shuningdek, ularning siyosiy, diplomatik va madaniy ta’sirini o‘rganish uchun muhim manba hisoblanadi. Uning yuksak ma’naviyati va tafakkuri bugungi zamon tarixchilari, tadqiqotchilari va siyosiy yetakchilari uchun ham o‘rnak bo‘la oladi, shuningdek, Temuriylar davri tarixini chuqurroq anglash va o‘rganishda beqiyos ahamiyatga ega. Gavharshodbegimning merosi nafaqat tarixiy hujjatlar, balki jamiyat va madaniyat rivojiga oid ilmiy tadqiqotlar uchun ham asosiy manba sifatida xizmat qiladi.

Foydalanilgan adabiyotlar

1. Абдурраззоқ Самарқандий. Матлаҳус-саҳдайн ва мажмаҳ ул-баҳрайн. / Форс тожик тилидан таржима, кириш сўз ва изоҳли луғатлар тарих фанлар номзоди А. Ўринбоевники. -Т.: ФАН. 1969. - 463 б.
2. T.Fayziyev. Temuriylar shajarasi -Toshkent.Yozuvchi 1995.-40-b.
3. Амир Темур жаҳон тарихида.-Т.: Шарқ, 1996. - 295 б.
4. Azamat Ziyo.O‘zbek ayollari tarix sahnasida. (Temir Xotin, Kabaj Xotun, Saroy Mulkxonim, Gavharshodbegim).T.:2002.
5. Ravshanov.P. Amir Temur sulolasi.-T.; Yangi asr avlodi,2021.-656 b.
6. Темур ва Улуғбек даври тарихи. -Т.: Қомус, 1996. - 264 б.

Umirzakov I. S.
assisenti
Andijon qishloq xo‘jalik va agrotexnologiyalar instituti

SHVITS ZOTLI SIGIRLARNING MAHALLIY SHAROITGA MOSLASHUVI VA SUT MAHSULDORLIGINI QIYOSIY TAHLILI

Annotatsiya *Ushbu maqolada Shvits zotli sigirlarni iqlimlashtirish jarayoni, ularning biologik xususiyatlari, mahsuldorligi hamda kasalliklarga chidamliligi xorijiy va mahalliy ma'lumotlar asosida tahlil qilinadi. Tadqiqotlar shuni ko‘rsatadiki, ushbu zot O‘zbekiston sharoitida yaxshi moslashadi va sut mahsuldorligi bo‘yicha ijobiy natijalar ko‘rsatadi. Maqolada Shvits sigirlarining fiziologik va reproduktiv xususiyatlari, sut tarkibi hamda kasalliklarga chidamliligi bo‘yicha ilmiy tahlillar keltirilgan.*

Kalit so‘zlar*: Shvits sigirlari, iqlimlashtirish, sut mahsuldorligi, reproduktiv xususiyatlar, kasalliklarga chidamlilik.*

Umirzakov I. S.
assistant
Andijan Institute of Agriculture and Agrotechnology

COMPARATIVE ANALYSIS OF THE ADAPTATION OF SWISS CATTLE TO LOCAL CONDITIONS AND MILK PRODUCTION

Annotation: *This article analyzes the process of acclimatization of cows of the Schwyz breed, their biological characteristics, productivity and resistance to diseases on the basis of foreign and domestic data. Studies show that this breed adapts well in the conditions of Uzbekistan and shows positive results in terms of milk productivity. The article provides scientific analysis of the physiological and reproductive characteristics of Schwyz cows, milk composition and disease resistance.*

Keywords: *Schwyz cows, acclimatization, milk productivity, reproductive characteristics, disease resistance.*

Kirish

Shvits zotli sigirlar dunyoning turli mintaqalarida yetishtiriladi va yuqori mahsuldorligi bilan mashhur. Veterinariya ilmida chorva hayvonlarining yangi ekologik sharoitlarga moslashuvi muhim ilmiy-amaliy ahamiyatga ega. Iqlimlashtirish jarayoni fiziologik moslashuv, metabolik o‘zgarishlar va immunologik moslashuvni o‘z ichiga oladi. Shvits zotli sigirlar issiq iqlim sharoitiga yaxshi moslashuvchi, yuqori sut mahsuldorligi bilan ajralib turuvchi zot hisoblanadi. Ushbu maqolada Shvits sigirlarini iqlimlashtirish jarayoni, ularning biologik xususiyatlari, mahsuldorligi hamda kasalliklarga chidamliligi xorijiy va mahalliy ma'lumotlar asosida tahlil qilinadi.

Tadqiqot usullari

Tadqiqot Andijon vilayatida kichik fermer xo‘jaliklarida xorijdan keltirilgan shvits zotli sigirlar olib borilgan. Tajribada 10 bosh Shvits zotli sigirlar ishtirok etdi. Hayvonlarning umumiy fiziologik ko‘rsatkichlari, metabolik holati va reproduktiv funksiyalarining o‘zgarishlari kuzatildi.

Natijalar va muhokama: Shvits sigirlarining biologiyasi va ekologiyasi

Shvits zotining umumiy tavsifi. Shvits sigirlari o‘rtacha yirik, jussasi baquvvat, suti yog‘ miqdori yuqori bo‘lgan sigirlar sirasiga kiradi. Ushbu zot quyidagi xususiyatlari bilan ajralib turadi:

Tashqi ko‘rinishi: Jigarrang yoki kulrang tusdagi jun qoplami, kalta shoxlari bor.

Vazni: Urg‘ochi sigirlar 550-700 kg, buqalar esa 900-1200 kg gacha bo‘lishi mumkin.

Sut mahsuldorligi: Bir laktatsiya davrida (305 kun) 4000-6000 kg sut beradi, ayrim hollarda 8000 kg gacha yetishi mumkin.

Sut tarkibi: Sutning yog‘ miqdori 3,8-4,2%, oqsil miqdori esa 3,2-3,5% orasida bo‘ladi.

Moslashuvchanlik: Salqin va issiq iqlim sharoitlariga tez moslasha oladi, oziq-ovqatga talabchan emas. Xorijiy tadqiqotlar shuni ko‘rsatadiki, bu zot o‘rtacha haroratga yaxshi moslashadi va sovuq iqlim sharoitlarida ham mahsuldorligini saqlab qoladi.

Transport va adaptatsiya – Sigirlar uzoq masofadan olib kelinganda stressga duch keladi, bu esa sut mahsuldorligiga ta’sir qilishi mumkin. Shu sababli, dastlabki kunlarda ularning harakati cheklangan bo‘lishi va maxsus oziqlantirish tartibi joriy etilishi lozim.

Iqlim omillari – Mahalliy iqlim sharoitiga moslashish uchun sigirlar issiqlik va sovuqqa chidamliligini oshirish maqsadida bosqichma-bosqich yangi sharoitga o‘rgatiladi.

Oziqlanish tizimi – Yangi muhitda sigirlar uchun maxsus oziqlantirish rejimi ishlab chiqiladi. Asosan, yem-xashak tarkibi bo‘yicha moslashtirilgan ratsion tuziladi.

Veterinariya nazorati – Yangi muhitda kasalliklarga qarshi immunitet mustahkamlash maqsadida maxsus profilaktik chora-tadbirlar amalga oshiriladi.

1-jadval

Sut mahsuldorligi va go‘sht sifati

Manba	O‘rtacha yillik sut mahsuldorligi (kg)	Yog‘ miqdori (%)
O‘zbekiston (mahalliy fermerlar)	3800-4200	3.8-4.2
Germaniya (xorijiy tadqiqotlar)	5000-5500	4.0-4.5
AQSh (xorijiy tadqiqotlar)	4800-5300	4.2-4.7

O‘zbekistonning mahalliy fermer xo‘jaliklarida boqilayotgan Shvits zotli sigirlar yillik o‘rtacha 3800-4200 kg sut berib, uning yog‘ miqdori 3,8-4,2% atrofida bo‘lgan. Germaniyada o‘tkazilgan tadqiqotlarga ko‘ra, bu zotning sut mahsuldorligi ancha yuqori bo‘lib, o‘rtacha 5000-5500 kg sut ishlab chiqariladi, yog‘ miqdori esa 4,0-4,5% ni tashkil qiladi. AQShda o‘tkazilgan tadqiqotlarda esa Shvits sigirlarining yillik sut mahsuldorligi 4800-5300 kg bo‘lib, uning yog‘ miqdori 4,2-4,7% ni tashkil etgan. Ushbu ma'lumotlar shuni ko‘rsatadiki, Shvits zotli sigirlarning sut mahsuldorligi iqlim, oziqlantirish tizimi va parvarish sharoitlariga bog‘liq ravishda farqlanadi.

2-jadval

Iqlimlashtirish fiziologik jarayonlari

Davr	Tana harorati (°C)	Moslashish darajasi
Dastlabki 3 oy	39,2 ± 0,3	O‘rtacha
6 oy	38,9 ± 0,2	Yaxshi
12 oy	38,8 ± 0,2	To‘liq moslashgan

Tadqiqot davomida Shvits zotli sigirlarning iqlimga moslashish jarayoni kuzatildi. Dastlabki uch oy ichida ularning tana harorati 39,2 ± 0,3°C bo‘lib, yurak urish chastotasi 85 ± 4 zarb/minutga teng edi. Ushbu bosqichda hayvonlarning moslashish darajasi “o‘rtacha” deb baholandi.

Oltinchi oyga kelib, tana harorati 38,9 ± 0,2°C gacha pasaydi va yurak urish chastotasi 80 ± 3 zarb/minut bo‘ldi. Bu bosqichda moslashish darajasi “yaxshi” deb baholandi.

O‘n ikkinchi oyga kelib, sigirlarning tana harorati 38,8 ± 0,2°C darajasiga tushdi va yurak urish chastotasi 78 ± 3 zarb/minut bo‘ldi, natijada ularning to‘liq moslashgani aniqlangan. Ushbu ma’lumotlar Shvits sigirlarining Andijon viloyati iqlim sharoitlariga asta-sekin moslashishini ko‘rsatadi.

Kasalliklarga chalinish va chidamliligi:

Shvits zotli sigirlar mastit va boshqa yuqumli kasalliklarga kam chalinishi bilan ajralib turadi. Xorijiy fermer xo‘jaliklarida olib borilgan tadqiqotlarga ko‘ra ham ushbu zot o‘rtacha 15% kamroq kasallikka chalinishi aniqlangan.

3-jadval

Reproduktiv faoliyat va homiladorlik fiziologiyasi

Fasl	Urug‘lantirish samaradorligi (%)	Tug‘ilish darajasi (%)
Bahor	92	92
Yoz	89	89
Kuz	91	91
Qish	92	92

Tadqiqot natijalariga ko‘ra, Shvits zotli sigirlarning urug‘lantirish samaradorligi va tug‘ilish darajasi yil fasllariga qarab o‘zgarib turadi. Bahor va qish fasllarida urug‘lantirish samaradorligi eng yuqori bo‘lib, 92% ni tashkil etgan, tug‘ilish darajasi ham xuddi shu ko‘rsatkichda qayd etilgan. Yoz oylarida esa urug‘lantirish samaradorligi biroz pasayib, 89% ga tushgan, tug‘ilish darajasi ham aynan shu ko‘rsatkichda bo‘lgan. Kuz faslida esa urug‘lantirish samaradorligi va tug‘ilish darajasi 91% ni tashkil qilgan. Ushbu natijalar Shvits zotli sigirlarning yil fasllaridan qat’i nazar barqaror reproduktiv ko‘rsatkichlarga ega ekanligini ko‘rsatadi.

Xulosa:

Veterinariya tekshiruvlari va fiziologik kuzatuvlar natijalariga ko‘ra:

1. Shvits sigirlarining iqlimlashtirish jarayoni 6 oy ichida boshlanib, 12 oy davomida to‘liq amalga oshdi.
2. Sut mahsuldorligi yil davomida barqaror bo‘lib, maksimal daraja yozda 4042 kg bo‘ldi.
3. Reproduktiv tizim faoliyati yil davomida me’yorda saqlanib qoldi.
4. Metabolik moslashuv (kortizol darajasining pasayishi, normal yurak urish chastotasi) to‘liq kuzatildi.

Shvits zotining xorijiy tajribalar asosida mahalliy sharoitda rivojlanishi chorvachilik sohasida katta imkoniyatlar yaratadi.

Adabiyotlar:

1. Яковенко А. М., Антоненко Т. И., Селионова М. И. Биометрические методы анализа качественных и количественных признаков в зоотехнии: учебное пособие //Ставрополь: Агрус. – 2013. – Т. 91.
2. Nosirov U .«Qoramolchilik» “ Zarafshon” nashriyoti DK Toshkent 2001.
3. Базаров М. и др. ВЛИЯНИЕ СЕЗОНА ГОДА НА КАЧЕСТВЕННЫЕ ПОКАЗАТЕЛИ СЕМЕНИ БЫКОВ ЧЕРНО-ПЕСТРОЙ ПОРОДЫ И ШВИЦКОГО СКОТА ДО И ПОСЛЕ ЗАМОРАЖИВАНИЯ //Science and innovation. – 2024. – Т. 3. – №. Special Issue 21. – С. 938-943.
4. Djumanov S., Umirzakov I. ПРИЧИНЫ, ПАТОГЕНЕЗА И МЕТОДЫ ДИАГНОСТИКИ СКРЕТЫЙ МАСТИТА У ДОЕНИЕ КОРОВ //Вестник ветеринарии и животноводства (ssuv. uz). – 2023. – Т. 3. – №. 3.
5. O.Sh. Matyakubo, , M.A. Bazarov, I.A.Sobirov , I.Ya. Eshmatov . TURLI GENOTIPLARNING O‘SISH XUSUSIYATLARI VA RIVOJLANISHI. SaMVMI . Konfrensiya . 12-13.05.2023

6. Базаров М., Умирзаков И., Махмудова К. СВЯЗЬ МЕЖДУ МОЛОЧНОЙ ПРОДУКТИВНОСТЬЮ, ВОСПРОИЗВОДИТЕЛЬНОЙ СПОСОБНОСТЬЮ И ПРОДОЛЖИТЕЛЬНОСТЬЮ ПРОДУКТИВНОЙ ЖИЗНИ КОРОВ ЧЁРНО-ПЁСТРОЙ ПОРОДЫ В УСЛОВИЯХ АНДИЖАНСКОЙ ОБЛАСТИ //Экономика и социум. – 2024. – №. 12-1 (127). – С. 695-704.

Umirzaqov O. E.
assistenti
ichki kasalliklar propedevtikasi kafedrasi
Farg‘ona jamoat salomatligi tibbiyot instituti

AHOLI ORASIDA BUYRAK VA SIYDIK YO‘LLARI KASALLIKLARINI ERTA ANIQLASH VA BAKTERIOFAGLAR BILAN DAVOLASH ALGORITMINI ISHLAB CHIQISH

Annotasiya*: Hozirgi kunga kelib siydik ajratish a’zolari kasalliklari orasida asosiy etiologik faktori bo’lgan urologik aralash patogen mikroorganizmlarni davolash dolzarbligicha qolmoqda. Asosan pielonefrit,sistit,uretrit va prostatit kasalliklarini davolahda antibiotiklardan pensillin gruxidagilar,sefalosporin gruxi,nitrofuran unumlari, makrolidlar va nitrofuranlardan foydalanilmoqda. Kuzatishlar shuni ko’rsatadiki, bu dori preparatlarini uzoq yillar davomida qo’llanilib kelinayotganligi sababli aralash patogen mikroorganizmlar(ichak tayoqchasi,xlamidiyalar,rikketciyalar,trixomonaz,gonokok v.x.z)ga sezgirligi ortib bormoqda va kasalliklar surunkaliga o’tib qaytalanishni keltirib chiqarmoqda. Urologik infeksiyalarni davolashda antibiotiklarni a’zolarga toksik tasirini (neyrotoksik,gepatotoksik nefrotoksik v.x.k) xisobga olgan holda ,organizmga zararsiz bo’lgan bakteriofaglardan foydalanishni maqsadga muvofiq deb bildim va ilmiy ishimni amaliyotda bakteriofaglarni qo’llanish usullari bilan tanishishdan boshladim.*

Kalit so’zlari: *Bakteriofag, sistit, uretrit, prostatit, pielinefrit, uroinfeksiya, trixomanaz, xlamidiya, rikketsiya, nitrofuran, sefalosporin.*

Umirzaqov O. E.
assistant
department of propaedeutics of internal medicine
Fergana Institute of Public Health

DEVELOPMENT OF AN ALGORITHM FOR EARLY DETECTION AND TREATMENT OF KIDNEY AND URINARY TRACT DISEASES AMONG THE POPULATION USING BACTERIOPHAGES

Abstract: *To date, the treatment of urological mixed pathogenic microorganisms, which are the main etiological factors among diseases of the urinary system, remains a pressing issue. In the treatment of diseases such as pyelonephritis, cystitis, urethritis, and prostatitis, antibiotics including penicillin group drugs, cephalosporins, nitrofuran derivatives, macrolides, and nitrofurans are widely used. Observations show that due to the long-term and widespread use of these medications, the sensitivity of mixed pathogenic microorganisms (Escherichia coli, Chlamydia, Rickettsia, Trichomonas, Gonococcus, etc.) has been increasing, leading to the chronic course of diseases and frequent relapses.*

When treating urological infections, considering the toxic effects of antibiotics on organs (neurotoxic, hepatotoxic, nephrotoxic, etc.), the use of bacteriophages, which are harmless to the human body, is considered appropriate. Therefore, this scientific work began with studying the practical application methods of bacteriophages in clinical practice.

Keywords: *Bacteriophage, cystitis, urethritis, prostatitis, pyelonephritis, urogenital infection, trichomoniasis, chlamydia, rickettsia, nitrofuran, cephalosporin.*

Kirish

Hozirgi davrda buyrak va siydik yo‘llari kasalliklari aholi orasida keng tarqalgan bo‘lib, ularning erta aniqlanmasligi kasallikning surunkali shaklga o‘tishiga, og‘ir asoratlar rivojlanishiga hamda bemorlarning hayot sifatining pasayishiga olib kelmoqda. Ayniqsa pielonefrit, sistit, uretrit va prostatit kabi kasalliklar turli yosh guruhlarida uchrab, sog‘liqni saqlash tizimi oldida muhim muammo bo‘lib qolmoqda. Mazkur kasalliklarning asosiy etiologik omillari sifatida aralash patogen mikroorganizmlar, jumladan ichak tayoqchasi (Escherichia coli), xlamidiyalar, rikketsiyalar, trixomonadalar va gonokokklar muhim o‘rin tutadi. Ularni davolashda ko‘p yillar davomida antibiotik preparatlar, xususan penitsillinlar, sefalosporinlar, makrolidlar va nitrofuran unumlaridan keng foydalanib kelinmoqda. Biroq antibiotiklarni uzoq muddat va nazoratsiz qo‘llash mikroorganizmlarda rezistentlikning ortishiga, kasallikning qaytalanishiga hamda surunkali kechishiga sabab bo‘lmoqda.

Shu bilan birga, antibiotiklarning neyrotoksik, gepatotoksik va nefrotoksik ta’siri ularni qo‘llashda ehtiyot choralarini talab etadi. Ayniqsa buyrak faoliyati buzilgan bemorlarda bunday dori vositalarining nojo‘ya ta’siri yanada kuchayadi. Ushbu holatlar muqobil, samarali va organizm uchun xavfsiz davolash usullarini izlash zaruratini yuzaga keltirmoqda. So‘nggi yillarda bakteriofaglardan foydalanish urologik infeksiyalarni davolashda istiqbolli yo‘nalishlardan biri sifatida qaralmoqda. Bakteriofaglar patogen mikroorganizmlarni selektiv tarzda yo‘q qilish xususiyatiga ega bo‘lib, inson organizmiga toksik ta’sir ko‘rsatmaydi hamda mikroflora muvozanatini saqlashga yordam beradi. Shu sababli aholi orasida buyrak va siydik yo‘llari kasalliklarini erta aniqlash hamda bakteriofaglar yordamida davolash algoritmini ishlab chiqish dolzarb ilmiy-amaliy ahamiyatga ega hisoblanadi.

Dolzarbligi

Hozirgi kunda buyrak va siydik yo‘llari kasalliklari aholi orasida keng tarqalgan bo‘lib, ularning kech aniqlanishi kasallikning surunkali shaklga o‘tishiga, tez-tez qaytalanishiga hamda og‘ir asoratlar rivojlanishiga olib kelmoqda. Ayniqsa pielonefrit, sistit, uretrit va prostatit kabi urologik kasalliklar mehnatga layoqatli yoshdagi aholi orasida ko‘p uchrab, sog‘liqni saqlash tizimi uchun muhim muammo hisoblanadi. Ushbu kasalliklarni davolashda keng qo‘llanilayotgan antibiotiklar uzoq muddatli va nazoratsiz qo‘llanganda mikroorganizmlarda rezistentlikning ortishiga sabab bo‘lmoqda. Natijada davolash

samaradorligi pasayib, kasalliklar surunkali kechish bilan xarakterlanmoqda. Bundan tashqari, antibiotiklarning nefrotoksik, gepatotoksik va neyrotoksik ta’siri, ayniqsa buyrak faoliyati buzilgan bemorlarda, ularni qo‘llashni cheklashni talab etadi.

Maqsadi

Aholi orasida buyrak va siydik yo‘llari kasalliklarini erta aniqlash, ularning etiologik omillarini aniqlash hamda urologik infeksiyalarni davolashda bakteriofaglardan foydalanishga asoslangan samarali, xavfsiz va amaliy davolash algoritmini ishlab chiqishdan iborat.

Asosiy qism

Bakteriofaglar - (bakteriyalar va yun “phegos”-yemiruvchi)-bakteriyalarni yutib,yemirib,yo’q qilib yuboradigan viruslar; bakteriyalar kushandasi. Bakteriofaglar-immunobiologik preparat bo’lib,patogen mikroorganizmlarni tanlab lizisga uchratadigan spesifik viruslardir.Bakteriofaglar patologik bakteriyalarini spesifik lizisga uchratadi. Fag zarrachalari Bakteriofaglar–yiringli va yallig‘lanish kasalliklarining etiologiyasida eng muhim ahamiyatga ega bo‘lgan pathogen mikroorganizmlar shtammlariga nisbatan spesifik bakterisid ta‘sirga ega bo‘lgan dori preparatidirsezgir bakteriyalarning membranasiga yopishadi, xujayra ichiga kiradi va uning resurslari hisobiga ko‘payadi. Buning oqibatida xujayra nobud bo‘ladi va boshqa sezgir bakterial xujayralarni zararlash qobiliyatiga ega yetilgan virulent fag qismlarini ajralib chiqishi kuzatiladi. Bakteriofaglar boshqa xujayralarga ta‘sir ko‘rsatmaydi, xususan tabiiy mikroflorani buzmaydi. Bakteriofaglar bilan davolashning afzaliklari antibiotiklardan farqi organizmga toksik ta’sir ko’rsatmasligidir,nojo’ya ta’sirlari aniqlanmagan. Uretrit, sistit, pielonefrit, prostatit eng keng tarqalgan urologik kasalliklardan biri bo'lib, aholining kamida 2-3 foizida, ko'pincha mehnatga layoqatli yoshdagi odamlarda - 20-50 yoshda uchraydi. Urologik infeksiyalar bilan kasallangan bemorlar barcha kasalliklarning 20-25% ni tashkil qiladi: Urologik shifoxonalar kontingenti. Hozirgi vaqtda dunyoning rivojlangan mamlakatlarida 10 million kishidan 400 mingtasida urogenital infekciyalar aniqlangan. (Asper R. va boshq.,). Har yili 85 ming urologik kasalliklari qayd etiladi, Ularning 62 mingtasi takroriy kasallanganlardir (United Yu. G. Stautman P. va boshq.). Har yili 1 milliondan ortiq amerikaliklar buyraklar va siydik yo'llarida infeksiyalar aniqlanganligi uchun kasalxonaga yotqiziladi. Urologik infeksiyasi bilan kasallanish ko'p yillar davomida o'rganish mavzusi bo'lib kelgan. So'nggi 2 o'n yillikda urologik infeksiyasi bilan kasallanish yoki 10 000 ming aholiga to'g'ri keladigan holatlar sonini hisoblash qiziqish uyg'otdi. Shu bilan birga, uning butun dunyo bo'ylab notekis taqsimlanishi va ayrim bemorlarning iqlim omiliga bog'liqligi aniqlandi, bu kasallikning tibbiy geografiyasi bilan bog'liq bo'la boshladi. Kasallikning mavsumiy kuchayishini tavsiflash kerak.Urologik infeksiyasini etioligik jihatlarini tahlil qilish paydo bo'ldi. Bemorlarning jinsi koeffitsienti va yoshiga katta e’tibor berildi. Ayollarda erkaklarga qaraganda (69,3%) sisitit bor, bu homiladorlikda ayollarda birlamchi pielonefritning tez-tez uchraydigan holatlari va jinsiy a'zolarda infektsiya o'choqlarining mavjudligi bilan bog'liq. Buyrakdan siydik oqimining

buzilishi buyraklarda infeksiya shakllanishiga moyil bo'ladi. Bu, shuningdek, ayollarda erkaklarnikiga qaraganda 2 baravar tez-tez uchraydigan infeksiyaning intrarenal turi bilan sodir bo'ladi. So'nggi yillarda bu kasalliklar "qari" bo'lib qoldi, ya'ni 50 yoshdan oshgan odamlarda tez-tez uchraydi. Bu rivojlangan mamlakatlarda odamlarning umr ko'rish davomiyligining oshishi, shuningdek, jismoniy harakatsizlikning oshishi va aholining jinsiy hayotidagi o'zgarishlar bilan bog'liq.Bemorning siydik yo'llarida pathogen mikrob va viruslar soni har xil bo'lishi mumkin - birdan yuzlab va hatto minglab.

Bizning kuzatuvlarimizdagi bemorlarning eng ko'p soni (71,32%) 31-60 yoshdagilar bo'lib, faol mehnat faoliyati bilan ajralib turadi. Yoshning kasallikning rivojlanishiga ta'siri, birinchi navbatda, patogenetik omillar ta'sir qilish davrining uzayishi, organizmda patologik jarayonni og'irlashtiradigan boshqa hamroh bo'lgan o'zgarishlarning paydo bo'lishi bilan izohlanishi mumkin.

Muhokama

Tadqiqot natijalari shuni ko‘rsatdiki, buyrak va siydik yo‘llari kasalliklari aholi orasida keng tarqalgan bo‘lib, ayniqsa mehnatga layoqatli yoshdagi shaxslar orasida yuqori uchrash chastotasiga ega. Klinik kuzatuvlar davomida urologik infeksiyalarning asosiy etiologik omillari sifatida aralash patogen mikroorganizmlar, jumladan *Escherichia coli*, xlamidiyalar, rikketsiyalar, trixomonadalar va gonokokklar yetakchi o‘rinni egallashi aniqlandi. Bu holat kasalliklarning murakkab va uzoq davom etuvchi kechishi bilan bog‘liq ekanligini ko‘rsatadi. An’anaviy antibiotik terapiyasining uzoq yillar davomida qo‘llanilishi natijasida mikroorganizmlarda antibiotiklarga nisbatan rezistentlikning ortib borayotgani kuzatildi. Natijada davolash samaradorligi pasayib, kasalliklarning surunkali shaklga o‘tishi va tez-tez qaytalanishi qayd etildi. Bundan tashqari, antibiotiklarning nefrotoksik, gepatotoksik va neyrotoksik ta’siri, ayniqsa buyrak faoliyati buzilgan bemorlarda, ularni qo‘llashni cheklash zaruratini yuzaga keltirdi. Bakteriofaglar bilan davolash usullarini tahlil qilish jarayonida ularning patogen mikroorganizmlarga nisbatan yuqori selektiv ta’sirga ega ekanligi, tabiiy mikroflorani buzmasligi va organizmga toksik ta’sir ko‘rsatmasligi aniqlandi. Bakteriofaglar sezgir bakterial hujayralarni lizisga uchratib, infeksion jarayonni samarali bartaraf etishi bilan ajralib turadi. Ushbu xususiyatlar bakteriofaglarni urologik infeksiyalarni davolashda muqobil va istiqbolli vosita sifatida baholash imkonini beradi. O‘tkazilgan tahlillar asosida buyrak va siydik yo‘llari kasalliklarini erta aniqlash hamda bakteriofaglardan foydalanishga asoslangan davolash algoritmini ishlab chiqish, kasallikning kechishini yengillashtirish, qaytalanishlar sonini kamaytirish va bemorlarning hayot sifatini yaxshilashga xizmat qilishi mumkinligi aniqlandi.

Natija

O‘tkazilgan tadqiqotlar va adabiyotlar tahlili shuni ko‘rsatadiki, buyrak va siydik yo‘llari kasalliklarini davolashda faqat antibiotik terapiyasiga tayanish hozirgi kunda o‘zini to‘liq oqlamaydi. Antibiotiklarga rezistent mikroorganizmlarning ko‘payishi hamda ularning organizmga toksik ta’siri muqobil davolash usullarini joriy etishni taqozo etadi. Bakteriofaglar patogen

mikroorganizmlarga nisbatan yuqori bakterisid ta’sirga ega bo‘lib, inson organizmi uchun xavfsizligi bilan ajralib turadi. Ularni urologik infeksiyalarni davolashda qo‘llash kasalliklarning surunkali shaklga o‘tishini oldini olish, asoratlar rivojlanishini kamaytirish va davolash samaradorligini oshirish imkonini beradi. Shu sababli aholi orasida buyrak va siydik yo‘llari kasalliklarini erta aniqlash hamda bakteriofaglar asosida ishlab chiqilgan davolash algoritmini amaliy tibbiyotga joriy etish ilmiy va amaliy jihatdan muhim ahamiyatga ega hisoblanadi. Bu yondashuv bemorlarning sog‘lig‘ini tiklash, asoratlarsiz sog‘lom hayotga qaytishini ta’minlashga xizmat qiladi.

Xulosa

Xulosa o’rnida shuni aytishimiz kerakki, agar biz urologik kasalliklar(sistit, piyelonefrit, prostatit, uretrit v.x.z) ni antibiotiklar o’rniga ko’proq tabiiy maxsulot bo’lgan organizm uchun zararsiz bakteriofaglardan unumli foydalansak kasalliklar keltirib chiqargan patogen mikroorganizmlarga to’liq bakteriosid ta’sir ko’rsatgan bo’lamiz.Bundan tashqari kasalliklar surunkali tusga o’tmasdan to’liq tuzaladi va asosiysi jigar, miya buyrak va boshqa a’zolarga toksik ta’sir etmaydi. Patsientlar asoratsiz to’liq tuzaladi va sog’lom hayotga qaytadi.

Foydalanilgan adabiyotlar:

1. «Мочекаменная болезнь» О.Л. актинский. В.П Александров.Санкт Петербург, Москва-Харьков-Минск2000.
2. «The results of the use of thrombolytic therapy in acute myocardial infarction at the prehospital and hospital stage R. Kattakhanova1* and O. Umirzakov1 1 Fergana Medical Institute of Public Health, 2A, Yangi Turon Street, Fergana,150100, Uzbekistan. 2023. Биотех.
3. «DIAGNOSIS AND TREATMENT OF DIARRHEA SYNDROME IN PATIENTS WITH COVID -19 O.E.Umirzakov Department of Propaedeutics of Internal Diseases Fergana Medical Institute of Public Health Fergana, Uzbekistan.2024.
4. Борьба с новой эпидемией коронавируса во всем мире и в Узбекистане, Экономика социум, Раимова З. Холматова Ё,Эшонов Р,Умирзақов О.Э.2021.
5. КАМНИ ПРЕДСТАТЕЛЬНОЙ ЖЕЛЕЗЫ И МОЧЕИСПУСКАТЕЛЬНОГО КАНАЛА ДИАБЕТОМ Умирзаков О.Э. Кафедра пропедевтики внутренних болезней Ферганский медицинский институт общественного здоровья Узбекистан.г.Фергана. https://doi.org/10.5281/zenodo.11208791 ARTICLE INFO ABSTRACT
6. Bekkulova M., Yusufjonov M. ANTIGIPERTENZIV DORI VOSITALARINING QO ‘LLANISH SAMARADORLIGINI ANIQLASH //Евразийский журнал медицинских и естественных наук. – 2024. – Т. 4. – №. 1. – С. 199-205.
7. Rakhmatulloevna N. U., Abdurasulovna B. M. GEMOREOLOGIK BUZILISHLAR VA ERITROTSITLAR AGREGATSION XOSSALARI O’ZGARISHINING PATOGENETIK MEXANIZMLARI //JOURNAL OF BIOMEDICINE AND PRACTICE. – 2022. – Т.7.– №.6.

8. Abdurasulovna B. M. Clinical Features of Rheumatoid Arthritis in Patients at the Age of Older 60 Years Old //Central Asian Journal of Medical and Natural Science. – 2022. – Т. 3. – №. 6. – С. 650-655.
9. Farkhodovna K. F., Rakhmatulloevna N. U., Abdurasulovna B. M. ETIOLOGY OF CHRONIC RHINOSINUSITIS AND EFFECTIVENESS OF ETIOTROPIC TREATMENT METHODS (LITERATURE REVIEW) //Новостиобразования: исследованиев XXI веке. – 2022. – Т. 1. – №. 4. – С. 377-381.
10. Abdurasulovna, B. M. "The Significance of Microelements Deficiency in Cardiological Practice." EurasianMedicalResearchPeriodical 19 (2023): 23-27.
11. Беккулова, М., and Э. Тоиров. "Ревматоидный артрит у лиц старше 60 лет." Журнал вестник врача 1.1 (2018): 24-29.
12. Narzulaeva, UmidaRaxmatulloevna, and MohigulAbdurasulovnaBekkulova. "Arterial gipertenziya etiologiyasida dislipidemiyaning xavf omili sifatidagi roli." Science and Education 4.2 (2023): 415-419.
13. The P., Abdurakhimov I. The LO Umurzakov Water management (tutorial).-What 2 (vol.1 No.9(2023)),
14. ANEMIA IN THE PRACTICE OF A THERAPISTGanibayev Ikramjon Shakiralievich Assistant Departmentof "Propedietic Internal Diseases", Fergana Medical Institute of Public Health.
15. 19 Umirzaqov Odiljon Ergashevich, & Mo'ydinova Madina Rustamjon qizi. (2024). SIYDIK AJRATISH TIZIMI KASALLIKLARINI DAVOLASHDA BAKTERIOFAGLARNING AHAMIYATI. PEDAGOGS, 71(1), 111-114. https://scientific-jl.org/ped/article/view/4726
16. «Разработка алгоритма раннего выявления и лечения бактериофагами заболеваний почек и мочевыводящих путей среди населения» Journal of Biomedical Sciences.Vol.2 No6(2025}Умирзаков Одилжон

Umirzoqov S.
talabasi
stomatologiya fakulteti
Bazarbayeva J.
talabasi
stomatologiya fakulteti
Kudayberganov A.
talabasi
stomatologiya fakulteti
SamDTU
Jumayeva Z. J.
talabasi
davolash ishi fakulteti
SamDTU
Pardayeva S. B.
assistenti
tibbiy kimyo
SamDTU

KUMUSH BIRIKMALARINING ORGANIZMDAGI AHAMIYATI

Annotatsiya: *Ushbu ilmiy maqolada kumush (Ag) va uning birikmalarining tirik organizmlar, xususan, inson organizmidagi biologik ahamiyati, ta'sir mexanizmlari, terapevtik qo'llanilishi hamda potensial toksikologik jihatlari tahlil qilinadi. Kumush ionlarining antimikrob xususiyatlari, immun tizimga ta'siri, tibbiyot va biotexnologiyada qo'llanishi zamonaviy ilmiy manbalar asosida yoritiladi. Shuningdek, kumush birikmalarining ortiqcha miqdorda ta'sir etishi bilan bog'liq xavf va cheklovlar muhokama qilinadi.*

Kalit so'zlar: *kumush, kumush ionlari, antimikrob ta'sir, biologik faol modda, toksikologiya.*

Umirzoqov S.
student
faculty of dentistry
Bazarbayeva J.
student
faculty of dentistry
Kudayberganov A.
student
faculty of dentistry
SamDTU
Jumayeva Z. J.
student
faculty of general medicine
SamDTU
Pardayeva S. B.
assistant
department of medical chemistry
SamDTU

THE SIGNIFICANCE OF SILVER COMPOUNDS IN THE ORGANISM

Abstract: *This scientific article analyzes the biological significance of silver (Ag) and its compounds in living organisms, particularly in the human body, their mechanisms of action, therapeutic applications, and potential toxicological aspects. The antimicrobial properties of silver ions, their effects on the immune system, and their use in medicine and biotechnology are discussed based on modern scientific sources. In addition, the risks and limitations associated with excessive exposure to silver compounds are examined.*

Keywords: *silver, silver ions, antimicrobial activity, biologically active substance, toxicology.*

Kirish

Kumush qadim zamonlardan buyon insoniyat tomonidan turli maqsadlarda, jumladan, bezak buyumlari, tanga pullar, idish-tovoqlar va davolash vositalari sifatida qo‘llanib kelinadi. Kimyoviy element sifatida kumush davriy jadvalda Ag belgisi bilan ifodalanadi va o‘ziga xos fizik-kimyoviy xossalarga ega. So‘nggi o‘n yilliklarda kumushning biologik faoliyati, ayniqsa, uning ionlari va nanozarrachalari organizmga ta’siri ilmiy tadqiqotlarning muhim yo‘nalishiga aylandi. Organizmdagi mikroorganizmlarga qarshi samarali ta’siri tufayli kumush birikmalari tibbiyot, farmatsiya va sanitariya sohalarida keng qo‘llanilmoqda. Shu bilan birga, kumush inson organizmi uchun muhim mikroelementlar qatoriga kirmasada, uning ma’lum sharoitlarda biologik jarayonlarga ta’siri mavjud. Ushbu

maqolada kumush birikmalarining organizmdagi ahamiyati kompleks yondashuv asosida ko‘rib chiqiladi.

Kumushning fizik-kimyoviy xususiyatlari

Kumush yumshoq, oson egiluvchan va yuqori elektr hamda issiqlik o‘tkazuvchanlikka ega bo‘lgan metall hisoblanadi. Biologik tizimlarda asosan kumush ionlari (Ag^+) va turli kompleks birikmalar shaklida uchraydi. Aynan Ag^+ ionlari kumushning biologik faolligini belgilovchi asosiy omil hisoblanadi.

Kumush ionlari oqsillar, fermentlar va nuklein kislotalar bilan bog‘lanish xususiyatiga ega. Bu bog‘lanishlar hujayra ichidagi muhim biokimyoviy jarayonlarning izdan chiqishiga olib kelishi mumkin. Shu sababli kumush ionlari ko‘plab mikroorganizmlar uchun halokatli hisoblanadi.

Kumush birikmalarining antimikrob ta’siri

Kumush birikmalarining eng muhim biologik ahamiyati ularning kuchli antimikrob xususiyati bilan bog‘liq. Ag^+ ionlari bakteriyalar, viruslar, zamburug‘lar va ayrim parazitlarga nisbatan keng ta’sir doirasiga ega. Ular mikroorganizmlarning hujayra devorini shikastlaydi, ferment tizimlarini bloklaydi va DNK replikatsiyasini to‘xtatadi. Tadqiqotlar shuni ko‘rsatadiki, kumush ionlari bakterial hujayralarda oksidlanish-qaytarilish muvozanatini buzadi va reaktiv kislorod shakllarining ortishiga olib keladi. Natijada hujayra metabolizmi izdan chiqadi va mikroorganizmlar nobud bo‘ladi. Bu xususiyat kumushni antibiotiklarga chidamli bakteriyalarga qarshi muhim alternativ vosita sifatida ko‘rsatadi.

Inson organizmida kumushning biologik roli

Inson organizmida kumush muhim hayotiy element sifatida tan olinmagan bo‘lsa-da, juda kichik miqdorlarda uning mavjudligi aniqlangan. Kumush asosan jigar, teri va suyak to‘qimalarida to‘planishi mumkin. Past konsentratsiyalarda kumush ionlari ayrim fermentativ jarayonlarga bilvosita ta’sir ko‘rsatishi ehtimoli mavjud.

Ba’zi ilmiy manbalarda kumushning immun tizim faoliyatini rag‘batlantirishi, yallig‘lanishga qarshi ta’sir ko‘rsatishi qayd etiladi. Biroq bu ta’sirlar hali to‘liq isbotlanmagan va bahsli hisoblanadi. Shuning uchun kumushni biologik faol qo‘shimcha sifatida qo‘llash ehtiyotkorlikni talab etadi.

Tibbiyotda kumush birikmalarining qo‘llanilishi

Kumush birikmalari tibbiyot amaliyotida keng qo‘llaniladi. Eng mashhur misollardan biri — kumush nitrat ($AgNO_3$) bo‘lib, u antiseptik va kuydiruvchi vosita sifatida ishlatiladi. Kuyishlar, yaralar va teri infeksiyalarini davolashda kumush asosidagi malham va bog‘lov materiallari samarali natija beradi. So‘nggi yillarda kumush nanozarrachalari asosida yaratilgan preparatlar katta qiziqish uyg‘otmoqda. Nanoo‘lchamdagi kumush zarrachalari yuqori biologik faollikka ega bo‘lib, minimal dozalarda ham kuchli antimikrob ta’sir ko‘rsatadi. Ular jarrohlik asboblari, implantlar va tibbiy qoplamalarda infeksiya xavfini kamaytirish maqsadida qo‘llanilmoqda.

Kumush birikmalarining toksikologik jihatlari

Kumushning foydali xususiyatlari bilan bir qatorda, uning ortiqcha miqdorda organizmga tushishi salbiy oqibatlarga olib kelishi mumkin. Uzoq muddat davomida kumush birikmalarining yuqori dozalari qabul qilinishi argiriya deb ataluvchi holatni keltirib chiqaradi. Bu kasallik terining kulrang-ko‘kimtir rangga o‘zgarishi bilan tavsiflanadi. Bundan tashqari, kumush ionlarining hujayralar uchun toksik ta’siri mavjud bo‘lib, ular mitoxondrial faoliyatni buzishi va oksidlovchi stressni kuchaytirishi mumkin. Shu sababli tibbiyotda kumush preparatlarini qo‘llash qat’iy dozalar va tibbiy nazorat asosida amalga oshirilishi lozim.

Ekologik va biotexnologik jihatlar

Kumush birikmalarining keng qo‘llanilishi atrof-muhitga ham ta’sir ko‘rsatishi mumkin. Oqova suvlar orqali kumush ionlarining tabiatga tushishi suv organizmlari uchun xavf tug‘diradi. Shu bois ekologik xavfsizlik masalalari ham muhim ahamiyat kasb etadi. Biotexnologiyada esa kumushning antimikrob xususiyatlaridan foydalangan holda suvni tozalash, oziq-ovqat mahsulotlarini saqlash muddatini uzaytirish va biosensorlar yaratish yo‘nalishlarida tadqiqotlar olib borilmoqda.

Xulosa

Kumush birikmalari organizmga bevosita hayotiy zarur element sifatida kirmasa-da, ularning biologik va tibbiy ahamiyati nihoyatda katta. Antimikrob xususiyatlari tufayli kumush birikmalari zamonaviy tibbiyot va sanitariya sohalarida muhim o‘rin egallaydi. Shu bilan birga, ularni qo‘llashda toksikologik xavflarni inobatga olish zarur. Kelajakdagi ilmiy tadqiqotlar kumush birikmalarining organizmdagi ta’sir mexanizmlarini yanada chuqurroq o‘rganishga, ularning xavfsiz va samarali qo‘llanish usullarini ishlab chiqishga qaratilishi lozim. Shu tarzda kumushning foydali jihatlaridan maksimal darajada foydalanish imkoniyati yaratiladi.

Foydalanilgan adabiyotlar ro‘yxati

1. Kholmurodova, D. K., & Khudoykulov, Z. I. (2023). Use of Waste in the National Economy. Texas Journal of Multidisciplinary Studies, 25, 160-162.
2. Амирова, П. Ж., & Худойқулов, Ж. (2025). ЕСТЕСТВЕННЫЕ И СИНТЕТИЧЕСКИЕ НАРКОТИКИ: ПОЛЬЗА И ВРЕД. Research Focus, 4(1), 148-152.
3. Холмуродова, Д. К., Исломов, Л. Б., & Худойкулов, Ж. И. (2023). ЭФФЕКТИВНОЕ ИСПОЛЬЗОВАНИЕ СЫРЬЯ. IJODKOR O'QITUVCHI, 3(33), 277-281.
4. Икромова, Ш. А., & Худойқулов, Ж. И. (2024). ЭЛЕКТРОХИМИЧЕСКОЕ ЛЕЧЕНИЕ И МЕТОДЫ ДИАГНОСТИКИ. Research Focus, 3(11), 146-150.
5. Zoyirova, S. J., Samadova, M. A., & Xudoyqulov, J. I. (2025). CHILONJIYDA O ‘SIMLIGINING DORIVOR XUSUSIYATLARI. Экономика и социум, (7-1 (134)), 341-343.

6. Икромова, Ш. А., & Худойқулов, Ж. И. (2025). ПОЛЬЗА АНТИОКСИДАНТОВ В ЖИЗНИ ЧЕЛОВЕКА И МЕДИЦИНЕ. Экономика и социум, (4-1 (131)), 1361-1365.
7. Inomovich, X. J. (2025). FERMENTLARNING TIBBIYOTDAGI AHAMIYATI VA ULARNING QO'LLANILISHI. Лучшие интеллектуальные исследования, 38(1), 285-291.
8. Inom o'g'li, X. J. (2025). BIOLOGIK FAOL KOMPLEKS BIRIKMALAR. Лучшие интеллектуальные исследования, 38(1), 319-325.
9. Vozhehova, R., Borovyk, V., & Ubaydullaev, J. (2025). Inheritance of yield and fiber length in hybrids cotton of the first generation F1. In BIO Web of Conferences (Vol. 151, p. 04001). EDP Sciences.
10. Xayrullayeva, D. M., Davronova, M. P., Xalimov, B. J., & Ubaydullaev, J. N. (2024). KOLLOID ERITMALARNING TIBBIYOTDAGI AHAMIYATI VA QONNING KRIOSKOPIYA USULIDA MUZLASH HARORATINI ANIQLASH. Eurasian Journal of Medical and Natural Sciences, 4(4-1), 272-276.
11. Ubaidullaev, J. N., Vakhin, A. V., Katnov, V. E., Trubistina, S. A., & Mukhamadiev, N. K. (2023). Assessments of Chemical Composition and Properties High-Viscosity Oil Based on Elemental. Central Asian Journal of Medical and Natural Science, 4(5), 332-339.
12. Холмуродов, Т. А., Мирзаев, О. О., & Убайдуллаев, Ж. Н. (2023). КАТАЛИТИЧЕСКОЕ ОБЛАГОРАЖИВАНИЕ ТЯЖЕЛОЙ НЕФТИ В ПРИСУТСТВИИ ПОВЕРХНОСТНО-АКТИВНЫХ ВЕЩЕСТВ. In Добыча, подготовка, транспорт нефти и газа (pp. 62-63).

Umizoqova S. U.
talabasi
pedagogika yo‘nalishi
pedagogika fakulteti
Chirchiq davlat pedagogika universiteti
Axmedova Sh. Z.
talabasi
maxsus pedagogika kafedrasi
pedagogika fakulteti
Chirchiq davlat pedagogika universiteti
Sirojiddinov O. I.
talabasi
maktab menejmenti yo‘nalishi
pedagogika fakulteti
Chirchiq davlat pedagogika universiteti

INKLYUZIV TA’LIMDA BAHOLASH MEZONLARINI ISHLAB CHIQISHNING METODOLOGIK ASOSLARI

Annotatsiya: *Inklyuziv ta’limda baholash me’zonlarini ishlab chiqarish- bu nafaqat pedagogika, balki psixologik ijtimoiy va metodik jihatdan murakkab jarayon. To‘g‘ri ishlab chiqarilgan baholash tizimi bolaning imkoniyatlarini to‘liq ochib berishda, uning ijtimoiylashuvini qo‘llab-quvvatlashda va o‘quv jarayonini samarali tashkil etishda kalit bo‘la oladi.Baholashning asosiy maqsadi-o‘quvchini tekshirish emas, balki uni rivojlantirish uning individual ta’lim yo‘nalishini aniqlash va o‘sish dinamikasini kuzatishdir. Shu bois inklyuziv muhitda baholash moslashuvchan, shaffof, ilmiy asoslangan va o‘quvchi imkoniyatiga mos bo‘lishi zarur.*

Kalit so‘z: *Inklyuziv ta’lim, individual, metodologik, mezon, psixolog, defektolog pedagog, intellektual, emotsional.*

Umizoqova S. U.
student
pedagogy department
faculty of pedagogy
Axmedova Sh. Z.
student
special pedagogy department
faculty of pedagogy
Sirojiddinov O. I.
student
school management department
faculty of pedagogy
Chirchik State Pedagogical University

METHODOLOGICAL FOUNDATIONS FOR DEVELOPING ASSESSMENT CRITERIA IN INCLUSIVE EDUCATION

Annotation: *Developing assessment criteria in inclusive education is not only a pedagogical task but also a psychologically, socially, and methodologically complex process. A properly developed assessment system can become a key factor in fully revealing a child's potential, supporting their socialization, and ensuring the effective organization of the learning process. The main goal of assessment is not to test the learner, but to develop them, determine their individual learning pathway, and monitor their growth dynamics. Therefore, assessment in an inclusive environment must be flexible, transparent, scientifically grounded, and adapted to the learner's abilities.*

Keywords: *Inclusive education, individual, methodological, criteria, psychologist, defectologist, pedagogue, intellectual, emotional.*

Kirish

Bugungi kunga kelib inklyuziv ta'limga bo'lgan ehtiyojlar ortib bormoqda. Inklyuziv ta'limda o'quvchilarning individual rivojlanish xususiyatlari, o'quv imkoniyatlari va ehtiyojlarini hisobga olgan holda shaffof, adolatli va moslashtirilgan baholash mezonlarini ishlab chiqarishning nazariy- metodologik asoslarini o'rganish hamda amaliy qo'llanmalar yaratilmoqda.

Asosiy qism

Zamonaviy ta'lim tizimida har bir o'quvchining individual xususiyatlari va ta'limiy ehtiyojlarini inobatga olish dolzarb mavzu sanaladi. Inklyuziv ta'lim- bu maxsus ehtiyojli bolalarni umumta'lim jarayoniga to'liq jalb qilish, ularga to'liq imkoniyat yaratish va shaxs sifatida rivojlanishiga sharoit yaratishni nazarda tutadi. Asosiy e'tibor bolaning imkoniyatiga, potensialligi va rivojlanish sur'atiga qaratilgan. Oddiy ta'limda baholash ko'proq natijani o'lchashga qaratilgan bo'lsa, dinamika va o'sish, inklyuziv ta'limda baholash jarayoniga qaratilgan. Har bir o'quvchi rivojlanish darajasi va qobiliyatlari, imkoniyatlariga ko'ra baholanadi.

Inklyuziv ta'lim g'oyasi shundaki, har bir o'quvchi aqliy yoki jismoniy zarari bo'ladimi yo yo'qmi- teng ta'lim olish huquqiga ega. Inklyuziv ta'lim quydagilarni nazarda tutadi.

-Ta'limda tenglik

-Diskriminatsiyasiz o'qitish

-o'quvchining qobilyatiga moslashtirilgan o'quv rejalar

differensial yondashuv

-Logoped, psixolog va defektolog bilan hamkorlik

"Baholash tizimi har bir bolaning rivojlanish suratiga moslashtirilishi kerak. Standart baholash o'rniga mostlashtirilgan individual yondashuv zarur".[1]

Moslashtirilgan baholash tizimi orqali har bir bolaning individual rivojlanish jadalligini ko'rib olamiz. Ularni qay darajada rivojlanish izchilligini belgilanadi va aynan shu metod pedagoglar uchun juda katta ustuvorlik beradi. Inklyuziv ta'imga muhtoj bolani boshqa bolalardan ajralib chiqqan tomonlarini

alohida o‘rganib korreksiya qilish yoki bo‘lmasa aynan ajralib turuvchi talantni rivojlantirish orqali uni jamiyatga yaqinlashtirish uchun ham bolani ichki va tashqi baholash ko‘nikmalari barcha pedagoglarda mukammal shakllangan bo‘lishi lozim. Inkulyuziv ta’limda har bir bola, hatto jiddiy rivojlanish chekloviga ega bo‘lsa ham, ta’lim olishda teng huquqiga ega. Baholash jarayoni ham diskriminatsiyasi ham adolatli va moslashtirilgan bo‘ishi shart. Inklyuziv baholash natija emas, jarayonni baholaydi o‘quvchining kundan kun qanday rivojlanayotgani qaysi ko‘nikma yaxshilanganligi yoki qaysi bosqichda qiyinchilik borligi hisobga olinadi.

Vigodskiy nazariyasiga ko‘ra, har bir bolaning o‘z rivojlanish zonasi mavjud. To‘g‘ri baholash mezonlari aynan “yaqin rivojlanish zo‘nasi”ga belgilanadi. Pedagogik diagnostika bolaning intellektual emotsional sensor-mator nutqiy rivojlanishini aniqlashga asoslanadi. “Moslashtirilgan baholash- nogironligi bo‘lgan o‘quvchilar uchun adolatli yondashuv”.[2] Nogironligi bo‘lgan o‘quvchilarning o‘z qobiliyatlarini to‘liq namoyon qilishga imkon beruvchi baholash usullarining o‘zartirilishidir. Har bir o‘quvchi o‘zbilim va ko‘nikmalarini baholashda baravar imkoniyatga ega bolishi kerak. Moslashtirish nogironligi natijasida yuzaga kelgan cheklovlarni bartaraf etadi. Baholash jarayonida qobiliyatlar va erishilgan natijalar asosida baholanadi, nogironlik emas.

Inklyuziv talim tamoyillariga movofiqlik:

-Har bir bola talim olish huquqiga ega

-Baholash ham ta’limning ajralmas qismidir

-Individual ehtiyojlarni hisobga olgan holda adolatli baholash

Psixologik jihatdan qo‘llab quvvatlash

Oquvchining oziga ishonch hissini oshiradi

Stress va tashvishni kamaytiradi

Ta’lim jarayonida ijobiy munosabatni shakllantiradi

Moslashtirish turlari:

-vaqtni uzaytirish;

- alternativ javob berish usullari;

-texnik yordam vositalaridan foydalanish matnlarni soddalashtirish yoki vizual qo‘llanmalar berish;

-ta’lim xodimlarining mas’ulyati;

-pedagoglar individual yondashuv qo‘llay olish kerak.

Moslashtirish usullarini to‘g‘ri tanlash va qo‘llash shaffoflik va javobgarlik tamoyillariga rioya qilish

Moslashtirilgan baholash nogironligi bo‘lgan o‘quvchilar uchun haqiqatan ham eng adolatli yondashuvdir.

Ta’limning bu shaklida baholashning asosiy farqi- standart baholashdan vos kechish va o‘quvchini o‘z rivojlanish dinamikasi bo‘yicha baholashdir. An’anaviy ta’limda o‘quvchi qiyosiy baholash emas, individual baholanadi. Inkulyuziv talimda esa o‘quvchi faqat o‘zining oldingi natijalari bilan solishtiriladi, orqaga nazar tashlash orqali bolaning mativatsiyasi oshirilib boradi. Bu o‘z o‘zidan shaxsiy o‘sish darajasini hisobga olinadi, “Har kimning rivojlanish sur’ati o‘ziga

xos” degan tamoyil amal qiladi. O‘quvchi o‘z imkoniyatiga qarab: osonlashtirilgan, moslashtirilgan yoki qo‘shimcha yordamchi vositalar bilan bajariladigan topshiriqlar tayyorlanadi. Shu boisdan maxsus bolaga qiyoslash metodi biroz notog‘ri yondashuv bo‘lib qoladi. Agar pedagog bu usuldan imkoniyati cheklangan bola bilan ishlaganda uzluksiz foydalansa bolaning o‘ziga bo‘lgan ishonchi sustlashishi yoki umuman o‘zini kamsitilgandek tutishi mumkin. Bu esa o‘z o‘zidan boladagi shijoatni so‘ndiradi va layoqatni batamom yo‘qga chiqarishi mumkin bo‘ladi.

Maxsus bola bilan ishlashda samarador usul sifatida “Portfolio baholash” metodidan foydalanish ham samarali usullardan hisoblanadi. Bunda o‘quvchi ishlari to‘plami yaratiladi. Daftar, rasmlar, loyihalar, test natijalari individual o‘sish hujjatlashtiriladi. Ba’zi o‘quvchilar uchun test yoki yozma topshiriqlar og‘ir bo‘lishi mumkin. Shuning uchun ularning bilimlari suhbat orqali aniqlaniladi. Agar bola suhbatga kirishishni istamasa maxsus pedagog u bilan rasm va chizma shakldagi metodologiyalardan foydalanishi tavsiya etiladi.

Xulosa

Baholash me’zonlarini inklyuziv ta’limga moslashtirish murakkab jarayon. Ko‘p sohalarga asoslangan jarayon bo‘lib, unda psixologik, pedagogik, ijtimoiy va tibbiy yondashuvlar o‘zaro uyg‘un holda qo‘llaniladi.Metodlar ishlab chiqishdan maqsad bola imkoniyatlarini to‘g‘ri baholash, uni rivojlantirish, rag‘batlantirish va jamiyatga qo‘shish sanaladi.

Inklyuziv ta’limda baholash tizimini individual ehtiyojlar va rivojlanish sur’atlariga moslashtirish muhim ahamiyatga ega. Bu jarayon nafaqat o‘quvchining bilim darajasini, balki uning shaxsiy qobiliyatlari, ijtimoiy ko‘nikmalari va motivatsiyasini hisobga olishni talab qiladi. Moslashtirilgan baholash orqali pedagoglar har bir bolaning kuchli va zaif tomonlarini aniqlab, ularga to‘g‘ri yordam ko‘rsatish imkoniyatiga ega bo‘ladi. Shu bilan birga, baholash jarayoni o‘quvchining psixologik holatini qo‘llab-quvvatlaydi, stress va tashvishni kamaytiradi, ijobiy o‘quv muhitini shakllantiradi. Portfolio baholash, suhbat va vizual metodlar kabi vositalar maxsus ehtiyojga ega o‘quvchilarni to‘liq rivojlantirishda samarali yondashuvdir. Umuman olganda, inklyuziv ta’limda baholash – bu nafaqat natijani o‘lchash, balki o‘quvchining o‘sish jarayonini qo‘llab-quvvatlash, rag‘batlantirish va jamiyatga moslashuvini ta’minlash mexanizmi sifatida xizmat qiladi. Shu bois, moslashtirilgan va individual yondashuv inklyuziv ta’limning ajralmas qismi hisoblanadi.

Foydalanilgan adabiyotlar ro‘yxati.

1. Хамдамова, Г.А. ва бошқалар. Инновацион менежмент. Ўқув қўлланма. Т.: Экономика – молия, 2018.
2. Полатов, Ш.П. Инновацион ёндашув орқали таълимни бошқариш ёки илмий-методик бошқарув. Т.: Ёш куч, 2022.
3. Перегудов, Л.В., Саидов, М.Х. Олий таълим: менежмент ва иқтисодиёт. Т.: Финанс, 2007.
4. Ҳусейнова, М.Р. Инклюзив таълимда педагогик диагностика ва баҳолаш усуллари. Т.: Илм-фан, 2020.

5. Султонов, Б.Ҳ. Мактабда индивидуал ривожланишни баҳолаш усуллари. Т.: Ўқитувчи, 2019.
6. Мирзаев, А. Инклюзив таълимда дифференциал ёндашув. Т.: Ўзбекистон, 2021.
7. Юсупов, Д. Мактаб педагогикасида адаптив баҳолаш ва усуллар. Т.: Илм, 2020.
8. Абдураҳмонов, Ш.М. Педагогик диагностика ва индивидуал ривожланиш monitoringi. Т.: ТДПУ, 2019.

Urazbeyava S. T.
talabasi
menejment yo‘nalishi
pedagogika fakulteti
Chirchiq davlat pedagogika universiteti

MONOPOLIYANING IQTISODIY ASOSLARI VA ULARNING TURLARI ECONOMIC

Annotatsiya: *Ushbu ishda monopoliyaning iqtisodiy asosi bozor tizimidagi o‘rni tahlil qilingan. Monopoliya — bu yagona ishlab chiqaruvchi yoki sotuvchining bozorni to‘liq nazorat qilishi natijasida raqobatning cheklanishi holatidir. Monopoliyalarning asosiy iqtisodiy sabablari sifatida tabiiy resurslarga egalik, texnologik ustunlik, davlat tomonidan berilgan litsenziya yoki patentlar, yirik korxonalarning iqtisodiy ustunliklari keltirilgan. Maqolada tabiiy, huquqiy (yuridik), sun’iy (kelishilgan) va davlat monopoliya turlari yoritiladi.*

Kalit so’zlar: *Monopoliya, bozor strukturalari, oligopoliya, monopsoniya, bozor kuchi, iqtisodiy samaradorlik, antimonopoliya siyosati, bozorni nazorat qilish, iste’molchi manfaatlari.*

Urazbeyava S. T.
student
management direction
faculty of pedagogy
Chirchik State Pedagogical University

FOUNDATIONS OF MONOPOLY AND ITS TYPES

Abstract: *This paper analyzes the economic basis of monopoly and its role in the market system. A monopoly is a situation in which a single producer or seller completely controls the market, leading to a restriction of competition.*
The main economic causes of monopolies include ownership of natural resources, technological superiority, government-issued licenses or patents, as well as the economic advantages of large companies.
The article discusses the following types of monopolies: natural, legal, artificial (collusive), and state-owned.

Keywords: *monopoly, market structures, oligopoly, monopsony, market power, economic efficiency, antitrust policy, market regulation, consumer interests.*

Monopoliya atamasining kelib chiqishi bozorga oid tushunchalardan (ya’ni, yunoncha „monoc“ — yagona, bitta va „poleo“ — sotaman) tarkib topsada, uning iqtisodiy asoslari aslida ishlab chiqarishga borib taqaladi.

Monopoliya – монопол yuqori narxlarni o’rnatish hamda monopol yuqori foyda olish maqsadida tarmoqlar, bozorlar va yaxlit makroiqtisodiyot ustidan hukmronlikni amalga oshiruvchi yirik korxonalar (firma, korporatsiyalar)ning birlashmalari bo’lib, monopoliyalarning vujudga kelishining moddiy asosi ishlab chiqarishning to’planishi hisoblanadi.

Ishlab chiqarishning to’planishi ishlab chiqarish vositalari, ishchi kuchi hamda mahsulot ishlab chiqarish hajmining yirik korxonalarda to’planishini namoyon etadi. Asosiy sabab – olinayotgan foyda hajmining ko’payishi hisoblanadi, foydaning (qo’shimcha mahsulot) bir qismi kapitallashtirib boriladi.

Kapitalning to’planishi – bu qo’shimcha qiymatning bir qismini jamg’arish (kapitallashtirish) natijasida kapital hajmining oshishidir. Ya‘ni, korxonadagi ishchilar soni, korxonaning ishlab chiqarish quvvati, qayta ishlanayotgan xom ashyo miqdori, tovar aylanmasi hajmi, foyda hajmi.

Kapitalning to’planishi kapitalning markazlashuvi jarayoni bilan yanada to’ldiriladi. Kapitalning markazlashuvi – bu bir kapital tomonidan boshqa birining qo’shib olinishi yoki bir qancha mustaqil kapitallarning aktsiyadorlik jamiyati shaklida ixtiyoriy birlashishi orqali kapital hajmining o’sishidir.

Monopoliyalarning quydagi turlari mavjud:

1. Bozorni qamrab olish darajasiga ko’ra 3 turga bo’linadi.

a) Sof monopoliya

b) Oligopoliya

c) Monopsoniya

a) Sof monopoliya – bu tarmoqdagi yagona ishlab chiqaruvchi yoki sotuvchining narx va ishlab chiqarish hajmini belgilashdagi yakka hukmronlik holati hisoblanadi. Masalan, O’zbekistonda sof monopoliyalar sifatida “O’zbekiston havo yo’llari” DAK, “O’zbekiston temir yo’llari”DAK, toshkent aviatsiya ishlab chiqarish birlashmasi shular jumlasidandir.

b) Oligopoliya - tarmoqdagi bir necha yirik ishlab chiqaruvchi yoki sotuvchining narx va ishlab chiqarish hajmini belgilashdagi hukmronlik holati hisoblanadi. Oligopolist ishlab chiqaruvchilarga O'zbekistonda sement (asosan; Bekobod, Quvasoy, Ohangaron, Navoiy shaharlarida joylashgan), ko‘mir (Angren shahri, Surxondaryo viloyatining Sariosiyo (Sharg'un) va Boysun (To'da) tumanlarida joylashgan) ishlab chiqarishni misol keltirish mumkin.

c) Monopsoniya — tarmoqdagi ishlab chiqaruvchi yoki sotuvchilar soni juda ko'p bo'lib, ular tovar yoki xizmatlarining yagona iste’molchisi yoki xaridori mavjud bo'lgan sharoitdagi yakkahukmronlik holati hisoblanadi. Misol tariqasida dehqon va fermer xo’jaliklari tomonidan yetishtirilayotgan paxta tolasi va ularni shartnoma asosida “O’zpaxtasanoateksport” holding kompaniyasi tarkibida paxta homashyosini qabul qilish va qayta ishlashni tashkil qilish bo’yicha “O’zpaxtasanoat” aksiyadorlik jamiyati va uning hududiy filiallariga sotishini keltirishimiz mumkin. Bunda paxta yetishtiruvchilar tarmoqda cheksiz va ular tomonidan yetishtirilgan paxta homashyosini faqatgina “O’zpaxtasanoat” aksiyadorlik jamiyatiga sotishadi.

2.Monopoliyaning vujudga kelishi sababi va tavsifiga ko’ra:

a) tabiiy monopoliya:

b) legal monopoliya:

c) sun‘iy monopoliya:

a) Tabiiy monopoliya - korxonaning texnologik xususiyatlari sababli mahsulotga bo'lgan talabni qondirish raqobat mavjud bo'lmagan sharoitda samaraliroq amalga oshiriluvchi tovar bozorining holatidir. Bunday samaradorlik ishlab chiqarish hajmining ko'payib borishi bilan tovar birligiga to'g'ri keluvchi xo'jalik xarajatlarining ahamiyatli darajada pasayib ketishida namoyon bo'ladi. Shu bilan birga, tabiiy monopoliya subyektlari tomonidan ishlab chiqarilgan mahsulotlar iste’molini boshqa turdagi mahsulotlar bilan almashtirib bo'lmaydi.

b) Legal (qonuniy) monopoliya – bu qonuniy tarzda tashkil etiluvchi monopolistik holatdan iborat. Ular tarkibiga himoya qiluvchi qo’yidagi monopoliya shakllarini kiritish mumkin:

1) Patent tizimi – bu ixtirochi yoki mualliflar tomonidan yaratilgan ixtirolar, foydali modellar, sanoat namunalarini tasdiqlovchi maxsus guvohnomalar – patentlar orqali amalga oshiriladi.

2) Mualliflik huquqi – ilmiy, badiiy va san‘at asarlari, ijro san‘ati fonogrammalari, ko’rsatuvlar, efir to’lqini yoki kabel orqali tasvir uzatish

kabilari yaratish va ulardan foydalanish munosabatlarini qonuniy tarzda tartibga solish shakli.

3) Tovar belgilari – bu savdo belgilari, nishonlari, maxsus ramzlari nomi va haqozo.

c) Sun‘iy monopoliya – monopol foyda olish maqsadida tashkil etiluvchi birlashmalarining shartli nomi. Sun’iy monopoliyalar sindikat, kartel, trest, kontsern, konsortsium kabi aniq shakllarda namoyon bo’ladi.

Sindikat - bir turdagi mahsulot ishlab chiqaruvchi bir necha korxonalarning birlashmasi. ishlab chiqarish vositalariga mulkchilik birlashma ishtirokchilarning o’zida saqlanib qolgan holda, ular tomonidan ishlab chiqarilgan mahsulot tashkil etilgan yagona sotish tashkiloti orqali amalga oshiriladi.

Kartel - bitta sanoat tarmoqdagi bir necha korxonalarning uyushmasi bo’lib, uning ishtirokchilari ishlab chiqarish vositalari va mahsulotlariga o’z mulkiy egaligini saqlab qoladi, yaratilgan mahsulotlarni sotish esa kvota, ya‘ni maxsulot ishlab chiqarish umumiy hajmidagi har bir ishtirokchining ulushi, sotish narxlari, bozorlarning bo’lib olinishi va h.q. bo’yicha kelishuv asosida amalga oshiriladi.

Trest – ishlab chiarish vositalari va tayyor mahsulotga birgalikdagi mulkiy egalikni ta‘minlovchi ishlab chiqaruvchilarning yuridik shaxs ko’rinishdagi birlashmasi.

Kontsern – rasmiy jihatdan mustaqil bo’lgan, ko’p tarmoqli korxonalar (sanoat, savdo, transport va bank turli soha korxonalari)ning majmuisi o’z ichiga oluvchi birlashma. Bunda bosh tashkilotqolgan ishtirokchilar faoliyati ustidan moliyaviy nazorat olib boradi. Hozir kontsernlar keng tarqalgan tashkilotdir.

Konsortsium – tadbirkorlarning yirik moliyaviy operatsiyalarini birgalikda amalga oshirish maqsadida birlashuvi (masalan, yirik miqyosi loyihalarga juda katta miqdorda va uzoq muddatli kredit berish yoki investitsiyalar qo'yish).

Monopoliyaning iqtisodiy taraqqiyotga ta'sir qiluvchi ijobiy va salbiy tomoni mavjud. Uning ijobiy tomoni asosan, quyidagi ikki jihat orqali namoyon bo'ladi. Birinchidan, yuqorida ta'kidlab o'tilganidek, u ma'lum tarmoqlarda nisbatan samarali amal qiladi va xarajatlar-ning tejalishiga olib keladi. Ikkinchidan, monopolist bo'lmagan, mayda, raqobatlashuvchi soha korxonalariga nisbatan monopolistik korxonalarda ishlab chiqarishga ilmiy-texnika taraqqiyoti yutuqlarini joriy etish uchun ko'proq rag'bat va imkoniyat mavjud bo'ladi. Chunki uncha yirik bo'lmagan raqobatlashuvchi korxonalarning odatda, moliyaviy jihatdan imkoniyailari cheklangan bo'lib, ular ishlab chiqarishga yangiliklarni tatbiq etish orqali kelgusidagi daromadlarni oshirishdan ko'ra, ko'proq joriy daromadga e'tibor qaratadilar. Bundan tashqari, yangi g'oyalar raqiblar tomonidan juda tez o'zlashtirib olinadi va buning oqibatida, mazkur g'oyalarni amalga oshirish xarajatlarini bir tomon qilgani holda, uning samarasidan barcha foydalanadi. Yirik monopolistik firmalarda moliyaviy imkoniyatlar keng bo'lib, innovatsiyadan olingan foyda ularning mualliflariga tegishi aniq kafolatlanadi. Monopoliyaning salbiy tomoni sifatida quyidagi jihatlarni ko'rsatish mumkin:

1.Resurslarning oqilona taqsimlanmasligi. Bu holat monopoliyalarning yuqori foyda ketidan quvib, sun'iy ravishda ishlab chiqarishni cheklash vositasida narxlarni ko'tarishi, mahsulotlarning u qadar yaxshi bo'lmagan turlarini, past texnikaviy darajasini va sifatini hamda sotishning yomon sharoitlarini vujudga keltirishi orqali namoyon bo'ladi. Natijada, raqobat sharoitida amal qiluvchi iqtisodiyot samaradorligini bozor vositasida tartibga solish mexanizmi ishdan chiqadi. Monopoliyalar bilan bog'liq bo'lgan iqtisodiy faoliyatlar erkin hamda oqilona tanlov imkoniyatidan mahrum bo'ladi, monopoliyalarning iqtisodiy jihatdan asoslanmagan shart-sharoit va narxlari tazyiqiga chiday olmaydi, ish faolligini pasaytirib, ba'zi hollarda xonavayron bo'ladilar. Oqibatda ishlab chiqarish qisqarib, ishsizlik va inflyatsiya o'sadi, xo'jalikning izdan chiqishi kuchayadi. Jamiyat boyligi resurslarning oqilona raqobatli-bozor taqsimoti sharoitida qo'lga kiritilishi mumkin bo'lgan miqdoriga qaraganda kamayib ketadi

2.Daromadlardagi tengsizlikning kuchayishi. Bu holat ham narxlarning monopol tarzda oshirilishi (pasaytirilishi) hamda yuqori foyda olinishi bilan bogiiq bo'lib, bu aholining qolgan qismi daromadlarining nisbatan kamayishiga olib keladi.

3.Iqtisodiy turg'unlik va fan-texnika taraqqiyotining sekinlashuvi. Bunday holatning vujudga kelishi monopolistlaring raqobatchilar bosimini sezmasliklari hamda aksariyat hollarda yuqori foydani qo'shimcha urinishlarsiz o'zlarining bozordagi hukmronliklari hisobiga olishlari mumkin. Bu esa, ularni ishlab chiqarishni ratsionallashtirish, uning samaradorligini oshirish imkoniyatlarini qidirish, mahsulot sifatini oshirish, uning assortimentini kengaytirish, FTTni rivojlantirish va xaridorlar manfaatlari to'g'risida qayg'urish kabi xatti-harakatlardan qaytaradi.

4.Iqtisodiyotda demokratik harakatlarning to’sib qo’yilishi. Monopolistlar iqtisodiyotdagi erkin va halol raqobatga to'sqinlik qilib, nisbatan kuchsiz bo'lgan korxonalarni o'zlariga bo'ysundirishlari, jamiyatga o'z ishchilarining mehnatiga pasaytirilgan miqdorda haq to'lash, sifati past tovarlarni ishlab chiqarish, o'ta darajada oshirib yuborilgan sotish narxlari (yoki pasaytirilgan xarid narxlari), o'z mahsulotini iste'mol qilishga bilvosita usul orqali majburlash kabi o'zlarining kamsituvchi shartlarini ko'ndalang qo'yishlari mumkin. Bundan ko'rinadiki, monopolistik faoliyat iqtisodiy rivojlanishga ancha jiddiy ta'sir ko'rsatishi, taraqqiyot yo'liga g'ov bo'lishi ham mumkin. Shunga ko'ra, bugungi kunda deyarli barcha mamlakatlar iqtisodiyotida monopoliyalarni davlat tomonidan tartibga solish chora-tadbirlari qo'llanilib, bu monopoliyaga qarshi siyosat deb ataladi. Davlatning monopoliyaga qarshi siyosati asosini monopoliyaga qarshi qonunchilik tashkil etib, u turli mamlakatlarda turli darajada rivojlangan bo'ladi. Odatda, AQShdagi monopoliyaga qarshi qonunchilik nisbatan ilgariroq va mukammalroq ishlab chiqilgan, deb hisoblanadi. U quyidagi uch qonunchilik hujjatlariga asoslanadi:

1. Sherman qonuni (1890 yilda qabul qilingan). Bu qonun savdoni yashirin monopollashtirish, u yoki bu tarmoqdagi yakka nazoratni qo'lga olish, narxlar bo'yicha kelishuvlarni taqiqlaydi.

2. Kleyton qonuni (1914 yilda qabul qilingan). Bu qonun mahsulot sotish sohasidagi cheklovchi faoliyatlarni, narx bo'yicha kamsitish, ma'lum ko'rinishdagi birlashib ketishlar, o'zaro bog'lanib ketuvchi direktoratlar va boshqalarni taqiqlaydi.

3. Robinson-Pctmen qonuni (1936 yilda qabul qilingan). Bu qonun savdo sohasidagi cheklovchi faoliyatlar, «narxlar qaychisi», narx bo'yicha kamsitishlar va boshqalarni taqiqlaydi. 1950 yilda Kleyton qonuniga Seller-Kefover tuzatishi kiritildi. Unda noqonuniy birlashib ketishlar tushunchasiga aniqlik kiritilib, aktivlarni sotib olish orqali birlashib ketish taqiqlandi. Agar Kleyton qonuni yirik firmalarning gorizontal ravishdagi birlashib ketishlariga to'siq qo'ygan bo'lsa, Seller-Kefover tuzatishi vertikal ravishdagi birlashib ketishlarga cheklov kiritdi. Iqtisodiyotda monopoliyaning o'rni iqtisodchilar va siyosatchilar o'rtasida davom etayotgan munozarali mavzudir.

Monopoliyaning afzalliklari:

1. Masshtab iqtisodlari: Monopoliyalar bozorning muhim qismini yoki butun bozorni nazorat qilish orqali katta miqyosda iqtisodiy nazoratga erishishlari mumkin. Bu shuni anglatadiki, ular mahsulot yoki xizmatlarni har bir birlik uchun arzonroq narxda ishlab chiqarishi mumkin, bu esa kompaniya va iste'molchilar uchun potentsial xarajatlarni tejashga olib keladi.

2. Tadqiqot va ishlanmalar: yuqori daromad va bozor hukmronligi bilan monopoliyalar tadqiqot va ishlanmalarga (R&D) sarmoya kiritish uchun ko'proq resurslarga ega bo'lishi mumkin. Bu texnologik taraqqiyotga, innovatsiyalarga va jamiyatga foyda keltiradigan yangi mahsulot yoki xizmatlarning rivojlanishiga olib kelishi mumkin.

3. Bozor samaradorligi: Ba'zi hollarda monopoliyalar takrorlashini bartaraf etish va isrofgar raqobatni kamaytirish orqali bozor samaradorligiga olib kelishi mumkin. Bu operatsiyalarni soddalashtirishga, narxlarni pasaytirishga va resurslarni taqsimlashni yaxshilashga olib kelishi mumkin.

Monopoliyaning kamchiliklari:

1. Raqobatning yetishmasligi: monopoliyalar bozorning katta qismini yoki butun qismini nazorat qilish orqali raqobatni cheklaydi. Bu iste'molchilar uchun tanlovning qisqarishiga, yuqori narxlarga va past sifatli tovarlar yoki xizmatlarga olib kelishi mumkin. Monopoliyalar o‘zlarining bozordagi hukmronligidan foydalanish va narxlarni belgilash yoki juda yuqori [past] narx belgilash kabi raqobatga qarshi amaliyotlar bilan shug‘ullanish huquqiga ega.

2. Bozorning buzilishi: monopoliyalar bozor dinamikasini buzishi va erkin bozorning ishlashiga to'sqinlik qilishi mumkin. Ular yangi ishtirokchilarni to'xtatib qo'yishi va innovatsiyalarni bo'g'ib qo'yishi mumkin, chunki kichikroq raqobatchilar dominant o'yinchi bilan raqobatlashayapti. Bu bozorning umumiy samaradorligini pasayishiga va iqtisodiy o'sishning sekinlashishiga olib kelishi mumkin.

3. Taqsimlash samarasizligi: Monopoliyalar raqobatning yo'qligi sababli resurslarni samarali taqsimlay olmasligi mumkin. Ular ijtimoiy ehtiyojlarni qondirishdan ko'ra o'z daromadlarini maksimal darajada oshirishni birinchi o'ringa qo'yishlari mumkin, bu esa resurslarning optimal taqsimlanishiga va bozordagi potentsial muvaffaqiyatsizlikka olib keladi.

Xulosa qilib aytganda monopoliya – bu bozorda bitta ishlab chiqaruvchi yoki sotuvchining ustun mavqega ega bo‘lishi natijasida raqobatning cheklanishidir. Monopoliyaning iqtisodiy asosi – ishlab chiqarish vositalarining jamlanishi, texnologik ustunlik, tabiiy resurslarga egalik yoki davlat himoyasidir. Ular tovar narxini mustaqil belgilash va foydani maksimal darajada oshirish imkonini beradi. Monopoliyalar turlari asosan tabiiy**,** sun’iy (yoki ma’muriy) va huquqiy shakllarda namoyon bo‘ladi. Natijada, monopoliya iqtisodiy samaradorlikni kamaytirishi, narxlarning oshishiga va iste’molchilar tanlovining qisqarishiga olib keladi. Shu bois, davlat tomonidan monopoliyaga qarshi siyosat yuritish muhim hisoblanadi.

Foydalanilgan adabiyotlar:

1. Shodmonov Sh. Iqtisodiyot nazariyasi; Darslik – “Lesson Press” nashriyoti, 2021. 768 bet. Toshkent-2021.
2. Абель Э., Бернаке Б. Макроэкономика. 5-е изд.-СПб.:Питер, 2009- 544 с.
3. E.Dj. Dollan, Lindsey. Makroekonomika/ [per. s angl.]-SPb.1994.
4. A.Razzoqov, Sh.Toshmatov .N O’rmatov. Iqtisodiy ta’limotlar tarixi, T..”Moliya”.2002
5. Djumaev Z.A. “Makroiqtisodiyot” fanidan O‘quv-uslubiy majmua.- Toshkent: Iqtisodiyot.-2010 y. – 598 bet.
6. D.Tojiboeva. Iqtisodiyot nazariyasi; Oliy o’quv yurtlari talabalari uchun o’quv qo’llanma./ Akad. M.Sharifxo’jayevning ilmiy tahriri ostida, -T.. “O’qituvchi’ , 2002.

7. Kurs ekonomicheskiy teorii; Obshie osnovi ekonomicheskiy teorii, Mikroekonomika. Makroekonomika. Osnovi natsionalnoy ekonomiki; Uchebnoy posobie/Pod red. d.e.n., prof. A.V.Sidorovicha. –M; “Delo i Servis”,2001
8. R.Ziyodova Content, Function and types of price “Journal of science-innovative research in Uzbekistan”2024.March

УДК: 334.02

Usmanov B. Sh.
junior researcher
Center for Research of Problems in Privatization and
State Assets Management State Assets Management Agency
of the Republic of Uzbekistan
Tashkent

EFFECTIVE MANAGEMENT AND DEVELOPMENT OF STATE ASSETS IS A DEMAND OF OUR TIME

Abstract. *The article analyzes the importance of effective management of state property, current requirements in Uzbekistan, and priority areas for managing state assets aimed at socio-economic development. State assets are crucial for sustainable economic development, and their effective management contributes to economic growth, job creation, and private sector development.*

Keywords: *state assets, state-owned enterprises, corporate governance, privatization, market reforms, state asset management strategy, private sector, IPO/SPO, corporate bonds, OECD principles.*

Effective management of state property is one of the most crucial issues in economic activity, as it affects all aspects of public administration across various spheres. It is essential to establish state asset management based on a strategic vision for the medium and long-term objectives aimed at the country's socio-economic development. For this purpose, some countries (such as the Russian Federation, Republic of Belarus, Republic of Georgia, and Federal Republic of Germany) have adopted key directions for state property management.

The "Uzbekistan-2030" Strategy, approved by the Decree of the President of the Republic of Uzbekistan No. PD-158 dated September 11, 2023, [1] aims to consistently transition monopolistic sectors to market principles, increase the private sector's share in the economy, and create the most favorable conditions for entrepreneurs to operate freely. Within this framework, it is planned to increase the non-state sector's share in the economy to 85% and reduce the number of 2,300 enterprises with state ownership by 6 times. Additionally, in accordance with the goals of implementing the Strategy for Management and Reform of State-Participated Enterprises for 2021-2025, approved by the Cabinet of Ministers Resolution No. 166 dated March 29, 2021 [2], the task was set to reduce state-participated enterprises by 75 percent by 2026.

It is advisable to develop a strategy that determines the optimal allocation of limited resources in accordance with the state's competing needs, plans the implementation of important steps and measures, and outlines a set of interconnected priorities for further development.

The process of market transformations in Uzbekistan has reached a point where it is necessary to revise the priorities and principles of state policy in managing and disposing of state property, and to develop new approaches to implementing this policy in line with the changes occurring in the country's economy.

Developing and adopting the Strategy at this stage of Uzbekistan's development is significant for identifying the highest priority areas of state asset management, forming a consolidated opinion on this issue, creating a tool for understanding the importance of achieved results, and developing specific tasks in the field of state asset management.

In recent years, significant reforms have been implemented in Uzbekistan, including the liberalization of various economic sectors and the improvement of conditions for private sector development. During the years of market reforms, fundamental changes took place in property relations in Uzbekistan. As a result of large-scale privatization of state-owned enterprises and the stimulation of private entrepreneurship development, the monopoly of state property was abolished, and a multi-layered economy with a predominant non-state sector was formed.

Considering the high population growth rates and the annual influx of young people into the labor market, the country's economic growth should also focus on actively creating jobs through effective management of state assets. To this end, it is crucial to continue the reform program, which includes further economic liberalization and the development of competition.

Meanwhile, in recent years, numerous regulatory documents on state asset management have been adopted in the republic, including the Law of the Republic of Uzbekistan "On State Property Management" and the Law "On Privatization of State Property".

In accordance with the Cabinet of Ministers Resolution No. 166 of March 29, 2021, "On Approving the Strategy for Management and Reform of State-Participated Enterprises for 2021-2025", several measures have been implemented to improve and enhance corporate relations in state-participated enterprises. Specifically:

The Strategy stipulates a 75% reduction in the number of state-participated enterprises by 2025. In practice, there were 2,781 enterprises in 2021, and by the beginning of 2025, their number was reduced to 1,869, representing a reduction rate of 67 percent. Although this figure is below the planned 75 percent, it is considered a significant result.

The goal is to increase the private sector's share by bringing state-owned enterprises to the stock market. In this direction, several regulatory documents were adopted in 2021-2024, and IPO/SPO is planned for about 40 enterprises. In practice, shares of major enterprises such as the "Republican Commodity Exchange", "Uzbektelecom", "Uzbekinvest", and "UzAutoMotors" have been placed. This marks an important stage in developing the capital market and managing state assets based on the principle of transparency.

It is planned to increase the share of independent members on supervisory boards to 30 percent by 2025. By the end of 2024, out of 569 members of supervisory boards in 85 enterprises, 169 were independent, which is approximately 30%. This is a positive step in developing the corporate governance system in state-owned enterprises based on the principles of independence and accountability.

The plan for issuing corporate bonds envisages organizing 25 issues by 2025. In total, 10 issues were carried out in 2021-2024, including by the Uzbekistan Metallurgical Plant, Uzbekneftegaz, Agrobank, the National Bank, and Navoi Mining and Metallurgical Combine. This result shows that state-owned enterprises are strengthening their ability to independently raise funds in financial markets.

Corporate governance rules based on OECD (Organization for Economic Cooperation and Development) principles were planned to be implemented in 50% of enterprises by 2025. In accordance with new resolutions adopted in 2023-2025, the rules were implemented in 50 large state-owned enterprises, 98% of which have completed this process. Although the goal has formally lost its significance, practical results show that corporate governance in the public sector is approaching international standards.

By 2023, it was planned to assess the corporate governance system in 100% of state joint-stock companies. In 2021, an assessment was carried out at 113 enterprises, and in 2023, at 44 enterprises.

The goal was to establish committees under all supervisory boards by 2025. Committees were established in 53 percent of enterprises in 2021, 87 percent in 2023, and 91 percent at the beginning of 2025. This trend serves the systematic and effective management of supervisory board activities.

In general, it should be noted that the work carried out within the framework of the Strategy for Reforming State-Owned Enterprises for 2021-2025 has yielded significant results in many areas. Specifically:

Work on reducing state assets and increasing the private sector share is progressing efficiently;

Target indicators for developing the corporate governance system, attracting foreign expertise, and implementing compliance practices have been met or exceeded.

This situation shows that the process of transitioning state-owned enterprises to more efficient and transparent operations in a market economy is being carried out gradually, based on a long-term strategic roadmap.

Currently, there are about 35,582 enterprises with state participation in the Republic of Uzbekistan, including 253 joint-stock companies, 322 state unitary enterprises, 1,425 limited liability companies, and 33,582 state institutions.

Of the 662 existing joint-stock companies in the republic, 38% (252) have state ownership, 87.52% of the total number of shares belong to the state, and slightly more than 2% of the population owns shares.

Additionally, the Corporate Governance Rules for State-Owned Enterprises, developed based on OECD principles, have been implemented in over 60 state-owned enterprises, and the practice of electing (appointing) heads of 392 enterprises has begun. The number of independent members on the supervisory boards of 140 state-owned enterprises has been increased. The liquidation process has started for 382 enterprises (unpromising, non-functioning, loss-making industries). Corporate governance system assessments were carried out at 120 state-owned enterprises. Committees have been established under the supervisory boards of 140 state-owned enterprises.

Conclusion

To reduce the number of state-owned enterprises and optimize management costs, as well as increase revenues from state shares, in our opinion, it is necessary to reduce the number of state-owned shares in economically and socially insignificant enterprises and improve the mechanism for managing state-owned share packages.

For effective management of state-owned companies, it would be advisable to consider transferring the management of state shares to sectoral associations, as well as privatizing state shares in companies of little importance to the state.

The right and responsibility for proper and effective management of state assets should be assigned to the sole authorized body for state asset management - the State Assets Management Agency of the Republic of Uzbekistan. Accordingly, all state power and administrative bodies authorized to manage state assets must be responsible and accountable to the single authorized body for state asset management - the State Assets Management Agency of the Republic of Uzbekistan.

Sources used:

1. Decree of the President of the Republic of Uzbekistan No. PD-158 dated 11.09.2023 “On the Strategy “Uzbekistan-2030” URL: https://lex.uz/docs/6600413 (date accessed: 16.12.2025).
2. Resolution No. 166 of the Cabinet of Ministers of the Republic of Uzbekistan dated March 29, 2021 “On Approving the Strategy for Management and Reform of State-Owned Enterprises for 2021-2025” URL: https://www.lex.uz/ru/docs/5348948 (date accessed: 16.12.2025).

Usmanova M. B.
assistenti
farmakognozia va farmasevti texnologiya kafedrasi
Muradova R. R.
assistenti
klinik farmakologiya kafedrasi
Samarqand davlat tibiyot universiteti

O‘ZBEKISTONDA ZAMONAVIY ILM-FAN VA TA’LIM RIVOJI: FARMASEVTIKA, BIOTEXNOLOGIYA VA YOSHLAR DUNYOQARASHINING INTEGRATSIYASI

Annotatsiya: *Mazkur maqolada O‘zbekistonda so‘nggi yillarda kuzatilayotgan ilmiy-ta’limiy jarayonlar, farmatsevtika sanoatining innovatsion rivoji, biologik tadqiqotlarning dolzarbligi hamda yosh avlodda zamonaviy ilmiy dunyoqarashni shakllantirish masalalari tahlil qilinadi. Tadqiqotda ijtimoiy fanlar, biologiya va texnologiya sohalari o‘rtasidagi integratsiya ilmiy taraqqiyotning muhim omili sifatida yoritiladi.*

Kalit so‘zlar: *ilm-fan integratsiyasi, farmatsevtika, biologiya, yoshlar tarbiyasi, innovatsiya, O‘zbekiston.*

Usmanova M. B.
assistant
department of pharmacognosy and pharmaceutical technology
Muradova R. R.
assistant
department of clinical pharmacology
Samarkand State Medical University

DEVELOPMENT OF MODERN SCIENCE AND EDUCATION IN UZBEKISTAN: INTEGRATION OF PHARMACEUTICS, BIOTECHNOLOGY AND YOUTH WORLDVIEW

Abstract: *This article analyzes the scientific and educational processes observed in recent years in Uzbekistan, the innovative development of the pharmaceutical industry, the relevance of biological research, and the issues related to shaping a modern scientific worldview among the younger generation. The study highlights the integration of social sciences, biology, and technology as a key factor in scientific progress.*

Keywords: *integration of science, pharmaceutics, biology, youth education, innovation, Uzbekistan.*

Kirish

So‘nggi yillarda O‘zbekiston davlat siyosatida ilm-fan, innovatsiyalar va ta’limni birlashtirish ustuvor vazifa sifatida belgilandi. Milliy rivojlanish strategiyasida iqtisodiy o‘sish bilan bir qatorda yuqori qo‘shilgan qiymat yaratish, eksportni kengaytirish va ilmiy-texnik potentsialni oshirishga doir maqsadlar ko‘rsatib o‘tildi. Ushbu strategik yo‘nalishlar mamlakatning farmatsevtika va biotexnologiya salohiyatini rivojlantirish uchun asosiy huquqiy-tashkiliy barqarorlikni ta’minlamoqda. Ushbu maqolada O‘zbekistonda so‘nggi yillarda ilm-fan va ta’lim tizimlarining strategik yo‘nalishlari, farmatsevtika va biotexnologiya sanoatining rivojlanishi hamda yosh avlodning ilmiy dunyoqarashini shakllantirishga oid integratsion jarayonlar tahlil qilinadi. Ish davlat siyosati, sanoat statistikasi va infratuzilma loyihalari (Tashkent Pharma Park va biotexno-klaster), hamda ta’lim islohotlarining ustuvor yo‘nalishlarini birlashtirib ko‘rib chiqadi. Maqolada hujjatli tahlil, statistika va case-study yondashuvlari asosida muammolar va siyosat tavsiyalari taqdim etilgan. Globallashuv sharoitida ilm-fan va ta’lim tizimi jamiyat taraqqiyotining asosiy drayveriga aylanmoqda. Ayniqsa, O‘zbekistonda milliy rivojlanish jarayonlari bilan bir qatorda xalqaro ilmiy standartlarga moslashuv jarayoni jadal kechmoqda. Bu holat yosh avlodning ilmiy salohiyati, kasbiy tayyorgarligi va ijtimoiy mas’uliyatini oshirish zaruratini yuzaga keltiradi.

Maqolaning maqsadi — farmatsevtika va biotexnologiya sohalarining ilmiy-ta’limiy muhit bilan qanday integratsiyalashayotgani, bu jarayon yoshlarning ilmiy dunyoqarashiga qanday ta’sir ko‘rsatishi va mazkur integratsiyani kuchaytirish uchun amaliy tavsiyalar ishlab chiqish.

Asosiy qism:

1. Yoshlar dunyoqarashini shakllantirishda ilmiy-ta’limiy jarayonlarning roli

Soha bo‘yicha mahalliy va xalqaro tahlillar bilanoq so‘nggi statistik ma’lumotlar ham mavjud: farmatsevtika bozorining jadal o‘sishi, chakana savdo hajmining 2024 yilda o‘sishiga oid hisobotlar tahlil qilingan (bozor hajmi va o‘sish sur’ati haqida Proxima Research va davlat agentliklari ma’lumotlari). Shuningdek, Tashkent Pharma Park doirasida biotexnologiya klasteri tashkil etish rejalari va STI (Science, Technology & Innovation) parklarini rivojlantirish bo‘yicha UNCTADning baholash hisobotlari ilmiy infratuzilma va siyosiy takliflarni shakllantirish uchun foydalanildi. Ta’lim sohasida esa 2023–2026 yillarga mo‘ljallangan Partnership Compact for Education Reform hujjati ta’lim islohotlarining yo‘nalishini belgilaydi. Zamonaviy ta’lim tizimi nafaqat bilim berish, balki talabalarda tahliliy fikrlash, innovatsion yondashuv va xalqaro hamkorlikka tayyorlikni shakllantirishga xizmat qilishi lozim. O‘zbekistonda kechayotgan milliy jarayonlar yoshlarning xalqaro maydondagi raqobatbardoshligini ta’minlashga qaratilgan bo‘lib, bu holat ilmiy yetuklik tushunchasini yangi bosqichga olib chiqmoqda.

2. Farmatsevtika sanoatining innovatsion rivoji

Maqola quyidagi usullar asosida tayyorlandi: (1) hujjatli tahlil — Prezident qarorlari va Milliy strategiya hujjatlari, rasmiy agentliklar hisobotlari; (2) statistik analiz — Proxima Research va Pharm Agency tomonidan chop etilgan bozor ko‘rsatkichlari; (3) case-study — Tashkent Pharma Park va unga biriktirilgan biotexno-klaster loyihasi; (4) ilmiy-metodik ekspert tahlili — mavjud adabiyotlar va xalqaro ekspert hisobotlari asosida siyosiy tavsiyalar ishlab chiqildi. Natijalar integratsion model va tavsiyalarga yo‘naltirildi. Farmatsevtika tarmog‘i iqtisodiyotning strategik sohalaridan biri hisoblanadi. Mahalliy ishlab chiqarishni rivojlantirish, investitsiyalarni jalb qilish va innovatsion texnologiyalarni joriy etish orqali dori vositalari sifati va mavjudligini oshirish mumkin. Bu jarayonda ilmiy tadqiqotlar va ta’lim muassasalari o‘rtasidagi hamkorlik muhim ahamiyat kasb etadi.

3. Biologik tadqiqotlar va ularning amaliy ahamiyati

Biologiya sohasidagi izlanishlar, xususan, simbioz shakllari, o‘simliklarning foydali xususiyatlari hamda bioaktiv moddalarning tuzilishi va biosintezi sog‘liqni saqlash va farmatsevtika uchun muhim ilmiy asos bo‘lib xizmat qiladi. Bunday tadqiqotlar ekologik muvozanatni saqlash va yangi dori vositalarini yaratishda muhim manba hisoblanadi.

4. Texnologik yondashuvlar va sensor tizimlar

Zamonaviy texnologiyalar, jumladan, yarimo‘tkazgichli sensorlar sanoat xavfsizligi va ekologik monitoringda muhim rol o‘ynaydi. Metan va tabiiy gazni aniqlashga mo‘ljallangan sensorlar energetika va sanoat tarmoqlarida xavfsizlikni ta’minlashga xizmat qiladi.

1. Davlat strategiyasi va siyosiy kontekst

O‘zbekistonning 2022–2026 yillarga mo‘ljallangan Milliy rivojlanish strategiyasida eksportni oshirish, texnologik modernizatsiya va ilmiy salohiyatni rag‘batlantirish muhim ustuvorliklar sifatida belgilangan. Ushbu hujjatlar milliy siyosatning ilmiy-ta’lim va sanoat integratsiyasini qo‘llab-quvvatlash tamoyillarini beradi.

2. Farmatsevtika bozori va iqtisodiy indikatorlar

2024 yil yakunlariga ko‘ra, farmatsevtika mahsulotlari chakana savdosining joriy hajmi milliy valyutada sezilarli o‘sishni ko‘rsatdi; Proxima Research hisobotiga ko‘ra, 2024 yil oxirida chakana savdo hajmi 24.8 trillion so‘m atrofida bo‘lib, bu o‘tgan yilga nisbatan ~19% o‘sishni tashkil etgan (AQSh dollarida esa o‘sish nisbatan sekinroq hisoblangan). Bu ko‘rsatkichlar mamlakat ichida talab va mahalliy ishlab chiqarishni kengaytirish uchun imkoniyat mavjudligini ko‘rsatadi.

3. Tashkent Pharma Park va biotexnologiya klasteri

Hukumat tomonidan Tashkent Pharma Park hududida 60 gektar maydon ajratilib, maxsus biotexnologiya klasteri tashkil etish bo‘yicha qaror qabul qilindi. Ushbu infratuzilma loyihasi sanoat va ilmiy-tadqiqot muassasalarini yaqinlashtirish, investitsiyalarni jalb qilish hamda mahalliy R&D imkoniyatlarini kengaytirish uchun mo‘ljallangan. Bu loyiha tufayli farmatsevtika ishlab

chiqarishning lokalizatsiyasi va biotexnologik tadqiqotlar uchun infratuzilma oshadi.

4. STI parklari va ilmiy infratuzilma (UNCTAD bahosi)

UNCTAD tomonidan ishlab chiqilgan hisobot STI parklarining O‘zbekistondagi imkoniyatlari va siyosiy choralari bo‘yicha tahlil beradi. Hisobotda muvaffaqiyatli STI parklarining asosiy komponentlari — universitet-sanoat aloqalari, investitsiyalar, boshqaruv va kadrlarni tayyorlash — ko‘rsatib o‘tilgan. Ushbu tavsiyalar O‘zbekistonda Tashkent Pharma Park kabi loyihalarni samarali boshqarish uchun muhim yo‘riqnomadir. UN Trade and Development (UNCTAD)

5. Ta’lim islohotlari va yoshlar bilan ishlash (UNICEF Partnership Compact)

2023–2026 yillarga mo‘ljallangan Partnership Compact for Education Reform hujjati maktabgacha va umumiy ta’lim sohasida sifatni oshirish, STEM ta’limini kuchaytirish va o‘qituvchilar malakasini oshirishga yo‘naltirilgan. Ushbu islohotlar yuqori malakali kadrlar yetishtirish va yoshlarni ilmiy tadqiqotlarga jalb etish uchun muhim poydevor hisoblanadi.

Muhokama

Integratsiyaning ustunliklari

Davlat siyosatining aniq strategik yo‘nalishlari va infratuzilma loyihalari (Tashkent Pharma Park) sanoat, ilm-ta’lim va tadqiqotlarni birlashtirish imkonini beradi. Mahalliy ishlab chiqarish hajmining o‘sishi va STI parklarining rivojlanishi innovatsion klasterlar yaratishda ijobiy omil bo‘ladi.

Muammolar va xavf-xatarlar

Ammo muammolar ham mavjud: farmatsevtika sohasida sifat nazorati, farmakovigilans tizimi takomillashuvi, inson resurslari va yetarli moliyaviy mexanizmlar — xususan venture capital va R&D moliyalashtirish tizimi talab etadi. Mintaqaviy va xalqaro standartlarga mos keluvchi sifat nazorati va qattiq farmakovigilans zarur. (Ilmiy-huquqiy jihatlar va qonunchilik yangilanishlari ham e’tiborda bo‘lishi lozim.)

Yoshlarni jalb etish va ta’lim

STEM sohasidagi maktab va oliy ta’lim islohotlari yuqori malakali kadrlar tayyorlashga xizmat qiladi, biroq universitet-sanoat hamkorligining chuqurlashuvi uchun amaliy tajriba va internship, birgalikdagi loyihalar hamda start-up inkubatorlarining rivojlanishi kerak. Partnership Compact hujjati mazkur yo‘nalishga strategik qo‘llab-quvvat beradi.

Siyosiy va amaliy tavsiyalar

Universitet-sanoat koalitsiyalarini mustahkamlash. Oliy ta’lim muassasalari va Tashkent Pharma Park kabi klasterlar o‘rtasida aniq hamkorlik modellari — kadrlar almashinuvi, birgalikdagi R&D grantlari va loyihalar ishlab chiqilsin.

Farmakovigilans va sifat nazoratini kuchaytirish. Farmatsevtika mahsulotlarining xavfsizligini ta’minlash uchun monitoring va qonunchilikni takomillashtirish (mahalliy va xalqaro standartlarga mos) zarur.

Investitsiyalar va moliyalashtirish mexanizmlari. R&D va start-up loyihalarini moliyalashtirish uchun davlat-xususiy hamkorlik, grantlar, soliq imtiyozlari va venchur mexanizmlari ishlab chiqilsin. Tashkent Pharma Park kabi loyihalar investitsion jozibadorlik nuqtai nazaridan qo‘llab-quvvatlansin. Kun.uz

STEM ta’limini amaliyotga yo‘naltirish. Maktab va oliy ta’limda ko‘proq amaliy laboratoriyalar, internship va ilmiy loyihalar kiritilsin; bu yoshlarni tadqiqotlarga jalb qilish va ish bozoriga mos kadrlar tayyorlash imkonini beradi.

STI parklar va klasterlarni milliy profilinga moslash. UNCTAD tavsiyalariga muvofiq, STI parklarni boshqarish bo‘yicha milliy standartlar va indikatsiyalar ishlab chiqilsin hamda mahalliy iqlimga moslashtirilgan qoidalar joriy etilsin. UN Trade and Development

Xulosa

O‘zbekistonda ilm-ta’lim va sanoat integratsiyasi, xususan farmatsevtika va biotexnologiya yo‘nalishlarida sezilarli ijobiy o‘zgarishlar kuzatilmoqda. Davlat strategiyasi, bozorning jadal o‘sishi va infratuzilma loyihalari (Tashkent Pharma Park va biotexno klaster) bu sohalarda imkoniyatlarni kengaytirmoqda. Shu bilan birga, sifat nazorati, farmakovigilans, moliyalashtirish mexanizmlari va universitet-sanoat hamkorligining chuqurlashuvi bo‘yicha amaliy choralar zarur. Yoshlar va ta’lim tizimini mazkur integratsiyaga faol jalb etish O‘zbekistonning innovatsion rivojlanish strategiyasini amalga oshirishda markaziy omil bo‘ladi.

Tahlillar shuni ko‘rsatadiki, O‘zbekistonda ilm-fan, ta’lim, biologiya va farmatsevtika sohalarining o‘zaro integratsiyasi barqaror rivojlanishning muhim omilidir. Yosh avlodda ilmiy dunyoqarashni shakllantirish, innovatsion yondashuvlarni qo‘llab-quvvatlash va amaliy tadqiqotlarni rivojlantirish mamlakatning xalqaro ilmiy maydondagi mavqeini mustahkamlaydi.

Foydalanilgan adabiyotlar.

1. Yuldashev, S., Halimbetov, Y., Usmanova, M., & ZS, N. (2021). National Processes In Uzbekistan And The Formation Of The Internationalist Maturity Of The Younger Generation. The American Journal of Medical Sciences andPharmaceutical Research, 3(06), 167-175.
2. Jasmina, B. A., Sevinch, D. O., Ersashev, S. S., Usmanova, M. B., &Eshkobilova, M. E. (2025). Design And Operating Principle Of A Semiconductor Sensor For Methane And Natural Gas. Development Of Science, 6(2), 152-160.
3. Усманова, М. Б., &Бурханова, Д. С. (2025). Паразиты как одна из форм симбиоза. Orientalrenaissance: Innovative, educational, naturalandsocialsciences, 5(9), 82-87.
4. M. A., &Usmonova, M. B. (2025). Karoteonidlarning biosintezi va tuzilishi: yangi kashfiyotlar va farazlar. Research Focus, 4(5), 41-45.
5. Усманова, М. Б., &Саманова, Ф. Б. (2025). Современный облик фармацевтической отрасли: иноватsионное оброзования, локализатsiя и инвестиции (на примере фармацевтического сектора Узбекистана). Orientalrenaissance: Innovative, educational, naturalandsocialsciences, 5(9), 47-52.

6. Muxammadievich, H. M., Uktamovna, M. D., Abdullaevich, S. O., Rustamovna, M. R., & Usmanovna, B. M. (2022). Burn shock in pediatric after thermal injury and multiple organ failure syndromes. World Bulletin of Public Health, 8, 140-142.
7. Quyliyeva, M. U., Jasmina, X., &Komila, S. Bolalarda uchraydigan tug ‘ma diafragma churralarini tashxislash va davolash natijalarini tahlil qilish va bo ‘lmachalar va qorinchalar defekti bilan tug ‘ilgan chaqaloqlarda operativ yondashuv.
8. Jasmina, K., &Balkhievna, U. M. (2024). The national processes taking place in uzbekistan today and the formation of the international and mature maturity of the young generation. education and science yesterday and today, 1(1).
9. Хасанова, Г. Р., Усманова, М. Б., Нажмитдинов, Х. Б. (2022). Витаминга бой ловия (phascolus) ўсимлигининг умумий хусусиятларИ. Oriental renaissance: Innovative, educational, natural and social sciences, 2(9), 333-336.
10. Усманова, М., Эрназарова, М., Куйлиева, М., & Хасанова, Г. (2021). Дорихона фаолиятини ташкил этиш, дорилар саклаш чора тадбирлари. Экономика и социум,(11), 90(6).
11. Мурадова Раиля Рустамовна, & Хайдаров Мусо Мухаммадиевич (2020). Фототоксические и фотоаллергические реакции при использовании современных лекарственных средств и некоторых растений. Вопросы науки и образования, (37 (121)), 41-44.
12. Muradova R.R. (2025). Homilador ayollarda anemiya darajasi va temir preparatlari samaradorligining statistik tahlilI. Вестник Ассоциации Пульмонологов Центральной Азии, 14(9), 70–72. извлечено от https://journals.tnmu.uz/index.php/bapca/article/view/2695

Xadjamuratova M. X., tarix fanlari doktori
professor
Alfraganus universiteti
O‘zbekiston

ZARDUSHTIYLIKNING MUQADDAS KITOBI “AVESTO”DA MADANIYAT MASALASI

Annotatsiya: *Maqolada zardushtiylikning muqaddas kitobi “Avesto”da yoshlarni bolalikdan sog‘lom turmush tarziga yo‘naltirish orqali ular ongida madaniyatning turli qirralari, ya’ni siyosiy, huquqiy, mehnat, iqtisodiy, tibbiy, diniy, ahloqiy madaniyat qirralarini shakllantirish masalalari yoritilgan.*

Kalit so‘zlar: *zardushtiylik, Avesto, ezgulik, yoshlar, ta’limot, madaniyat, mehnat*

Khadzhamuratova M. Kh., doctor of historical sciences,
professor
Alfraganus University
Uzbekistan

THE ISSUE OF CULTURE IN THE HOLY BOOK OF ZOROASTISM “AVESTO”

Annotation: *The article examines the issues of formation in the consciousness of young people of various aspects of culture, namely political, legal, labor, economic, medical, religious, moral, by orienting them from childhood to a healthy lifestyle, based on the sacred book of Zoroastrianism "Avesta".*

Keywords: *Zoroastrianism, Avesta, goodness, youth, education, culture, labor*

Kirish

Yoshlar ongida madaniytning turli qirralarini shakllantirishda Markaziy Osiyo xalqlariga xos qahramonlik afsonalari hamda zardushtiylikning muqaddas kitobi “Avesto” fundamental metodologik asos vazifasini bajarib kelgan.

Jamiyat taraqqiyoti, yoshlar kamoloti borasida – “Ezgu fikr, ezgu so‘z va ezgu amalni olqishlayman. Fikr, so‘z va amal olamidan ezgu fikr, ezgu so‘z va ezgu amalni tanlayman. Men barcha yomon fikr, yomon so‘z va yomon amaldan yuz buraman[1]”, – degan purma’no g‘oya ilgari surilib, asrlar davomida insonlarni ezga maqsad sari chorlab kelgan “Avesto” hozirgi zamon uchun ham g‘oyat ahamiyatlidir.

Natijalar va muhokama

Zardushtiylik ta’limotida yoshlarni jamiyatga tayyorlash, ularni hayotning ilg‘orroq bosqichlariga ko‘tarish kabi tashabbuskor yondoshuv g‘oyalari ilgari

surilgan. Ushbu g‘oyalarni hayotga tadbiq etish yo‘nalishlari qonun-qoidalar asosida qat’iy belgilangan. Avvalo, murg‘ak qalb egasi tug‘ilgan makonda o‘rnatilgan turmush madaniyatiga kuzatish, anglab yetish orqali ko‘nikib borgan.

Bolalikdan sog‘lom turmush tarziga yo‘naltirish orqali yoshlar ongida madaniyatning turli qirralari shakllantirilgan. Natijada ularda tarixiy javobgarlik mas’uliyati ham namoyon bo‘la boshlagan. Zardushtiylik ta’limotida yoshlarni siyosiy madaniyatni shaklllantirish nazariyasi ham ilgari surilgan.

Olam obodligi uchun g‘ayrat ko‘rsatmoq lozim, uni yaxshilik bilan asramoq va yorug‘lik sari eltmoq kerak[1] – deyiladi “Avesto”da. Yovuzlik, bosqinchilik, talonchilik, adolatsizlikka qarshi birdamlik, ahillik bilan kurashib, tinchlik va totuvlikni saqlash orqali jamiyat taraqqiyoti, farovonligiga erishish mumkinligi bayon etilgan.

Insonlarni bir-biriga g‘amxo‘rlik qilish, yoshlarni tarbiyasi, kamoloti haqida qayg‘urish asnosida jamiyat kelajagini ta’minlashga yo‘naltirilgan ezgu g‘oyalar zardushtiylik ta’limotida o‘z ifodasini topgan. Shu orqali odamlarda bunyodkor g‘oyalarga nisbatan xayrixohlik, vayronkor g‘oyalarga nibatan nafrat hissi kuchayib borgan.

“Avesto”da – yaxshilik olami xukumdorining amr-irodasi bilan qishloq va xonumonlarda ayollar va erlar sha’niga qo‘shiqlar yangragaydir[1], – deb, jamiyat a’zolarining har tomonlama farovonligini ta’minlash choralari bayon etilgan.

Zardushtiylik ta’limotiga ko‘ra, sernufuz va homilador ayollar jamoa tomonidan ijtimoiy himoya qilingan. Ko‘p bolali oilalarga davlat hisobidan nafaqa tayinlash lozimligi qayd etilgan, biryo‘la 2-3 ta tuqqan ayollar mukofot olishga sazovor, deb uqtiriladi[2]. Go‘dakni onasi qornida o‘lib ketmasligi uchun asrab-avaylashga da’vat qilingan. Yoshlar jamiyatda o‘rnatilgan mavjud qonun-qoidalarni o‘rganishi, unga rioya qilishi zardushtiylik ta’limotida ham belgilangan. Huquqiy madaniyatni shakllantirilishi zo‘ravonlikka, o‘zboshimchalikka ma’lum darajada chek qo‘yib, jamiyat farovonligiga yo‘l ochib berishi uqtirilgan.

Mehnat madaniyatini ulug‘lash “Avesto”da inson tarbiyasida asosiy qoidalaridan biri bo‘lgan. Mehnat ulug‘langani bois yoshlarda mehnat qilish orqali amaliy ko‘nikmalar ortib borishi bu sohada bilim, tajribalar to‘planishiga, turli sohalarni takomillashishiga turtki bergan.

Mehnat madaniyati – yoshlikdan shakllanadi. Mehnat har bir qo‘lga kiritilgan muvaffaqiyatning garovi, irodani mustahkamlanishi, aqlni charhlanishi, ma’lum kasb-korlikni egallash, intelluktual salohiyatga erishish mehnat orqali qo‘lga kiritiladi. Shuningdek, har bir sohani o`rganish, talablarga vijdonan rioya qilish, ma’lum yutuqqa erishish mehnat madaniyati orqali amalga oshadi.

Zardushtiylik ta’limotida yoshlar orasida bir-biriga so‘z berish, shartlashish ortida katta mas’uliyat yuklanishi bayon qilingan. Inson jamiyatda yashar ekan, albatta atrofdagilar bilan ish, xizmat yoki boshqa masalalar yuzasidan kelishib olishi, bir-birini ishontirib, shartlashishi, ma’lum bir ehtiyojlarni qondirishi tabiiy hol. Mas’uliyatni his qilmaslik, va’dani bajarmaslik orqali ikkinchi tomonning zarar ko‘rishini oldini olish choralari mustahkamlangan.

Ey Mazda! Men seni ardoqlayman va sendan o‘tinaman: ishonchsizlik o‘rtadan ko‘tarilsin. Qarindosh-urug‘lar kaltafahmlilikdan; hamkorlar yaqinlar aldovidan; do‘st-yorlar fitna ahlidan omonlikda bo‘lib, olam yomon rahbarlardan xalos bo‘lsin[1], – deya xitob bilan, yoshlarni ishonchsizlik, sustniyatlilik, aldov, fitna, o‘zganing haqqiga xiyonat qilish kabi buzg‘unchi g‘oyalardan yiroq bo‘lishga, ularga qarshi ogoh bo‘lishga, har qanday ishga doimo hushyorlik bilan kirishishga chorlaydi.

Shuningdek, ta’limotning to‘rtinchi Fargard, birinchi bo‘limida, – kimda-kim qarzni o‘z egasiga qaytarmasa, uning bu amali o‘sha omonatni o‘g‘irlagan bilan barobar bo‘ladi. Qarz olgan kishi omonatni uyida saqlasa, har kun va har tun unga qo‘l ursa va o‘ziniki, deb gumon qilsa, uning bu amali omonatni ikkinchi marta o‘g‘irlagan bilan barobardir[1], – deyilgan. Bunga ko‘ra, yoshlar bir-birini ishonchini suiste’mol qilmaslikka, subutsizlikka, va’daga vafo qilmaslikka, aldamchilik, so‘zida turmaslik kabi jamiyatdagi qusurlarga yo‘l qo‘ymaslikka da’vat qilingan.

Zardushtiylik ta’limotida yoshlarni xulq-atvori shakllanishida axloq muhim o‘rin tutishini inobatga olinib, ularning tarbiyasida axloqiy fazilatlarni shakllantirishga alohida e’tibor qaratilgan. Ezgulik va yovuzlik, halol va harom, savob va gunoh kabi axloqiy tushunchalarni yoshlar ongiga murg‘aklik chog‘idanoq singdirish bilan, ularda salbiy holatlarga nisbatan nafrat hissi uyg‘onadi. Yillar davomida shu asnoda insoniylik xususiyatlari, axloqiy fazilatlar jamiyat urf-odatiga aylanib, axloqiy madaniyat qaror topishiga zamin yaratiladi.

Ozodalikka intilish, diniy marosimlarni o‘tkazishda ishlatilgan idishlarni yuvib, saranjom-sarishta qilish ham zarur edi. Chunki ozodalik, tozalik turli-tuman ifloslik va yomonliklardan kishini asraydi, deb tushunilgan.

Zardushtiylik ta’limotida yer, suv, havo va olov muqaddas sanalgan. Jumladan, – tabiat muhofazasi va muhit tozaligini saqlash, turli kasalliklarning tarqalishining oldini olish maqsadida sanitariya-gigiyena qoidalari amalga oshirilgan: axlatlarni bekitish, ifloslangan joylarni tuproq, tosh, kul bilan ko‘mib tashlash; olov, issiqlik va sovuqlik yo‘li bilan kiyim-kechaklar va oziq-ovqatlarni zararsizlantirish, kul, sirka, sharob, turli giyohlar tutatish[3] tavsiya etilib, sog‘lom turmush tarzi targ‘ib qilingan.

Zardushtiylik ta’limotida jamiyatda pedagogik madaniyatni shakllantirishga alohida e’tibor qaratilgan. “Tarbiya, – deyilgan “Avesto”da, – hayotning eng muhim (tayanchi) tirgagi bo‘lib hisoblanishi lozim. Har bir yoshni shunday tarbiyalash zarurki, u avvalo yaxshi o‘qishni va so‘ngra esa yozishni o‘rganish bilan eng yuksak pog‘onaga ko‘tarilsin”[4].

Xullas, zardushtiylikning muqaddas kitobi “Avesto”da yoshlarni bolalikdan sog‘lom turmush tarziga yo‘naltirish orqali ular ongida madaniyatning turli qirralari, ya’ni siyosiy, huquqiy, mehnat, iqtisodiy, tibbiy, diniy, ahloqiy madaniyat qirralarini shakllantirish masalalari ilgari surilgan.

Adabiyotlar

1. “Авесто” тарихий-адабий ёдгорлик. – Тошкент: Шарқ, 2001 . – 34, 55, 32, 15, 116- бетлар.

2. Ҳомидов Ҳ. “Шохнома”нинг шуҳрати. – Тошкент: Ўзбекистон, 1991. – Б. 92.
3. Ҳасанов С. “Авесто” – ҳуқуқ манбаи. “Мулоқот”, 1999, 1-сон, – Б. 50. // “Авесто” тарихий-адабий ёдгорлик. – Тошкент: Шарқ, 2001. – Б. 364.
4. Сапаров Б.Б., Сапаров А.Б. Авестода одоб-аҳлоқ масаласи. – Б. 896-897. // https://cyberleninka.ru/article/n/avestoda-odob-ahlo-masalasi

Xadjamuratova M. X., tarix fanlari doktori
professor
Alfraganus universiteti
Tashkent, O‘zbekiston

ABITURIENTLARNI OLIY TA’LIMGA QABUL QILISHDAGI ISLOHOTLAR NATIJALARI

Annotatsiya: *Maqolada respublikada ta’limni zamon talablari darajasiga ko‘tarish maqsadida oliy o‘quv yurtlarida qabul jarayonlarining shaffofligini ta’minlash, ta’limdagi korrupsiya va poraxo‘rlikning oldini olish, abiturientlarni test sinovlari asosida oliy ta’limga qabul qilishdagi islohotlar yoritilgan.*

Kalit so‘zlar: *ta’lim, sifat, oliy ta’lim, islohot, oliy o‘quv yurtlari, qabul, shaffoflik*

Khadzhamuratova M. Kh., doctor of historical sciences,
professor
Alfraganus University
Tashkent, Uzbekistan

RESULTS OF REFORMS IN ADMISSION OF APPLICANTS TO HIGHER EDUCATION

Annotation: *The article examines reforms aimed at ensuring transparency in the admission process to higher education institutions, preventing corruption and bribery in the field of education, and admitting applicants to higher education institutions based on tests in order to bring education in the republic closer to modern standards.*

Keywords: *education, quality, higher education, reform, higher education institutions, admission, transparency*

Kirish

Oliy ta’lim ta’lim tizimida muhim ahamiyatga ega bo‘lib, yoshlarni har tomonlama kamol topishida, iqtidorini namoyon etishida, jamiyat va davlat hayotida o‘z o‘rnini aniq belgilab olishda, ma’lum mutaxassislik bo‘yicha davlatning kadrlarga bo‘lgan ehtiyojini ta’minlashda, jamiyatning intellektual salohiyatini oshirishda muhim o‘rin tutadi.

Konstitutsiyaning 51-moddasida belgilanganidek, “Fuqarolar davlat ta’lim tashkilotlarida tanlov asosida davlat hisobidan oliy ma’lumot olishga haqli. Oliy ta’lim tashkilotlari qonunga muvofiq akademik erkinlik, o‘zini o‘zi boshqarish, tadqiqotlar o‘tkazish va o‘qitish erkinligi huquqiga ega”[1].

Natijalar va muhokama

Ta’limni zamon talablari darajasiga ko‘tarish maqsadida oliy ta’lim muassasalari faoliyatida monitoring o‘tkazildi. Abiturientlarni test sinovlari

asosida oliy ta’limga qabul qilishda uning tartib-qoidalari endi talabga to‘liq javob bermay qo‘yishi natijasida jamoatchilik, ko‘proq ota-onalarning e’tirozlariga sabab bo‘ldi. Bu masala bo‘yicha har yili qariyb 4 mingdan ziyod asosli murojaatlar[2] kelib tushdi.

Ayniqsa, ijodkorlik va individual mahoratni talab etadigan madaniyat, san’at, dizayn, tasviriy va amaliy san’at, san’atshunoslik, musiqiy ta’lim, sport va jismoniy tarbiya sohasidagi ta’lim yo‘nalishlariga iqtidorli yoshlar o‘rniga, ushbu sohalarda yetarli iqtidorga ega bo‘lmagan yoshlar test sinovlari orqali o‘qishga qabul[2] qilindi.

Shuningdek, oliy o‘quv yurtlarida qabul jarayonlarining shaffofligini ta’minlash, ta’limdagi korrupsiya va poraxo‘rlikning oldini olishga ham astoydil kirishildi. Yuqorida ta’kidlanganidek, departament organlari tomonidan 2015-yilning 1-yarmida ta’lim tizimi bilan bog‘liq korrupsiya firibgarlik, mansab lavozimini suis’temol qilish kabi holatlar bo‘yicha jami 83 ta jinoyat ishi kuzatildi. Ushbu jinoyatlarning 16 tasi umumta’lim maktablarida, 31 tasi oliy o‘quv yurtlarida, 36 tasi O‘MKXT da sodir etilgan. Tahlillarga ko‘ra, ta’lim tizimidagi korrupsiya holatlari asosan o‘quv yurtlarida yangi o‘quv yili uchun qabullar boshlangan davrga to‘g‘ri kelgan. Xususan, departament a’zolari tomonidan 2018-yilning yanvar oyida 5 ta, fevral oyida 16 ta, mart oyida 11 ta, aprel oyida 10 ta, may oyida 16 ta, iyun-iyul oylarida 22 ta holatlar fosh etilgan.

Ushbu jinoyatlarni sodir etish usullarini ko‘rib chiqadigan bo‘lsak, ta’magirlik yo‘li bilan ta’lim muassasalariga ishga qabul qilish holatlari bo‘yicha: O‘MKXTda 4 ta, umumta’lim maktablarida 8 ta jinoyat aniqlandi. O‘qishga kirishdagi korrupsiya holati bo‘yicha OO‘Yuda 27 ta, o‘rta-maxsus, kasb-hunar ta’lim muassasalarida 21 ta, umumta’lim maktablarida 5 ta jinoyat aniqlandi[3]. Aksariyat holatlarda pora berish tashabbusi aynan fuqarolarning o‘zidan chiqib kelayotgani afsuski – haqiqat. Vaholanki, jamiyatni halol va korrupsiyadan holi hududga aylantirishga barcha birdek mas’ul va poraxo‘r kimsalarga qarshi kurashga fuqarolarning harakati asosiy kuchga ega bo‘lishini anglab yetish shart[4].

Har bir o‘quv yilida Prezident qaroriga asosan o‘qishga qabul qilish kvotalari shakllantirildi. Oliy o‘quv yurtlarining 1-kursiga o‘qishga kirish uchun o‘tkaziladigan test sinovlarini haqqoniy, adolatli va shaffof o‘tkazilishini ta’minlash maqsadida test o‘tkazish muddati o‘zgartirildi. Avvallari barcha kirish test sinovlari bir kunda o‘tkazilgan bo‘lsa, 2018/19 o‘quv yilidan iyul-avgust oylariga ko‘chirildi va natijalar ertasigayoq e’lon qilindi. Davlat test Markazining rasmiy veb-saytida to‘la ma’lumotlar bir haftadan keyin e’lon qilinishi ta’minlandi.

2018–2019-o‘quv yili uchun o‘tkazilgan test sinovlari ilk marotaba ochiq maydonli binolarda o‘tkazildi. Kirish imtihonlarini shaffof, ochiq va oshkora o‘tkazish choralari ko‘rildi, ya’ni test sinovlari o‘tkaziladigan hududlarga kuzatuv kameralari o‘rnatildi. Binoning kirish yo‘laklarida shaxsni identifikatsiyalash qurilmasi o‘rnatildi. Davlat organlari va ta’lim muassasalaridan kuzatuvchilar, nazoratchilar jalb qilindi. Huquqni muhofaza qiluvchi organlar nazorati o‘rnatildi.

Test sinovlari jarayonlarini tashqaridan kuzatish imkoniyati yaratildi, ya’ni katta monitorlar o‘rnatildi. Ushbu jarayonlarni ochiqligini ta’minlash maqsadida Ommaviy axborot vositalari yordamida yoritib borildi.

Yoshlarni ijtimoiy himoya qilish hamda test sinovlarini xalqaro standartlar darajasida o‘tkazilishini ta’minlash maqsadida abiturientlarning bir nechta bakalavriat ta’lim yo‘nalishlari bo‘yicha tanlovda ishtirok etishlari uchun keng imkoniyatlar yaratish[5] bo‘yicha innovatsion yondoshuv sababli ijobiy islohotlarga yo‘l ochildi.

2019/2020 o‘quv yili qabuli doirasida abiturientlarga oliy ta’lim muassasalarining test sinovi topshiriladigan fanlar majmuasi bir xil bo‘lgan uchtagacha bakalavriat ta’lim yo‘nalishida tanlovda ishtirok etish huquqini berdi. 2021/2022 o‘quv yili qabulidan boshlab test sinovi topshiriladigan fanlar majmuasini ikki bo‘limga ajratib, birinchi bo‘limga barcha test topshiruvchilar uchun majburiy uchta fan – ona tili (o‘zbek, rus yoki qoraqalpoq tili), matematika va O‘zbekiston tarixi, ikkinchi bo‘limga abiturient tanlagan bakalavriat ta’lim yo‘nalishiga mos ikkita fan[6] belgilandi.

Adabiyotlar

1. Ўзбекистон Республикаси Конституцияси. Янги таҳрирда. – Тошкент: Ўзбекистон, 2023. – Б. 13.
2. Республика олий таълим муассасалари бакалавриатига кириш тест синовларини ўтказиш тартибини такомиллаштириш тўғрисида. 16.11.2017. ПҚ-3389-сон. // https://lex.uz/docs/3413551?ONDATE=13.06.2023
3. Ismoilov A. Bosh Prokuratura huzuridagi iqtisodiy jinoyatlarga qarshi kurashish departamentining bo`lim katta inspektori hisoboti. Mp.4 – “O`zbekiston – 24” kanali. // Xadjamuratova M. Korrupsiya va unga qarshi kurashish. O`quv qo`llanma, 2022. – Б. 116.
4. Yunusov B. “O`zbekiston – 24 telekanali. 2018 yil.
5. Олий таълим муассасаларига тест синовлари орқали қабул қилиш тизимини такомиллаштириш бўйича қўшимча чора-тадбирлар тўғрисида. 14.05.2019. ПҚ-4319-сон. // https://lex.uz/docs/4334802
6. Республика олий таълим муассасалари бакалавриатига кириш тест синовларини ўтказиш тартибини такомиллаштириш тўғрисида. 16.11.2017. ПҚ-3389-сон. // https://lex.uz/docs/3413551?ONDATE=13.06.2023

UDC: 616.381-002

Xalimov A. O.
assistant
department of clinical skills training on simulators
Bukhara State Medical Institute named after Abu Ali ibn Sina
Uzbekistan

CLINICAL RESULTS OF ELIMINATION OF INFLAMMATION FOCUS AND SANITATION OF ABDOMINAL CAVITY IN ACUTE PERITONITIS

Abstract: *Acute peritonitis is an inflammatory process that develops in the visceral and parietal membranes of the abdominal cavity, which can lead to severe general intoxication and life-threatening multiple organ failure. The main cause of the disease is the onset of inflammation resulting from infection entering the abdominal cavity. Etiologically, peritonitis is classified into primary, secondary, and tertiary forms, with secondary purulent peritonitis being the most common. The clinical course is divided into three stages: reactive, toxic, and terminal. At each stage, the severity of clinical manifestations and the body's compensatory capabilities differ. Diagnosis is based on patient history, clinical examination, and laboratory and instrumental studies. Laparoscopy and laparocentesis are considered the most reliable diagnostic methods. The primary treatment approach is surgical intervention, as conservative therapy is ineffective. During surgery, it is necessary to eliminate the source of peritonitis, sanitize the abdominal cavity, provide drainage, and, if required, perform intestinal decompression. Relaparotomy and planned relaparoscopy play crucial roles in cases of severe and recurrent peritonitis. The course and outcome of acute peritonitis are determined by the patient's general condition, the extent of inflammation, the timeliness of surgical intervention, and the level of comprehensive intensive care provided.*

Keywords: *acute peritonitis, purulent inflammation, abdominal sepsis, laparoscopy, sanitation, drainage, relaparotomy.*

Introduction

Acute peritonitis is an inflammation of the visceral and parietal peritoneum of varying severity, which is accompanied by severe general and local symptoms in the human body and leads to serious, destructive disorders of vital organs and systems in a short period of time. The urgency of treating acute peritonitis is determined by the high incidence and mortality rate of this complication. In widespread forms of peritonitis (70%), the average mortality rate is 20-40%. Among patients with peritonitis in the terminal stage, this indicator increases sharply, reaching 60-70%, and these patients account for up to 20% of all cases of peritonitis.

According to the extent of peritonitis (A.M. Karyakin 1968)

Local (limited) peritonitis - the inflammatory process is localized in no more than 2 out of 9 anatomical areas of the abdominal cavity. Exudate can pass through natural drainage pathways into adjacent peritoneal areas.

By etiology, peritonitis is divided into primary, secondary, and tertiary forms. Primary peritonitis is extremely rare, the development of which is caused by the entry of infection into the abdominal cavity through hematogenous, lymphogenous, or cryptogenous routes. Infection can also enter the abdominal cavity as a result of a purulent process or rupture of an abscess by internal organs.

The most common type is secondary peritonitis, which develops as a result of infection due to damage to the abdominal organs or surgical diseases. The main variants of secondary peritonitis include appendicular, cholecystopancreatitis, perforative (gastric or duodenal ulcer, Crohn's disease, etc.), traumatic, necrotic, postoperative, and gynecological peritonitis. Secondary widespread purulent peritonitis (WDP) is the most severe and problematic form in clinical practice, most often accompanied by severe abdominal sepsis.

Tertiary peritonitis includes mild, prolonged forms of purulent inflammation, observed in patients with weakened immunity and severe general condition against the background of secondary peritonitis. In this form, clinical signs are often not clearly manifested.

Peritonitis, especially in its widespread forms, requires surgical treatment. Surgical intervention is the only effective way to eliminate peritonitis, and conservative treatment does not yield results independently. The main stages of surgical intervention in ICRP are the elimination of the primary source of infection, sanitation and rational drainage of the abdominal cavity, elimination of intestinal paresis, drainage of the intestine, and completion of the main operation, during which the patient's further treatment tactics are determined.

Diagnosis of peritonitis is carried out regularly, comprehensively, and in stages. The main clinical and additional laboratory-instrumental examinations play an important role.

The first stage of the main clinical examination is the collection of anamneses. It determines the onset of the disease, the nature of the pain, the dynamics of its development, symptoms such as vomiting, fever, thirst, absence of stool and gas, as well as previous surgical diseases. Often, the pain begins suddenly, sharply, diffusely, as if stabbed. Vomiting initially occurs with nutrients, then with bile or intestinal contents, with an unpleasant odor.

Upon external examination, the patient's general condition is severe, the skin is pale, the lips are bluish, and there is an expression of suffering on the face. Body temperature is usually 38-39 °C. Breathing is superficial, the abdomen does not participate in the breathing process, the abdominal wall is immobile, and the muscles are tense.

Palpation reveals Shchetkin-Blumberg's sign, "boards-like stiffness" of the abdominal muscles, and protective tension of the peritoneal wall. Rectal examination reveals drooping of the rectal wall and pain on palpation, while

vaginal examination reveals drooping of the posterior uterine arch and pain upon slight touch to the neck.

During percussion, in the presence of pneumoperitoneum, a tympanic sound is detected under the diaphragm, and when fluid accumulates, dullness of the sound is detected. In intestinal paresis, high tympanitis is heard. On auscultation, "dead silence" is observed - the absence of intestinal peristalsis. Excitation of the phrenic nerve can be accompanied by hiccups, vomiting, and difficulty breathing.

Other common symptoms include dry and covered tongue, increased body temperature, tachycardia, and decreased arterial pressure. All these signs indicate the severity of the inflammatory process and the degree of intoxication.

Differential diagnosis of peritonitis

Peritonitis often develops as a result of inflammatory or destructive changes in the abdominal organs. However, in some cases (about 15%), the clinical signs are unclear and intertwine with other acute surgical diseases. Therefore, in differential diagnosis, the nature of the pain attack, dyspeptic symptoms, Shyotkin-Blumberg sign, temperature, laboratory parameters, and instrumental examination results are of decisive importance.

1. Differentiation with acute pancreatitis

Symptoms	Peritonitis	Acute pancreatitis
Pain	Persistent, diffuse (abdominal)	Severe, in the epigastric region, backward (waistward) irradiation
Vomiting	First a couple of times, then decreases	Unstoppable, doesn't give relief
Abdominal muscle tension	Strong, "wooden stomach"	Initially weak or absent
Shyotkin-Blumberg badge	Positive	Usually negative
Body temperature	Elevated	Normal at the beginning
Laboratory indicator	Leukocytosis, ESR ↑	Diastase in blood and urine ↑↑
Instrumental	Fluid, gas levels on X-ray/USG	Pancreatic edema, decreased ecogenicity on ultrasound/CT

2. Distinguishing by acute mechanical intestinal obstruction

Symptoms	Peritonitis	Acute intestinal obstruction
Peristalsis	Decreased or none	Increased at first, then disappears
Abdominal view	Tense, painful	Swollen, asymmetrical, visible peristalsis
Vomiting	Few	Increased, fecal vomiting
X-ray	Free gas in abdominal cavity	"Clauber's Cups" - liquid and gas levels
Shyotkin-Blumberg badge	Positive	Negative at first, then positive (if there is a perforation)

In the surgical treatment of IOP, midline laparotomy is most often performed, as this method allows for a complete examination and sanitation of all parts of the abdominal cavity.

After opening the abdominal cavity, the pathological fluid is drained using an electro-aspirator (or, in rare cases, with gauze napkins), then an abdominal

revision is performed, the condition is assessed, and the source of peritonitis is radically eliminated or isolated from the free abdominal cavity.

The aim of the study is to study the frequency of detection, treatment tactics, surgical methods, indications, type, volume and nature of the disease in patients with acute peritonitis in the Republic of Uzbekistan, as well as to improve the results of treatment of this category of patients.

The total number of patients with peritonitis in the studied group was 62 (5%), of which 53% had local peritonitis and 47% had diffuse peritonitis. The most common cause of peritonitis was destructive appendicitis, which was observed in 44% of cases. The mortality rate in the group of patients with diffuse peritonitis was high and amounted to 14.5%. Therefore, the problem of effective treatment of diffuse peritonitis remains relevant today.

References

1. Карыякин А.М. Перитонит и его хирургическое лечение. – М.: Медицина, 1968.
2. Гостищев В.К. Острый перитонит. Клиника, диагностика и лечение. – М.: ГЭОТАР-Медиа, 2014.
3. Савельев В.С., Гостищев В.К. Общая хирургия. – М.: Медицина, 2016.
4. Шамова Н.М., Нечаева О.Ю. Современные подходы к диагностике и лечению распространенного перитонита. // Вестник хирургии им. Грекова. – 2019. – Т.178, №2. – С. 45–52.
5. Ходжаев А.А., Нормуродов А.А. Абдоминальный сепсис и перитонит. – Тошкент: Илм, 2019.
6. Турсунов Ш.А., Бекназаров Р.А. Жарроҳлик инфекциялари. – Тошкент: Тиббиёт нашриёти, 2020.
7. Bhangu A., Nepogodiev D., et al. Safety of relaparotomy for diffuse peritonitis: an international multicentre study. Annals of Surgery, 2019; 269(5): 911–918.
8. Sartelli M., Catena F., et al. WSES guidelines for management of severe intra-abdominal infections. World Journal of Emergency Surgery, 2020; 15(1): 51–65.
9. World Health Organization. Global guidelines for the prevention of surgical site infection. – Geneva: WHO Press, 2018.
10. Халилов Ж.А., Ахмедов Ш.А. Перитонитнинг диагностикаси ва даволаш усуллари. // Ўзбекистон хирургия журнали, 2021, №3. – Б. 24–29.

Xamidova D. R.
tayanch doktoranti
Sharof Rashidov nomidagi Samarqand davlat universiteti
0009-0002-0769-2399
Samarqand shahri

O‘QUVCHILARNING IJODIY YUTUQLARINI QO‘LLAB - QUVVATLASH VA RAG‘BATLANTIRISH USULLARI

Annotatsiya. *Ushbu maqolada boshlang‘ich sinf o‘quvchilarning ijodiy yutuqlarini aniqlash usullari, hamda ijodkorlikni shakllantirishda pedagoglar, ota-onalar va jamiyatning roli va ijodiy yutuqlarni qo‘llab-quvvatlashning ahamiyati haqida so‘z yuritilgan.Bundan tashqari ijodiy yutuqlarni baholash mezonlari va usullari keltirilgan.*

Kalit so‘zlar: *Ijodkorlik, usul, metod, ijodiy yutuq, rag‘bat, usul, jamiyat, davlat, qobiliyat,o‘qituvchi,ota-ona, ijodkorlik.*

Khamidova D. R.
supporting doctoral student
Sharof Rashidov Samarkand State University
0009-0002-0769-2399
Samarkand city

METHODS OF SUPPORTING AND ENCOURAGING STUDENTS' CREATIVE ACHIEVEMENTS

Abstract. *This article discusses the methods of determining the creative achievements of primary school students, as well as the role of educators, parents and society in the formation of creativity and the importance of supporting creative achievements. In addition, the criteria and methods for assessing creative achievements are presented.*

Keywords. *Creativity, method, method, creative achievement, motivation, method, society, state, ability, teacher, parents, creativity.*

Kirish

Ijodiy yutuqlar - bu o‘quvchilarning yangi, original va foydali g‘oyalar, ishlar yok.i mahsulotlarni yaratishdagi muvaffaqiyatlari hisoblanadi. Ijodkorlik - insonning yangi fikrlarni ishlab chiqish, mavjud bilim va tajribalarni yangicha tarzda qo‘llash qobiliyatidir. Ta’lim jarayonida o‘quvchilarning ijodiy yondashuvini rivojlantirish ularning muammolarni hal qilish, mustaqil fikrlash va yangi g‘oyalar yaratish ko‘nikmalarini shakllantirishga xizmat qiladi. O‘quvchilarning ijodiy yutuqlarini qo‘llab-quvvatlash va rag‘batlantirish zamonaviy ta’limning ajralmas qismi hisoblanadi. Bu jarayon o‘quvchilarning individual qobiliyatlarini ochish, mustaqil fikrlashni rivojlantirish va yangi

bilimlar yaratish imkonini beradi. Pedagoglarning professional yondashuvi, ota-onalar va jamiyatning faol ishtiroki hamda zamonaviy texnologiyalardan foydalanish ta’lim sifatini oshiradi.

Adabiyotlar tahlili va metodlar

Ijodiy qobiliyatlar - bu o‘quvchining yangi, kutilmagan yechimlar topish, o‘z fikrlarini erkin ifoda etish va o‘zini yangicha ko‘rsatish imkoniyatidir. Ushbu qobiliyatlar yoshligidan rivojlantirilishi lozim, chunki ular kelajakda nafaqat ta’limda, balki kasb-hunar va hayotda ham muvaffaqiyatga erishishda muhim ahamiyatga ega.O‘quvchilarda ijodiy yondashuvni shakllantirish pedagogik jarayonning asosiy vazifalaridan biri bo‘lib, bunda o‘qituvchi ularni doimo yangi bilimlarni izlashga, qiyinchiliklarni yengib o‘tishga va o‘z fikrlarini yangicha ifoda etishga undashi zarur. O‘quvchilarning ijodiy yutuqlarini to‘g‘ri aniqlash va baholash ta’lim jarayonining muhim qismidir. Bu orqali o‘quvchilar o‘z kuchli tomonlarini ko‘rishlari, pedagoglar esa ularning qobiliyatlarini rivojlantirish uchun zarur sharoitlarni yaratishlari mumkin.

Ijodiy yutuqlarni aniqlash uchun quyidagi usullar keng qo‘llaniladi:

Kuzatuv va baholash	Pedagoglar dars davomida o‘quvchilarning ijodiy faoliyatini doimiy kuzatib boradilar. Bu jarayonda o‘quvchining mustaqil fikrlashi, yangi g‘oyalar ishlab chiqishi, muammolarni hal qilishdagi yondashuvi o‘rganiladi. Shuningdek, o‘quvchilarning guruhda ishlash qobiliyatlari ham tahlil qilinadi
O‘quvchilarning o‘zaro baholashlari	Guruh ichida o‘quvchilar bir-birining ishlarini baholab, konstruktiv fikrlar bildirishlari ham ijodiy yondashuvni rivojlantirishga yordam beradi. Bu o‘zaro tahlil o‘quvchilarda tanqidiy fikrlash va o‘z ishini takomillashtirish istagini oshiradi.
Pedagogik suhbatlar va intervyular	Guruh ichida o‘quvchilar bir-birining ishlarini baholab, konstruktiv fikrlar bildirishlari ham ijodiy yondashuvni rivojlantirishga yordam beradi. Bu o‘zaro tahlil o‘quvchilarda tanqidiy fikrlash va o‘z ishini takomillashtirish istagini oshiradi.
Test va ijodiy topshiriqlar	Maxsus testlar va ijodiy topshiriqlar orqali o‘quvchilarning fikrlash doirasi va ijodkorlik darajasi o‘lchanadi. Masalan, ularga ochiq savollar berish, yangi mahsulot yaratish yoki muammoni bir necha usulda hal qilish vazifalarini berish mumkin.
Loyihalar va portfoliolar tahlili	O‘quvchilarning ijodiy yutuqlari ko‘pincha loyihalar orqali namoyon bo‘ladi. Loyihalar ijodkorlikni har tomonlama sinovdan o‘tkazadi, muammoni yechish, rejalashtirish va taqdim etish qobiliyatlarini rivojlantiradi. Shuningdek, o‘quvchining portfoliolari — ya’ni u tomonidan yaratilgan ishlar to‘plami — uning ijodiy taraqqiyotini ko‘rsatadi.

Ijodiy faoliyatning asosiy xususiyatlari quyidagilardan iborat:

- Yangi va original bo‘lishi — yaratilgan mahsulot yoki fikr avval mavjud bo‘lmagan yoki boshqalarnikidan farq qilishi kerak.
- Foydalilik — ijodiy yutuq amaliy yoki nazariy jihatdan foydali bo‘lishi muhim.

- Individual yondashuv — har bir o‘quvchi o‘ziga xos ijodiy uslub va qobiliyatlarni namoyish etadi.

Natijalar

O‘quvchilarning ijodiy yutuqlarini qo‘llab-quvvatlash nafaqat ularning shaxsiy rivojlanishi, balki butun jamiyatning taraqqiyoti uchun ham katta ahamiyatga ega. Ijodiy yondashuvlarni rag‘batlantirish orqali o‘quvchilar o‘zlarining qobiliyatlarini to‘liq namoyon eta oladilar, yangi bilim va ko‘nikmalarni egallaydilar hamda mustaqil fikrlash darajasi oshadi.

Psixologik motivatsiya

Ijodiy yutuqlarga erishgan o‘quvchilar o‘zlarini qadrli his qiladilar, bu esa ularning o‘ziga bo‘lgan ishonchini oshiradi. Qo‘llab-quvvatlash ularni yanada ko‘proq izlanishlarga undaydi va ijobiy ruhda ta’lim olishlariga yordam beradi.

Mustaqil fikrlash va muammolarni hal qilish ko‘nikmalarini rivojlantirish

Ijodiy faoliyat orqali o‘quvchilar turli vaziyatlarda muammoni boshqacha yondashuv bilan hal qilishga o‘rganadilar. Bu esa ularning hayotdagi qiyinchiliklarga tayyor bo‘lishlariga xizmat qiladi.

Yangi bilim va ko‘nikmalar hosil qilish

Ijodiy yutuqlar orqali o‘quvchilar yangi nazariy va amaliy bilimlarni o‘zlashtiradilar. Bu esa ta’lim sifatini oshirishga yordam beradi.

Jamiyat va mamlakat rivojiga hissa qo‘shish

Ijodkor shaxslar kelajakda innovatsiyalar yaratib, jamiyat rivojida yetakchi o‘rin egallaydilar. Shuning uchun o‘quvchilarning ijodiy yutuqlarini qo‘llab-quvvatlash — milliy taraqqiyot uchun muhim omildir.

Muhokama

O‘quvchilarning ijodiy yutuqlarini rag‘batlantirish ta’lim jarayonida ularning qobiliyatlarini yanada rivojlantirish va motivatsiyasini oshirish uchun muhim hisoblanadi. Rag‘batlantirishning samarali usullari o‘quvchilarning qiziqishlarini uyg‘otadi, yangi yutuqlarga intilishga undaydi va ijodkorlikni rivojlantiradi.

O‘quvchilarning muvaffaqiyatlari uchun og‘zaki maqtovlar, sertifikatlar, diplomlar va boshqa mukofotlar berish motivatsiyani oshiradi. Bu, ayniqsa, yosh o‘quvchilar uchun o‘zini qadrlashni kuchaytiradi va ijodiy faoliyatga intilishlarini rag‘batlantiradi.

Ijodiy ishlar bo‘yicha tanlovlar, ko‘rgazmalar va festivallar o‘quvchilar uchun o‘z ishlarini namoyish etish imkoniyatini yaratadi. Bunday tadbirlar ularning ijodiy yutuqlarini keng jamoatchilikka taqdim etish imkonini beradi va raqobat ruhini uyg‘otadi.

Har bir o‘quvchining qobiliyatlari va ehtiyojlarini hisobga olib, individual yondashuv qo‘llash muhimdir. O‘qituvchi o‘quvchi bilan yaqin aloqada bo‘lib, uni rag‘batlantirish va yo‘nalish berishda yordam ko‘rsatishi lozim.

Ta’limda interaktiv metodlar, loyihalar asosida o‘qitish, raqamli vositalar va kreativ mashg‘ulotlardan foydalanish o‘quvchilarning ijodiy fikrlashini rivojlantirishga xizmat qiladi.

Guruhda ijodiy ishlash o‘quvchilarda hamkorlik ko‘nikmalarini shakllantiradi va yangi g‘oyalar paydo bo‘lishini rag‘batlantiradi.

Ijodiy yutuqlarni qo‘llab-quvvatlashda pedagoglarning roli

Pedagoglar o‘quvchilarning ijodiy yutuqlarini rivojlantirish va rag‘batlantirish jarayonida asosiy rol o‘ynaydilar. Ularning mahorati, pedagogik yondashuvi va psixologik qo‘llab-quvvatlashi o‘quvchilarning ijodkorlik salohiyatini to‘liq ochib berishda hal qiluvchi ahamiyatga ega bo‘lib,quyidagi vzifalarni bajaradi.

- Psixologik yordam ko‘rsatish
-Rivojlantiruvchi muhit yaratish
-Yangi o‘quv metodlarini qo‘llash

Ijodiy yutuqlarni rag‘batlantirishda ota-onalar va jamiyatning roli

O‘quvchilarning ijodiy yutuqlarini qo‘llab-quvvatlashda ota-onalar va jamiyatning roli beqiyosdir. Uy sharoitida yaratiladigan muhit va jamiyat tomonidan taqdim etiladigan imkoniyatlar o‘quvchining ijodiy salohiyatini rivojlantirishda muhim omillar hisoblanadi.

- Uyda ijodga rag‘bat berish
-Jamiyat tomonidan tashkil etiladigan imkoniyatlar
-Ota-onalar va maktab o‘rtasida hamkorlik
-Jamiyatdagi ijobiy namoyishlar

Texnologiyalar va ijodiy yutuqlar

1. Raqamli vositalardan foydalanish
2. Internet resurslari va onlayn kurslar
3. Interaktiv o‘quv muhitlari
4. Hamkorlik va tarmoq orqali ijodiy ishlash

Ijodiy yutuqlarni baholash mezonlari va usullari

Ijodiy yutuqlarni to‘g‘ri baholash pedagogik jarayonning muhim qismi hisoblanadi. Baholash natijalari asosida o‘quvchilarning kuchli va zaif tomonlari aniqlanadi, ularning keyingi rivojlanishi uchun reja tuziladi. Ijodiy ishlarni baholashda quyidagi mezonlar va usullar qo‘llaniladi.

Baholash mezonlari:

1. Original va yangi yondashuv — ishda ilgari ko‘rilmagan, yangicha fikr yoki yechim mavjudligi.
2. Amaliy foydalilik — ijodiy mahsulot yoki g‘oyaning real hayotda qo‘llanilishi yoki foydasi.
3. Ijodiy jarayonning mustaqilligi — o‘quvchi o‘zining shaxsiy yondashuvi va fikrlarini namoyish etganligi.
4. Estetik va ta’sirchanlik — ijodiy ishning tashqi ko‘rinishi, ta’sirchanligi va qiziqarli bo‘lishi.
5. Qiyinchiliklarni yengish darajasi — o‘quvchi muammoni hal qilishda qanday darajada kreativlik ko‘rsatgani.

Baholash usullari:

- Rubrikalar — baholash mezonlari asosida tayyorlangan maxsus jadval yoki ko‘rsatkichlar tizimi. Bu usul baholashni aniq va adolatli qiladi.

- O‘z-o‘zini baholash — o‘quvchilarning o‘z ijodiy ishlarini tahlil qilib, kuchli va zaif tomonlarini anglashlari.
- Hamkasblar bahosi — o‘qituvchilar yoki boshqa mutaxassislar tomonidan ijodiy ishlar ko‘rib chiqilib baholanadi.
- Guruhdagi o‘quvchilar tomonidan baholash — o‘zaro baholash orqali o‘quvchilar tanqidiy fikrlashni rivojlantiradi va o‘z ishini takomillashtiradi.

Xulosa

Ijodiy yutuqlarni rivojlantirish uchun kelajakdagi istiqbollar va takliflar

Ta’lim sohasida o‘quvchilarning ijodiy salohiyatini rivojlantirish doimiy e’tibor talab qiladigan masaladir. Kelajakda bu yo‘nalishda quyidagi istiqbollar va takliflarni amalga oshirish samarali bo‘ladi:

Ijodiy fikrlash va innovatsiyalarni rivojlantirishga qaratilgan darslik va o‘quv materiallarini yaratish zarur. Dasturlar o‘quvchilarning individual qobiliyatlarini hisobga olgan holda moslashtirilishi lozim.

O‘qituvchilarning zamonaviy metod va texnologiyalarni o‘zlashtirishi, ijodiy yondashuvlarni qo‘llash bo‘yicha doimiy malaka oshirish kurslari tashkil etilishi kerak.

Raqamli vositalar, virtual laboratoriyalar, onlayn platformalar va boshqa innovatsion yechimlar ta’lim sifatini oshirish va ijodiy faoliyatni rag‘batlantirishga xizmat qiladi.

Maktab, ota-ona va jamiyat o‘rtasida samarali aloqalarni o‘rnatish, ijodiy faollikni qo‘llab-quvvatlash bo‘yicha umumiy tashabbuslar yaratish lozim.

O‘quvchilar uchun doimiy ravishda ijodiy tanlovlar, stipendiyalar va grantlar ajratish tizimini yo‘lga qo‘yish zarur. Bu esa yangi iste’dodlarni aniqlash va rivojlantirishga katta hissa qo‘shadi. Ijodiy yutuqlarni baholash jarayonida adolat va konstruktiv fikrlar muhim ahamiyatga ega bo‘lib, ular o‘quvchining kelajakdagi rivojlanishiga yo‘l ko‘rsatadi.

Adabiyotlar ro‘yxati:

1. Abdurahmonov S. Pedagogika asoslari. Toshkent, 2018. 45–52-betlar.
2. Xolmurodova G. Bolalarda ijodkorlikni rivojlantirish metodikasi. Toshkent, 2020. 63–70-betlar.
3. Karimov J. Ta’limda kreativlik va innovatsiyalar. Samarqand, 2019. 28–34-betlar.
4. Ismoilova N. O‘quvchilarning ijodiy yondashuvini shakllantirish. Toshkent, 2021. 51–58-betlar.
5. Vygotskiy L. S. Psixologik rivojlanish nazariyasi. Moskva, 112–120-betlar.
6. Xudayberdiyeva J. R., Xamidova D. R. Umumiy pedagogika. Toshkent, 2025. 77–85-betlar.
7. Zokirova M. Pedagogik mahorat asoslari. — Toshkent, 2021. — 39–44-betlar.
8. Yusupova D. O‘quvchilarda ijodiy fikrlashni rivojlantirish metodlari // ilmiy maqola. 2022. 3–7-betlar.

Xasanova G. R.
assistent
farmakognoziya va farmatsevtika texnologiyalari kafedrasi
Mallaeva M. M.
Umumiy gigiena va ekologiya kafedrasi
Botirov X. T.
talaba
TSMU
Matyoqubova M. K.
talaba
SamSMU
Samarqand davlat tibbiyot universiteti

EKOLOGIK MUVOZANATNI TIKLASH: MUAMMOLAR, OMILLAR VA ZAMONAVIY YONDASHUVLAR

Annotatsiya *Ushbu maqolada ekologik barqarorlikning zamonaviy talqini, uning iqtisodiy, ijtimoiy va ekologik omillar bilan o‘zaro bog‘liqligi, shuningdek, tabiat resurslaridan oqilona foydalanishning ustuvor yo‘nalishlari tahlil etilgan. Maqola ekologik xavfsizlikni ta’minlashda innovatsion texnologiyalar, yashil iqtisodiyot, qayta tiklanuvchi energiya manbalari va jamiyat ekologik madaniyatining ahamiyatini ochib beradi. Taklif etilgan xulosalar ekologik boshqaruv tizimlarini takomillashtirishga qaratilgan.*

Kalit so‘zlar: *ekologik barqarorlik, barqaror rivojlanish, yashil iqtisodiyot, qayta tiklanuvchi energiya, ekologik xavfsizlik, iqlim o‘zgarishi, biologik xilma-xillik, ekologik muammolar, ekologik monitoring, chiqindilarni qayta ishlash, ekologik madaniyat, tabiiy resurslar, ekologik boshqaruv.*

Khasanova G. R.
assistant
department of pharmacognosy and pharmaceutical technologies
Mallaeva M. M.
department of general hygiene and ecology
Botirov Kh. T.
student
TSMU
Matyoqubova M. K.
student
SamSMU
Samarkand State Medical University

RESTORING ECOLOGICAL BALANCE: CHALLENGES, FACTORS, AND MODERN APPROACHES

Abstract: *This article examines the modern concept of environmental sustainability, its interrelation with economic, social, and ecological factors, as well as the priority directions for the rational use of natural resources. The study highlights the importance of innovative technologies, the green economy, renewable energy sources, and the ecological culture of society in ensuring environmental safety. The proposed conclusions are aimed at improving environmental management systems.*

Keywords: *environmental sustainability, sustainable development, green economy, renewable energy, environmental safety, climate change, biodiversity, environmental issues, environmental monitoring, waste recycling, environmental awareness, natural resources, environmental management.*

Kirish

XXI asrda insoniyat duch kelayotgan eng dolzarb global muammolardan biri — ekologik barqarorlikni ta’minlashdir. Aholining o‘sishi, sanoatlashtirish jarayonlari, tabiiy resurslarning tez sur’atlarda kamayishi va iqlim o‘zgarishi o‘z ta’sirini kuchaytirmoqda. Ekologik barqaror rivojlanish konsepsiyasi tabiat va jamiyat o‘rtasidagi muvozanatni saqlash, kelajak avlodlar manfaatlarini himoya qilish va atrof muhitga salbiy ta’sirlarni minimallashtirishga qaratilgan. Bugungi kunda ekologik masalalarni hal etish uchun kompleks, ilmiy asoslangan va innovatsion yondashuvlar talab qilinadi.

Ekologik barqarorlik tushunchasi va uning asosiy tamoyillari

Ekologik barqarorlik — bu atrof-muhitning o‘zini tiklash qobiliyati saqlangan holda iqtisodiy rivojlanishning davom etishi. Ushbu tushuncha uch asosiy komponentni o‘z ichiga oladi:

Ekologik barqarorlik – ekotizimlarning tabiiy holatini saqlash, biologik xilma-xillikni himoya qilish, atmosferaga zararli modda chiqarilishini kamaytirish.

Ijtimoiy barqarorlik – inson salomatligi va farovonligini ta’minlash, ekologik xavfsiz yashash muhiti yaratish.

Iqtisodiy barqarorlik – resurslardan oqilona foydalanish va iqtisodiy o‘sishni ekologik talablarga mos olib borish.

Mazkur tamoyillar o‘zaro chambarchas bog‘liq bo‘lib, ulardan birining buzilishi ekologik tizimda izchil o‘zgarishlarni keltirib chiqarishi mumkin.

Ekologik barqarorlikni ta’minlashda muammolar

1. Iqlim o‘zgarishi

Atmosferaga chiqarilayotgan issiqxona gazlari global isish jarayonini tezlashtirmoqda. Bu holat suv tanqisligi, ekstremal ob-havo hodisalari, agrar sektor hosildorligining kamayishi kabi oqibatlarni yuzaga keltirmoqda.

2. Biologik xilma-xillikning kamayishi

O‘rmonlarning qisqarishi, yerlarning degradatsiyasi, suv havzalarining ifloslanishi bir qator hayvon va o‘simlik turlarining yo‘qolishiga olib kelmoqda.

3. Tabiiy resurslarning haddan tashqari ekspluatatsiyasi

Yer osti boyliklari, chuchuk suv zaxiralari va o‘rmon resurslarining taqchillashuvi global miqyosda ekologik xavfsizlikka tahdid solmoqda.

4. Maishiy va sanoat chiqindilari

Chiqindilarni qayta ishlash tizimlarining yetarlicha rivojlanmaganligi ekologik xavflarni oshirmoqda, tuproq va suv havzalarining ifloslanishiga sabab bo‘lmoqda.

Ekologik barqarorlikni ta’minlashning zamonaviy yo‘nalishlari

1. Yashil iqtisodiyotga o‘tish

Yashil iqtisodiyot modeli energiya tejamkor texnologiyalarni joriy etish, chiqindilarni kamaytirish va qayta ishlashni kengaytirishni o‘z ichiga oladi. Bu korxonalar uchun ham ekologik, ham iqtisodiy jihatdan samaralidir.

2. Qayta tiklanuvchi energiya manbalari

Quyosh, shamol, biogaz kabi manbalardan foydalanish atmosferaga chiqariladigan CO_2 miqdorini sezilarli kamaytiradi. Dunyoning ko‘plab davlatlarida qayta tiklanuvchi energiya ulushi yildan yilga oshib bormoqda.

3. Ekologik monitoring va raqamli texnologiyalar

Dronlar, sun’iy yo‘ldosh monitoringi, «aqlli» ekologik kuzatuv tizimlari atrof-muhit holatini real vaqt rejimida baholash imkonini bermoqda.

4. Atrof-muhitni boshqarishda qonunchilikni kuchaytirish

Ekologik talablarga rioya etilishini nazorat qilish, jarimalarni kuchaytirish, ekologik sertifikatlashtirish tizimlari barqaror rivojlanish siyosatini mustahkamlaydi.

5. Jamiyat ekologik madaniyatini oshirish

Aholining ekologik ongini shakllantirish, o‘quv dasturlariga ekologiya fanlari kirishini kengaytirish, ommaviy axborot vositalari orqali ekologik tashabbuslarni targ‘ib qilish barqarorlikning muhim shartidir.

6.Ekologik barqarorlikning O‘zbekistondagi ahamiyati

O‘zbekiston geografik jihatdan quruq iqlim mintaqasida joylashgan bo‘lib, suv resurslarining cheklanganligi, tuproqning sho‘rlanishi, havoning changlanishi

va global iqlim o‘zgarishlariga yuqori darajada sezuvchanligi bilan ajralib turadi. Shu sababli ekologik barqarorlik masalasi mamlakatning uzoq muddatli rivojlanish strategiyasida ustuvor yo‘nalishlardan biri sifatida qaraladi. Ekologik muammolarni bartaraf etish nafaqat atrof-muhitni tiklash, balki iqtisodiyot tarmoqlarining samaradorligi, aholining turmush sifati va milliy xavfsizlikni ta’minlashda ham muhim omil bo‘lib hisoblanadi.

Oral dengizi fojiasi va uning oqibatlari

Oral dengizi inqirozi O‘zbekistonning ekologik tarixida eng yirik muammolardan biridir. Dengizning qurishi:

mintaqadagi iqlim sharoitining keskinlashuvi,
qurg‘oqchilik va yozgi haroratning ko‘tarilishi,
shamol orqali tarqaladigan sho‘r chang bo‘ronlari,
respirator kasalliklar ko‘payishi,
o‘simlik va hayvonot dunyosining qisqarishi

kabi salbiy oqibatlarni yuzaga keltirdi. Bu hodisa ekologik barqarorlikni milliy xavfsizlik bilan bevosita bog‘laydi. Keyingi yillarda Orolbo‘yi hududida o‘rmonzorlar barpo etish, «yashil zonalar» yaratish va infrastruktura tiklash orqali ekologik barqarorlikni tiklash bo‘yicha keng ko‘lamli ishlar olib borilmoqda.

Suv resurslarining cheklanganligi

O‘zbekiston aholisi va iqtisodiyotining asosiy ehtiyojlari Amudaryo va Sirdaryo havzalariga bog‘liq. Suv resurslarining transchegaraviyligi ularning siyosiy, iqtisodiy va ekologik jihatdan muvozanatli taqsimlanishini talab qiladi. Suv yetishmovchiligi:

qishloq xo‘jaligi hosildorligining pasayishi,
yerlarning degradatsiyasi va sho‘rlanishi,
ichimlik suvi ta’minotidagi muammolar

yuzaga kelishiga sabab bo‘lmoqda. Shu bois suvdan oqilona foydalanish, tomchilatib sug‘orish, drenaj tizimlarini takomillashtirish va suv tejovchi texnologiyalarni joriy etish ekologik barqarorlikning muhim sharti hisoblanadi.

Iqlimning keskin kontinental xususiyatlari

Mamlakat hududida yozda ekstremal issiqlik, qishda esa sovuq havo kuzatiladi. Global isish fonida:

suv bug‘lanishi kuchaymoqda,
energiya sarfi oshmoqda,
qishloq xo‘jaligida agrotexnik stress ko‘paymoqda,
umumiy ekologik xavflar kuchaymoqda.

Shu sababli O‘zbekiston iqlim o‘zgarishiga moslashuv strategiyalarini ishlab chiqmoqda. Ularga qishloq xo‘jaligida iqlimga mos navlarni yaratish, suvni tejovchi texnologiyalarni qo‘llash, yashil iqtisodiyotga o‘tish kiradi.

Ekologik siyosat va davlat dasturlarining ahamiyati

So‘nggi yillarda O‘zbekistonda ekologik muammolarni bartaraf etishga qaratilgan qator davlat dasturlari qabul qilindi:

1. “Yashil makon” umummilliy loyihasi

Ushbu tashabbus doirasida har yili millionlab daraxt va butalar ekilishi rejalashtirilgan. Daraxtzorlarning ko‘payishi:

havoning changlanishini kamaytiradi,

kislorod balansini yaxshilaydi,

iqlimni yumshatadi,

eroziya jarayonlarini kamaytiradi,

shaharlarning ekologik muhitini yaxshilaydi.

Bu loyiha ekologik muvozanatni tiklashda eng samarali tashabbuslardan biri sifatida qaralmoqda.

2. Qayta tiklanuvchi energiya manbalarini rivojlantirish

Quyoshli kunlar sonining ko‘pligi O‘zbekistonni quyosh energetikasini rivojlantirish uchun qulay hududga aylantiradi. So‘nggi yillarda:

yirik quyosh va shamol elektr stansiyalari qurildi,

“yashil energiya” ulushi yildan yilga oshmoqda,

elektr energiyasini ishlab chiqarishda CO_2 chiqindilari kamaymoqda.

Bu nafaqat ekologik, balki iqtisodiy barqarorlik uchun ham muhimdir.

3. Chiqindilarni boshqarish tizimini modernizatsiya qilish

Respublikada maishiy va sanoat chiqindilarini qayta ishlash ko‘lamini oshirish bo‘yicha yangi infratuzilmalar joriy etilmoqda. Poligonlarni optimallashtirish, chiqindilarni saralash va qayta ishlash ekologik zararlarni sezilarli kamaytiradi.

Aholining ekologik madaniyatini oshirish

Ekologik barqarorlik faqat davlat siyosati bilan emas, balki aholining ekologik ongiga ham bog‘liq. Maktablarda ekologiya darslarining kengaytirilishi, yoshlar o‘rtasida tabiatni asrash bo‘yicha aksiyalar, ekologik volontyorlik harakatlarining rivojlanishi jamiyatning ekologik masalalardagi mas’uliyatini oshirmoqda.Xulosa

Ekologik barqarorlikni ta’minlash — nafaqat ekologiya sohasining vazifasi, balki jamiyatning barcha qatlamlari, davlat va nodavlat tashkilotlarining umumiy mas’uliyatidir. Inson faoliyati tabiatning tiklanish imkoniyatidan oshib ketmasligi uchun resurslardan oqilona foydalanish, chiqindilarni kamaytirish, energiya samaradorligini oshirish va ekologik madaniyatni rivojlantirish zarur. Innovatsion texnologiyalarni joriy etish, qayta tiklanuvchi energiya manbalariga o‘tish va ekologik qonunchilikni kuchaytirish kelajak avlodlarga sog‘lom yashash muhiti qoldirishning eng ishonchli yo‘lidir.

Xulosa

Ekologik muvozanatni tiklash zamonaviy davrning eng muhim global vazifalaridan biridir. Tabiiy resurslarning cheklanganligi, antropogen yuklamaning ortishi, sanoat va qishloq xo‘jaligi faoliyatining kengayishi ekologik tizimlarning barqarorligiga bevosita ta’sir ko‘rsatmoqda. Tadqiqotlar shuni ko‘rsatadiki, ekologik muvozanatga erishish uchun faqatgina biogeokimyoviy jarayonlarni tiklash yetarli emas, balki ijtimoiy-iqtisodiy omillarni ham kompleks tarzda boshqarish zarur.

Zamonaviy yondashuvlar – barqaror rivojlanish konsepsiyasi, “yashil iqtisodiyot”, raqamli monitoring tizimlari, bioindikatsiya, ekologik xavfsizlikni ta’minlash texnologiyalari va tabiiy resurslardan oqilona foydalanishga asoslangan strategiyalar – ekotizimlarning tiklanish jarayonini sezilarli darajada jadallashtirmoqda. Shuningdek, ekologik ta’lim va aholining ekologik madaniyatini oshirish muhim omillardan biri bo‘lib, mazkur jarayonning samaradorligini ta’minlamoqda.

Tahlil natijalariga ko‘ra, ekologik muvozanatni tiklashning uzoq muddatli natijalariga erishish uchun davlat siyosati, ilmiy-tadqiqot ishlari, innovatsion texnologiyalar va jamoatchilik ishtirokini birlashtirgan integratsion yondashuv zarur. Kompleks ekomanagement tizimlarining joriy etilishi ekologik muammolarni kamaytirish, tabiiy resurslarni tejash va barqaror rivojlanish maqsadlarini amalga oshirishga xizmat qiladi.

Foydalanilgan adabiyotlar ro‘yxati:

1. Odum, E.P. Fundamentals of Ecology. Philadelphia: Saunders, 2005.
2. Daly, H., & Farley, J. Ecological Economics: Principles and Applications. Island Press, 2011.
3. Meadows, D., Randers, J., Meadows, D. Limits to Growth: The 30-Year Update. Chelsea Green Publishing, 2004.
4. Cunningham, W.P., Cunningham, M.A. Environmental Science: A Global Concern. McGraw-Hill, 2020.
5. Brundtland Commission. Our Common Future. United Nations, 1987.
6. Сафонов А. Н. Экологическая безопасность: теория и практика. — Москва: Академия, 2019.
7. Ходжаев А.Х., Мустафоyev Ш.М. Ekologiya va atrof-muhit muhofazasi. – Toshkent: O‘qituvchi, 2021.
8. United Nations Environment Programme (UNEP). Global Environment Outlook 6. UN, 2019.
9. Millennium Ecosystem Assessment. Ecosystems and Human Well-being. Island Press, 2005.
10. OECD. Green Growth Indicators 2023. OECD Publishing, 2023.

Xaydarova S., texnika fanlari nomzodi
v.b.proffessori
raqamli texnologiyalar va sun'iy intellekt kafedrasi
Qo'qon davlat universiteti
Mamadaliyeva M.
magistranti
ta'limda axborot texnologiyalari
Qo'qon davlat universiteti

CHIZIQLI DASTURLASH MASALALARINI YECHISHNING OPTIMAL VARIANTLARINI ISHLAB CHIQISH VA TAHLIL QILISH

Annotatsiya: *Ushbu maqolada chiziqli dasturlash (ChD) masalalarining optimal yechimlarini ishlab chiqish va tahlil qilish jarayoni IMRAD (Introduction–Methods–Results–Discussion) talablari asosida yoritilgan. Tadqiqotda Simpleks, Dual va Sun'iy o'zgaruvchilar usullarining afzalliklari, ularning matematik modeli, amaliyotdagi qo'llanilish sohalari hamda hisoblash samaradorligi tahlil qilindi. Natijalar shuni ko'rsatdiki, Dual usuli hisoblash tezligi jihatidan, Simpleks usuli esa barqarorlik va aniqlik jihatidan samaraliroqdir. Ushbu maqola iqtisodiy va texnik sohalarda optimal qaror qabul qilish jarayonida chiziqli dasturlash usullarining amaliy ahamiyatini yoritadi. Shuningdek, ushbu tadqiqotda chiziqli dasturlashning zamonaviy qo'llanilish yo'nalishlari va algoritmik yechimlarni yaxshilashga qaratilgan yangi yondashuvlar ham o'rganildi. Xususan, optimallashtirish jarayonida hisoblash murakkabligini kamaytirish, algoritmning konvergensiya tezligini oshirish hamda katta o'lchamli masalalarni samarali yechish imkonini beruvchi modifikatsiyalangan algoritmlar tahlil qilindi. Bugungi kunda ishlab chiqarish, logistika, energiya taqsimoti, tibbiyot va axborot texnologiyalari kabi sohalarda chiziqli dasturlashdan foydalanish kengayib borayotgani sababli, algoritmlarning tezkor va aniq ishlashi alohida ahamiyat kasb etadi.*

Kalit so'zlar: *chiziqli dasturlash, optimal yechim, Simpleks usuli, Dual usuli, algoritm, matematik model, optimallashtirish.*

Khaydarova S., candidate of technical sciences
acting professor
department of digital technologies and artificial intelligence
Kokand State University
Mamadaliyeva M.
master's student
information technologies in education
Kokand State University

DEVELOPMENT AND ANALYSIS OF OPTIMAL OPTIONS FOR SOLUTION OF LINEAR PROGRAMMING PROBLEMS

Abstract: *This article discusses the process of developing and analyzing optimal solutions to linear programming (LP) problems based on IMRAD (Introduction–Methods–Results–Discussion) requirements. The study analyzes the advantages of the Simplex, Dual, and Artificial Variable methods, their mathematical models, areas of application in practice, and computational efficiency. The results show that the Dual method is more effective in terms of computational speed, and the Simplex method is more effective in terms of stability and accuracy. This article highlights the practical importance of linear programming methods in the process of optimal decision-making in economic and technical fields. This study also studies modern areas of application of linear programming and new approaches aimed at improving algorithmic solutions. In particular, modified algorithms that reduce computational complexity in the optimization process, increase the convergence speed of the algorithm, and effectively solve large-scale problems were analyzed. Today, as the use of linear programming is expanding in areas such as manufacturing, logistics, energy distribution, medicine, and information technology, the fast and accurate operation of algorithms is of particular importance.*

Keywords: *linear programming, optimal solution, Simplex method, Dual method, algorithm, mathematical model, optimization.*

Kirish

O‘zbekiston Respublikasida raqamli iqtisodiyot konsepsiyasi bosqichma-bosqich joriy qilinayotgani sababli, tahliliy qarorlarni tezkor va asosli qabul qilish uchun **optimallashtirish modellarini raqamlashtirish** jarayoni tobora dolzarb ahamiyat kasb etmoqda. Xususan, davlat boshqaruvi, transport logistika tizimlari, ta’lim va sog‘liqni saqlash sohalarida chiziqli dasturlash modellariga asoslangan tahliliy tizimlar ishlab chiqilmoqda.

Masalan, ishlab chiqarish korxonalarida ishlab chiqarish quvvatlarini rejalashtirish, xomashyo resurslarini optimal taqsimlash, transport yo‘nalishlarini optimallashtirish, energetika tizimida yuklamalarni balanslash, moliyaviy rejalashtirishda esa foyda funksiyasini oshirish uchun chiziqli dasturlash usullari keng qo‘llanilmoqda. Bularning barchasi mazkur ilmiy yo‘nalishning amaliy qiymatini oshiradi.

Bugungi kunda global raqobat muhiti tobora kuchayib borayotgan bir davrda, har bir mamlakat, korxona va tashkilot uchun mavjud resurslardan oqilona va samarali foydalanish eng muhim vazifalardan biri bo‘lib qolmoqda. Iqtisodiy islohotlar, texnologik yangilanishlar va raqamli boshqaruv tizimlari sharoitida ishlab chiqarish jarayonlarini optimallashtirish, resurslarni tejash, foydani maksimal darajaga yetkazish va xarajatlarni kamaytirish dolzarb masalalardan hisoblanadi.

Bunday muammolarni hal etishda **matematik modellashtirish** va **optimallashtirish nazariyasi** muhim rol o‘ynaydi. Aynan shu yo‘nalishda chiziqli dasturlash (Linear Programming — LP) usuli o‘zining soddaligi, aniqligi va amaliy ahamiyati bilan boshqa matematik yondashuvlardan ajralib turadi. Chiziqli

dasturlashning asosiy maqsadi — ma’lum cheklovlar asosida maqsad funksiyani (foyda, vaqt, xarajat va hokazolar) maksimal yoki minimal qiymatga yetkazishdan iboratdir.

Chiziqli dasturlash masalalari nafaqat nazariy sohada, balki iqtisodiy, ishlab chiqarish, transport, logistika, energetika, ekologiya, tibbiyot va axborot texnologiyalari tizimlarida ham keng qo‘llaniladi. Masalan, ishlab chiqarish jarayonida korxona o‘z resurslarini — mehnat, vaqt, xomashyo va kapitalni — eng samarali taqsimlashni istaydi. Transport sohasida esa chiziqli dasturlash yordamida yuk tashish yo‘nalishlarini optimallashtirish, yoqilg‘i sarfini kamaytirish va transport xarajatlarini minimallashtirish mumkin.

Energetika tizimlarida chiziqli dasturlash elektr energiyasi ishlab chiqarish va taqsimot jarayonini muvozanatlash, yuklamalarni tenglashtirish va energiya isrofini kamaytirishda keng qo‘llaniladi. Shu bilan birga, qishloq xo‘jaligida ham hosilni maksimal darajaga yetkazish, yer maydonlarini oqilona taqsimlash va texnika resurslaridan to‘g‘ri foydalanish uchun chiziqli dasturlash modellaridan foydalanish mumkin.

Shuningdek, so‘nggi yillarda sun’iy intellekt, mashinaviy o‘qitish (machine learning) va katta ma’lumotlar (big data) texnologiyalarini chiziqli dasturlash bilan birlashtirish orqali **intellektual optimallashtirish tizimlari** yaratilmoqda. Bu esa iqtisodiy tahlilda inson omilini kamaytirib, avtomatik ravishda eng samarali qarorlarni topish imkonini beradi.

Mazkur tadqiqotning asosiy maqsadi — chiziqli dasturlash masalalarini yechish uchun **optimal algoritmik variantlarni ishlab chiqish**, ularning hisoblash samaradorligini amaliy jihatdan tahlil qilish va o‘zaro taqqoslashdir. Shuningdek, ushbu maqolada Simpleks, Dual va Sun’iy o‘zgaruvchilar usullarining nazariy asoslari, hisoblash tezligi, aniqligi va amaliy qo‘llanish sohalari tahlil qilinadi.

Tadqiqot natijalari nafaqat nazariy jihatdan, balki amaliy tizimlarda — xususan, iqtisodiy rejalashtirish, ishlab chiqarish tahlili, transport va logistika sohalarida — qaror qabul qilish samaradorligini oshirishda qo‘llanilishi mumkin.

Metodlar

Tadqiqotda chiziqli dasturlash masalalarini yechish uchun uchta asosiy algoritmik yondashuv o‘rganildi: **Simpleks usuli**, **Dual usuli** va **Sun’iy o‘zgaruvchilar usuli**. Har bir usul o‘zining matematik tamoyillari, hisoblash murakkabligi va amaliy natijalari bilan farqlanadi.

Simpleks usuli – bu G. Dantzig tomonidan ishlab chiqilgan eng mashhur algoritm bo‘lib, chiziqli dasturlash masalalarini yechishda asosiy vosita hisoblanadi. U feasible (ruxsat etilgan) yechimlar to‘plamini tashkil etuvchi ko‘pyoqlikning burchak nuqtalari bo‘ylab harakatlanish orqali optimal yechimni topadi.

Matematik modeli:

Maksimizatsiya qilish kerak:

$$Z = c_1x_1 + c_2x_2 + \ldots + c_nx_n,$$

cheklovlar:

$$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n \leq b_1,$$

va $x_i \geq 0$.

Dual usuli esa Simpleksga qarama-qarshi tamoyilga asoslanadi. Bu usulda har bir chiziqli dasturlash masalasi uchun unga mos dual masala tuziladi. Dual masalaning optimal yechimi asosiy masalaning optimal qiymatini beradi. Masalan, agar asosiy masala resurslardan maksimal darajada foydalanish bo‘lsa, dual masala ularning bahosini minimallashtirishga qaratiladi. Bu usul iqtisodiy tahlil va resurs baholashda samarali hisoblanadi.

Sun’iy o‘zgaruvchilar usuli esa boshlang‘ich yechim mavjud bo‘lmagan holatlarda qo‘llaniladi. Bu usulda qo‘shimcha o‘zgaruvchilar kiritilib, Simpleks usulini ishga tushirish uchun dastlabki tayanch yechim yaratiladi. Amaliyotda bu yondashuv transport va ishlab chiqarish masalalarini avtomatik modellashtirishda yordamchi bosqich sifatida ishlatiladi.

Natijalar

Tadqiqot jarayonida **Python** dasturlash tili va **Excel Solver** vositasidan foydalanilib, Simpleks, Dual va Sun’iy o‘zgaruvchilar usullari bo‘yicha bir nechta sinov masalalari yechildi. Quyidagi jadvalda natijalar keltirilgan:

Usul	Hisoblash tezligi (sek.)	Aniqlik (%)	Afzallik	Kamchilik
Simpleks	1.24	99.6	Barqaror natija, keng qo‘llaniladi	Katta o‘lchamli masalalarda sekin
Dual	0.72	98.9	Tez yechim, resurs tahlili oson	Faqat ayrim masalalarda samarali
Sun’iy o‘zgaruvchilar	1.95	99.1	Murakkab holatlarda foydali	Hisoblash hajmi katta

Natijalar shuni ko‘rsatadiki, **Dual usuli** hisoblash tezligi bo‘yicha eng yuqori samaradorlikni ko‘rsatdi. **Simpleks usuli** esa natijaning barqarorligi va aniqligi jihatidan ustun bo‘ldi. **Sun’iy o‘zgaruvchilar usuli** murakkab masalalarda boshlang‘ich yechim topishda muhim rol o‘ynaydi.

Hisoblash samaradorligi tahlili natijasida Dual usulining hisoblash tezligi Simpleks usuliga nisbatan 40% yuqori ekanligi aniqlandi. Bu esa amaliy tizimlarda vaqtni tejash va natijani tez olish imkonini beradi.

Natijalar shuni ko‘rsatadiki, Dual usuli hisoblash tezligi bo‘yicha eng yuqori samaradorlikni namoyish etdi. Simpleks usuli esa natijalarning barqarorligi, iteratsiyalarning izchilligi va javobning aniqligi bo‘yicha ustunlikka ega bo‘ldi. Sun’iy o‘zgaruvchilar usuli esa ayniqsa boshlang‘ich yechim mavjud bo‘lmagan yoki cheklovlar tizimi murakkab shaklda berilgan modellarni yechishda juda muhim bo‘lib, dastlabki tayanch nuqtani yaratishda samarali yordamchi mexanizm bo‘lib xizmat qildi.

Shuningdek, tadqiqot natijalari har bir algoritmning amaliy samaradorligi masalaning o‘lchami, o‘zgaruvchilar soni, cheklovlar murakkabligi va maqsad funksiyasining ko‘rinishiga bog‘liq ekanligini ko‘rsatdi. Kichik va o‘rta o‘lchamli masalalarda Simpleks usuli deyarli barcha hollarda eng optimal natija berdi, ammo katta o‘lchamli masalalarda Dual usuli sezilarli darajada samaraliroq bo‘ldi.

Tajriba jarayonida algoritmlarning iteratsiya soni ham solishtirildi. Dual usulida iteratsiya miqdori Simpleksga nisbatan 25–30% kam bo‘lgani aniqlandi, bu esa hisoblash jarayonining tezligini oshiradi. Sun’iy o‘zgaruvchilar usuli esa ko‘proq iteratsiya talab qilgani uchun umumiy vaqt ko‘rsatkichlari sekinroq bo‘ldi. Biroq, bu usulning afzalligi shundaki, u boshlang‘ich bazis mavjud bo‘lmagan hollarda optimal yechimga tez va izchil yaqinlashish imkonini yaratdi.

Bundan tashqari, natijalar modellarning barqarorlik darajasini ham tahlil qilishga imkon berdi. Simpleks usuli ma’lumotlar orasida kichik o‘zgarishlar kiritilganda natijaning barqaror qolishini ta’minlagani sababli amaliy modellar uchun ishonchli usul sifatida o‘zini namoyon qildi. Dual usuli esa resurs baholarini aniqlashda, iqtisodiy samaradorlik tahlillarida va narx mexanizmlarini hisoblashda ustunlikka ega bo‘lib, iqtisodiy modellashtirishda ko‘proq mos kelishi aniqlandi.

Natijalar, shuningdek, har bir algoritmning kompyuter resurslaridan foydalanish samaradorligini ham tahlil qildi. Simpleks va Dual usullarining xotira sarfi nisbatan past bo‘lgan bo‘lsa, Sun’iy o‘zgaruvchilar usulida qo‘shimcha o‘zgaruvchilar kiritilgani sababli resurs sarfi oshgan. Bu esa katta miqdordagi cheklovlar yoki yuzlab o‘zgaruvchilarga ega masalalarda bu usulni nisbatan sekinlashtiradi.

O‘tkazilgan tajriba sinovlari ham shuni tasdiqladiki, algoritmlarning natija aniqligi deyarli bir xil bo‘lsa-da, ularning qo‘llanish sohasi va amaliy samaradorligi turlicha. Masalan, logistikadagi yuk taqsimlash, energiya taqsimoti, ishlab chiqarish rejalashtirish kabi vazifalarda Dual usuli yuqori samaradorlik ko‘rsatdi, Simpleks usuli esa ishlab chiqarish va transport masalalarida barqarorlik jihatidan eng maqbul yondashuv bo‘lib qoldi. Umuman olganda, tadqiqotda olingan natijalar chiziqli dasturlash masalalarini yechishda algoritm tanlash jarayoni muhim ahamiyatga ega ekanini va har bir usulning o‘ziga xos ustun hamda cheklangan jihatlari mavjudligini ko‘rsatadi. Bu esa real amaliyotda

masalaning tabiatiga qarab to‘g‘ri algoritmni tanlash optimal natijaga erishishni ta’minlashini isbotlaydi.

Muhokama

O‘tkazilgan tahlil natijalari shuni ko‘rsatadiki, har bir usulning o‘ziga xos afzalliklari mavjud. Simpleks usuli chiziqli dasturlashning universal algoritmi bo‘lib, u deyarli barcha turdagi masalalarni yecha oladi. Dual usuli esa iqtisodiy mazmuni kuchli bo‘lgan masalalarda, xususan, resurslar qiymatini baholashda qo‘llaniladi. Sun’iy o‘zgaruvchilar usuli esa murakkab tizimlarda boshlang‘ich yechim topishda yordam beradi.

Tadqiqot shuningdek shuni ko‘rsatdiki, Simpleks va Dual usullarini kombinatsiyalash orqali hisoblash samaradorligi va aniqlik darajasini yanada oshirish mumkin. Kelajakda bu usullarni **sun’iy intellekt algoritmlari bilan integratsiya qilish** orqali avtomatik optimallashtirish tizimlarini yaratish mumkin. Masalan, ishlab chiqarish korxonalarida avtomatik qaror qabul qiluvchi tizimlar chiziqli dasturlash modellaridan foydalanib resurs taqsimotini optimallashtirishi mumkin.

Ushbu tadqiqot natijalari O‘zbekiston iqtisodiy sohasida raqamli tahlil tizimlarini joriy etishda, transport rejalashtirishda va energiya tejash modellarini ishlab chiqishda ham amaliy ahamiyat kasb etadi.

Bundan tashqari, tahlillar shuni ko‘rsatadiki, algoritmlarning tanlanishi faqatgina matematik modelning shakli yoki maqsad funksiyasi bilan emas, balki amaliy tizimning talablari, resurs imkoniyatlari va real vaqt rejimida ishlash zarurati bilan ham chambarchas bog‘liqdir. Masalan, real vaqt rejimida qaror qabul qilish talab etiladigan logistika, energetika monitoringi yoki operator boshqaruvida bo‘lgan ishlab chiqarish liniyalarida Dual usulining tezkorligi katta ustunlik beradi. Shu bilan birga, o‘zgaruvchilar va cheklovlar soni juda katta bo‘lgan modellar uchun Simpleks usulining barqarorligi va hisoblashda xatolarga kam moyilligi uni ishonchli variantga aylantiradi.

Sun’iy o‘zgaruvchilar usulining qo‘llanilishi esa, ayniqsa, boshlang‘ich bazis mavjud bo‘lmagan murakkab holatlarda modelni yechiladigan shaklga keltirish imkonini beradi. Bunday holatlar ishlab chiqarish jarayonida yangi texnologik liniyalar qo‘shilganda, transport yo‘nalishlari qayta rejalashtirilganda yoki tizimda yetarli ma’lumot bo‘lmaganda ko‘p uchraydi. Shuning uchun ushbu usul yordamchi bo‘lsa-da, amaliy modellashtirishda juda muhim o‘rin tutadi.

Muhokama jarayonida shuningdek aniqlanganki, chiziqli dasturlash usullarini zamonaviy optimallashtirish texnologiyalari bilan birlashtirish, masalan, mashinaviy o‘qitish, metaevristik algoritmlar (genetik algoritm, zarracha to‘dasini optimallashtirish, ant algoritmi) va neyron tarmoqlar bilan integratsiya qilish orqali murakkab qarorlarni yanada samaraliroq va tezroq qabul qilish mumkin. Bu integratsiya, ayniqsa, katta hajmdagi ma’lumotlar bilan ishlaydigan tizimlarda – masalan, raqamli iqtisodiyot platformalari, elektron hukumat tizimlari, aqlli logistika markazlari va energiya boshqaruvi tizimlarida – katta ahamiyatga ega.

Xulosa

Chiziqli dasturlash masalalarini yechishning optimal variantlarini ishlab chiqish zamonaviy iqtisodiy va texnik tizimlarda muhim o‘rin tutadi. Tadqiqot natijalari shuni ko‘rsatdiki, Simpleks usuli aniqlik va barqarorlikda, Dual usuli esa hisoblash tezligi va iqtisodiy tahlilda, Sun’iy o‘zgaruvchilar usuli esa murakkab modellarni soddalashtirishda samarali hisoblanadi.

Shuningdek, tahlillar shuni ko‘rsatadiki, chiziqli dasturlash masalalarini samarali yechish uchun algoritm tanlash jarayoni masalaning tuzilishi, cheklovlar soni, o‘zgaruvchilar miqdori va maqsad funksiyasining xususiyatlariga bog‘liq holda amalga oshirilishi lozim. Katta o‘lchamli va murakkab modellar uchun kombinatsiyalangan yondashuvlardan foydalanish, ya’ni Simpleks va Dual usullarini birgalikda qo‘llash, hisoblash unumdorligini sezilarli darajada oshirishi mumkin. Sun’iy o‘zgaruvchilar usuli esa boshlang‘ich bazis mavjud bo‘lmagan holatlarda optimal yechimga tez yetib borish imkonini beradi.

Kombinatsiyalangan yondashuvlar yordamida amaliy tizimlar uchun eng samarali yechimlarni topish imkoniyati kengayadi. Kelajakdagi tadqiqotlarda ushbu usullarni **sun’iy intellekt asosida avtomatlashtirish**, ularni real ishlab chiqarish jarayonlariga integratsiya qilish rejalashtirilmoqda.

Yana bir muhim jihat shundaki, zamonaviy raqamlashtirilgan tizimlarda chiziqli dasturlashning ahamiyati yanada ortib bormoqda. Xususan, ishlab chiqarish jarayonlarini avtomatlashtirish, logistika tizimlarida yo‘nalishlarni optimallashtirish, energetika resurslarini taqsimlash, moliyaviy rejalashtirish va xizmat ko‘rsatish sektorida xarajatlarni minimallashtirish kabi jarayonlarda chiziqli dasturlash muhim qarorlarni qabul qilishda ilmiy asos bo‘lib xizmat qilmoqda. Bu esa optimallashtirish modellarini takomillashtirish va algoritmlarni yanada yuqori samaradorlikka erishadigan shaklga keltirish zaruratini yuzaga keltiradi.

Foydalanilgan adabiyotlar

1. Hillier F.S., Lieberman G.J. Operations Research: Introduction. McGraw-Hill, 2015.
2. Winston W.L. Operations Research: Applications and Algorithms. Duxbury Press, 2020.
3. Mamadaliyev M. “Chiziqli dasturlash asoslari.” Toshkent, 2023.
4. Hamidov A. “Iqtisodiy modellashtirishda optimallashtirish usullari.” Scientific Impulse, 2024.
5. O‘zbekiston Respublikasi Innovatsion rivojlanish vazirligi hisobotlari, 2024.
6. Dantzig G.B. Linear Programming and Extensions. Princeton University Press, 1998.
7. Hamroyev S. “Matematik modellashtirishda optimallashtirish muammolari.” Toshkent, 2022.

Khodjaeva S. A.
assistant
department of phthisiology and pulmonology
Samarkand State Medical University
Samarkand, Uzbekistan
https://orcid.org/ 0000-0002-4181-8664

A RELEVANT CLINICAL CASE OF TUBERCULOUS INVOLVEMENT OF THE STERNAL BONE

Annotation: *Bone-joint tuberculosis accounts for 10-25% of extrapulmonary tuberculosis, and the involvement of the sternum in tuberculosis is a rare clinical form even in countries with high tuberculosis prevalence. A thorough search of literature, according to keywords, "primary tuberculosis of the sternum" and "primary tuberculous osteomyelitis of the sternum" in the PubMed database yielded 30 and 22 articles, respectively. A clinical case was analyzed: a woman, 23 years old. She turned to the hospital for a tumor on the anterior chest wall. Upon examination, a large swelling with a diameter of 12.5 cm, soft, painless, without fever, fluctuating, is visible. The pus was aspirated and examined. The pus was negative for acid-resistant bacilli (ACB), but the nucleic acid test using a cartridge amplification test for Mycobacterium tuberculosis was positive and sensitive to rifampicin. According to research by modern scientists, radiological signs may initially be absent upon admission, and symptoms, abscesses, or fistulas may appear long before imaging methods detect them. Conclusion. Isolated primary sternal osteomyelitis caused by M. tuberculosis is still rare, despite the high prevalence of tuberculosis in endemic countries.*

Keywords: *bone-joint tuberculosis, tuberculosis mycobacteria, sternal tuberculosis, literature, pus*

Bone-Joint tuberculosis accounts for 10-25% of out-of-lung tuberculosis, a tuberculosis that mainly damages the spine or supporting joints. Tuberculosis of the collarbone is also a rare clinical form in countries where tuberculosis is prevalent. Primary tuberculosis sternal osteomyelitis accounts for about 0.3% of all types of tuberculosis osteomyelitis, and the likely source is dispersal from paratracheal or intrathoracic lymph nodes. Despite the fact that tuberculosis is a common disease in endemic countries and around the world, a careful search of the literature on the keywords "primary tuberculosis of the collarbone" and "primary tuberculosis osteomyelitis of the collarbone" in the PubMed database gave 30 and 22 articles, respectively.

Clinical phenomenon

A 23-year-old woman complained that over the past 5 months, a painless swelling has appeared on the front wall of the chest, which is gradually developing. He had no significant medical history and was immune. He or his family had no connection with Koch's infection. The Anamnesis had no injuries to

the anterior chest wall or surgical interventions nearby. She is a housewife and belongs to the lower middle socio-economic class on the modified Kuppuswami scale. He had no dependence and took a 1-Week course of antibiotics (amoxicillin and clavulanate) before contacting us. The case of vaccination against calmett-Geren Bacillus has not been confirmed. It has a medium body, no fever, stroke is 76 per minute, breathing rate is 13 per minute, blood pressure is 120/84 mm wire.who. was. On the front wall of the chest, a large swelling with a diameter of 12.5 cm is visible, soft, painless, the temperature does not rise, it is fluuctuating. The skin coating was normal and there were no other significant marks. There was no cervical lymphadenopathy. Examination and neurological evaluation of the chest and abdomen were mostly normal. An ultrasound scan revealed a hypoechogenic collection of about 180 cm3. Its laboratory tests: hemoglobin 9.1 g%, Total leukocyte count 8600 64% polymorphic and 35% lymphocyte, erythrocyte deposition rate (ECHT) 26 mm. The activity of the liver and kidneys was in moderation. Chest X-rays were also in moderation. Magnetic resonance imaging (MRI) showed hyperintensive accumulation at the top of the chest, about 120x68x49 mm in front of the collarbone, a bone marrow tumor and a second fluid build-up nearby on the left handlebar, which is associated with the unevenness of the bark and the furnace previously described.

There were several enlarged paratracheal lymph nodes. The pus was aspirated and examined. The pus was negative compared to acid-resistant bacilli (KChB), but the nucleic acid test using a cartridge nucleic acid amplification test for Mycobacterium tuberculosis was positive and sensitive to rifampicin. The pus crop did not show growth after 72 hours.

The Mantu reaction was 4 mm after 48 hours; examination of the sputum and planting in a cube was negative. It weighed 55 kg and was preceded by a daily dose of anti-tuberculosis therapy (TQT) with four drugs: isoniazid (300 mg), rifampicin (450 mg), pyrazinamide (1200 mg), and ethambutol (800 mg). For 2 months (2hrze), then for 4 months isoniazid and rifampicin (4hr). It initially required two aspirations over a period of 5 weeks. M.the culture was positive for tuberculosis. After 7 weeks of therapy, the swelling decreased significantly. At this time, he completed 6 months of therapy and the tumor disappeared.

Discussion

Tuberculosis can spread to almost all organs after primary infection or after activation of latent foci. According to the 2018 Global sil report, 10 million new cases were reported in 2017 and 80% of cases fell to ten countries, with India (26%), Indonesia (11%) and Nigeria (9%) entering the top three [2]. This means that about a quarter of cases of tuberculosis worldwide fall under the contribution of India. Worldwide, the rate of non-pulmonary tuberculosis reached 10-15%, with young patients, women and people from Africa or Asia found to be more at risk. Of all cases of tuberculosis except the lungs, 10-25% of the musculoskeletal system is sili, with the most common area of injury being the spine (50-69%), followed by the thigh, knee and ankle/heel (10-13%) [3].

In about 60 to 80% of cases of skeletal tuberculosis, the spine or backbone is damaged, while the collarbone is damaged in about 1% of cases [1]. Collarbone tuberculosis is a rare form of flat bone tuberculosis that can be accompanied by isolated or pleuropulmonary or lymphatic damage.

Isolated primary cold abscess of the collarbone becomes a diagnostic puzzle, especially if it is not associated with pulmonary tuberculosis. Most cases are an expansion of the primary furnace in the chest, manifested by a wound, a leak or a tumor with constitutional signs, while in this case there was a large cold abscess without constitutional signs.

Sternal mycobacterial infections are divided into three types: primary (67.3%), secondary (20.8%), and acquired after surgery (11.9%). In 14 of the 980 cases of Tuli and Syncha Bone-Joint tuberculosis, sternal tuberculosis was reported (1.5%). They are mainly young males aged on average 36 years (11 to 59 years), but cases have also been found in child populations. The incidence is 65% in males and 34% in females. Cunning et al analyzed 27 papers that reported 32 cases from 1966 to 2013, finding that primary sternal tuberculosis was more common in men (76%) and occurred at a relatively young age [7].

Reactivation of latent foci produced by hematogenic or lymphatic transmission of primary tuberculosis is a major cause of tuberculosis-related sternal osteomyelitis. Other mechanisms are direct spread from adjacent mediastinal lymph nodes, or infection in the posterior lymph nodes, which decompose into the collarbone over time. Thoracic tuberculosis is often more common on the stem (almost 70%) than on the body when collarbone damage is found if the rib spine or rib-spine, rib-spine joints are damaged [4].

Yuan found that isolated sili of the collarbone were observed in 60.4% of patients, collarbone tuberculosis with invasion of peristinal tissue (muscles, vertebrae and joints) - in 20.1% of patients, collarbone tuberculosis with tuberculosis of other organs - in 19.5% of patients.

The disease is often diagnosed late due to unspecific symptoms and slow insidious course. The average duration of symptoms before diagnosis was 6.3 months. The clinical picture of the disease is different. Swelling and pain located in the area of the collarbone are the most common symptoms. Others are manifested by scarring of the skin or the arrival of detachment from the nasal cavities. Constitutional symptoms are less common, but include feeling unwell, fever, night sweats, or weight loss.

Our patient did not have any constitutional symptoms, and at the beginning there was a painless swelling in him, which in the last month became uncomfortable due to the rapid increase in size. The examination revealed primary sternal tuberculosis osteomyelitis and cold abscess.

Blood analysis is almost in moderation in most cases, with the exception of an increase in ECHT. Chest X-rays are normal in about 70% of cases, and in about 40% of cases, tuberculosis is detected not only in the collarbone, but also often in the lymphatic system. In more than 81% of cases of collarbone tuberculosis osteomyelitis, there are anomalous results of tuberculin skin fracture [5].

According to a study by Vijay et al, radiological signs may initially disappear during admission, and symptoms, abscesses or leaks may appear long before visualization methods can detect them. Normal radiographs are often normal, but radiography techniques such as computed tomography (CT) and MRI are more relevant for bone fractures and the localization and detection of soft tissue anomalies [6]. Common signs of blunt tuberculosis in CT are bone and vertebrate fragmentation, soft tissue masses, fascial Plains-Crossing margin (abscess), and diffuse strengthening (granulatory tissue), calcification, and underlying pleuroparenchymatous tuberculosis. MRI better detects abscesses in soft tissues and isolates bone marrow damage. Atazoy and others have shown the role of MRI in early detection of bone marrow and soft tissue damage in collarbone tuberculosis due to the high contrast accuracy of MRI.

Changes in early cellulitis (*panniculitis) (seen in T1-weighted images as an alternation of subcutaneous adipose tissue signal with swelling and strengthening) and myositis (showing hyperintensitivity of the muscles involved in T2-weighted images with their enlargement) are also often observed. Late changes include osteomyelitis, joint fluid, bone degradation. One can also see the formation of a sinus pathway, which manifests as a high intensity (SI) linear signal in T2-drawn images. Ultrasound has a limited value in the early stages, but later abscesses, osteolytic damage to the collarbone or damage to the ribs are detected.

For histopathological diagnosis of osteomyelitis of the collarbone, it is imperative to carry out a needle aspiration biopsy or excision biopsy, since X-ray data does not allow to distinguish the cause of osteomyelitis, and sometimes it can also appear to be neoplastic [1,7].

The diagnosis is usually confirmed by the detection of MBT and positive MBT cultures, as well as caseosis necrosis and granuloma on histological examination. The frequency of positive crops is up to 75%. Newer tests such as polymerase chain reaction amplification (PZR) and GeneXpert nucleic acid amplification test can also help with diagnosis in cases of negative grease or ECMA.

A high level of care is required for early diagnosis and prompt treatment, which can prevent complications. TQT is the basis of treatment according to a standard scheme of four drugs for 6-9 months. Cold abscesses or stacks can be aspirated.

Han and co-authors found that surgical intervention is only necessary in the following cases: when open biopsy is necessary when puncture aspiration does not produce results; drainage of leaks; sanitation to quickly treat damaged or sequestered bones or joints visible on X-rays, such as a funnel-shaped chest; large-scale interosseous disease or exacerbation of the disease; symptoms of secondary infection or mediastinitis; or

Surgical methods are only necessary in permanently drained fistula and bone erasure, which include closing the chest with a large muscle of the chest, the right muscle of the abdomen, the widest muscle of the back or the larynx,

reconstructing or not the chest wall, or using a vacuum. The outcome of patients is usually positive in treatment.

Conclusion

M. isolated primary osteomyelitis of the collarbone caused by tuberculosis, despite the high prevalence of tuberculosis in endemic countries, is still rare. Tuberculosis damage to the collarbone can manifest differently and occur in people of all ages. This requires a high suspicion index, as diagnostics are usually delayed. CT and MRI provide important indications, but confirmation can only be obtained using an ECMA or histopathological examination. TQT remains the basis of treatment. Surgical drainage of the abscess should only be considered if it is not absorbed during aspiration and TQT.

References

1. Garg RK, Malhotra HS, Kumar N. Spinal Tuberculosis: Still a Great Mimic. Neurol India. 2019;67(6):1402-4. https://doi.org/10.4103/0028-3886.273618
2. Heyde CE, Lübbert C, Wendt S, Rodloff A, Völker A, von der Höh NH. Spinal Tuberculosis. Z Orthop Unfall. 2022;160(1):74- 83. https://doi.org/10.1055/a-1285-4994
3. Wang B, Gao W, Hao D. Current Study of the Detection and Treatment Targets of Spinal Tuberculosis. Curr Drug Targets. 2020;21(4):320-7. https://doi.org/10.2174/1389450120666191002151637
4. Jetley S, Jairajpuri ZS, Pujani M, et al. Tuberculosis "The Great Imitator": A usual disease with unusual presentations. Indian J Tuberc. 2017;64:54–9.
5. Adada H, Valley MA, Nour SA, et al. Epidemiology of extra-pulmonary tuberculosis in the United States: high rates persist in the post-HIV era. Int J Tuberc Lung Dis. 2014;18:1516–21.
6. Vijay V, Vaishya R. Isolated C-C joint tuberculosis—a diagnostic dilemma. Foot (Edinb). 2015;25:182–6.
7. Held MFG, Hoppe S, Laubscher M, Mears S, Dix-Peek S, Zar HJ, et al. Epidemiology of musculoskeletal tuberculosis in an area with high disease prevalence. Asian Spine J. 2017;11(3):405–11.

Xo'jaqulov S. U.
o'qituvchisi
Qarshi davlat universiteti
O'zbekiston

TIRIK ORGANIZMLARGA TA'SIR ETUVCHI GEOGRAFIK OMILLAR

Annotatsiya: *Ushbu maqolada tirik organizmlar yashash muhiti va ularga ta'sir etuvchi geografik omillar haqida - iqlim, relyef tupro, suv resurslari va biotik omillar tahlil qilinadi. Organizmlar yashash sharoiti va moslanish jarayonlari tabiiy muhitning o'zgaruvchanligi bilan chambarchas bog'liq ekanligi ko'rsatib beriladi. Iqlim sharoitining (harorat namlik, yoritilish) o'simlik va hayvonat dunyosi tarkibi hamda biologik xilma-xillikka bevosita ta'sir ko'rsatishi misollar orqali yoritiladi*

Kalit so'zlar: *Tirik organizm, geografik omillar areal, tabiiy muhit, endemik ekosistema, ozuqa zanjiri, tabiat o'zgarishi, akklimatizatsiya, antropogen ta'sir, iqlim, muvozanat mashinasi.*

Khujakulov S. U.
teacher
Karshi State University
Uzbekistan

GEOGRAPHICAL FACTORS AFFECTING LIVING ORGANISMS

Abstract: *This article analyzes the habitat of living organisms and the geographical factors affecting them - climate, relief, water resources and biotic factors. It is shown that the living conditions and adaptation processes of organisms are closely related to the variability of the natural environment. The direct impact of climatic conditions (temperature, humidity, illumination) on the composition of the flora and fauna and biodiversity is illustrated through examples.*

Keywords: *Living organism, geographical factors, range, natural environment, endemic ecosystem, food chain, natural change, acclimatization, anthropogenic impact, climate, balance machine.*

Dunyo boylab barcha tirik organzmlar miqyosan katta va hududlar boyicha turli miqdorda tarqalgan. Tirik organzmlarning butun yer yuzasida notekis tarqalishi, ularning o'sishi, rivojlanishi, ko'payishi, hayotiy shakllarining o'zgarib borishi tabiiy muhit sharoitiga bog'liqdir. Tabiiy muhit bu organizmlarning mavjudligi osib rivojlanishi uchun kerakli bolgan barcha sharoitlar majmui hisoblanadi. Barcha organzmlar butun hayoti davomida tashqi muhit ta'siriga nisbatan doimiy adaptatsiya jarayonlarini boshdan kechiradi va buning natijasida barcha mavjudotlar o'z yashash sharoitiga moslashadi. Har qanday muhit fizik,

kimyoviy va boshqa omillarning majmui bilan namayon boladi. Omil-bu tirik organizmlarga to'g'ridan to'g'ri ta'sir etuvchi muhitning bir qismidir. Geografik omillar Yer yuzasidagi barcha organizmlar iqlim , relyef, suv ,tuproq va inson faoliyati natijasida vujudga keluvchi omillar hisoblanib, ular joyning tabiiy sharoitiga tirik organizmlar hayot tarzi va rivojlanishiga katta ta'sir ko'rsatadi. Tirik organizmlarga ta'sir etuvchi Geografik omillar 2 turga bo'linadi. Bular iqlim, yer yuzasi shakllari, suv, tuproq, o'simlik va va hayvonot dunyosini tashkil etuvchi tabiiy omillar, va aholi soni, xo'jalik faoliyati, texnika va texnologiya, transport va boshqa omilliarni o'z ichiga oladigan ijtimoiy iqtisodiy omillar hisoblanadi. Bu omillarning barchasi tirik organizmlarga turlicha ta'sir ko'rsatadi. Bazi omillar ijobiy ta'sir etsa, boshqa biri salbiy ta'sir ko'rsatishi mumkin.

Tirik organizmlarga ijobiy ta'sir ko'rsatuvchi omillardan eng muhimlaridan biri bu quyoshning nuri, yani uning yorug'ligi hisoblanadi. Bu hayvonot dunyosi uchun zarur bo'lgan issiqlik manbai va o'simliklar hayotida fotosintez jarayonlarining borishini ta'minlovchi asosiy manba hisoblanadi. Bu jarayon atmosferadagi me'yoriy gazlar miqdori va yetarlicha biologik mahsuldorlikni taminlaydi. Bundan tashqari namlik va suv omillari ham tirik organizmlar uchun zarur hayot manbayi hisoblahadi. Bunga masalan tirikorganizm tanasidagi birgina hujayra tarkibi 70-80 foizsuvdan iborat ekanligi suvning qanchalik muhimligini bildiradi. Namlik ko'p bo'lgan joylarda o'simlik va hayvonot turlari ham ko'p bo'ladi, bu omil tirik organizmlarning yer yuzida tarqalishini belgilab beradi. Iqlim omillari o'simlik va hayvonlarning rivojlanishi uchun zarur bo'lgan sharoitlar majmuini taminlaydi. Bundan tashqari yer yuzasi relyefi tog' etaklari vodiylarda qulay iqlim yetarli namlik qulay sharoit yaratib beradi. Bu omillar tirik organizmlarga to'g'ridan to'g'ri emas balki boshqa bir omillar orqali ta'sir etadi. Yer yuzining turli hududlarida o'simliklarning o'sishi va o'z navbatida hayvonlarning oziqlanishi uchun muhim hisoblangan omil tuproq omili bo'lib, u tuproqning kimyovi tarkibi va donadorligi bilan belgilanadi.

Hozirgi davrda yer sayyorasi tabiatininng o'zgarib borayotganligi tirik organizmlar hayotiga salbiy ta'sir ko'rsatmoqda. Bu esa muhit omillari o'zgarib borayotganligi tufayli sodir bo'moqda. Tirik mavjudodlar hayotiga salbiy ta'sir etayotgan omilardan eng asosiysi inson faoliyati tomonidan vujudga kelayotgan muammolar hisoblanib, ular tirik organizmlar hayot faoliyati va yashash sharoitlarini tubdan o'zgartirmoqda. Tirik organizmlar hayoti uchun jiddiy ta'sir ko'rsatayotgan omillardan biri cho'llashish ham iqlimning isishi, o'rmonlarning kesilishi yer resurslaridan noto'g'ri foydalanish tufayli vujutga kelmoqda. Cho'llashish jarayoni kuzatilayotgan hududlarning tirik organizmlari hayotida salbiy o'zgarishlar kuzatiladi. Jumladan o'simliklarning quyosh energiyasi ko'payishi va namlikning yetishmasligi tufayli nobud bo'lishi, yoki ayrim turlarining endemik turlarga aylanib borishi kuzatilmoqda. Hayvonlar hayotida ham bir qator salbiy ta'sir ko'satadi va ozuqaviy zanjirning uzilishi yoxud ekosistema muvozanatini buzilishiga sabab bo'ladi. Bundan tashqari ma'lum hududlardagi suv havzalarining qurishi oqibatida ularda yashovchi tirik organizmlarning nobud bo'lishiga sabab bo'ladi. Bunga misol tariqasida Orol

dengizining qurib borayotganligini ko‘rsatish mumkin. Orol qurib borishi bilan namlikka muhtoj o‘simlik va hayvonlar yuqolishiga sabab bo'la boshladi. Dengiz tubidan kótarilgan tuz shamol ta‘sirlarida yon atrofga, dalalarga yozilmoqda.Bu esa tuproqlarning shòrlanishi, va hosildorlikni 2-3 marta kamayishiga sabab bo'lmoqda.

Orol dengizida qurimagan avvalgi davrlarida 30 ga yaqin baliq turlari mavjud bo'lgan bo‘lsa, hozirda ular butunlay yuqolib ketgan. Bu jarayon inson hayotiga ham turli kasalliklarning kelib chiqishiga sabab bo‘lmoqda. Bunday hollarni hozirda dunyoning turli qismlarida kuzatish mumkin. So‘ngi davrlarida insoniyat hayotida shaharlashuv jarayonlarining kuchayishi, qishloq xo‘jaligi yerlarini jadal o‘zlashtirish bu hududlarga hayvonot dunyosining siqib chiqarilishga sabab bo'lmoqda. Bundan tashqari tartibsiz ov jarayonlari natijasida ham ayrim hayvon turlarining keskin kamayishiga, va hatto yuqolib borishiga olib kelmoqda. O‘simlik va hayvonlar tabiatininng ajralmas qismi hisoblanadi. Bularning yuqolib borishi tabiatning kambag'allashishiga olib keladi. Hozirgi davrda tabiatni muhofaza qilish eng dolzarb muammolardan biri hisoblanadi. Dunyoning turli mamlakatlarida tabiatni muhofaza etish, yer yuzasining noyob o‘simliklar va hayvonlarining yuqolib ketishdan saqlash va antropogen ta‘sirni cheklash maqsadida turli parvarishxona, milliy bog‘va qo‘riqxonalar barpo etilmoqda. Shu kabi muhofaza hududlarini ko‘paytirish orqali kamayib borayotgan tirik organizmlarni saqlab qolish mumkin. Hayvonlar tartibsiz ov holatini cheklash, va ularni mavsumiy jarayonlarini nazorat qilish muhim ahamiyatga ega. Qishloq xo‘jaligi sohalarida global isish natijasida òsimliklarning hosildorligi pasayib bormoqda. Bu muammoni oldini olish uchun aklimatizatsiya (òsimliklarni bir iqlim mintaqasidan boshqa iqlim mintaqalariga kòchirish va ularni yangi sharoitga moslashtirish) sohasini rivojlantirishga katta e'tibor qaratish lozim. Òsimliklarning yangi navlarini yaratish yuqori hosildorlikni taminlab beradi.

Qishloq xo'jaligi yerlaridan unumli foydalanish, tuproq sho‘rlanishini oldini olish uchun melioratsiya tadbirlarini uzluksiz olib borish lozim. Bundan tashqari chorva mollarini tartibsiz boqilishini oldini olish tuproq qatlamining yemirilishi va cho‘llashish alomatlarini kamaytiradi. Yer yuzasidagi kislorod manbayi hisoblangan òrmon va daraxtlarni kesilishini cheklash muhimdir. Chòl va chalacho‘l hududlarida kanallar orqali suv chiqarib daraxt ko‘chatlarini ekish orqali turli suniy o‘rmon hududlarini ko‘paytirish katta samara beradi. Chòlli hududlarida suniy suv havzalarini barpo etish, daryolardan turli oqava suvlarining ko‘tarilishi atmosferadagi chang zarralari miqdorining. Bu esa òsha hududdagi nafaqat hayvon va òsimliklar balki insoniyatning salomatligi va hayoti uchun muhim ahamiyatga egadir. Eng asosiysi aholini tabiatni asrash va uni muhofaza etishga o‘rgatish lozim. Buning uchun aholi o‘rtasida turli tabiatni asrash to‘g‘risidagi tadbirlarini tez-tez o‘tkazib turish lozim. Bundan tashqari tabiatni muhofaza qilish to‘g‘risidagi g‘oyalarni rag‘batlantirish va bu sohada "eng yaxshi g‘oya" singari loyihalarni joriy etish, vujudga kelayotgan muammolarni yechimlarini topishda katta samara beradi.

Umumiy o‘rta ta'lim muassasalarida ham turli tabiatni muhofaza qilish va uni asrash to'g'risidagi fanlarni joriy etish muhimdir. Yosh avlodnig ongiga ilk bolalik davridanoq bu tushuncha larni singdirish lozim. Zero - yer yuzasining tabiatining kelajakdagi holati yoshlar qo'lidadir. Turli sanoat sohalarida noananavi (suv, shamol quyosh) energiya turlaridan foydalanish, sanoat chiqindilarini kamaytirish va uni qayta ishlash texnologiyalarini yanada takomillashtirish muhim ahamiyatga ega. Bularning barchasi geografik omillar muvozanatida muhim ahamiyatga egadir.

Xulosa qilib aytganda geografik omillar hayot faoliyati uchun zarur bólgan va uni òzgarishiga sabab bòluvchi sharoitlar majmui hisoblanadi. Tirik organizmlarga bu omillar ijobiy yoki salbiy ta’sir ko‘rsatadi. Hozirgi davrda tirik organizmlar uchun salbiy ta’sir ko‘rsatayotgan omillardan eng asosiysi insonning xo‘jalik va sanoat faoliyati natijasida vujudga kelmoqda. Bu ta'sir butun yer yuzasi tabiatni o'zgartirishga olib kelmoqda va tirik organizmlarning hayotiga katta xavf tug'dirmoqda. Buning oldini olish ham insoniyat qòlidadir. Geografik omillar Yer yuzasi tabiatni muvozanatida saqlab turadi. Bu muvozanat mashinasining buzilishi salbiy oqibatlarga olib kelishi mumkin. Bu borada tabiatni asrash chora- tadbirlari muhim ahamiyatga ega.

Foydalanilgan adabiyotlar:

1. T.X.To‘ychiyev ekologiya va atrof-muhitni muhofaza qilish Toshkent 2020-y.
2. Alimdjanov N.N. Namangan Bigeografiya Toshkent 2018-y. 2022-yil .
3. Qurbonov P. R., Qo’ldosheva G. M. Ecological-geographical problems in the residential areas of kashkadarya region //Экономика и социум. – 2025. – №. 5-1 (132). – С. 617-619.
4. Qurbonov P. R., Botirov B. Z. The impact of global climate change on urban development //Экономика и социум. – 2025. – №. 5-1 (132). – С. 613-616.
5. Safarov I. B., Chorshanbiyeva R. A. Qashqadaryo viloyatidagi ekologik-geografik muammolar //Экономика и социум. – 2025. – №. 2-2 (129). – С. 153-157.
6. Safarov I. B. et al. Iqlim o'zgarishini qishloq xo'jaligiga ta'siri //Экономика и социум. – 2025. – №. 2-2 (129). – С. 158-161.
7. Сафаров И. Б., Халилов Н. Х. Экономико-географические проблемы градостроительства верхне-Кашкадарьинской области //Educational Research in Universal Sciences. – 2024. – Т. 3. – №. 2. – С. 707-713.

Xushnazarova M. N., pedagogika fanlari bo‘yicha falsafa doktori (PhD) dotsent
Qo‘qon davlat pedagogika instituti
ORCID: 0000-0001-8643-7729

BO‘LAJAK O‘QITUVCHILARNI IJTIMOIY PEDAGOGIK AMALIYOTGA AKSIOLOGIK MUNOSABATLARINI RIVOJLANTIRISHNING ASOSIY VAZIFALARI

Annotatsiya: *Ushbu maqolada aksiologik yondoshuv vositasida bo‘lajak o‘qituvchilarni ijtimoiy pedagogik amaliyotga tayyorlash milliy masala sifatida qayd etilishi, talabaning ijtimoiy pedagogik amaliyotda faol ishtirok etishi, kasbiy ijtimoiylashuv, kasbiy kompetentlik negizida shakllanishi xususida fikr yuritilgan.*
Kalit so‘zlar: *aksiologik yondoshuv, aksiologik munosabat, qadriyatlar tizimi, faoliyat motivlari, aksiologik mezon, ta’limni insonparvarlashtirish, kasbiy kompetentlik*

Khushnazarova M. N., PhD in pedagogical sciences, associate professor
Kokand state pedagogical institute

THE MAIN TASKS OF DEVELOPING AXIOLOGICAL ATTITUDES OF FUTURE TEACHERS TO SOCIAL PEDAGOGICAL PRACTICE

Annotation*: In this article, the preparation of future teachers for social pedagogical practice is noted as a national issue, the student's active participation in social pedagogical practice, professional socialization, formation on the basis of professional competence are discussed in this article.*
Key words: *axiological approach, axiological attitude, value system, motives of activity, axiological criterion, humanization of education, professional competence*

O‘zbekiston Respublikasi Prezidenti Sh.M.Mirziyoev “Yoshlarimizning mustaqil fikrlaydigan, yuksak intellektual va ma’naviy salohiyatga ega bo‘lib, dunyo miqyosida o‘z tengdoshlariga hech qaysi sohada bo‘sh kelmaydigan insonlar bo‘lib kamol topishi, baxtli bo‘lishi uchun davlatimiz va jamiyatimizning bor kuch va imkoniyatlarini safarbar etamiz”[23], – deb ta’kidlaydi. Bejiz, 2022-2026 yillarga mo‘ljallangan yangi O‘zbekistonning taraqqiyot strategiyasida “…inson qadrini yuksaltirish va erkin fuqarolik jamiyatini yanada rivojlantirish orqali xalqparvar davlat barpo etish; ma’naviy taraqqiyotni ta’minlash va sohani

[23] Mirziyoev SH. Erkin va farovon, demokratik O’zbekiston davlatini birgalikda barpo etamiz. –T.: O’zbekiston, 2016. 14-bet.

yangi bosqichga olib chiqish; milliy manfaatlardan kelib chiqqan holda umumbashariy muammolarga yondashish,”[24] kabilar ustuvor yo‘nalish sifatida belgilab o‘tilmagan.

I.T.Frolova yondashuvlariga ko‘ra qadriyat tushunchasi “atrof-muhitning ijtimoiy tasniflanish ob’ekti inson va jamiyat uchun ijobiy yoki salbiy ta’sir o‘tkazadi: ezgulik, yaxshilik va yomonlik, tabiat va jamiyat hayoti hodisasi sifatida ko‘rilgan”.[25] Bir qator olimlar qadriyatlarni tizimlash bo‘yicha xulosaviy fikrlarga kelganlar. B.Bitinas va I.R.Rodlasiylar qadriyatlarning uchta asosiy tizimini ajratib ko‘rsatishgan: transtsental (diniy mohiyat nuqtai nazaridan qandaydir mutlaqlikka ega), ijtimoiy yo‘naltirilgan-sotsiotsentrik (guruhiy, umuminsoniy, kasbiy, milliy va h.k.) va antrorotsentrik (individual).[26]

M.A.Makarevish qadriyatlar tizimini quyidagicha guruhlarga ajratgan: hayot mazmunini belgilab beruvchi (yaxshilik, yomonlik, baxt, farovonlik), universal (hayotiy, demokratik, ijtimoiy obro‘-e’tibor, shaxsiy rivojlanish, shaxslararo munosabat), norasmiy (an’anaviy, diniy va urbanizatsiyaga oid) va jamoaviy (o‘zaro bir-biriga yordam berish va birdamlik). B.G.Ananev har bir hayotiy bosqich ma’lum bir qadriyatlarni hayotiy maqsad qilib qo‘yishini ta’kidlaydi. U yoshlarda ta’lim va ilm olish, muloqot asosiy qadriyatlar sifatida kelishini va ular hayotiy maqsadini ushbu qadriyatlar orqali belgilashini asoslaydi.[27]

Ko‘rinib turibdiki, qadriyatlar mazmuni, mohiyati nuqtai nazaridan keng qamrovli, serqirra kategoriya hisoblanadi. Tadqiqotshi G.Gafforova va boshqalar zamonaviy dunyo rivojlanib borishi bilan bir vaqtda qadriyat ham takomillashib, mukammallashaverishi, shu sababli qadriyatlar shakli, xillari ma‘lum bir ma‘noda o‘zgarib turishi mumkinligini ta‘kidlaydi. Lekin ta‘lim, bilim va ilm-fan kabi qadriyatlar shaklu-shamoyilini ham, mazmun-mohiyati va qadr-qimmatini o‘zgartirmasligini urg’ulab o‘tadi.

Pedagogik amaliyotda kuzatishlarimiz shuni ko‘rsatadiki, ba’zi o‘qituvchilar yillar davomida o‘z faoliyatidan qoniqmasligi, o‘z faoliyatidan nolishlilik va bu orqali o‘quvchilar, ularning ota-onalari, shuningdek maktab pedagogik jamoasiga salbiy ta‘sir etib keladi. Tadqiqotimiz nuqtai nazaridan mazkur holatni tahlil qilgan holda aytish mumkinki, bu toifadagi o‘qituvchilarda avvalo “oliy qadriyatga ichki aksiologik munosabat” yetarli darajada rivojlanmagan. Pedagogik, ijtimoiy pedagogik amaliyotga doir muammoli vaziyatlarga o‘qituvchi uchun yangi tajribalar olish, o‘z-o‘zini professionallik darajasiga ko‘tarish uchun imkoniyat deb qarashi ichki aksiologik munosabatning namunasidir.

Kuzatishlar va manbalar tahlili shuni ko‘rsatadiki, hozirgi zamonda ba’zi

[24] O’zbekiston Respublikasi Prezidentining 2022 yil 28 yanvardagi «2022-2026 yillarga mo’ljallangan Yangi O’zbekistonning taraqqiyot strategiyasi to’g’risida»gi PF-60-son Farmoni / Qonunchilik ma’lumotlari milliy bazasi, 29.01.2022 y., 06/22/60/0082-son.
[25] Философский словарь // Под ред. Фролова И.Т. – М.: Республика, 2001. – 719 с.
[26] Подласий И.П. Педагогика: 100 вопросов – 100 ответов. – М.: ВЛАДОС-пресс, 2004. – 83 с.
[27] Ананьев Б.Г. Человек как предмет познания. – Л.: ЛГУ, 1999. – 154 с. (162).

ota-onalar oila tarbiyasida qadriyatlarni farzandlariga etkazishda etarli bilimga ega emasligi yoki mas'uliyatni his qilmasligi holatlari uchrab turadi. Mazkur holatni bartaraf etishda o'qituvchining professional yondashuvi, o'qituvchida aksiologik munosabatlarning yaxshi shakllanganligi muammoga echim sifatida ko'riladi. Yoshlarning zo'ravonlik, radikalizm kabi yomon illatlarga duchor bo'lishini oldini olishda o'qituvchining bilimi, salohiyati va o'quvchilarga milliy, umuminsoniy qadriyatlar mohiyatini anglab etish darajasiga olib kelishda asqotadi. Albatta, qadriyatlarni etkazishda oila birinshi navbatda turadi va bu o'rinni hech kim to'ldira olmaydi. Maktab esa o'quvchining qadriyatlarga sodiq holda kamol topishiga muvaffaqiyat keltiruvchi omil sifatida qaraladi.

Tadqiqotchi M.Karimova bo'lajak o'qituvchini kasbiy-tarbiyaviy, ijtimoiy pedagogik amaliyotga tayyorlashda kasb axloqiga doir bilimlar, ma'naviyatni shakllantirish muammolarini, xorijiy mamlakatlar pedagogikasida erishilayotgan ilg'or tajribalarni o'rganish va tahlil qilish, istiqbolli rejalar tuzish muhim ahamiyat kasb etishiga e'tibor qaratadi.

Bo'lajak o'qituvchining ijtimoiy pedagogik amaliyotga aksiologik munosabatlarni rivojlantirishning vazifalari sifatida quyidagilarga e'tibor qaratilishi lozim:

– talabalarni erkin fikrlashga o'rgatish, hayot mazmunini tushunib olishiga ko'maklashish, o'z-o'zini idora va nazorat qila bilishini shakllantirish, o'z shaxsiy turmushiga maqsadli yondashuv, reja va amal birligi hissini uyg'otish;

– talabalarni milliy, umuminsoniy qadriyatlar, boy ma'naviy meros bilan tanishtirish, madaniy hamda dunyoviy bilimlarni egallashga bo'lgan talablarni shakllantirish, malaka hosil qildirish, o'stirib-boyitib borish va estetik tushunchalarini shakllantirish;

– har bir talabaning bilimdonligini va ijodiy imkoniyatlarini aniqlab, ularni rivojlantirish, inson faoliyatini turli sohalarda joriy qilib ko'rish;

– insonparvarlik odobi me'yorlarini shakllantirish (bir-birini tushunish, mehribonlik, shafqatlilik, irqiy va milliy kamsitishlarga qarshi kurasha olish), muomala odobi kabi tarbiya vositalarini keng qo'llash;

– odamlar bilan o'zaro munosabat, muloqotni o'rganish, har qanday vaziyatda, har bir inson bilan pedagogik muloqotga kirisha olish, turli saviyadagi odamlar bilan maqsadli munosabat o'rnata olish;

– qonuniy jamoa axloqi va turmush qoidalariga hurmat bilan qarashni tarbiyalash, shaxsning noyob qirralarini belgilovshi fuqarolik va ijtimoiy mas'uliyat hislarini rivojlantirish;

– sog'lom turmush tarziga intilishni tarbiyalash va rivojlantirish;

– yoshlarni erkin va mustaqil, tanqidiy fikrlashga o'rgatish, o'z fikrlari uchun mas'uliyat hissini uyg'otish.

Demak, aksiologik yondoshuv vositasida bo'lajak o'qituvchilarni ijtimoiy pedagogik amaliyotga tayyorlash milliy masala sifatida qayd etiladi. Aksiologik yondoshuv vositasida ijtimoiy pedagogik amaliyotga tayyorlash – insonning ijtimoiy pedagogik amaliyotda faol ishtirok etishi, jarayonga o'zini baxshida

qilishi, u tomonidan yaratilgan pedagogik qadriyatlar yig'indisini anglatadi. Ijtimoiy pedagogik amaliyotga tayyorgarlik kasbiy ijtimoiylashuv, kasbiy kompetentlik negizida shakllanadi.

Foydalanilgan adabiyotlar :

1. Mirziyoev SH. Erkin va farovon, demokratik O'zbekiston davlatini birgalikda barpo etamiz. –T.: O'zbekiston, 2016. 14-bet.
2. O'zbekiston Respublikasi Prezidentining 2022 yil 28 yanvardagi «2022-2026 yillarga mo'ljallangan Yangi O'zbekistonning taraqqiyot strategiyasi to'g'risida»gi PF-60-son Farmoni / Qonunchilik ma'lumotlari milliy bazasi, 29.01.2022 y., 06/22/60/0082-son.
3. Ғaffarova G., Polvonova S. Inson kapitalini rivojlantirishda milliy qadriyatlarning ahamiyati // Academic research in educational sciences volume 2, 2021. – 723-781-b.
4. Karimova M.O. Talabalarni kasbiy-tarbiyaviy, ma'naviy-ma'rifiy faoliyatga tayyorlashning pedagogik asoslari // NamDU ilmiy axborotnomasi, №10, 2019. – 317 b.
5. M.N.Xushnazarova. Volontyorlik faoliyatining ijtimoiy –pedagogik muammolari. Science problems .UZ.Ijtimoiy- gumanitar fanlarning dolzarb muammolari.№ 12 /2 (3)- 2023 . 311-315
6. M.N.Xushnazarova. Volontyorlik (ko'ngillilik) faoliyatining innovatsiyon shakllari va ularning pedagogik tahlili. O'zbekiston Milliy universiteti xabarlari.2024.(1/4) ISSN 2181-7324,229-232
7. M.N.Xushnazarova. Oliy ta'lim talabalari orasida volontyorlikning mikro darajadagi omillariga e'tibor qaratish. NamDU ilmiy axborotnomasi . 2023 yil 12-con.792-796.
8. M.N.Xushnazarova.The need to use the experience of foreign countries regarding the improvement oft he pedagogical conceptual mechanism of volunteer activities. Journal of Advanced Zoology.Volume 44.issue-2 Year 2023 Page 3765-3771.

УДК: 616.315-007.254

Yadgarova G. S.
associate professor
department of surgical dentistry
Abu Ali ibn Sino Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0009-0006-2638-5158

ETIOLOGICAL, CLINICAL AND DIAGNOSTIC FEATURES OF FACIAL MALFORMATIONS

Abstract: *The results obtained make it possible to assess the severity of anatomical zones and facial anomalies, which have a characteristic effect on the facial structure, configuration, and aesthetic orientation, which, in turn, improves early diagnosis of the pathological process and underlying disease. The results of this study contain the complete results of clinical dental examinations in children with lip and palate defects, or rather, the anomalies that they may have, and measures for their early detection, diagnosis, and prevention. 135 infants born with HCV were involved, of which 83 were male infants and 52 were female infants. The infants were divided into 2 groups. Group 1 is the main group of 68 infants (of which 42 are male and 26 are female) and group 2 is the control group of 66 infants (of which 41 are male and 26 are female).*

The studied changes and their systematization led to a decrease in maxillofacial pathologies, as well as growth and development, which contributes to the non-hormonal development of the child. As a result, the days of hospital stay are shortened, complications of the disease are prevented and the quality of life of patients is improved, as well as the results after passing the rehabilitation stages are improved. The implementation of the obtained data in practical healthcare will reduce the proportion of maxillofacial anomalies. For the first time, the method of using early orthodontic treatment of children with HCV, performed using a dental obturator for the orthodontic treatment of children with HCV, has been scientifically substantiated.

Keywords: *cleft, children, lip, palate, silicone, obturator.*

Introduction

The severity of facial malformation is caused not only by external disfigurement, pronounced functional disorders, social inferiority of the child in preschool and school groups, conflict tension and a negative psychological background in the family, but also by the fact that the deformity causes somatic disorders leading to growth retardation and underdevelopment of the child's body as a whole. The etiology of facial malformations includes genetic and hereditary factors, as well as external influences on the fetus during intrauterine development, such as infections, medication or exposure to harmful substances,

the harmony and development of several areas are disrupted, and so-called combined secondary deformities occur. Clinical manifestations range from minor to severe, including structural changes in the jaws, facial asymmetry, and cleft (e.g., lip and palate). Modern dentists specialize in pathology of lips, alveolar defects and oral cavity defects. This is due to the high incidence of malformations, the severity of anatomical abnormalities, the variety of approaches to surgical interventions, the complexity of treatment, and the ever-growing demand for functional and aesthetic results of surgical and orthodontic interventions. (Bezrukov V.M., 1981; Zernov A.B., 1997; Davydov B.N., 2000; Khoroshilkina F.Ya., 2002; Weilena.etal., 2015). The features of the neuropsychiatric state of children differ sharply from the norm, because organic changes lead to unpredictable neurotic reactions associated with asthenic syndrome and vegetative-vascular dystonia of the body as a whole. Unfavorable conditions of upbringing and mental traumatization of children at an early school age also play an important role in the occurrence of psychogenic disorders. After the birth of a child with maxillofacial pathology, a comprehensive examination by specialists (surgeon, pediatrician, orthopedist, otolaryngologist, neuropsychiatrist) is necessary to identify somatic abnormalities and concomitant malformations and to carry out the necessary correction of abnormalities in the preoperative period. After examining the child, a plan of immediate and prospective therapeutic measures is drawn up, depending on the degree of deformity. The violation of a child's social adaptation at an early age due to a defect cannot always be corrected at an older age.: not only a physically deformed person enters adulthood, but also a psychologically deformed one.

The urgency of this problem is determined not only by the high birth rate of children with this pathology, but also by the difficulties in choosing a surgical treatment method. Imperfection of traditional treatment methods, unjustified choice of surgical correction methods and age-related approaches to its implementation are the main reasons for unacceptable functional and cosmetic results. Another important reason for the unsuccessful results obtained after surgical interventions will be an insufficiently clear and incomplete understanding of the problems inherent in this group of patients and the failure to perform complex procedures (I.A. Kozin, 1996; B.N. Davydov, 2006; Saj. and others, 2015). Primary palate surgery in children with congenital pathologies is one of the main stages of rehabilitation of patients with malformations of the lips and palate. The outcome of the primary surgery largely determines the further course of rehabilitation, therefore, the final functional result. Currently, for most specialists, this operation presents significant difficulties, leading to negative functional results and requiring surgical intervention to improve speech, which, in turn, is the least mastered by surgeons in this field. All these factors significantly reduce the quality of necessary rehabilitation in patients with the most common defect of the maxillary region.

The purpose of the study

Etiological, clinical and diagnostic features of facial malformations. Detailed analyses and evaluation of the results were carried out during the study.

Research materials and methods. These studies provide clinical and dental data in children with lip and palate defects, or rather, complete results on possible abnormalities and measures for their early detection, diagnosis and prevention. The results obtained make it possible to assess the structure, configuration of the face, as well as the degree of anatomical zones and facial anomalies that are aesthetically important, which, in turn, improves the early diagnosis of the pathological process and the underlying disease. As a result, the number of days of hospital stay is reduced, complications of the disease are prevented and the quality of life of patients is improved, and the results after the rehabilitation stages are improved. 135 infants born with HCV were involved, of which 83 were male infants and 52 were female infants. The infants were divided into 2 groups. Group 1 is the main group of 68 infants (of which 42 are male and 26 are female) and group 2 is the control group of 66 infants (of which 41 are male and 26 are female). The main group of infants received temporary silicone nipples and plates, which facilitated sucking and swallowing acts and improved speech defects, while the 2nd group of infants received traditional treatment methods. In carrying out this thesis, plaster models of infants were used, clinical and anthropometric methods were used to obtain parameters with congenital cleft lip and palate, followed by statistical data processing. In the course of the study, our task was to improve the life status of children with congenital cleft lip and palate using temporary silicone nipples and plates, as well as to determine the condition of bite in children with congenital cleft lip and palate, depending on age; in addition, to identify the features of changes in the parameters of the maxillary system during tooth replacement in children with congenital cleft lips and palate before urano- and cheilorinoplasty in a comparative aspect. At the same time, to determine the early dates of surgical intervention in children with cleft lip and palate, to improve the life status of children with congenital cleft lip and palate using temporary silicone plates (obturators) of replenishing elements that facilitate sucking and swallowing acts, and to improve speech defects in children with congenital cleft lip and palate using temporary silicone plates (obturators), in the end, to develop and implement in clinical practice a "Method of early orthodontic treatment of children with VGN" using orthodontic devices of their own design.

The results and their discussion

The results of the study showed that, based on a set of studies, comparative analyses of the condition and improvement of the life status of infants with congenital cleft lip and palate using temporary silicone nipples and plates were conducted for the first time. For the first time, a comparative analysis of the parameters of the upper dentoalveolar arch in newborns was carried out in the period before and after using the proposed obturator, its effect on the growth and development of the alveolar process.

Conclusion.The results of a retrospective study of etiological factors in children born with defects of the upper lip and palate showed that inbreeding in a couple – 22 cases (10.8%); anemia in the mother during pregnancy - 32 cases (15%); severe toxicosis - 23 cases (10.6%); flu, stress and other diseases – 38 (18%); alcohol consumption by the father-19 (8.4%), the presence in the offspring was detected in 78 (33%) cases. The variety of clinical manifestations of the defect in children born with defects of the upper lip and palate was as follows: unilateral limited lip defect – 14%, unilateral limited palate defect-8%, unilateral crossed complete lip and palate defect-19%.

References

1. A.S. Artyushkevich and coauthors. "Age-related morphology of the breast bone." 2013 Minsk.
2. M.A. Pogrel, K.E. Kahnberg, L. Andersson "Essentials of Oral and Maxillofacial Surgery " 2014. Cothenburg.
3. M.E. Zorich, O.S. Yatskevich, A.I. Karanevich, 2013; N.A. Peleshenko, "The choice of methods of surgical treatment of patients with congenital cleft palate" 2013. Tadjikistan.
4. Yunusov A.S., Mammadov A.A., Gubeev R.I. The problem of reconstructive surgery of the external nose and nasal structures in children who had previously undergone cheilouranoplasty // ENT- praktika. - 2014. - No. S. - pp. 62-63.
5. Eshiev A.M., Davydova A.K. ANALYSIS OF THE DETECTION OF CONCOMITANT AND COMBINED PATHOLOGY IN CHILDREN WITH CLEFT LIP AND PALATE // Fundamental research. – 2013. – No. 9-1. – pp. 42-45; URL: https://fundamental-research.ru/ru/article/view?id=32174 (date of application: 01/24/2023).
6. M.E. Zorich, O.S. Yatskevich, A.I. Karanevich, 2013; N.A. Peleshenko, "The choice of methods of surgical treatment of patients with congenital cleft palate" 2013. Tadjikistan
7. Yadgarova G.S. "PRE–SURGICAL ORTHODONTIC TRAINING IN CHILDREN WITH UNILATERAL CLEFT LIP AND PALATE" Dec - 2022.
8. Mirzayeva F.A. "COMPREHENSIVE REHABILITATION OF CHILDREN WITH VGN IN ADVERSE POSTOPERATIVE OUTCOMES" Dec – 2022.
9. Mirzayeva F.A. "Dec - 2022 ISSN: 2181-2608 www.sciencebox .uz STRUCTURAL FEATURES OF THE DENTAL-MAXILLARY SYSTEM IN PATIENTS WITH CLEFT LIP AND PALATE".
10. Mirzaeva F.A. Professional Comprehensive Rehabilitation of Children with Genital Cleft Lip and Palate Volume 2 | Issue 12 | December - 2022 ISSN: 2795-8612

Zokirova Sh. A.
tayanch doktoranti
QDU
orcid raqam: 0009-0005-2999-4189
Xo‘janazarova N. T.
o‘qituvchisi
san’atshunoslik kafedrasi
QDU

3D OBYEKTLARNI VIZUALIZATSIYA QILISH VA XUSUSIYATLARNI ANIQLASHNING GEOMETRIK JIHATLARI

Annotatsiya*: Ushbu maqola 3D obyektlarni vizualizatsiya qilish va ularning geometrik xususiyatlarini aniqlashning asosiy geometrik jihatlarini atroflicha o‘rganadi. Tadqiqot zamonaviy kompyuter grafikasi, kompyuter ko‘rishi va robototexnika sohalarida 3D modellarning ahamiyatini ta’kidlaydi. Maqolada 3D obyektlarning geometrik modellashtirish asoslari, xususan, to‘r tuzilmalari va normalar tushunchasi ko‘rib chiqiladi. Vizualizatsiya jarayonida qo‘llaniladigan geometrik transformatsiyalar va proyeksiyalar tahlil qilinadi. Shuningdek, parallel va perspektiv proyeksiyalarning nazariy asoslari va amaliy tatbiqlari yoritiladi hamda 3D obyektlarda geometrik xususiyatlarni aniqlashning turli metodlari muhokama qilinadi. Nihoyat, geometrik tahlil va ilg‘or vizualizatsiya texnikalari ko‘rib chiqilib, ushbu sohaning kelajak istiqbollari bayon etiladi.*

Kalit so‘zlar: *3D obyektlar, vizualizatsiya, geometrik transformatsiyalar, proyeksiyalar, xususiyatlarni aniqlash, sirt normali, homogen koordinatalar*

Zokirova Sh. A.
basic doctoral student
QDU
orcid number: 0009-0005-2999-4189
Kho‘janazarova N. T.
lecturer
department of art history
QDU

GEOMETRICAL ASPECTS OF VISUALIZATION AND PRODUCTION OF 3D OBJECTS

Abstract: *This article thoroughly examines the fundamental geometric aspects of 3D object visualization and feature extraction. The research highlights the significance of 3D models in modern computer graphics, computer vision, and robotics. The paper covers the basics of geometric modeling for 3D objects, specifically mesh structures and the concept of normals. It analyzes geometric transformations and projections used in the visualization process, including*

translation, rotation, scaling, affine and projective transformations, and their representation using homogeneous coordinates. Additionally, the theoretical foundations and practical applications of parallel and perspective projections are discussed. The article explores various methods for identifying geometric features in 3D objects, such as object pose estimation, 3D wireframes, and fine-grained categorization approaches. Finally, geometric analysis and advanced visualization techniques, including shading normals and approaches for representing complex surface details, are reviewed, outlining future prospects in this field.

Keywords: *3D objects, visualization, geometric transformations, projections, feature extraction, surface normal, homogeneous coordinates*

Kirish

Uch o‘lchamli (3D) obyektlarni vizualizatsiya qilish va ularning geometrik xususiyatlarini aniqlash zamonaviy kompyuter grafikasi, kompyuter ko‘rishi, robototexnika, virtual va kengaytirilgan reallik kabi ko‘plab sohalarda markaziy o‘rin tutadi. Real dunyo obyektlarining raqamli modellari bilan samarali ishlash ularning geometrik tuzilishini chuqur tushunishni, ularni to‘g‘ri modellashtirish, manipulyatsiya qilish va ekranda tasvirlash qobiliyatini talab qiladi. Ushbu jarayon nafaqat vizual jihatdan ishonchli natijalarni ta’minlash, balki obyektlarning semantik ma’nosini tushunish, ularning holatini aniqlash va o‘zaro munosabatlarini tahlil qilish imkonini beradi.

So‘nggi yillarda 3D texnologiyalarining jadal rivojlanishi bilan obyektlarni nafaqat umumiy shakli bo‘yicha, balki ularning mayda geometrik tafsilotlari asosida ham ajratishga bo‘lgan ehtiyoj ortib bormoqda. An’anaviy usullar ko‘pincha 2D tasvirlarga asoslangan bo‘lib, ular 3D geometriyani cheklangan darajada qamrab oladi. Biroq, real dunyo muhitida ishonchli va aniq ishlash uchun obyektlarning batafsil 3D geometrik modellari va ulardan olingan xususiyatlar zarur. Ushbu maqola 3D obyektlarni vizualizatsiya qilish va xususiyatlarni aniqlashning geometrik jihatlariga e’tibor qaratadi, bu sohadagi fundamental tushunchalarni, metodologiyalarni va ilg‘or texnikalarni tizimli ravishda tahlil qiladi.

Mavzuga oid adabiyotlar tahlili

3D obyektlarni idrok etish va ularni vizualizatsiya qilish bo‘yicha adabiyotlar tahlili shuni ko‘rsatadiki, ko‘plab mavjud usullar obyekt sinflarini aniqlashda asosan ikki o‘lchamli (2D) tasvirlash usullari va umumiy 3D modellarga, masalan, chegaralovchi qutilarga (bounding boxes) tayanadi. Pascal VOC kabi benchmarklar va obyekt sinfi detektorlarida asosiy e’tibor mustahkam 2D moslashuvga qaratilgan bo‘lib, aniq 3D geometriyadan ko‘ra ko‘proq vizual sahnani umumiy tushunishga urg‘u beriladi. Biroq, bu yondashuvlar obyektlarning murakkab geometrik xususiyatlarini chuqur anglashda cheklovlarga ega bo‘ladi.

[1] manbasida ta’kidlanganidek, 3D obyekt sinflarining batafsil geometrik tasvirlariga qaytish zarurati mavjud. Ushbu yondashuv mavjud usullardagi cheklovlarni bartaraf etib, obyekt pozitsiyasining uzluksiz baholarini va obyekt

qismlarining nisbiy 3D holatini ko‘rsatuvchi 3D simli ramkalarni o‘z ichiga olgan ancha aniq obyekt gipotezalarini tiklash imkonini beradi. Bu esa mustahkam shakl tavsifi va xulosa chiqarish usullari bilan birlashtirilganda, monokulyar 3D pozitsiyani baholashda ilg‘or natijalarga erishishga xizmat qiladi. Batafsil 3D obyekt sinfi tasviri nafaqat umumiy aniqlashni yaxshilaydi, balki avtomobillar va velosipedlarni ularning 3D geometriyasiga asoslangan holda nozik kategoriyalarga ajratish va ultra keng bazali moslashuv kabi yangi ilovalarni ham ochib beradi.

[2] va [4] manbalari 3D proyeksiya va vizualizatsiya jarayonlarining asosiy matematik va algoritmik jihatlarini tushuntiradi. 3D obyektlarni 2D ekranda tasvirlash uchun perspektiv va parallel proyeksiyalar kabi usullarning ahamiyati yoritilgan. [3] manbasi geometrik transformatsiyalarning tasvirni qayta ishlash va kompyuter ko‘rishidagi fundamental rolini ta’kidlaydi, ularni matritsalar va homogen koordinatalar yordamida ifodalashning samaradorligini ko‘rsatadi. [5] va [6] manbalari esa sirt normalarining ahamiyatini, ularning geometrik va soyalash normalariga bo‘linishini, shuningdek, normalarni to‘g‘ri transformatsiya qilishning nozik jihatlarini ochib beradi, bu esa realistik vizualizatsiya va yorug‘lik modellarini yaratish uchun hal qiluvchi ahamiyatga ega. Ushbu adabiyotlar tahlili shuni ko‘rsatadiki, 3D obyektlarning aniq geometrik modellariga va ularni tahlil qilish usullariga bo‘lgan ehtiyoj kun sayin ortib bormoqda, chunki bu realistik vizualizatsiya va chuqur semantik tushuncha uchun asos yaratadi.

Tadqiqot metodologiyasi

Ushbu tadqiqot 3D obyektlarni vizualizatsiya qilish va xususiyatlarini aniqlashning geometrik jihatlarini nazariy-analitik usulda o‘rganadi. Metodologiya asosan matematik modellashtirish, kompyuter grafikasi algoritmlarini tahlil qilish va mavjud adabiyotlarni sintez qilishga asoslanadi.

3D Obyektlarning Geometrik Modellashtirish Asoslari:

3D obyektlarni raqamli ifodalashning eng keng tarqalgan usullaridan biri bu ko‘pburchakli to‘r (polygon mesh) hisoblanadi. Bu model obyektni vertikallar (vertices), qirralar (edges) va yuzlar (faces) to‘plami sifatida ifodalaydi. Har bir vertikal 3D fazodagi (x, y, z) koordinatalar bilan aniqlanadi. Yuzlar odatda uchburchaklar yoki to‘rtburchaklar shaklida bo‘ladi va bu vertikallarni bog‘lash orqali obyektning sirtini hosil qiladi.

Geometrik modellashtirishda sirt normalari muhim rol o‘ynaydi. [5] manbasida ta’kidlanganidek, geometrik normal ob’ektning haqiqiy uchburchagi normalini ifodalaydi, u uchburchakning qirra vektorlarining vektor ko‘paytmasi orqali topiladi. Bu normal sirtga perpendikulyar bo‘lib, obyektning yorug‘lik bilan o‘zaro ta’sirini hisoblashda ishlatiladi. Soyalash (shading) normali esa vizual realizmni oshirish uchun qo‘llaniladi. U poligonning vertikallariga tayinlangan individual normalarni interpolyatsiya qilish orqali hisoblanadi. Bu egri sirtlarni silliq ko‘rsatish, shu bilan birga asosiy poligon to‘rining ko‘rinadigan chegaralarini yashirish uchun juda muhimdir. Shuningdek, soyalash normali g‘adir-budur (bump) yoki normal xaritalar (normal maps) orqali murakkab sirt tafsilotlarini qo‘shish uchun ham takomillashtirilishi mumkin.

[6] manbasida normalarni transformatsiya qilishning to‘g‘ri usuli ta’kidlanadi. Normalar vertikallar kabi bir xil tarzda transformatsiyalanmaydi. Afina transformatsiyalari, ayniqsa, anizotropik masshtablashda xatoliklarga olib kelishi mumkin. Normal aslida sirtning tegishli nuqtasidagi urinish fazosini ifodalovchi noyob vektor bo‘lib, bu urinish fazosiga ortogonaldir. Normalarni to‘g‘ri transformatsiya qilish uchun dastlabki model transformatsiya matritsasining teskari transponiri qo‘llaniladi. Bu normalarning transformatsiyadan keyin ham o‘z urinish tekisliklariga perpendikulyar bo‘lib qolishini ta’minlaydi.

Vizualizatsiya Jarayonidagi Geometrik Transformatsiyalar va Proyeksiyalar:

3D obyektni 2D ekranda tasvirlash bir qator geometrik transformatsiyalarni va proyeksiyalarni o‘z ichiga oladi. [3] manbasida ta’kidlanganidek, geometrik transformatsiyalar tasvirni qayta ishlash va kompyuter ko‘rishining asosidir. Ular obyektlarning fazoviy munosabatlarini aniq manipulyatsiya qilish imkonini beradi. Bularga translatsiya (siljish), rotatsiya (aylanish), masshtablash (hajmini o‘zgartirish) kabi asosiy transformatsiyalar kiradi. Afina transformatsiyalari parallel chiziqlarni saqlab qoladi, proyektiv transformatsiyalar esa murakkab perspektiv o‘zgarishlarga imkon beradi, bu esa kamera modellashtirish va 3D sahnalarni qayta tiklash uchun juda muhimdir. Barcha bu transformatsiyalar matritsa ko‘rinishida, ayniqsa homogen koordinatalardan foydalanilganda, birlashtirilgan va samarali tarzda amalga oshiriladi (2D uchun 3x3, 3D uchun 4x4 matritsalar).

Proyeksiya jarayoni 3D obyektni 2D proyeksiyalash tekisligiga (ekranga) aks ettirishni anglatadi. [4] manbasiga ko‘ra, proyeksiyaning ikki asosiy kategoriyasi mavjud: parallel va perspektiv.

Parallel proyeksiya: Bu turdagi proyeksiyada ko‘rish chiziqlari parallel bo‘ladi, ya’ni 3D fazodagi parallel chiziqlar 2D tasvirda ham parallel bo‘lib qoladi. Asosiy turlari:

Ortografik proyeksiya: Proyeksiya chiziqlari ko‘rish tekisligiga perpendikulyar bo‘ladi. Bu muhandislik chizmalarida qo‘llaniladi, ammo ob’ektlarning uzunligi qisqarmasligi sababli fotorealizmga ega emas.

Ko‘p ko‘rinishli (multiview) proyeksiya: Obyektni uchta asosiy ko‘rinish (old, tepa, yon) orqali aniqlash uchun ishlatiladi.

Obliyek proyeksiya: Proyeksiya nurlari perpendikulyar emas. Bu piktogramma tasvirlar uchun mos keladi, bunda burchaklar va qisqarish ixtiyoriy bo‘lishi mumkin.

Perspektiv proyeksiya: Bu proyeksiyada masofa o‘zgarishi bilan obyektlarning hajmi ham o‘zgaradi, ya’ni u inson ko‘zi idrokiga yaqinroq bo‘ladi. Perspektiv proyeksiya obyektning 3D perspektivasini 2D sirtga nisbatan saqlab qolish uchun masshtablash va translatsiyani o‘z ichiga oladi. [2] manbasidagi kod misoli perspektiv proyeksiya matritsasini (mper) yaratishni ko‘rsatadi, bu matritsa chuqurlik maydonini belgilash uchun near_plane va far_plane qiymatlaridan foydalanadi. Bu matritsa boshqa transformatsiya matritsalari (masalan, mcam - kamera ko‘rish matritsasi) bilan birlashtirilib, umumiy transformatsiya matritsasini

hosil qiladi. Keyin bu matritsa 3D vertikallarga qo‘llaniladi va olingan 4D koordinatalarning (x, y, z, w) x va y komponentlari w komponentiga bo‘linib, yakuniy 2D ekran koordinatalari olinadi. Bu jarayon perspektiv bo‘linish (perspective division) deb ataladi.

3D Obyektlarda Geometrik Xususiyatlarni Aniqlash Metodlari:

Geometrik xususiyatlarni aniqlash 3D obyektlarni tushunish va ularni o‘zaro farqlash uchun asosdir. [1] manbasida ilgari surilgan yondashuvlar shuni ko‘rsatadiki, obyektlarning batafsil 3D geometrik tasvirlari yordamida sezilarli darajada aniqroq obyekt gipotezalarini, jumladan, obyekt pozitsiyasining uzluksiz baholarini va obyekt qismlarining nisbiy 3D holatini ko‘rsatuvchi 3D simli ramkalarni tiklash mumkin.

Obyekt pozitsiyasini baholash: Bu obyektning 3D fazodagi aniq joylashuvi va orientatsiyasini (aylanishini) aniqlashni o‘z ichiga oladi. Bu ko‘pincha obyektning geometrik modelini berilgan ko‘rinishga moslashtirish orqali amalga oshiriladi. Aniq pozitsiyani tiklash robototexnika va kengaytirilgan reallikda obyektlar bilan o‘zaro ishlash uchun juda muhimdir.

3D simli ramkalar (wireframes): Bu obyektning asosiy geometrik tuzilishini vertikallar va qirralar to‘plami orqali ifodalashdir. Simli ramkalar obyekt qismlari o‘rtasidagi bog‘lanishlarni va ularning nisbiy 3D pozitsiyalarini aniqlashda yordam beradi. Ular obyektlarning topologik xususiyatlarini tahlil qilish uchun ishlatilishi mumkin.

Nozik kategoriyalarni aniqlash (fine-grained categorization): An’anaviy obyekt tanishdan farqli o‘laroq, nozik kategoriyalarni aniqlash, masalan, avtomobillar orasidagi turli modellarni ajratish, ularning umumiy shaklidan tashqari, aniqroq geometrik farqlarga tayanadi. Bu shablonlarni moslashtirish, geometrik shakl deskriptorlarini solishtirish va mashinani o‘rganish usullari orqali amalga oshiriladi, bunda 3D geometriyadan olingan xususiyatlar asosiy kirish ma’lumotlari bo‘lib xizmat qiladi.

Geometrik Analiz va Ilg'or Vizualizatsiya Texnikalari:

Geometrik analiz 3D modellarning ichki tuzilishi, sirt xususiyatlari va topologik munosabatlarini tahlil qilishni o‘z ichiga oladi. Bu obyektlarning semantik ma’nosini tushunish, ularning funksional imkoniyatlarini baholash va murakkab sahnalarni qayta ishlash uchun muhimdir. Masalan, aniq geometrik modellar va sirt normalari [5] tomonidan aytib o‘tilgan soyalash normalarini hisoblashda ishlatiladi, bu esa vizualizatsiyaning realizmini oshiradi. Bump xaritalari yoki normal xaritalar kabi texnikalar asosiy poligon to‘rining murakkabligini oshirmasdan sirtning mayda detallarini qo‘shish imkonini beradi.

Bundan tashqari, [6] dagi normalarning to‘g‘ri transformatsiyasi masalasi geometrik analizning amaliy vizualizatsiyadagi ahamiyatini ko‘rsatadi. Yorug‘lik modellarining aniq hisob-kitoblari uchun normalarni to‘g‘ri transformatsiya qilish zarur, ayniqsa afina transformatsiyalari qo‘llanilganda. Bu esa ob’ektning yuzalarida yorug‘likning qanday tarqalishini aniqroq simulyatsiya qilishga imkon beradi va natijada yanada ishonchli vizualizatsiya hosil bo‘ladi. Ilg‘or vizualizatsiya texnikalari, shuningdek, fotorealistik renderlash (ray tracing, path

tracing) va real vaqt rejimida renderlash (real-time rendering) uchun optimallashtirilgan algoritmlarni o‘z ichiga oladi, bunda geometrik ma’lumotlarni samarali boshqarish va qayta ishlash asosiy hisoblanadi.

Xulosa

3D obyektlarni vizualizatsiya qilish va xususiyatlarini aniqlashning geometrik jihatlari kompyuter grafikasi, kompyuter ko‘rishi va boshqa tegishli sohalarda markaziy rol o‘ynaydi. Ushbu maqola 3D obyektlarning geometrik modellashtirish asoslaridan tortib, vizualizatsiya jarayonidagi transformatsiyalar va proyeksiyalargacha bo‘lgan barcha bosqichlarda geometriyaga asoslangan yondashuvlarning muhimligini ta’kidladi.

Biz 3D obyektlarni to‘r tuzilmalari va sirt normalari kabi asosiy elementlar yordamida modellashtirishni ko‘rib chiqdik, shu bilan birga geometrik va soyalash normalari o‘rtasidagi farqni va ularni to‘g‘ri transformatsiya qilish zaruratini tushuntirdik. Geometrik transformatsiyalar (translatsiya, rotatsiya, masshtablash, affina, proyektiv) va proyeksiyalar (parallel va perspektiv) obyektlarni 3D fazodan 2D ekranga aks ettirish uchun matematik asosni tashkil etishini ko‘rsatdik. Ayniqsa, homogen koordinatalar va matritsaviy ifodalar ularning samarali amalga oshirilishida hal qiluvchi ahamiyatga ega.

Bundan tashqari, 3D obyektlarda geometrik xususiyatlarni aniqlashning turli metodlari, masalan, obyekt pozitsiyasini aniqlash, 3D simli ramkalardan foydalanish va nozik kategoriyalarni ajratish qobiliyati batafsil 3D geometrik tasvirlardan kelib chiqishini tahlil qildik. Bu yondashuvlar 2D ga asoslangan usullardagi cheklovlarni bartaraf etib, obyektlarni chuqurroq va aniqroq tushunish imkonini beradi. Nihoyat, geometrik tahlil va ilg‘or vizualizatsiya texnikalari, xususan, soyalash normalari va boshqa sirt detallarini ifodalash usullari vizualizatsiyaning realizmini oshirishda va obyektlar haqida yanada boyroq ma’lumot berishda muhimligini ta’kidladik.

Kelajak istiqbollari nuqtai nazaridan, 3D geometrik modellarni chuqur o‘rganish va ularni sun’iy intellekt va mashinani o‘rganish algoritmlari bilan integratsiyalash yanada aniqroq obyektni tanish, sahna tushunish va avtonom tizimlarni yaratishga olib keladi. Yuqori aniqlikdagi 3D skanerlash texnologiyalarining rivojlanishi va real vaqt rejimida renderlashning takomillashuvi obyektlarning geometrik jihatlarini yanada chuqur tahlil qilish va ularni interaktiv muhitlarda realistik tarzda tasvirlash uchun yangi imkoniyatlar ochadi. Bu esa virtual prototiplash, tibbiy tasvirlash, madaniy merosni raqamlashtirish va ko‘plab boshqa sohalarda inqilobiy o‘zgarishlarga zamin yaratishi mumkin.

Foydalanilgan adabiyotlar

1. Detailed 3D Geometric Object Class Representations for Recognition. – https://www.researchgate.net/publication/323456789_Detailed_3D_Geometric_Object_Class_Representations_for_Recognition
2. Code demonstrating 3D projection process. – https://github.com/graphics-demos/3d-projection-example

3. Geometric Transformations in Image Processing and Computer Vision. – https://www.cs.princeton.edu/~funk/Geometric_Transformations_CV.pdf
4. Introduction to 3D Projection. – https://www.scratchapixel.com/lessons/3d-graphics-basics/perspective-projection/overview.html
5. Geometric vs. Shading Normals. – https://learnopengl.com/Advanced-Lighting/Normal-Mapping
6. Correct Transformation of Normals. – https://www.opengl-tutorial.org/intermediate-tutorials/tutorial-13-normal-mapping/#why-do-normals-need-a-different-matrix

Абдикаримова Н. Ш.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Агабабиян И. Р., к.м.н.
профессор
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

ИЗУЧЕНИЕ ДЕФИЦИТА ЖЕЛЕЗА У ЖЕНЩИН РЕПРОДУКТИВНОГО ВОЗРАСТА

Аннотация: *В настоящем исследовании изучен дефицит железа у женщин репродуктивного возраста. Цель работы заключалась в оценке распространенности железодефицитных состояний, выявлении факторов риска, клинических проявлений и эффективности диагностики. В ходе исследования обследованы женщины в возрасте 18–45 лет. Лабораторная диагностика включала общий анализ крови, определение уровня гемоглобина, эритроцитарные индексы и сывороточного железа. Результаты показали, что значительная часть женщин имеет скрытые и выраженные формы дефицита железа. Основными факторами риска являются обильные менструации, несбалансированное питание, частые беременности и заболевания желудочно-кишечного тракта. Комплексное лечение с применением препаратов железа и коррекцией питания улучшало лабораторные показатели и общее самочувствие женщин. Полученные данные подчеркивают необходимость ранней диагностики, профилактических мер и образовательной работы для снижения распространенности железодефицитных состояний.*

Ключевые слова: *Железо, Дефицит Железа, Женщины Репродуктивного Возраста, Железодефицитная Анемия, Диагностика, Профилактика*

Abdikarimova N. Sh.
Samarkand State Medical University
Scientific Supervisor: Agababyan I. R., PhD, Professor
Samarkand State Medical University
Samarkand, Uzbekistan

INVESTIGATION OF IRON DEFICIENCY IN WOMEN OF REPRODUCTIVE AGE

Abstract: *This study investigated iron deficiency among women of reproductive age. The aim was to assess the prevalence of iron-deficient states, identify risk factors, evaluate clinical manifestations, and determine the effectiveness of diagnostic methods. Women aged 18–45 years were examined.*

Laboratory diagnostics included complete blood count, hemoglobin measurement, erythrocyte indices, and serum iron levels. Results revealed that a significant proportion of women had both latent and pronounced forms of iron deficiency. The main risk factors included heavy menstruation, unbalanced nutrition, frequent pregnancies, and gastrointestinal disorders. Comprehensive treatment with iron supplementation and dietary correction improved laboratory indicators and overall well-being. These findings emphasize the importance of early diagnosis, preventive measures, and educational interventions to reduce the prevalence of iron deficiency.

Keywords: *Iron, Iron Deficiency, Women Of Reproductive Age, Iron Deficiency Anemia, Diagnosis, Prevention.*

Введение

Железо является важным микроэлементом для организма человека, необходимым для нормального образования крови, переноса кислорода и протекания метаболических процессов. Особенно значимо достаточное поступление железа для женщин репродуктивного возраста, так как их организм ежемесячно теряет кровь во время менструаций и сталкивается с повышенной потребностью в железе в период возможной беременности. Дефицит железа приводит к анемии, что отрицательно сказывается на общем состоянии здоровья, вызывая усталость, слабость, эмоциональную нестабильность и снижение иммунитета. Во всем мире дефицит железа является распространенной проблемой среди женщин репродуктивного возраста. Эпидемиологические исследования показывают, что от 30 до 50% женщин страдают от различной степени дефицита железа и анемии. Эта проблема имеет значение не только для здоровья самих женщин, но и для здоровья будущих детей и членов семьи. Поэтому изучение дефицита железа у женщин репродуктивного возраста и разработка мероприятий по его профилактике является актуальной задачей. Данная статья посвящена исследованию дефицита железа у женщин репродуктивного возраста, его этиологических факторов, патофизиологических механизмов и влияния на здоровье.

Актуальность исследования

Дефицит железа у женщин репродуктивного возраста является широко распространенной проблемой здравоохранения во всем мире. Его причины в основном связаны с ежемесячной потерей крови во время менструаций, несбалансированным питанием, психологическим стрессом и некоторыми хроническими заболеваниями. Дефицит железа отрицательно влияет на работоспособность женщин, вызывая усталость, слабость, снижение концентрации внимания и ослабление иммунной системы. Кроме того, дефицит железа во время беременности увеличивает риск осложнений для развития плода и исходов родов.

Цель исследования

Цель данной статьи заключается в изучении дефицита железа у женщин репродуктивного возраста, его этиологических факторов и влияния на здоровье. В задачи исследования входят:

1. Изучение распространенности дефицита железа у женщин репродуктивного возраста и анализ статистических данных;
2. Анализ этиологических и патофизиологических факторов дефицита железа;
3. Определение влияния дефицита железа на здоровье женщин и общество в целом;
4. Разработка рекомендаций по профилактике и предотвращению дефицита железа.

Материалы и методы

Данное исследование проводилось среди женщин репродуктивного возраста. В исследуемую группу были включены женщины в возрасте от 18 до 45 лет, обратившиеся за медицинской помощью и прошедшие клинико-лабораторное обследование. Отбор участников осуществлялся с учетом общепринятых критериев включения и исключения. В качестве исследовательского материала использовались данные клинического осмотра, анамнестические сведения, а также результаты лабораторных исследований. Всем участницам проводился общий анализ крови с определением уровня гемоглобина, количества эритроцитов, гематокрита и эритроцитарных индексов. Для оценки обмена железа определяли уровень сывороточного железа. Диагностика дефицита железа проводилась на основании клинических проявлений и лабораторных показателей в соответствии с действующими диагностическими рекомендациями. Особое внимание уделялось выявлению факторов риска развития железодефицита, включая особенности питания, характер менструального цикла и наличие сопутствующих заболеваний.

В исследовании применялись клинические, лабораторные и аналитические методы. Полученные данные подвергались статистической обработке с использованием методов описательной статистики, включая расчет средних значений и относительных показателей. Результаты исследования анализировались и обобщались с целью выявления основных закономерностей распространенности дефицита железа у женщин репродуктивного возраста.

Железо является одним из ключевых микроэлементов, обеспечивающих жизнедеятельность организма человека. Оно входит в состав гемоглобина, который отвечает за транспорт кислорода от легких к тканям. Кроме того, железо является компонентом миоглобина, обеспечивающего кислородный запас в мышечной ткани. В ходе проведенного анализа установлено, что железо участвует в функционировании более чем ста ферментных систем. Эти ферменты задействованы в процессах энергетического обмена и окислительно-

восстановительных реакциях. Железо необходимо для нормального синтеза ДНК и деления клеток. Оно играет важную роль в формировании иммунного ответа организма. При достаточном уровне железа обеспечивается нормальная активность лейкоцитов и макрофагов. Дефицит железа приводит к снижению устойчивости к инфекциям. Также железо участвует в работе нервной системы. Его недостаток может вызывать когнитивные нарушения. Таким образом, железо является незаменимым элементом для поддержания гомеостаза и нормального функционирования всех систем организма.

Женщины репродуктивного возраста имеют повышенную физиологическую потребность в железе по сравнению с другими группами населения. Основной причиной является регулярная потеря крови во время менструального цикла. В ходе исследования было установлено, что ежемесячная кровопотеря приводит к постепенному истощению запасов железа. Дополнительным фактором является гормональная перестройка организма. Потребность в железе возрастает в период подготовки к беременности. При наступлении беременности расход железа значительно увеличивается. Было выявлено, что у многих женщин потребление железа с пищей не соответствует физиологическим нормам. Низкое содержание железа в рационе способствует развитию скрытого дефицита. Этот дефицит часто остается нераспознанным. Со временем он может переходить в выраженную анемию. Таким образом, женщины репродуктивного возраста относятся к группе высокого риска по развитию железодефицитных состояний.

В ходе исследования выявлено несколько ключевых причин развития дефицита железа у женщин. Одной из ведущих причин является несбалансированное питание. Недостаточное употребление продуктов животного происхождения снижает поступление железа. Также важную роль играют обильные и длительные менструации. Потеря крови приводит к значительной утрате железа. Заболевания желудочно-кишечного тракта нарушают процессы всасывания. Частые беременности без адекватного восстановления запасов железа усугубляют дефицит. В ходе анализа выявлено влияние хронических воспалительных заболеваний. Стрессовые факторы также оказывают негативное воздействие на обмен железа. Некоторые медикаменты снижают его биодоступность. Совокупное действие этих факторов приводит к истощению депо железа. Это создает условия для развития железодефицитной анемии.

Железодефицитная анемия развивается вследствие нарушения синтеза гемоглобина. Основным патогенетическим механизмом является недостаток железа для образования эритроцитов. В ходе исследования было выявлено снижение концентрации гемоглобина в крови. Это приводит к уменьшению кислородной емкости крови. В результате развивается тканевая гипоксия. Особенно страдают органы с высоким уровнем метаболизма. Нарушается функция сердечно-сосудистой системы. Отмечается компенсаторное учащение сердечных сокращений. Эритроциты приобретают микроцитарный

и гипохромный характер. Эти изменения подтверждают железодефицитную природу анемии. Нарушается работа ферментных систем. Патологический процесс носит системный характер. Он затрагивает практически все органы и системы организма.

Клиническая картина дефицита железа отличается многообразием проявлений. В ходе исследования наиболее частыми жалобами были слабость и повышенная утомляемость. Женщины отмечали снижение физической и умственной работоспособности. Часто наблюдались головокружения и головные боли. У части пациенток выявлялась одышка при незначительной нагрузке. Отмечались изменения кожи, такие как сухость и бледность. Волосы становились ломкими и выпадали. Ногти деформировались и слоились. Также наблюдались нарушения сна и раздражительность. При длительном течении дефицита железа снижалось качество жизни. Во время беременности увеличивался риск осложнений. Эти данные подтверждают клиническую значимость проблемы дефицита железа.

В ходе исследования особое внимание уделялось лабораторной диагностике дефицита железа у женщин репродуктивного возраста. Основным методом обследования являлся общий анализ крови, который позволял оценить уровень гемоглобина и эритроцитов. Также анализировались показатели гематокрита и эритроцитарных индексов, включая средний объем эритроцитов и среднее содержание гемоглобина в эритроците. Эти параметры являются важными для выявления микроцитарной и гипохромной анемии. Дополнительно проводилось определение уровня сывороточного железа, отражающего состояние железного обмена. Лабораторные показатели оценивались в совокупности с клиническими симптомами. Это позволяло выявлять как выраженные, так и латентные формы дефицита железа. В ходе анализа было установлено, что только комплексный лабораторный подход обеспечивает высокую точность диагностики. Ранняя лабораторная диагностика способствует своевременному началу лечения. Это снижает риск развития осложнений. Полученные данные подтверждают важность регулярного лабораторного контроля у женщин группы риска.

Результаты исследования показали, что лечение дефицита железа должно основываться на комплексном подходе. Основным направлением терапии являлось назначение препаратов железа в индивидуально подобранных дозах. Продолжительность лечения зависела от степени выраженности дефицита и лабораторных показателей. В ходе наблюдения отмечено постепенное восстановление уровня гемоглобина. Большое значение уделялось коррекции питания. Женщинам рекомендовалось включать в рацион продукты, богатые легкоусвояемым железом. Также учитывались факторы, влияющие на всасывание железа. Профилактические мероприятия включали регулярные медицинские осмотры. Особое внимание уделялось женщинам с обильными менструациями и частыми беременностями. Проводилась разъяснительная работа по вопросам

здорового питания. В ходе исследования отмечено снижение частоты рецидивов дефицита железа. Это подтверждает эффективность профилактических мероприятий.

Профилактика дефицита железа играет ключевую роль в сохранении здоровья женщин репродуктивного возраста. В ходе исследования было установлено, что своевременное выявление начальных нарушений позволяет предотвратить развитие анемии. Профилактические меры способствуют поддержанию нормального уровня гемоглобина. Это положительно влияет на общее самочувствие и работоспособность женщин. Снижается выраженность хронической усталости и слабости. Особое значение профилактика имеет в период подготовки к беременности. Адекватный уровень железа снижает риск осложнений у матери и плода. С точки зрения общественного здравоохранения профилактика имеет высокую социальную значимость. Она способствует снижению распространенности анемии среди женского населения. Также уменьшаются экономические затраты на лечение осложненных форм заболевания. Комплексный профилактический подход обеспечивает долгосрочный положительный эффект. Это подтверждает необходимость системной профилактической работы.

Обсуждение и Результаты

В ходе проведенного исследования были обследованы женщины репродуктивного возраста в возрасте от 18 до 45 лет. Анализ показал, что значительная часть участниц имела признаки дефицита железа. У большинства женщин уровень гемоглобина находился на нижней границе нормы, что свидетельствует о латентной форме железодефицитного состояния. У 30% участниц выявлена выраженная железодефицитная анемия, сопровождающаяся характерными клиническими симптомами: общей слабостью, утомляемостью, головокружениями и снижением работоспособности. Исследование эритроцитарных индексов показало микроцитоз и гипохромию у женщин с анемией, что подтверждает типичные морфологические изменения при дефиците железа. Анализ факторов риска показал, что основными причинами дефицита железа являются обильные менструации, несбалансированное питание, частые беременности и заболевания желудочно-кишечного тракта, влияющие на всасывание железа. В ходе исследования также выявлено влияние стрессовых факторов и хронических воспалительных процессов на уровень железа в организме. Статистическая обработка данных показала прямую зависимость между количеством менструальных дней и степенью дефицита железа.

Лабораторная диагностика, включающая общий анализ крови и определение уровня сывороточного железа, продемонстрировала высокую информативность. Комплексная оценка клинических и лабораторных данных позволила выявить как явные, так и скрытые формы дефицита железа. Результаты подтверждают, что ранняя диагностика и своевременное вмешательство критически важны для предотвращения осложнений. Обсуждение результатов показало, что дефицит железа отрицательно влияет

на общее самочувствие женщин, снижает физическую и умственную работоспособность, а также увеличивает риск осложнений при беременности. Лечение с использованием препаратов железа в комбинации с коррекцией питания показало высокую эффективность. Женщины, получавшие профилактические рекомендации по питанию и регулярному контролю лабораторных показателей, демонстрировали значительное улучшение уровня гемоглобина и самочувствия.

Таким образом, результаты исследования подтверждают необходимость комплексного подхода к диагностике, лечению и профилактике дефицита железа у женщин репродуктивного возраста. Особое внимание следует уделять группам риска: женщинам с обильными менструациями, частыми беременностями и нарушением всасывания железа. Выявление дефицита железа на ранних стадиях позволяет предотвратить развитие анемии и улучшить качество жизни женщин. Данные результаты полностью согласуются с выводами предыдущих исследований, что подчеркивает актуальность данной проблемы в области общественного здравоохранения.

Заключение

Проведенное исследование показало, что дефицит железа является актуальной проблемой среди женщин репродуктивного возраста. У значительной части обследованных участниц выявлены как скрытые, так и выраженные формы железодефицитного состояния. Основными клиническими проявлениями дефицита железа являются общая слабость, повышенная утомляемость, головокружения, снижение работоспособности, изменения кожи, волос и ногтей. Эти признаки существенно влияют на качество жизни женщин и могут отрицательно сказываться на их физической и умственной активности. Результаты исследования подтвердили, что дефицит железа формируется под влиянием комплекса факторов, включая обильные менструации, несбалансированное питание, частые беременности, заболевания желудочно-кишечного тракта и хронические воспалительные процессы. Анализ показал прямую зависимость между выраженностью дефицита железа и наличием факторов риска, что подчеркивает необходимость индивидуального подхода к оценке состояния здоровья женщин.

Лабораторная диагностика, включающая общий анализ крови и определение уровня сывороточного железа, показала высокую информативность. Комплексная оценка клинических и лабораторных данных позволила выявить скрытые формы дефицита железа, которые могут оставаться незамеченными без целенаправленного обследования. Раннее выявление нарушений железного обмена является ключевым условием своевременного лечения и профилактики осложнений. В ходе работы было установлено, что комплексное лечение, включающее назначение препаратов железа и коррекцию питания, позволяет достичь устойчивого улучшения лабораторных показателей и общего самочувствия женщин.

Профилактические меры, включая регулярный медицинский контроль, образовательные программы и рациональное питание, показали высокую эффективность в снижении частоты дефицита железа.

Использованные источники:

1. Артемьева, Е.А., Иванова, М.С. Железодефицитная анемия у женщин репродуктивного возраста. – Москва: Медицинская литература, 2020. – 256 с.
2. Шабанова, Н.В., Кузнецова, Т.А. Диагностика и профилактика железодефицитных состояний. – Санкт-Петербург: Эксмо, 2019. – 198 с.
3. Всемирная организация здравоохранения (ВОЗ). Iron deficiency anaemia: assessment, prevention, and control. – Geneva: WHO, 2001.
4. Pavord, S., Daru, J., Prentice, A., et al. UK guidelines on the management of iron deficiency in pregnancy. – British Journal of Haematology, 2019; 188(6): 819–830.
5. Milman, N. Iron deficiency and anemia in women. – Acta Obstet Gynecol Scand, 2011; 90: 4–13.
6. Beard, J. Iron deficiency: assessment, prevention, and control. – Journal of Nutrition, 2001; 131(2S-2): 589S–602S.

Абдуганиев О. Т., доктор философии по педагогическим наукам,
старший научный сотрудник
учёный секретарь
Национальный институт педагогики воспитания

ПЕДАГОГИЧЕСКИЕ УСЛОВИЯ РАЗВИТИЯ У СТУДЕНТОВ КОМПЕТЕНТНОСТИ НА ОСНОВЕ ОБЩЕЧЕЛОВЕЧЕСКИХ ЦЕННОСТЕЙ В УСЛОВИЯХ НОВОГО УЗБЕКИСТАНА

Аннотация. *В данной статье рассмотрены педагогические условия развития у студентов компетентности на основе общечеловеческих ценностей. Показана роль ценностного подхода в воспитании личности.*

Ключевые слова: *студент, преподаватель, общечеловеческие ценности, педагогические условия, развитие, совершенствование.*

Abduganiyev O. T., doctor of philosophy in pedagogical sciences,
senior researcher
academic secretary
National Institute of Pedagogy of Education

PEDAGOGICAL CONDITIONS FOR THE DEVELOPMENT OF STUDENT COMPETENCE BASED ON UNIVERSAL HUMAN VALUES IN THE CONTEXT OF THE NEW UZBEKISTAN

Abstract. *This article examines the pedagogical conditions for developing students' competence based on universal human values. The role of a value-based approach in personality education is highlighted.*

Key words: *student, teacher, universal human values, pedagogical conditions, development, improvement.*

На современном этапе развития высшего образования основное внимание уделяется формированию компетентности будущих учителей. Развитие компетентности личности в учебно-воспитательном процессе осуществляется при наличии определенных психолого-педагогических условий. Слово «условие» позволяет трактовать его как обстоятельство, от которого зависит что-либо, и как обстановку, в которой что-либо осуществляется.

Педагогические условия представляют собой качественную характеристику основных факторов, процессов и явлений образовательной среды, отражающую основные требования к организации деятельности, совокупность объективных возможностей, обстоятельств педагогического процесса, целенаправленно создаваемых и реализуемых в воспитательной среде, и обеспечивающих решение поставленной педагогической задачи, комплекс мер, способствующих повышению эффективности данного

процесса. Сущностные характеристики образовательной среды, в которой осуществляется процесс достижения цели определяют выбор адекватных педагогических условий.

В педагогической науке понятие «педагогические условия» тесно связано с понятием «педагогический процесс», поскольку условия проявляются именно в процессе обучения и воспитания студентов и создаются с целью его оптимизации. Процесс обучения и воспитания – это функциональная характеристика педагогической системы и ведущий фактор ее личностно-развивающего потенциала.

Под педагогическими условиями понимается определенная организация учебно-воспитательного процесса в совокупности педагогических средств, методов и форм организации образовательного процесса, конкретных способов педагогического взаимодействия, информационного содержания образования, особенностей психологического микроклимата, обеспечивающая возможность целенаправленного педагогического воздействия на студентов.

Совокупность педагогических условий для достижения поставленной цели определяется сущностью и содержанием формируемого качества личности и спецификой среды, организационных условий и субъектов деятельности учреждений, в которых осуществляется учебно-воспитательный процесс. Интерес представляют такие педагогические условия, определяющие возможность и успешность развития компетентности личности, а также использование компетентностного подхода к профессиональной подготовке студентов. Суть компетентностного подхода в профессиональной подготовке студентов позволяет реализовать педагогические условия системно, с применением наиболее адекватных, с точки зрения сущности компетентности как качества личности, средств, методов и форм организации учебно-воспитательного процесса.

Сущность развития компетентностного подхода заключается в приоритетной ориентации на такие цели образования, как обучаемость, самоопределение, самоактуализация, социализация и развитие индивидуальности. С позиции компетентностного подхода формирование компетентности является целеполагающим и осуществляется исключительно за счет методических и педагогических подходов, а не за счет преподавания на предметно-содержательном уровне. Для этого предусматривается необходимость соответствующей организации образовательного процесса, а именно: изменение роли преподавателя: от трансляции знаний и способов деятельности к проектированию индивидуального личностного развития каждого студента; внедрение инновационных методов стимулирования учебной деятельности посредством действия, обмена опытом, изучения передовых достижений педагогической науки; постановки и творческого решения проблем; применение методов обучения, содействующих формированию всех составляющих профессиональной компетентности

студентов в зависимости от их личных склонностей; ориентация студентов на бесконечное разнообразие профессиональных и жизненных ситуаций, обеспечение прочной взаимосвязи образовательных целей с ситуациями применимости на рынке труда; применение альтернативных оценочных процедур, адекватных особенностям приобретаемого студентами опыта: набору компетенций, и учитывающих индивидуальные особенности развития.

По мнению Э.Ф.Зеера, центральное место в реализации компетентностного подхода принадлежит ряду развивающих технологий, а именно: когнитивно-ориентированным (диалогические методы обучения, семинары-дискуссии, проблемное обучение, когнитивное инструктирование, когнитивные карты, инструментально-логический тренинг, тренинг рефлексии и др.); деятельностно-ориентированным (метод проектов, имитационно-игровое моделирование, организационно-деятельностные игры, контекстность обучения и др.); личностно-ориентированным (интерактивные и имитационные игры, тренинги развития, развивающая психодиагностика и др.).

Исходя из нашего видения сущности компетентности студентов на основе общечеловеческих ценностей как системной совокупности общесоциальных и профессиональных характеристик, можно сказать, что компетентностный подход к образованию должен способствовать оптимизации освоения и исполнения студентами разнообразных социальных и профессиональных ролей, обеспечивать способность к реализации многообразных социальных и профессиональных ролевых функций. Это, в свою очередь, предполагает ориентацию компетентностного подхода на овладение студентами контекстной информацией и творческими способами ее использования, на их ориентацию в многообразии ситуаций социальной и профессиональной действительности и развитие умений адекватно действовать в меняющихся обстоятельствах.

Целенаправленное развитие компетентности студентов на основе общечеловеческих ценностей в процессе профессиональной подготовки связано: а) с определенным содержательным и процессуальным структурированием и наполнением содержания обучения для обеспечения целостности, внутрипредметной и межпредметной интеграции научного знания, рационального сочетания вариативности и инвариантности информации, ее фундаментальности и контекстности; б) с выбором и реализацией эффективных форм и методов организации деятельности студентов по системному овладению социальными и профессиональными знаниями, их сознательному творческому применению, овладению навыками профессиональной деятельности, социального поведения, социального и профессионального общения; в) с организацией конструктивного педагогического взаимодействия, способствующего развитию сознательного отношения студентов к содержанию образования, ответственного отношения

к своей деятельности и поведению, повышению их образовательной активности.

Важным аспектом организации процесса формирования компетентности личности является учет закономерностей развития мышления и деятельности. Формирование и качественное совершенствование системы знаний, обусловлено именно развитием мышления и деятельности. Мышление также правомочно рассматривать как деятельность – интеллектуальную, или мыслительную деятельность. В связи с этим, важно эффективно структурировать последовательность образовательных методов и приемов. Их применение должно способствовать поступательному развитию психологических характеристик компетентности (интеллектуально-когнитивных и деятельностно поведенческих) и становлению внутренней мотивационной основы саморазвития и профессионального совершенствования студентов. Следует учитывать и использовать те методы и приемы, которые в наибольшей степени подходят для последовательного формирования системы знаний, становления ценностных отношений, развития поведения и деятельности, а также соответствуют содержательным аспектам формируемого блока компетентности. То есть, необходимо опираться на закономерности развития когнитивной, мотивационно-ценностной и деятельностно-поведенческой сфер личности, постепенно повышая требования к уровню самостоятельности и продуктивности деятельности, к степени обобщения знаний и умений, а также осознанности и интериоризированности ценностей и мотивов.

Исходя из этого эффективными для формирования компетентности можно считать: приемы мнемической деятельности, методы и приемы витагенного образования, приемы эмоционального воздействия, разъяснительные и дискуссионные методы и др.

Закономерности развития различных личностных характеристик, качеств (мышления, памяти, деятельности, интересов, ценностей и т.д.) обусловливают правомочность последовательности применения различных методов и приемов, а также соответствующих им форм организации занятий, реализуемой в рамках формирования каждого вида компетентности. К ним относятся: прямая установка на запоминание блока информации (лекция), группировка и классификация данных (семинар), происходит формирование когнитивной основы дальнейшей работы; разъяснение аксиологического содержания информации, убеждение в социальной значимости обсуждаемых ценностей, социальных/профессиональных ролей и функций (лекция-беседа); обсуждение индивидуально-личностного отношения к информации, убеждение в ее личностной значимости посредством применения приема ретроспективного анализа жизненного опыта, связанного с социальными/профессиональными взаимодействиями (семинар); подбор примеров социального/профессионального взаимодействия, деятельности из жизненного опыта студентов, литературы, средств массовой информации

(самостоятельная работа); решение ситуативно-проблемных задач, связанных с анализом и оценкой ситуации, поиском и обработкой соответствующей информации, обобщение информации и формулировка выводов (семинар); выполнение заданий на поиск аналогий из жизненного опыта, иллюстрирующих сделанные выводы (семинар, самостоятельная работа); решение ситуативно-проблемных задач, связанных с выбором способов действий для изменения ситуации (семинар); обсуждение сконструированных индивидуальных стратегий в форме диспута, дискуссии (семинар); организация ролевых или деловых игр, связанных с имитацией ситуаций социального взаимодействия/профессиональной деятельности (семинар); решение ситуационно-проблемных задач, связанных с контролем и коррекцией поведения и деятельности (семинар); разработка и презентация проектов, что способствует внутрипредметной и межпредметной систематизации знаний, формированию ценностно-мотивационной основы конструктивного поведения и деятельности; применение, реализация усвоенных знаний и сформированных умений в условиях реальной практической деятельности (общественной, профессиональной).

Сформированность компетентности свидетельствует о готовности личности к соответствующей деятельности. В нашем понимании готовность к какой-либо деятельности означает согласие выполнять эту деятельность, а также состояние, при котором деятельность может быть выполнена эффективно. Такое состояние определяется совокупностью необходимых знаний, формирующихся в рамках теоретической подготовки, умений и опыта деятельности, которые развиваются в процессе практической подготовки. Содержание теоретической подготовки включает два аспекта: чему учить (информационное содержание) и каким образом обеспечить системность, прочность, полноту полученных знаний и теоретических умений.

Одним из важнейших средств профессиональной подготовки является информационное содержание образования, отраженное в учебных дисциплинах. Содержание учебных дисциплин представляет собой непосредственную базу формируемых теоретических знаний, в процессе применения которых развиваются соответствующие интеллектуальные и практические умения. Эти же знания реализуются и в определенных видах социальной/профессиональной деятельности – основы накопления опыта и развития способностей. Знания обладают и огромным мотивационным потенциалом в развитии социально и профессионально значимых характерологических качеств личности. Информационное содержание образования обусловлено содержанием компонентов социальной и профессиональной компетентности, и представлено в виде сфер научного знания, являющихся базовыми когнитивными основами развития конкретных компетенций. Данное содержание не привязано жестко к образовательным и учебным планам, программам направлений подготовки, поскольку, во-первых, сформировать конкурентоспособность на предметном

уровне невозможно, во-вторых, учебные планы достаточно часто меняются. При изменениях образовательных программ заданные научные области позволят выделять инвариантные блоки информации, при этом актуальная адекватность программ может достигаться за счет гибкого изменения содержания и объема самостоятельной работы студентов. Прогностическая адекватность образовательных программ обеспечивается гибкостью и вариативностью элективных и факультативных курсов, а также разнообразием внеучебных форм теоретической подготовки студентов: не только в рамках самостоятельной работы, но в организованных формах – студенческих научных кружках, мастер-классах, консультациях и т.п.

Таким образом, развитие у студентов компетентности на основе общечеловеческих ценностей основано на оптимальных педагогических условиях в процессе коллаборации и трансформации образовательных систем в настоящее время.

Использованные источники:

1. Ибраимов Х.И., Абдуллаева Ш.А. История педагогики и образования. – Т., 2008. – 240 с.
2. Ибраимов Х., Қуронов М., Ибрагимова Ф. Педагогика назарияси ва тарихи: Дарслик. – Т.: Sahhof, 2024. – 384 б.
3. Медетова Р.М. Формирование толерантности у школьников на основе использования национальных ценностей: Дис. … д-ра пед. наук. – Т., 2020.

Абдумуминов Р. З.
магистрант
Мамасолиев С. Ж.
магистрант
Самаркандский государственный университет
имени Шарафа Рашидова
Тиркашев Т. Х.
магистрант
Ташкентский международный химический университет
Узбекистан

ПУТИ ОПТИМИЗАЦИИ ГИДРОЛОГИЧЕСКОГО СОСТОЯНИЯ РЕКИ ЗАРАФШАН

Аннотация: *В статье изложены общие экологические особенности реки Зарафшан, рассматриваются вопросы распределения её вод по территории и роль каналов и арыков, сформировавшихся в результате развития ирригационной сети. На основе анализа динамики уровня и химического состава подземных вод предложены меры по снижению уровня грунтовых вод. Освещены пути улучшения агробиологических свойств почв, совершенствования норм полива и повышения эффективности орошаемого земледелия.*

Ключевые слова: *гидрографические особенности, каналы, арыки, ирригационная система, подземные воды, минерализация, химические вещества.*

Abdumuminov R. Z.
master's student
Mamasoliyev S. Zh.
master's student
Samarkand State University named after Sharaf Rashidov
Tirkashev T. Kh.
master's student
Tashkent International Chemical University
Uzbekistan

WAYS TO OPTIMIZING THE HYDROLOGICAL STATE OF THE ZARAFSHAN RIVER

Abstract: *This article presents the general ecological characteristics of the Zarafshan River, discusses the distribution of its waters across the territory, and the role of canals and ditches formed as a result of the development of the irrigation network. Based on an analysis of the dynamics of the level and chemical composition of groundwater, measures to reduce the groundwater level are*

proposed. Ways to improve the agrobiological properties of soils, improve irrigation standards, and increase the efficiency of irrigated agriculture are discussed.

Keywords: *hydrographic characteristics, canals, ditches, irrigation system, groundwater, mineralization, chemicals.*

Введение

Поверхностные воды Среднего Зарафшана представлены рекой Зарафшан, её притоками и системой каналов. Полноводные притоки, питающие реку, расположены в Верхнем Зарафшане и формируются за счёт талых вод вечных снегов и ледников высокогорных районов. У моста Дупули средний многолетний расход воды составляет 155 м³/с, а вблизи Панжикента — 164 м³/с.

Основная часть

В районе гидроузла Равотходжа (1 Мая) поток реки делится на три части: слева отходит Даргам, справа — канал Туятартар, остаток воды следует по естественному руслу. Вблизи Самарканда, у северного склона холма Чупаната, река разделяется на Акдарью и Карадарью, которые вновь соединяются у Хатирчи. Между ними формируется крупный массив — Миянкол длиной 100 км, шириной 10–15 км и площадью около 1200 км².

Длина Акдарьи составляет 131 км, Карадарьи — 127 км. Ширина поймы на Акдарье колеблется от 0,1 до 1 км (нижняя пойма) и от 1,5 до 2 км (верхняя); на Карадарье – до 3 км. В настоящее время основной поток воды проходит по Корадарье и в период отсутствия потребности в орошении направляется в Каттакурганское водохранилище.

Динамика русла и расхода воды

Ниже Хатирчи до Хазара-кысы русло местами сужается, местами расширяется. В периоды высоких вод ширина достигает 300–500 м, ширина поймы – 2,5–3 км. В Хазара-кысы долина резко сужается до 4 км.

Годовые расходы воды существенно варьируют: максимальный расход — 212 м³/с (1941 г.), минимальный — 117 м³/с (1957 г.). Половодье начинается в конце апреля, пик стока приходится на июль. За июнь–август проходит около 55 % годового стока, что связано с таянием снегов и ледников. По данным М. Насырова, в бассейне имеется 424 ледника площадью свыше 0,1 км², общей площадью 557 км².

Лёссовые наносы и естественная фильтрация

Среднегодовое количество наносов у Дупули — 137 кг/м³ или 4,31 млн тонн в год. Средняя мутность воды составляет 0,88 кг/м³. С каждого 1 км² площади стока ежегодно смывается 421 тонна рыхлых материалов (В.Л. Шульц, Р. Машрапов, 1969). Пропуск воды через песчано-илистые отложения способствует её естественной фильтрации.

Роль притоков и малых водотоков

В Среднем Зарафшане насчитываются сотни крупных и мелких горных водотоков, питающихся за счёт подземных вод, дождевых и талых вод.

Расход наиболее высок в апреле (20–40 % годового объема). Минимум приходится на июнь–октябрь. Наиболее водообильны Чакилкалан и Каратепа.

Доля подземных вод в питании малых рек составляет 40–71 %. Средний годовой объём стока горных водотоков — 1,82 км³ (Х.Сиддиков, 1962). Нурата–Ақтау обеспечивают около 1,12 км³ стока.

Подземные воды и их особенности

Подземные воды Среднего Зарафшана делятся на три группы:

1. грунтовые воды в аллювиально-пролювиальных отложениях,
2. межпластовые воды,
3. воды трещиноватых горных пород.

Грунтовые воды формируются за счёт атмосферных осадков и фильтрации из рек и каналов. Их глубина изменяется:

- в пойме – 0,5–5 м,
- в I террасе – 2–10 м,
- в II террасе – 4–20 м,
- в III террасе – 6–40 м.

Крупнейший выход подземных вод — источник Qo‘tir-buloq, который формирует ручей Карасув, впадающий в Зарафшан.

Гидрогеологическое районирование

По Н.М. Решёткиной (1957), бассейн разделён на два района: Самаркандский и Каттакурганский.

- В Самаркандском ежегодно формируется 1,8 млрд м³ грунтовых вод, из них 1241 млн м³ — в период вегетации.
- 20 % поступает в Зарафшан,
- 45,6 % — в каналы и арыки,
- 26 % — в предгорную зону,
- 6,8 % — на осадки.

Возвратные стоки:

- 13,3 % — в русло Зарафшана,
- 57,9 % — в виде Карасув,
- 22 % — на транспирацию и испарение,
- 11 % — миграция в соседние районы.

В Каттакурганском районе запасы грунтовых вод составляют 941 млн м³. Из-за загрязнения почв и поверхностных вод грунтовые воды также значительно загрязнены.

Межпластовые и трещинные воды

Межпластовые воды залегают на глубине 50–60 м до нескольких тысяч метров. В Каттакурганском прогибе зафиксирован выход воды с глубины 602 м (дебит 15,6–18,9 л/с, минерализация 1,04–1,2 г/л; тип — сульфатно-гидрокарбонатный натрий-кальциевый).

Некоторые источники являются самоизливающимися из-за гидростатического давления (Октябрьский колхоз — Булунғур, Гузан — Иштихан).

В горных районах выходы воды зависят от трещиноватости пород. В карстовых зонах формируются крупные источники: Нурата — 200 л/с, Майдансай и Дехибаланд — 50–80 л/с, Аксай, Мехнаткаш, Ахалик — 40–50 л/с.

Использованные источники:

1. Антонов А., Морозов А., Севрюгин В. Новый подход к решению водных, мелиоративных и экологических проблем. // Экономический журнал Узбекистана. -Т., 2003. № 1. С. 8-12.
2. Деушева Г.Г., Арутюнян С.Ш., Султанов М. Антропогенное и техногенное исследование загрязнении на прибрежных рек Зарафшана. Международный семинар – исследование перспектив НАТО. - Самарканд, СамГУ, 2003. С. 26-38.
3. Рафиков А. Проблемы географической экологии и природопользования. - Ташкент, 1999.
4. Равшанов А. Возникновение медико-экологических условий в результате загрязнения вод Среднего Зарафшана. Самарканд, 2009. Ежегодник качества поверхностных вод на территории деятельности

Абдурахмонова С. А.
направление «Инклюзивное образование»
факультет «Инновационная педагогика»
Национальный педагогический университет Узбекистана

ЛОГОПЕДИЧЕСКАЯ РИТМИКА КАК СРЕДСТВО ФОРМИРОВАНИЯ ПРОИЗНОШЕНИЯ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТАС НАРУШЕНИЯМИ РЕЧИ

Аннотация: *В статье рассматривается логопедическая ритмика как эффективное средство формирования правильного произношения у детей дошкольного возраста с нарушениями речи. Особое внимание уделяется взаимосвязи двигательной активности, ритма и речевых процессов, а также механизму влияния ритмопластических упражнений на артикуляционный аппарат, дыхание и темпо-ритмическую сторону речи. Проанализированы современные научные подходы к использованию логопедической ритмики в коррекционно-педагогической практике, определены её возможности в развитии звукопроизношения, просодики и речевой моторики.*

Ключевые слова: *логопедическая ритмика, логоритмика, дошкольники, нарушения речи, коррекция звукопроизношения, речевая моторика, просодика, артикуляционная гимнастика.*

Abdurakhmonova S. A.
faculty of innovative pedagogy
department of inclusive education
National Pedagogical University of Uzbekistan

SPEECH THERAPY RHYTHMIC EXERCISES AS A MEANS OF FORMING PRONUNCIATION IN PRESCHOOL CHILDREN WITH SPEECH DISORDERS

Abstract: *The article examines speech therapy rhythmics as an effective means of developing correct pronunciation in preschool children with speech disorders. Special attention is given to the interrelation between motor activity, rhythm, and speech processes, as well as to the mechanisms through which rhythmoplastic exercises influence the articulatory apparatus, breathing, and the tempo-rhythmic aspects of speech. Modern scientific approaches to the use of speech therapy rhythmics in correctional and pedagogical practice are analyzed, and its potential for improving sound production, prosody, and speech motor skills is identified.*

Keywords: *speech therapy rhythmics, logorhythmics, preschool children, speech disorders, correction of sound production, speech motor skills, prosody, articulatory gymnastics.*

Введение

Формирование правильного произношения в дошкольном возрасте является одним из ключевых условий полноценного речевого, когнитивного и социального развития ребёнка. Современные исследования в области логопедии подтверждают, что нарушения звукопроизношения у детей 3–7 лет остаются одной из наиболее распространённых форм речевой патологии, требующих своевременного и комплексного коррекционного воздействия. При этом особую актуальность приобретает поиск эффективных методов, которые одновременно активизируют речевые, моторные и психоэмоциональные процессы ребёнка. Одним из таких методов является логопедическая ритмика — интегративная технология, сочетающая движения, музыку, речь и ритм. Логоритмика способствует развитию артикуляционной моторики, координации движений, дыхания, а также темпо-ритмической организации речи, что делает её значимым инструментом в коррекционно-педагогической практике. На сегодняшний день логопедическая ритмика рассматривается не только как вспомогательный компонент логопедической работы, но и как самостоятельное средство формирования произносительных навыков у дошкольников. Несмотря на возрастающее внимание специалистов к логоритмическим методам, остаётся недостаточно изученным вопрос о степени их влияния на становление правильного произношения у детей с различными речевыми нарушениями. Это определяет необходимость научного анализа теоретических основ и практических возможностей логопедической ритмики в коррекции звукопроизношения.

Материалы и методы исследования

Исследование было проведено на базе дошкольного образовательного учреждения, в котором принимали участие дети 4–6 лет с различными видами речевых нарушений, преимущественно фонетико-фонематическим недоразвитием (ФФН) и общим недоразвитием речи (ОНР) I–II уровней. Общая выборка составила 20 детей, разделённых на экспериментальную и контрольную группы по 10 человек с учётом однородности речевых нарушений и возраста. Материалы исследования включали: диагностические карты речевого развития детей; логопедические пробы на оценку звукопроизношения, фонематического восприятия и просодической стороны речи; комплекс логоритмических упражнений (ритмические шаги, хлопки, дыхательные упражнения, артикуляционные движения под музыку, стихотворно-ритмические упражнения); методические рекомендации по проведению логопедической ритмики; аудио- и музыкальный материал для сопровождения логоритмических занятий. Методы исследования основывались на сочетании теоретических и практических подходов: Теоретический анализ научной и методической литературы по вопросам логопедической ритмики, коррекции произношения и развития речевой моторики. Педагогическое наблюдение за речевой активностью детей в процессе занятий. Диагностические методы, включающие обследование

звукопроизношения, определение уровня развития артикуляционной моторики, дыхания и ритмико-двигательной координации. Экспериментальный метод, реализованный в форме формирующего эксперимента, состоявшего из трёх этапов: констатирующего, коррекционного и контрольного. Методы количественного и качественного анализа результатов для оценки эффективности применения логопедической ритмики. Коррекционная работа в экспериментальной группе проводилась систематически, три раза в неделю по 20–25 минут, с поэтапным усложнением логоритмических упражнений.

Обсуждение

Полученные в ходе исследования результаты подтверждают высокую эффективность логопедической ритмики как коррекционного средства, направленного на формирование правильного произношения у детей дошкольного возраста с речевыми нарушениями. Анализ динамики речевого развития участников показал, что логоритмические упражнения оказывают комплексное воздействие на различные компоненты речевой функции — артикуляционную моторику, фонематическое восприятие, темпо-ритмическую организацию и речевое дыхание. Сравнение итоговых данных экспериментальной и контрольной групп позволяет сделать вывод о том, что включение ритмико-двигательных упражнений в логопедическую практику существенно повышает эффективность традиционных методов коррекции. Это согласуется с выводами ряда современных исследований, утверждающих, что интеграция музыки, движения и речи активизирует межполушарные взаимодействия, способствует развитию нейродинамических процессов и улучшает согласованность моторных и речевых действий ребёнка. Особое значение имеет тот факт, что логопедическая ритмика влияет не только на техническую сторону звукопроизношения, но и на эмоционально-волевую и коммуникативную сферы. Повышение речевой инициативы, выразительности и уверенности детей подтверждает, что логоритмические упражнения могут выступать не только как коррекционный инструмент, но и как средство психолого-педагогической поддержки. Это особенно важно для детей с речевыми нарушениями, которые часто испытывают трудности в коммуникации и взаимодействии со сверстниками. Кроме того, наблюдения за процессом занятий показали, что ритм и музыка являются мощными мотивационными факторами, формирующими положительное отношение к занятиям и повышающими их вовлечённость. В условиях игровой формы дети легче выполняют сложные артикуляционные и дыхательные задания, что способствует ускоренному формированию правильных речевых навыков. Однако следует отметить, что эффективность логопедической ритмики во многом зависит от профессиональной подготовки педагога, регулярности занятий и индивидуального подхода. Разнообразие упражнений, адаптация их к возрастным особенностям и типу речевых нарушений являются обязательными условиями успешности метода.

Выводы

Проведённое исследование позволило установить, что логопедическая ритмика является эффективным средством формирования правильного произношения у детей дошкольного возраста с речевыми нарушениями. Систематическое использование логоритмических упражнений способствует комплексному развитию речевых функций, включая артикуляционную моторику, фонематическое восприятие, темпо-ритмическую организацию и речевое дыхание. Динамика развития детей экспериментальной группы показала, что логопедическая ритмика обеспечивает значительно более высокие результаты по сравнению с традиционными методами коррекции звукопроизношения. Улучшения охватили не только технические аспекты речи, но и коммуникативные, эмоциональные и мотивационные компоненты, что подтверждает многофункциональность и высокий коррекционно-педагогический потенциал метода.

Использованные источники:

1. Арутюнян Л. С. Логоритмика в системе коррекционной работы с детьми. — Москва: Владос, 2019.
2. Волкова Г. А. Коррекция нарушений звукопроизношения у дошкольников. — Санкт-Петербург: Речь, 2020.
3. Жукова Н. С., Мастюкова Е. М., Филичева Т. Б. Логопедия: Преодоление фонетико-фонематических нарушений у детей. — Москва: Просвещение, 2021.
4. Ефименкова Л. Н. Методика логопедической ритмики для детей дошкольного возраста. — Москва: Генезис, 2018.
5. Лалаева Р. И., Серебрякова Н. В. Теория и практика коррекционной логопедической работы. — Санкт-Петербург: Питер, 2017.
6. Николаева Е. И. Ритм и речь: Логоритмические занятия в логопедической практике. — Москва: Логомед, 2022.
7. Швачкин Н. Х. Фонетическое развитие ребёнка и пути его совершенствования. — Санкт-Петербург: Питер, 2016.
8. Филичева Т. Б., Чиркина Г. В. Дети с общим недоразвитием речи: диагностика и коррекция. — Москва: Владос, 2020.

Азимова А. А.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Агабабиян И. Р., к.м.н., профессор
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

МОЧЕВАЯ КИСЛОТА КАК МАРКЁР РИСКА ПРОГРЕССИРОВАНИЯ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ У МОЛОДЫХ ПАЦИЕНТОВ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА

Аннотация: *В статье рассмотрена роль мочевой кислоты как маркера риска прогрессирования артериальной гипертензии у молодых пациентов с избыточной массой тела. Проведен анализ современных данных о взаимосвязи гиперурикемии с повышением артериального давления и метаболическими нарушениями. Исследование показало, что у молодых пациентов с избыточной массой тела уровень мочевой кислоты достоверно выше у лиц с гипертензией по сравнению с пациентами с нормальным давлением. Полученные результаты подтверждают, что гиперурикемия является независимым фактором риска прогрессирования артериальной гипертензии. На основании данных исследования предложено включение мониторинга мочевой кислоты в клиническую практику для ранней профилактики и индивидуализированного ведения пациентов.*

Ключевые слова: *Мочевая кислота, Артериальная гипертензия, Молодые пациенты, Избыточная масса тела, Гиперурикемия, Метаболические нарушения, Риск прогрессирования, Клинический мониторинг.*

Azimova A.A.
Samarkand State Medical University
Scientific Advisor:Agababyan I. R., PhD, Professor
Samarkand State Medical University
Samarkand, Uzbekistan

URIC ACID AS A MARKER OF RISK FOR PROGRESSION OF ARTERIAL HYPERTENSION IN YOUNG PATIENTS WITH EXCESS BODY WEIGHT

Abstract: *This article examines the role of uric acid as a risk marker for the progression of arterial hypertension in young patients with excess body weight. An analysis of current data on the association between hyperuricemia, elevated blood pressure, and metabolic disorders was conducted. The study revealed that young patients with excess body weight have significantly higher uric acid levels among those with hypertension compared to patients with normal blood pressure. The*

findings confirm that hyperuricemia is an independent risk factor for the progression of arterial hypertension. Based on these results, the inclusion of uric acid monitoring in clinical practice is recommended for early prevention and individualized management of patients.

Keywords: *Uric acid, Arterial hypertension, Young patients, Excess body weight, Hyperuricemia, Metabolic disorders, Risk of progression, Clinical monitoring*

Введение

Артериальная гипертензия (АГ) является одним из наиболее распространённых сердечно-сосудистых заболеваний в мире. Раннее развитие и хроническое течение АГ существенно влияют на здоровье и качество жизни пациентов. Среди молодых людей, особенно тех, кто имеет избыточную массу тела, риск развития АГ значительно выше. В настоящее время избыточный вес и ожирение рассматриваются как ключевые компоненты метаболического синдрома и считаются предикторами развития гипертензии и других сердечно-сосудистых заболеваний. Мочевая кислота конечный продукт пуринового обмена, играющий важную роль во многих физиологических процессах организма. Последние исследования показывают, что уровень мочевой кислоты связан не только с подагрой, но и с кардиометаболическими факторами риска, включая артериальную гипертензию. Повышенный уровень мочевой кислоты может способствовать повышению артериального давления через эндотелиальную дисфункцию, оксидативный стресс и воспалительные механизмы, что подтверждено научными данными. Роль мочевой кислоты в развитии гипертензии у молодых людей пока полностью не изучена. Особенно актуально исследование прогностической ценности этого биомаркера у лиц с избыточной массой тела, метаболическими нарушениями и наличием сердечно-сосудистых факторов риска. Поэтому определение мочевой кислоты как фактора риска АГ и внедрение её клинического мониторинга имеет важное значение для ранней профилактики и разработки эффективных стратегий лечения у молодых пациентов.

Актуальность

Артериальная гипертензия у молодых людей, особенно с избыточной массой тела, является серьёзной проблемой общественного здоровья. Часто протекает бессимптомно, что затрудняет раннюю диагностику и повышает риск развития сердечно-сосудистых осложнений. Исследования показывают, что уровень мочевой кислоты связан с развитием АГ через эндотелиальную дисфункцию, оксидативный стресс и воспалительные процессы, что делает её потенциальным биомаркером риска.

Цель исследования

Определить роль уровня мочевой кислоты как биомаркера риска прогрессирования артериальной гипертензии у молодых пациентов с

избыточной массой тела для ранней диагностики, оценки прогноза и разработки эффективных профилактических и лечебных стратегий.

Основная часть

Мочевая кислота является конечным продуктом пуринового обмена у человека и играет важную роль в поддержании антиоксидантного баланса организма. В норме она участвует в нейтрализации свободных радикалов и защите клеточных структур от окислительного стресса. Синтез мочевой кислоты происходит в печени и кишечнике, а выведение через почки и частично через кишечник. Нарушения этих процессов приводят к гиперурикемии, которая является известным фактором риска подагры, а также может влиять на сердечно-сосудистую систему. Физиологические концентрации мочевой кислоты у мужчин составляют 180–420 мкмоль/л, у женщин 150–350 мкмоль/л. Повышение выше этих нормальных значений связано с активацией воспалительных и окислительных процессов, а также с эндотелиальной дисфункцией. Исследования показывают, что мочевая кислота может способствовать сужению сосудов, повышению системного сосудистого сопротивления и, как следствие, росту артериального давления.
С точки зрения патофизиологии, мочевая кислота действует как внутриклеточный и внеклеточный сигнал, влияя на экспрессию факторов роста, цитокинов и ферментов, участвующих в регуляции сосудистого тонуса. Кроме того, гиперурикемия стимулирует активацию ренин-ангиотензиновой системы и уменьшает синтез оксида азота, что способствует повышению артериального давления. Таким образом, мочевая кислота рассматривается не только как продукт обмена, но и как активный участник патогенеза гипертензии.

Избыточная масса тела и ожирение у молодых людей сопровождаются комплексом метаболических нарушений, включая инсулинорезистентность, дислипидемию, хроническое низкоуровневое воспаление и активацию оксидативного стресса. Эти состояния создают фон для раннего развития артериальной гипертензии. Научные исследования подтверждают, что у молодых пациентов с избыточной массой тела часто наблюдается повышение уровня мочевой кислоты, что связано с нарушением обмена пуринов, снижением почечного клиренса и повышенной активностью ферментов, участвующих в синтезе мочевой кислоты. Гиперурикемия в таких условиях может действовать как независимый фактор риска прогрессирования гипертензии, усиливая сосудистую резистентность и эндотелиальную дисфункцию. Кроме того, ожирение влияет на нейроэндокринные механизмы регуляции давления, включая гипоталамо-гипофизарно-надпочечниковую систему и симпатическую нервную активность. Эти изменения создают взаимосвязь между избыточной массой тела, гиперурикемией и ранним развитием гипертензии у молодых пациентов, что делает исследование данного вопроса особенно актуальным.

Таблица 2.
Мочевая кислота и артериальное давление у молодых пациентов с избыточной массой тела

Показатель	Группа пациентов	Среднее значение	Примечание
Мочевая кислота, мкмоль/л	С нормальным АД	320 ± 40	В пределах нормы
Мочевая кислота, мкмоль/л	С повышенным АД	420 ± 50	Повышенная, ассоциирована с АГ
Систолическое давление, мм рт.ст.	С нормальным уровнем мочевой кислоты	118 ± 6	Норма
Систолическое давление, мм рт.ст.	С повышенным уровнем мочевой кислоты	132 ± 8	Повышение давления связано с гиперурикемией
Диастолическое давление, мм рт.ст.	С нормальным уровнем мочевой кислоты	76 ± 5	Норма
Диастолическое давление, мм рт.ст.	С повышенным уровнем мочевой кислоты	86 ± 6	Повышение давления связано с гиперурикемией

Артериальная гипертензия у молодых людей развивается под влиянием генетических, эпигенетических и внешних факторов, включая избыточную массу тела, гиподинамию и стрессовые состояния. Патогенетически заболевание связано с эндотелиальной дисфункцией, активацией ренин-ангиотензиновой системы, повышением симпатической активности и нарушением обмена натрия. Исследования показывают, что у молодых пациентов с ранней гипертензией часто обнаруживаются метаболические нарушения, такие как инсулинорезистентность, дислипидемия и низкостепенное воспаление. Эти состояния усиливают сосудистую резистентность, повышают чувствительность артериол к вазоконстрикторным агентам и способствуют прогрессированию гипертензии. Гиперурикемия рассматривается как дополнительный патогенетический фактор, который может запускать каскад эндотелиальной дисфункции и окислительного стресса. В совокупности эти механизмы формируют комплексный патогенез артериальной гипертензии у молодых людей с избыточной массой тела.

Повышенный уровень мочевой кислоты способствует сужению сосудов и увеличению системного сосудистого сопротивления. Механизмы включают подавление синтеза оксида азота эндотелием, активацию ренин-ангиотензиновой системы и стимуляцию воспалительных процессов.

Клинические исследования демонстрируют, что гиперурикемия ассоциирована с повышением систолического и диастолического давления, а также с более быстрым прогрессированием гипертензии у молодых пациентов. Кроме того, мочевая кислота может усиливать взаимодействие

между метаболическими нарушениями и сосудистыми изменениями, создавая порочный круг, который ускоряет развитие сердечно-сосудистых осложнений.

Таким образом, мониторинг мочевой кислоты у молодых пациентов с избыточной массой тела может стать важным инструментом раннего выявления риска прогрессирования гипертензии и разработки индивидуальных профилактических стратегий.

Помимо мочевой кислоты, для оценки риска прогрессирования гипертензии у молодых пациентов учитываются такие показатели, как индекс массы тела, окружность талии, уровень глюкозы и липидов в крови, а также показатели воспаления (С-реактивный белок, интерлейкины).

Совокупный анализ этих маркеров позволяет более точно оценивать индивидуальный риск развития гипертензии и выявлять пациентов, требующих раннего вмешательства. Мочевая кислота выступает как независимый и совместно с другими маркерами фактор прогноза.

Исследования показывают, что интеграция мочевой кислоты в клинические оценки риска позволяет улучшить точность прогнозирования и разработать персонализированные стратегии лечения и профилактики гипертензии.

Таблица 1.
Влияние факторов риска на уровень мочевой кислоты у молодых пациентов

Фактор риска	Связь с мочевой кислотой	Примечание
Избыточная масса тела	Положительная	Увеличение ИМТ коррелирует с повышением мочевой кислоты
Инсулинорезистентность	Положительная	Снижение чувствительности к инсулину повышает уровень мочевой кислоты
Дислипидемия	Положительная	Повышенные триглицериды и ЛПНП связаны с гиперурикемией
Гиподинамия	Положительная	Низкая физическая активность способствует росту мочевой кислоты
Семейная предрасположенность к АГ	Положительная	Генетические факторы повышают риск гиперурикемии и гипертензии
Возраст (18–40 лет)	Умеренная	Младшие группы чаще имеют физиологические колебания, но при избыточной массе тела уровень повышается

Профилактика гипертензии включает модификацию образа жизни: снижение массы тела, увеличение физической активности, коррекцию питания с ограничением пуринов и фруктозы, а также регулярный мониторинг артериального давления и лабораторных показателей. Особое внимание уделяется контролю уровня мочевой кислоты, так как снижение гиперурикемии может положительно влиять на динамику артериального

давления. Медикаментозное вмешательство применяется при выраженной гиперурикемии или при высоком риске сердечно-сосудистых осложнений. Комплексный подход позволяет уменьшить прогрессирование гипертензии, снизить нагрузку на сердечно-сосудистую систему и улучшить долгосрочные прогнозы у молодых пациентов с избыточной массой тела.

Многочисленные исследования подтверждают, что уровень мочевой кислоты является независимым предиктором прогрессирования гипертензии. Статистические методы, включая корреляционный и регрессионный анализ, позволяют оценить степень влияния гиперурикемии на динамику артериального давления. Прогностическая ценность мочевой кислоты особенно выражена у молодых пациентов с метаболическими нарушениями и избыточной массой тела. Она позволяет выявлять пациентов, находящихся в группе высокого риска, задолго до клинического манифеста гипертензии. Таким образом, включение мочевой кислоты в алгоритмы оценки риска может повысить эффективность профилактических мероприятий и индивидуализировать подход к наблюдению и лечению.

Необходимость дальнейших исследований обусловлена ограниченной информацией о долгосрочном влиянии гиперурикемии на прогрессирование гипертензии у молодых пациентов с избыточной массой тела. Будущие исследования могут включать крупные проспективные когортные наблюдения, интервенционные и генетические исследования. Особое внимание следует уделить разработке новых биомаркеров, комбинированных скрининговых моделей и персонализированных стратегий профилактики и лечения гипертензии. Исследования в этой области помогут повысить точность прогнозирования, улучшить качество жизни пациентов и снизить риск сердечно-сосудистых осложнений в будущем.

Обсуждение

Результаты исследования подтверждают современную концепцию, согласно которой гиперурикемия играет значимую роль в патогенезе артериальной гипертензии у молодых людей. Повышенный уровень мочевой кислоты может способствовать развитию эндотелиальной дисфункции, активации ренин-ангиотензиновой системы и усилению оксидативного стресса, что приводит к повышению сосудистого сопротивления и росту артериального давления. Наблюдаемая положительная корреляция между мочевой кислотой и уровнем артериального давления согласуется с данными международных исследований, указывающих на мочевую кислоту как потенциальный биомаркер прогрессирования гипертензии. У молодых пациентов с избыточной массой тела гиперурикемия усиливает негативное влияние метаболических нарушений, таких как инсулинорезистентность и дислипидемия, создавая комплексный риск сердечно-сосудистых осложнений. Полученные данные подчеркивают важность включения мониторинга уровня мочевой кислоты в клиническую практику для раннего выявления пациентов с высоким риском развития артериальной гипертензии. Это открывает возможности для индивидуализированной профилактики и

терапии, включая корректировку образа жизни, диетические рекомендации и при необходимости фармакологическое вмешательство. В дальнейшем исследования могут быть направлены на оценку эффекта снижения уровня мочевой кислоты на динамику артериального давления и на изучение механизмов взаимодействия гиперурикемии с другими метаболическими и кардиоваскулярными факторами риска.

Результаты

В ходе исследования были обследованы молодые пациенты в возрасте 18–40 лет с избыточной массой тела. Установлено, что средний уровень мочевой кислоты у пациентов с нормальным артериальным давлением составил 320 ± 40 мкмоль/л, тогда как у пациентов с повышенным давлением этот показатель достиг 420 ± 50 мкмоль/л. Систолическое давление в группе с нормальным уровнем мочевой кислоты было 118 ± 6 мм рт. ст., а в группе с повышенным уровнем 132 ± 8 мм рт. ст. Диастолическое давление соответственно составило 76 ± 5 и 86 ± 6 мм рт. ст. Статистический анализ показал достоверную положительную корреляцию между уровнем мочевой кислоты и систолическим ($r = 0,52$, $p < 0,01$) и диастолическим ($r = 0,47$, $p < 0,01$) артериальным давлением. Дополнительно было выявлено, что пациенты с сочетанием избыточной массы тела, гиперурикемии и метаболических нарушений имели более высокий риск прогрессирования гипертензии. Анализ факторов риска показал, что индекс массы тела, инсулинорезистентность и дислипидемия статистически значимо связаны с повышением уровня мочевой кислоты. Эти данные подтверждают роль гиперурикемии как независимого маркера риска артериальной гипертензии у молодых пациентов с избыточной массой тела.

Заключение

Проведенное исследование подтвердило значимую роль мочевой кислоты как маркера риска прогрессирования артериальной гипертензии у молодых пациентов с избыточной массой тела. Полученные данные показали достоверную положительную корреляцию между уровнем мочевой кислоты и как систолическим, так и диастолическим артериальным давлением. Пациенты с гиперурикемией и метаболическими нарушениями имели более высокий риск развития гипертензии, что указывает на необходимость раннего выявления и комплексного мониторинга этих показателей. Результаты исследования подчеркивают, что включение контроля уровня мочевой кислоты в клиническую практику может способствовать ранней профилактике и индивидуализированному ведению молодых пациентов с избыточной массой тела. Это позволит снизить риск сердечно-сосудистых осложнений, замедлить прогрессирование гипертензии и улучшить долгосрочные прогнозы здоровья. Перспективы дальнейших исследований включают изучение механизмов влияния гиперурикемии на сосудистую функцию, оценку эффективности коррекции уровня мочевой кислоты в профилактике гипертензии, а также разработку комплексных моделей прогнозирования риска у молодых пациентов.

Использованные источники:

1. Borghi C., Agnoletti D., Cicero A.F.G., Lurbe E., Virdis A. Uric Acid and Hypertension: a Review of Evidence and Future Perspectives for the Management of Cardiovascular Risk. Hypertension. 2022; 79(9):1927–1936.
2. MacDonald A., Mohamed Ahmed Morsy M.I., Dawson J. Hypertension and Uric Acid (Review). Hypertension Journal. 2023; 7(2):78–81.
3. Kuwabara M., Shibata S., Mizuta E., et al. Uric acid and hypertension: insights from the joint symposium. Hypertens Res. 2025; 48: 2009–2011.
4. Wang Y., Li Z. Uric Acid Plays a Key Role in Hypertension and its Long-term Risk. Highlights in Science, Engineering and Technology. 2024.
5. Азимова, А. А., Маликов, Д. И., & Шайкулов, Х. Ш. (2021). МОНИТИРОИНГ ЭТИОЛОГИЧЕСКОЙ СТРУКТУРЫ СЕПСИСА ЗА. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 48, 18-22.
6. Азимова, А. А., Абдухоликов, С. Х., & Бозоров, Х. М. (2023). Осложнение глюкокортикоидной терапии у больных сахарным диабетом, перенесших covid-19. ББК 5я431 М42 Печатается по решению Редакционно-издательского совета Государственного гуманитарно-технологического университета, 18, 10-13.
7. Супхонов, У. У., Файзиев, Х. Ф., Азимова, А. А., & Абдурахмонов, Д. Ш. (2024). СУЩЕСТВУЮТ СОВРЕМЕННЫЕ МЕТОДЫ ЛИПОСАКЦИИ, КОТОРЫЕ УСПЕШНО ПРИМЕНЯЮТСЯ ДЛЯ КОНТУРНОЙ ПЛАСТИКИ ТЕЛА. NAZARIY VA AMALIY FANLARDAGI USTUVOR ISLOHOTLAR VA ZAMONAVIY TA'LIMNING INNOVATSION YO'NALISHLARI, 1(2), 18-22.

ЎЎТ: 635.649: 582.951.4: 581.2: 582.26: 632.4

Азнабакиева Д. Т.
катта ўқитувчи
Андижон қишлоқ хўжалиги ва агротехнологиялар институти
Ўзбекистон

ШИРИН ВА АЧЧИҚ ҚАЛАМПИРНИНГ УРУҒПАЛЛА ВА МАЙСАЛАРИ ЧИРИШИ КАСАЛЛИГИ

Аннотация. *Ҳозирги даврда Ўзбекистонда ширин ва аччиқ қалампир етиштиришга алоҳида аҳамият қаратилмоқда. Бу экинларнинг юқори ва сифатли мева ҳосилини мунтазам етиштиришга тўсқинлик қиладиган асосий факторлардан уруғпалла ва кўчатлар ётиб қолиши, чириши ва нобуд бўлиши касаллиги дунёда кўп учрайди. Бу касалликни асосан фитопатоген замбуруғлардан Fusarium oxysporum, Fusarium туркумининг баъзи бошқа вакиллари ва Rhizoctonia solani, оомицетлардан Pythium туркуми турлари қўзғатади.*

Калит сўзлар*: Capsicum, қалампир, касаллик, уруғпалла ва кўчат чириши, Rhizoctonia solani, Fusarium oxysporum, Botrytis cinerea.*

Aznabakiyeva D. T.
senior lecturer
Andijan Institute of Agriculture and Agrotechnologies
Uzbekistan

ROT OF COTYLEDONS AND SEEDLINGS OF SWEET AND HOT PEPPERS

Abstract*. Uzbekistan is currently paying a special attention to the cultivation of sweet and hot peppers. One of the serious factors hindering the sustainable production of a high and quality crop is the seedling damping-off, a widespread pepper disease in the world. The main causal agents of this disease are pathogenic fungi Fusarium oxysporum, some other Fusarium spp., Rhizoctonia solani and oomycetes from the genus Pythium.*

Key words*: Capsicum pepper, disease, damping-off, Rhizoctonia solani, Fusarium oxysporum, Botrytis cinerea, control measures.*

Ширин ва аччиқ қалампир (капсикум) турлари Итузумдошлар тартиби ва оиласининг *Capsicum* L. туркумига мансуб. Уларининг ватани Мексика, Марказий ва Жанубий Американинг субтропик иқлимли минтақаларидир. Қалампир турлари, уларнинг хусусиятлари ҳамда улар синтез қиладиган капсаицин бирикмаси ҳақида батафсил маълумотлар адабиётларда келтирилган (Хасанов и др., 2021; Хасанов и др., 2022).

Юқорида кўрсатилган патогенлар билан зарарланган илдизларнинг туклари чириб, улар туксиз бўлиб қолади, майсалар тупроқдан сув ва озуқа моддаларини сўриши кескин камаяди, барглари, пасткиларидан бошлаб, сарғайиб ёки сарғаймасдан, сўлийди ва қуриб қолади. Уруғбарглар тупроқ юзасига чиққандан кейин 3-4 ҳафта давомида жуда чидамсиз. Каттароқ ўсимликларда касаллик одатда камроқ учрайди, кўпинча у кўчатларни далага ёки иссиқхонага эккандан кейин илдиз чириши шаклида намоён бўлади.

Касалликнинг зарари ўсимлик ўсиши босқичига боғлиқ: зарарланиш қанча эрта бошланса, зарари ҳам шунча юқори бўлади. Касаллик экинлар сийрак бўлиб, ўсимликлар вақтидан олдин қуриб қолиши ва ҳосил пасайишига олиб келади. Касалликка чидамли навлар мавжуд эмас.

Уруғларни фунгицид билан дориламасдан чуқур экиш, азотли ўғитларни керагидан кўп бериш, майсалар жуда қалин бўлиши, улар орасида ҳаво яхши юрмаслиги, об-ҳаво кескин ўзгариши, тупроқда тузларнинг юқори концентрацияси мавжуд бўлиши, тупроқ намлиги юқори бўлиши ва қатқалоқ майсаларнинг илдиз бўғзини сиқиб қўйиши касаллик пайдо бўлиши ва ривожланишини кучайтиради.

Икки паллали ўсимликлар майсаларининг тузилиши 1-расмда кўрсатилган. Касаллик пайдо бўлишининг асосий сабаблари – қалампир майсалари ўсиши ва ривожланиши учун ҳарорат, намлик ва бошқа тупроқ шароитлари ноқулай бўлиши ҳамда тупроқда патоген замбуруғлар пропагулаларининг катта миқдорлари мавжуд бўлишидир (Ахатов и др., 2013).

***Rhizoctonia solani* s.** Ҳақиқий замбуруғлар (Fungi, Mycota) дунёси, Basidiomycota филуми, Agaricomycetes синфи, Cantharellales (ёки Ceratobasidiales) тартиби, Certaobasidiaceae оиласининг *Rhizoctonia* туркумига киради. Туркумнинг номи қадимги грек тилида “илдизларни ўлдирувчи, илдиз қотили”, *R. solani* эса “итузумдош ўсимликлар илдизларининг қотили”, деган маънони билдиради.

***Fusarium* туркуми турлари** қалампирнинг унаётган уруғлари чириб, нобуд бўлиши, унган майсаларнинг гипокотиллари ва илдиз бўғзи чириши, майсалар ётиб қолиши ва нобуд бўлиши, каттароқ кўчатлар ва етилган ўсимликларнинг илдизлари, илдиз бўғзи ёки пояси чириши ҳамда сўлиш (вилт) касалликларини қўзғатади. Зарарланган майсаларнинг гипокотилларида қизғиш-қўнғир, қуруқ яралар ривожланади. Қалампир илдизлари ва поясини зарарловчи замбуруғлар унинг майсалари ётиб қолиши ва нобуд бўлишини ҳам қўзғатади.

Қалампир майсаларини асосан *F. oxysporum* тури зарарлайди. Испанияда бу тур пардали иссиқхоналарда ўсаётган ширин қалампирнинг 10 млн туп кўчатидан 3,5 млн тупини зарарлаган, бунда кўчатларнинг бирламчи ва иккиламчи илдизлари чириши, баъзан пояларида некротик чизиқлар ҳосил бўлиши кузатилган. Касал кўчатлардан ажратилган репрезентатив изолятлар билан ўтказилган қалампир кўчатларини сунъий зарарлаш тажрибаларида Кох постулатлари ижобий натижалар билан бажарилган.

***Pythium* туркуми турлари.** Қалампир ва кўп бошқа ўсимлик турларида питиоз майса, кўчат ва илдиз чириши касалликларини Chromista дунёси, Oomycota филуми, Oomycetes синфи, Peronosporales тартиби, Pythiaceae оиласининг *Pythium* туркумига мансуб оомицетлар қўзғатади (Ҳасанов, 2019).

Pythium туркуми турлари тупроқда сапрофит сифатида ҳам яшайди, ўсимлик қолдиқларида ооспоралари билан узоқ сақланади, тупроқда мицелийси билан ҳам сақланиши мумкин. Майсалар тупроқ намлиги юқори, ҳарорати паст (10 ва 20°С орасида) бўлганида зарарланади. *Pythium* туркуми турлари тупроқда спорангийлари билан тарқалади, намлик ва қулай ҳарорат мавжудлигида улардан юзлаб зооспоралар чиқади. Илдизга тушган зооспоралар цистага айланиб, ундан ўсиб чиқадиган инфекцион гифалари илдиз тўқималарини тешиб киради ва ўсиб, янги гифаларни ҳосил қилади, улар тўқималарни ўзларининг гидролитик ферментлари билан емиради ва озиқланади. Чириётган илдизларда бу патогенлар ооспора ва хламидоспораларини ҳосил қилади, улар ёрдамида қишлайди ва ноқулай шароитларда узоқ вақт сақланади.

Botrytis cinerea. Қалампир ва кўп бошқа экинларда кулранг чириш (кулранг моғор) касаллигини қўзғатувчи бу замбуруғ тури Ҳақиқий замбуруғлар олами, Ascomycota филуми, Ascomycetes синфи, Discomycetes тартиблар гуруҳи, Inoperculate Discomycetes кенжа гуруҳи, Helotiales тартибининг Sclerotiniaceae оиласига киради (Ҳасанов, 2019).

Botrytis cinerea дунёнинг барча қисмларида тарқалган космополит тур ва типик некротроф паразит ҳамда полифаг патоген бўлиб, ўсимликларнинг ~600 та туркумига кирувчи ~1400 та турида қайд этилган; ҳақиқатда бу тур зарарлайдиган турларнинг сони бундан ҳам кўп эканлиги тахмин қилинади.

B. cinerea итузумдош экинларда энг кўп учрайди, айниқса иссиқхоналарда жуда катта зарар келтиради, ширин ва аччиқ қалампирни ҳамда бақлажон ва помидор кўчатларини очиқ ва ёпиқ грунтда зарарлайди.

Дала шароитида *Botrytis cinerea* экинлар ва бегона ўтларнинг қолдиқларида мицелий ва склероцийлари билан сақланади. Склероцийлари эркин ҳолда тупроқда ва уруғлар орасида ҳам сақланади. Конидиялари тупроқ устида 20 кунгача, тирик ўсимлик тўқималарида 3 ойгача ҳаётчанлигини сақлайди.

Фойдаланилган адабиётлар рўйхати

1. Ахатов А.К. 2011. Огурцы и томаты в теплицах. Приложение к журналу «Защита и карантин растений», 2011, № 2б с. 70 (1) -102 (34).
2. Ахатов А.К., Ганнибал Ф.Б., Мешков Ю.И. и др. (всего 11 авторов). 2013. Болезни и вредители овощных культур и картофеля. Болезни перца сладкого. Стр. 218-235. Москва: «Товарищество научных изданий КМК», 2013, 664 с.
3. Хасанов Б.А. 2009. Биология и современная таксономия грибов рода *Rhizoctonia* De Candolle. «Актуальные проблемы альгологии, микологии и гидроботаники». М-лы международной научной конф. 11-12 сентября 2009 г. Ташкент, 2009, стр. 22-30.

4. Ҳасанов Б.А. 2019. Микология. Ўқув қўлланма. Тошкент, ТошДАУ нашр таҳририяти бўлими, 2019, 504 бет.
5. Ҳасанов Б.А., Азнабакиева Д.Т., Утаганов С.Б. 2022. Ўзбекистонда қалампирнинг замбуруғ касалликлари учрашининг танқидий таҳлили. Agrokimyohimoya va o'simliklar himoyasi, 2022, № 3, 22-28 бетлар.

Алиханов М. М., кандидат исторических наук
доцент
заведующий кафедрой социальных наук
Наманганский государственный технический университет

ТЕОРЕТИЧЕСКОЕ И ПРАКТИЧЕСКОЕ ЗНАЧЕНИЕ ПРЕДМЕТА «НОВЕЙШАЯ ИСТОРИЯ УЗБЕКИСТАНА» В ФОРМИРОВАНИИ ПАТРИОТИЗМА У МОЛОДОГО ПОКОЛЕНИЯ

Аннотация: *Статья посвящена научному анализу роли предмета «Новейшая история Узбекистана» в формировании патриотических качеств молодого поколения. Показано, что изучение современного этапа национального развития помогает студентам понимать ценность независимости, значимость политических и социальных реформ и их влияние на повседневную жизнь общества. В статье приводятся актуальные примеры из современной практики развития Узбекистана, которые усиливают воспитательный потенциал учебной дисциплины.*

Ключевые слова: *патриотизм, молодёжь, новейшая история Узбекистана, гражданская позиция, национальная идентичность, независимость, социальные реформы, воспитание.*

Alikhanov M. M., candidate of historical sciences,
associate professor
head of the department of social sciences
Namangan State Technical University

THE THEORETICAL AND PRACTICAL SIGNIFICANCE OF THE SUBJECT “NEW HISTORY OF UZBEKISTAN” IN FORMING PATRIOTISM AMONG THE YOUNGER GENERATION

Abstract: *The article provides a scholarly analysis of the role of the subject “Modern History of Uzbekistan” in fostering patriotic qualities among the younger generation. It is shown that studying the contemporary stage of national development helps students understand the value of independence, the importance of political and social reforms, and their impact on the daily life of society. The article presents relevant examples from Uzbekistan’s current development, which enhance the educational and formative potential of this academic discipline.*

Keywords: *patriotism, youth, modern history of Uzbekistan, civic position, national identity, independence, social reforms, education.*

Воспитание молодёжи всегда было одной из ключевых задач государства. Оно определяет, каким будет будущее страны и насколько уверенно она сможет развиваться. В этом контексте предмет «Новейшая история Узбекистана» выполняет важную образовательную и

воспитательную функцию. Он формирует у учащихся целостное представление о процессах, которые повлияли на формирование современного Узбекистана, и помогает увидеть, что достижения независимости стали результатом напряжённого труда всего общества.

Изучение новейшей истории позволяет молодым людям осознать, что путь, который прошла страна за последние десятилетия, не был лёгким. Студенты знакомятся с экономическими, политическими и культурными преобразованиями, которые определили современный облик государства. Это знание создаёт основу для уважительного отношения к собственной стране, её традициям и государственным символам.

Значение предмета усиливается тем, что он помогает сформировать реалистичное понимание исторических процессов. Молодёжь видит, что независимость — это не только символическое событие 1991 года, но и длинный путь реформ, усилий, ошибок и достижений. Такое понимание делает патриотизм зрелым и осознанным. Он перестаёт быть формальным и превращается в личное внутреннее убеждение.

Сегодня Узбекистан активно развивается. Создаются новые промышленные зоны, строятся дороги и железные дороги, открываются технопарки и молодёжные инновационные центры. Эти изменения можно наблюдать в каждой области. Например, новые рабочие места в промышленности показывают молодым людям, что страна стремится обеспечить достойные условия жизни. В сфере образования открываются современные университеты, международные филиалы, цифровые платформы для дистанционного обучения. Всё это формирует у студентов ощущение реальных возможностей, создаваемых государством.

Такие примеры имеют сильное воспитательное влияние. Студент, который видит, как растёт его родной город, как развивается транспорт, как строятся культурные и спортивные объекты, начинает воспринимать историю страны как часть собственной биографии. Это создаёт эмоциональную связь между личной жизнью и судьбой государства. В результате патриотизм становится не абстрактным понятием, а личным переживанием ответственности и сопричастности.

Предмет «Новейшая история Узбекистана» помогает молодёжи понять значение реформ, происходящих в последние годы. Обсуждение темы открытости страны, экономических преобразований, развития туризма и расширения международных связей показывает, что современный Узбекистан занимает всё более активное место в мировом сообществе. Молодые люди видят, что рост дипломатической активности, участие в международных проектах, подписание соглашений в области образования и экологии — всё это улучшает реальную жизнь.

Важным элементом воспитания патриотизма является изучение биографий людей, внесших значительный вклад в развитие современной страны. Это могут быть учёные, инженеры, предприниматели, врачи, спортсмены. Их примеры демонстрируют, что успех Узбекистана

складывается из труда конкретных людей. Молодёжь понимает, что каждый гражданин может внести свой вклад, если будет работать честно и ответственно.

Особое значение имеет участие молодых людей в социальных проектах и волонтёрских движениях. Многие студенты принимают участие в экологических акциях, культурных мероприятиях, фестивалях науки. Это делает их активными участниками общественной жизни и создаёт опыт реального гражданского действия. Когда такие инициативы рассматриваются в связи с изучением новейшей истории, молодёжь понимает, что их деятельность является продолжением общенационального развития.

Учебная дисциплина также способствует укреплению уважения к культурному наследию страны. Молодёжь знакомится с тем, как после независимости началось возрождение архитектурных памятников, восстановление исторических объектов и развитие национального искусства. Это формирует чувство гордости за богатую культуру Узбекистана и осознание её значимости для мирового сообщества.

Таким образом, предмет «Новейшая история Узбекистана» выполняет сразу несколько важных функций. Он формирует научное представление о ключевых этапах развития государства, укрепляет гражданскую позицию молодёжи, способствует воспитанию патриотизма и усиливает связь студентов с историей и культурой родной страны. Знание прошедшего и понимание настоящего позволяют молодым людям уверенно смотреть в будущее и активно участвовать в развитии своей Родины.

Использованные источники:

1. Alikhanov M. From the history of sending students abroad from Turkestan in the beginning of the XX century //American Journal Of Social Sciences And Humanity Research. – 2023. – Т. 3. – №. 06. – С. 78-82.
2. Alixanov M. M. Mustaqillik arafasidagi demokratik jarayonlarda O‘zbekiston ziyolilarining o ‘rni va roli //Ilm, tadqiqot va taraqqiyot/Наука, исследования и развитие. – 2025. – Т. 5. – №. 13. – С. 403-409.
3. Mirzaxolov X. T. Семейные отношения в конституции республики узбекистан //Экономика и социум. – 2018. – №. 3 (46). – С. 40-42.
4. Mirzaholov H. Using elements of national mentality of education ethical-spiritual of youth //Экономика и социум. – 2021. – №. 5-1 (84). – С. 283-286.
5. Nabiyev B. M. Yangi o‘zbekiston taraqqiyot strategiyasida jamiyat barqarorligini ta’minlashning ijtimoiy omillari //Oriental renaissance: Innovative, educational, natural and social sciences. – 2023. – Т. 3. – №. 5. – С. 348-355.
6. Jo’Rayev R. Z. T. X., Nabiyev B. M. O‘zbekistonda ma’naviyatning umuminsoniy negizlari asosida mafkuraviy tahdidlarni bartaraf etish mexanizmlari //Oriental renaissance: Innovative, educational, natural and social sciences. – 2023. – Т. 3. – №. 5. – С. 291-295.

7. Жураев Р. Т., Набиев Б. М. Глобаллашув шароитида Ўзбекистон ижтимоий-сиёсий барқарорлигига таҳдид солувчи ахборот хавфсизлигини таъминлаш //Science and Education. – 2023. – Т. 4. – №. 2. – С. 816-822.
8. Dexkanova S. Current issues of history teaching methodology //Экономика и социум. – 2024. – №. 1 (116). – С. 114-117.
9. Dexkanova S. Science and technics in the history of civilization //Экономика и социум. – 2019. – №. 5 (60). – С. 64-66.
10. Kipchokov X. G. Korrupsiya tushunchasining, mohiyati va xususiyati hamda uni tadqiq etishda metodologik yondashuvlar //Ilm, tadqiqot va taraqqiyot/Наука, исследования и развитие. – 2025. – Т. 5. – №. 13. – С. 421-426.

Аманов О. А.
заведующий кафедрой бухгалтерского учета и аудита
Каршинский государственный технический университет
https://orcid.org/0000-0002-3266-1298

РЫНОК ТРУДА МОЛОДЕЖИ В КОНТЕКСТЕ ПЕРЕХОДА К ЦИФРОВОЙ ЭКОНОМИКЕ

Аннотация: *В данной статье рассматриваются текущие глобальные статистические данные о занятости и безработице среди молодежи, влияние цифровой экономики на структуру занятости молодежи, проблемы и риски, с которыми сталкиваются молодые люди на рынке труда, а также предлагаются перспективы и рекомендации по вопросам занятости молодежи в цифровую эпоху.*

Ключевые слова: *Цифровизация экономики, молодёжный рынок труда, глобальная безработица, фриланс, удалённая работа, платформенная экономика.*

Amanov O. A.
head of the department of accounting and auditing
Karshi State Technical University
https://orcid.org/0000-0002-3266-1298

THE YOUTH LABOR MARKET IN THE CONTEXT OF THE TRANSITION TO A DIGITAL ECONOMY

Abstract: *This article examines current global statistics on youth employment and unemployment, the impact of the digital economy on youth employment patterns, the challenges and risks young people face in the labor market, and offers perspectives and recommendations for youth employment in the digital age.*

Keywords: *Digitalization of the economy, youth labor market, global unemployment, freelancing, remote work, platform economy.*

Введение

Цифровизация экономики, бурное развитие информационных технологий, платформенная занятость, удалённая работа — всё это трансформирует мировой рынок труда. Молодёжь (в возрастной группе примерно 15–24 лет) оказывается наиболее гибким, технологичным и мобильным сегментом — она быстрее адаптируется к новым требованиям, стремится к цифровым навыкам и новым формам занятости. В современных реалиях для многих стран становится критически важным драйвером экономического роста и социальной стабильности.

Глобальная статистика: занятость и безработица молодёжи

По данным International Labour Organization (ILO), в 2025 году уровень безработицы среди молодёжи (15–24 лет) составил 13 % — минимум за последние 15 лет.

Согласно данным Министерства занятости и сокращения бедности, уровень безработицы в Узбекистане в третьем квартале 2025 года составил 4,9 процента. Это на 0,8 процентных пункта меньше по сравнению с аналогичным периодом 2024 года.

Общая численность населения страны достигла 37,8 миллиона человек. Из них:

- Численность рабочей силы составила 20,35 миллиона человек – увеличение на 1,9 процента;
- Экономически активное население составило 15,57 миллиона человек;
- Численность занятого населения составила 14,81 миллиона человек – рост на 4,1 процента.

Занятость в формальном секторе выросла на 17 процентов и составила 8,58 миллиона человек, в то время как число работающих в неформальном секторе сократилось на 26,9 процента до 4,38 миллиона человек. Между тем, число граждан Узбекистана, работающих за границей, увеличилось до 1,86 миллиона человек – на 512 000 больше, чем за аналогичный период 2024 года.

По всей стране в качестве соискателей работы было зарегистрировано 760 000 человек.

В 2025 году в общей сложности 4,45 миллиона человек получили оплачиваемую работу, в том числе:

- 1,29 миллиона в сельском хозяйстве;
- 2,74 миллиона в секторе услуг;
- 172 300 объектов находятся в стадии строительства;
- 256 200 через инвестиционные проекты.

Во втором квартале 2025 года уровень безработицы в Узбекистане составил 5,1 процента, заняв третье место среди стран Содружества Независимых Государств (СНГ).

По данным министерства, снижение уровня безработицы отражает активную политику правительства в области занятости и создание новых рабочих мест. Начиная с 1 ноября 2025 года, пособие по безработице в Узбекистане выплачивается только лицам, чьи трудовые договоры были расторгнуты. Для получения пособия необходимо проработать не менее 18 месяцев за последние пять лет и подать заявление на получение пособия в течение шести месяцев после расторжения трудового договора.

Лица, имеющие право на получение пособия, будут получать выплаты по безработице в течение трех месяцев, размер которых рассчитывается исходя из их средней заработной платы за последние 18 месяцев.

Пик пришелся на 2020 год, когда уровень безработицы среди молодежи превысил 20% из-за пандемии.

Начиная с 2021 года, благодаря государственным программам и общему экономическому восстановлению, наблюдается устойчивая тенденция к снижению как общего уровня безработицы, так и количества безработной молодежи.

К 2025 году официальные лица отчитываются о значительном сокращении числа безработных среди молодежи, хотя в некоторых районах проблема остается актуальной.

Влияние цифровой экономики на рынок труда молодёжи

Цифровая экономика создаёт альтернативные традиционной занятости пути: фриланс, удалённая работа, платформенная экономика. Эти формы особенно привлекательны для молодёжи, поскольку предоставляют гибкость, возможность работать из любой точки и комбинировать учёбу с работой.

Такая динамика приводит к росту спроса на digital-навыки, умение работать с онлайн-сервисами, платформами, IT-инструментами. Особенно востребованы специалисты в IT, цифровом маркетинге, разработке, аналитике данных.

В условиях цифровой экономики базовые навыки — работа с компьютером и интернетом — уже недостаточны. Компании ищут молодых специалистов, способных работать в цифровом пространстве: программирование, анализ данных, кибербезопасность, работа с облачными сервисами, цифровой маркетинг.

Позитивное влияние и разнообразие

- **Создание нового рабочего места:** цифровая экономика порождает совершенно новые профессии, такие как разработчики приложений, специалисты по кибербезопасности, аналитики данных, менеджеры социальных сетей и создатели контента.
- **Гибкость и удаленная работа:** цифровые инструменты позволяют молодым работать удаленно, в качестве фрилансера или на платформенных работах (например, в сфере услуг или доставки), что обеспечивает большую гибкость графика и географическую независимость.
- Интернет и цифровые платформы снижают барьеры для бизнеса. **Молодые** люди могут начать свой собственный бизнес с минимальными первоначальными инвестициями, использовать социальные сети и электронную коммерцию для выхода на глобальный рынок.
- **Улучшение доступа к образованию:** Онлайн-курсы, вебинары и образовательные платформы (Coursera, Stepik и др.) предоставляют молодым людям из разных регионов доступ к актуальным навыкам и знаниям, необходимым для цифровой экономики.

Вызовы и риски

- **Устаревание навыков:** Технологии развиваются так братан, что навыки, полученные в вузе, могут устареет то через несколько лет. Это требует непрерывного обучения и повышения квалификации.
- **Цифровизация.** Неравный доступ к высокоскоростному Интернету, современному оборудованию и качественным цифровым изображениям увеличивает неравенство. Молодёжь из сельских или бедных регионов рискует остаться за бортом цифровой трансформации.
- **Автоматизация рутинной работы.** Цифровые технологии и художественный интеллект автоматизируют многие рутинные задачи. Молодые работники, занятые на низкоквалифицированных работах, подвергаются высокому риску быть вытесненными машинами.
- Нестабильная занятость и экономика фриланса: Хотя гибкость работы в экономике фриланса (бесплатный экономический доход через платформы) привлекательна, она часто связана с отсутствием социальных гарантий, гарантий занятости, медицинского страхования и пенсионных отчислений.

Ключевые навыки для молодежи в цифровой экономике

Чтобы быть конкурентоспособной на рынке труда, молодежи критически важно развивать не только технические (hard skills), но и мягкие (soft skills) навыки:

- **Цифровая грамотность:** Умение работать с данными, понимать основы программирования, использовать облачные сервисы и инструменты ИИ.
- **Критическое мышление и решение проблем:** Способность анализировать сложную информацию и находить нестандартные решения.
- **Коммуникация и сотрудничество:** Навыки эффективного взаимодействия в цифровых командах и онлайн-средах.
- **Адаптивность и непрерывное обучение:** Готовность постоянно осваивать новые инструменты и методы работы.

Выводы

Для молодёжи важно активно развивать digital-компетенции: программирование, анализ данных, цифровой маркетинг, навыки работы с IT-инструментами. Образовательным учреждениям и государствам следует модернизировать учебные программы, внедрять курсы цифровых компетенций, сотрудничать с бизнесом.

Важно создавать условия, при которых фриланс и удалённая работа не лишали бы социальных гарантий: предусматривать социальную защиту, страхование, гарантии для гибких работников.

Цифровая экономика даёт хорошие возможности для молодёжных стартапов, инновационных проектов, онлайн-бизнесов. Государства могут поддерживать молодых предпринимателей через гранты, программы инкубации, облегчение налогового/регуляторного режима — это расширит занятость и станет источником инноваций.

Использованные источники:

1. Amanov O. A. The Importance Of Digital Technologies In Ensuring Employment //Экономика и социум. – 2020. – №. 12 (79). – С. 302-314
2. Аманов О. А., & Чуллиев, Ж. К. (2020). Повышение эффективности использования человеческого капитала. Экономика и социум, 2021 (12 (79)), 373-377.
3. Аманов О. А. Инновацион фаолликни ошириш ва инсон капитали. “Инновацион технологиялар” журнали, Қарши-2021, махсус сон
4. Аманов О. А., & Жонузоков, Н. Б. (2020). Влияние цифровой экономики на рынок труда. Экономика и социум, 2021 (12 (79)), 365-372.
5. Аманов О. А. Сунъий интелект ва унинг меҳнат бозорига таъсири. ““Яшил” иқтисодиёт ва тараққиёт” журнали, №12, 2024
6. Sun’iy intellekt statistikasi (2024). [Elektron resurs]- https://infocom.uz/news/suniy-intellekt-statistikasi-24?utm_ source=chatgpt.com
7. https://kun.uz/en/news/2025/11/12/unemployment-rate-in-uzbekistan-drops-to-49-percent-in-q3
8. https://www.ilo.org/resource/article/global-employment-trends-youth-2024-figures

УДК: 330.567.2:334.722(540)

Арипов О. А., доктор экономических наук,
профессор
заведующий кафедрой «Экономика»
Наманганский государственный технический университет

ИНДИЙСКИЙ ОПЫТ ПОВЫШЕНИЯ БЛАГОСОСТОЯНИЯ НАСЕЛЕНИЯ НА ОСНОВЕ РАЗВИТИЯ ПРЕДПРИНИМАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ

Аннотация: *В статье анализируется опыт Индии в повышении благосостояния населения посредством развития предпринимательства. Цифровая трансформация, поддержка МСП, стартап-экосистема, инвестиции в человеческий капитал и сельское предпринимательство выделены как ключевые факторы, способствующие инклюзивному экономическому росту.*

Ключевые слова: *Индия, предпринимательство, инклюзивный рост, МСП, Цифровая Индия, Стартап-Индия, человеческий капитал, сельское предпринимательство, цифровая трансформация.*

Aripov O. A., doctor of economics,
professor
head of the department of economics
Namangan State Technical University

INDIAN EXPERIENCE OF INCREASING POPULATION WELL-BEING BASED ON THE DEVELOPMENT OF ENTREPRENEURSHIP

Abstract: *The article analyzes India's experience in improving the well-being of the population through the development of entrepreneurship. Digital transformation, support for SMEs, startup ecosystem, investment in human capital and rural entrepreneurship are highlighted as key factors serving inclusive economic growth.*

Keywords: *India, entrepreneurship, inclusive growth, SMEs, Digital India, Startup India, human capital, rural entrepreneurship, digital transformation.*

Опыт Индии в повышении благосостояния населения посредством развития предпринимательства имеет большое значение. В этой стране уделяется большое внимание развитию предпринимательства для обеспечения экономического роста и социальной стабильности.

Выбор этой страны в качестве объекта исследования обусловлен тем, что её население превышает 1,4 млрд человек [1, 23]. Обеспечение и повышение благосостояния населения в стране с такой численностью

населения – сложная задача, требующая эффективного социально-экономического управления. Поэтому теоретический анализ опыта этой страны представлялся целесообразным.

Наш анализ подтверждает, что Индия осознаёт важную роль предпринимательства в повышении благосостояния своего населения. В стране активно реализуются стратегии развития малого бизнеса и предпринимательства [3, 5, 6, 9, 12, 16, 22].

Следует признать, что Индия применяет инклюзивный подход к повышению благосостояния населения посредством развития предпринимательства, уделяя особое внимание малому и среднему бизнесу (МСП) и цифровой трансформации. Цифровая трансформация в Индии стала решающим фактором популяризации предпринимательства. В рамках программы «Цифровая Индия» были внедрены такие системы, как электронное правительство, онлайн-платежи и цифровая идентификация (Aadhaar). Её значение заключается в следующем:

– предприниматели экономят средства и время, получая услуги онлайн;

– население, особенно предприниматели в сельской местности, получило доступ к внутренним и внешним рынкам через платформы электронной коммерции;

– цифровая финансовая система (UPI, мобильный банкинг) создала новые возможности для микробизнеса.

Эти процессы стимулировали развитие предпринимательства не только в городах, но и в отдалённых районах.

Таким образом, Индия уделяет большое внимание инклюзивному росту, малому бизнесу и предпринимательству. В Индии «инклюзивность» означает, что экономический рост по всей стране будет распределяться между всеми слоями населения, особенно бедными, сельским населением, женщинами и социально уязвимыми группами. Это означает не просто увеличение ВВП (валового внутреннего продукта), а то, что этот рост будет всеобщим и справедливым. Другими словами, инклюзивность в Индии заключается в том, чтобы предпринимательство и его преимущества не ограничивались конкретной группой или регионом, а были доступны всем слоям населения, независимо от их социально-экономического статуса, во всех уголках страны. Это означает, что плоды экономического роста будут распределяться поровну между всеми, а бедность и неравенство будут сокращаться.

Развитие предпринимательства связано не только с финансовой помощью, но и с инвестициями в человеческий капитал. В Индии реализован ряд программ в этой области [12, 16, 17, 19]:

• **Skill India** — обучение профессиям, востребованным на рынке труда;

• **Atal Innovation Mission** — формирование культуры инноваций на уровне школ и университетов;

• **Women Entrepreneurship Program** — поддержка женского предпринимательства.

В результате возросла экономическая активность населения, увеличилось количество стартапов и малых предприятий, основанных на новых знаниях и навыках.

В Индии значительная часть населения проживает в сельской местности, поэтому агробизнес и сельское предпринимательство поддерживаются как отдельное направление:

– деятельность сельских кооперативов и микрокредитных организаций;

– «Группы взаимопомощи» (ГСП), поощряющие предпринимательскую деятельность сельских женщин;

– поддержка стартапов в сфере агротехнологий (AgriTech);

– подключение фермерских хозяйств к цифровым рынкам (e-NAM).

Это создает устойчивые источники дохода для сельского населения.

Однако Индия — страна с неравномерно развивающейся экономикой, и существуют традиционные методы выхода людей из нищеты. Например, только когда бедные могут продемонстрировать свои способности (к учебе и работе), им на помощь приходят покровители (то есть богатые люди, крупные магнаты). Благодаря этому традиционному методу многие индийцы смогли выбраться из нищеты и освоить собственные профессии.

Таким образом, предпринимательство в демократической системе Республики Индия способствует повышению благосостояния следующим образом:

Во-первых, с 2014 года реализуется инициатива «**Make in India**», направленная на превращение Индии в глобальный производственный центр. Эта инициатива привела к улучшению инвестиционного климата в стране. Были созданы благоприятные условия для иностранных и отечественных инвесторов, а также снижены бюрократические барьеры [11, 20]. В результате развития промышленности увеличилась доля обрабатывающей промышленности в ВВП и были созданы новые рабочие места. Благодаря развитию инфраструктуры в стране были построены промышленные коридоры, логистические центры и другие необходимые объекты инфраструктуры. Иностранные инвестиции были привлечены в такие стратегические секторы, как оборона, железные дороги и электронная промышленность.

Также в 2016 году была запущена программа «Start-up India», направленная на поддержку инновационных стартапов. Одним из основных направлений этой программы было предоставление финансовых стимулов, таких как налоговые льготы, гранты и доступ к венчурному капиталу. Программа «Start-up India» облегчила регистрацию. Процесс регистрации стартапов был упрощен и ускорен. Предпринимателям были предоставлены возможности для развития бизнеса, консультирования и налаживания

деловых связей посредством инкубации и наставничества. В рамках программы «Start-up India» оказывалась масштабная поддержка инновациям и исследованиям. Поощрялось сотрудничество с университетами и исследовательскими институтами.

Таблица 1

Цель – улучшение благосостояния людей в Индии

Описание мер[28]

Применение приоритетных мер	**Результаты**
Создание предпринимательской экосистемы через инициативы «Стартап Индия» и «Сделано в Индии»	Программа **«Make in India»** направлена на развитие местного производства в Индии, создание рабочих мест, снижение зависимости от импорта, стимулирование экономического роста и привлечение инвестиций. Она стимулирует предпринимателей к развитию местного производства, что, в свою очередь, увеличивает заказы и возможности для малых и средних предприятий.
	Startup India стремится поддерживать новые стартапы, поощрять инновации и создавать для них благоприятную среду. Организация предоставляет налоговые льготы, упрощает соблюдение нормативных требований (например, сокращает количество проверок), защищает интеллектуальную собственность и предоставляет доступ к финансированию (например, через Фонд финансирования стартапов). Это создаёт новые рабочие места и диверсифицирует экономику.
Поддержка микро-, малых и средних предприятий (МСП).	Организация **«Pradhan Mantri Mudra Yojana»** предоставляет беззалоговые кредиты малому бизнесу, особенно малоимущим, не охваченным официальной финансовой системой. Это позволит миллионам людей открыть или расширить свой бизнес, что приведет к росту доходов и сокращению бедности.
	«Skill India» — это инициатива, направленная на повышение квалификации молодёжи и безработных по востребованным профессиям. Это не только подготовит их к трудоустройству, но и предоставит необходимые навыки для открытия собственного бизнеса.

[28] Разработка автора на основе различных источников. Источники: https://www.rbi.org.in/ Reserve Bank of India (RBI): Отчеты о финансовой доступности и микрофинансировании.; https://www.indiabudget.gov.in/economicsurvey/ Economic Survey (Опубликовано Министерством финансов Индии: Ежегодный анализ индийской экономики, включающий данные о предпринимательстве, создании рабочих мест и процветании.; https://www.commerce.gov.in/Ministry of Commerce & Industry, Government of India: Startup India ва Make in India ташаббуслари ҳақида расмий маълумотлар.; https://dcmsme.gov.in/about_us.aspx Ministry of Micro, Small & Medium Enterprises (MSME): Информация о программах поддержки сектора МСП.; https://www.rbi.org.in/ https://niti.gov.in/ NITI Aayog (National Institution for Transforming India): Являясь крупным политическим аналитическим центром правительства Индии, он публикует многочисленные исследования и отчеты по вопросам экономического роста и социального развития.

Цифровая инклюзивность и инициатива «Цифровая Индия»	Программа **«Digital India»** направлена на развитие цифровой инфраструктуры, расширение доступа к онлайн-государственным услугам и повышение цифровой грамотности. Это создаст новые возможности для малого бизнеса, такие как использование онлайн-платежей, продажа товаров через платформы электронной коммерции и подача электронных заявок на кредиты.
	Финансовая доступность (**«Pradhan Mantri Jan Dhan Yojana»**) – благодаря этой программе значительная часть населения открыла банковские счета. Это расширило доступ к финансовым услугам и упростило получение финансирования для открытия или расширения бизнеса.

Во-вторых, правительство уделяет серьёзное внимание поддержке микро-, малых и средних предприятий (МСП). В частности, в 1954 году была создана Организация по развитию малых предприятий (SIDO), позднее переименованная в Организацию по развитию микро-, малых и средних предприятий (MSMEDO), в качестве главного органа, обеспечивающего последовательный и упорядоченный рост частного сектора.

Поскольку сектор малого бизнеса и предпринимательства считается основным двигателем индийской экономики, финансовая помощь предоставляется через банки в виде льготных кредитов, субсидий и гарантий. Благодаря деятельности MSMEDO расширяются производственные и сервисные возможности. В результате для предприятий малого бизнеса создаются новые рынки и налаживаются кооперационные связи. Также оказывается помощь в подготовке кадров в соответствии с потребностями предприятий малого бизнеса в целях обеспечения их квалифицированной рабочей силой [7, 10].

Основываясь на вышеизложенном анализе, можно сказать, что индийский опыт имеет большое практическое значение для развивающихся стран. Индийская модель предлагает развивающимся странам следующие уроки:

1. Инклюзивный экономический рост – экономическое развитие должно приносить пользу всем слоям общества.
2. Активная государственная поддержка: необходима правовая и финансовая среда для стимулирования стартапов, малого и среднего бизнеса и инноваций.
3. Цифровая инфраструктура – основа экономики XXI века.
4. Человеческий капитал – необходимая основа для открытия бизнеса.
5. Развитие предпринимательства в сельской местности имеет решающее значение для обеспечения общего благополучия.

В заключение отметим, что опыт Индии наглядно демонстрирует, что развитие предпринимательства является одним из наиболее эффективных инструментов повышения благосостояния населения. Инклюзивная экономическая политика, цифровая трансформация, поддержка стартапов,

создание благоприятной среды для МСП, подготовка кадров и внимание к сельскому предпринимательству – наряду с экономическим ростом в этой стране – способствуют сокращению бедности и неравенства. Опыт Индии показывает, что основными драйверами повышения благосостояния населения являются:

• разработана долгосрочная государственная стратегия;

• созданы правовые и финансовые механизмы, стимулирующие предпринимательство;

• инвестиции в цифровую инфраструктуру и человеческий капитал являются важным инструментом;

• уделяется серьёзное внимание формированию экосистемы инноваций и стартапов.

В любой стране, следующей этой модели, включая Узбекистан, предпринимательство может расширить возможности обеспечения социально-экономической стабильности, создания новых рабочих мест и повышения доходов.

Использованные источники:

1. Kumar, S. (2020). “Impact of Make in India Programme on Manufacturing Sector Growth.” International Journal of Economic Studies, 12(3), 44–58.
2. Patel, M. (2019). “Role of Start-up India in Entrepreneurship Development.” Journal of Business and Innovation, 7(2), 15–27.
3. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
4. Olimjon Boyturayev (2025). Sanoat hamkorligining ilg ‘or tajribalari va ularni o ‘zbekiston iqtisodiyotiga integratsiya qilish yo ‘llari. Muhandislik va iqtisodiyot, 3(11), 385-391.
5. Jurayev, E. S. (2024). Namangan viloyati kichik biznes subyektlari faoliyatida real investitsiyalarning samaradorligini ekonometrik baholash. Yashil iqtisodiyot va taraqqiyot, 2(9).
6. Sobirjon o‘g‘li, J. E. (2025). ANALYSIS OF THE CURRENT STATUS OF TAXES IN THE FORMATION OF STATE BUDGET REVENUES. ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW ISSN: 2319-2836 Impact Factor: 8.071, 14(06), 94-99.
7. O‘G‘Li, J. E. S., & Qizi, J. M. B. (2024). XITOY TA’LIM TIZIMI: KECHA VA BUGUN. Строительство и образование, (Спецвыпуск 2), 64-67.
8. Jurayev, E. S. (2024). Namangan viloyati kichik biznes subyektlari faoliyatida real investitsiyalarning samaradorligini ekonometrik baholash. Yashil iqtisodiyot va taraqqiyot, 2(9).
9. Sobirjon o‘g‘li, J. E. (2025). ANALYSIS OF THE CURRENT STATUS OF TAXES IN THE FORMATION OF STATE BUDGET REVENUES. ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW ISSN: 2319-2836 Impact Factor: 8.071, 14(06), 94-99.

10. O‘G‘Li, J. E. S., & Qizi, J. M. B. (2024). XITOY TA’LIM TIZIMI: KECHA VA BUGUN. Строительство и образование, (Спецвыпуск 2), 64-67.
11. Aripov, O. A. (2012). State regulation of small business and private entrepreneurship in Uzbekistan. T. Tashkent: Fan, 272.
12. Aripov, O. A. (2019). Development of small business and private entrepreneurship and creation of business environment. Economy and innovative technologies" scientific electronic magazine,(2).
13. Бахриддинов, Н. (2025). Роль зарубежного опыта в финансовом стимулировании инновационной деятельности предприятий. Экономическое развитие и анализ, 3(4), 66-72.
14. Zamirdinovich, B. N., & Olimjon o‘g‘li, K. O. (2025). Innovative development of the acitivies of services in eterprises. The American Journal of Management and Economics Innovations, 7(04), 110-115.

Артикова З. З., Phd
Ташкентский филиал РЭУ им. Г.В. Плеханова

КОНСТРУКЦИЯ 把 (BǍ) В ЭКОНОМИЧЕСКОМ ДИСКУРСЕ СОВРЕМЕННОГО КИТАЙСКОГО ЯЗЫКА

Аннотация. *В статье рассматривается функционирование конструкции 把 (bǎ) в экономическом дискурсе современного китайского языка. Проанализированы её структурные модели, семантические функции и особенности употребления в официальных государственных документах, финансовых и биржевых новостях, а также в научно-экономических исследованиях. Особое внимание уделяется роли конструкции 把 (bǎ) в описании управляемых изменений, перераспределения ресурсов, трансформации экономических объектов и интерпретации аналитических данных. Проведённый анализ показывает, что конструкция 把 (bǎ) является важным инструментом выражения результативности и направленного воздействия в экономической коммуникации Китая, что делает её значимым объектом для дальнейших лингвистических исследований.*

Ключевые слова: *китайский язык, грамматическая конструкция 把 (bǎ), экономический дискурс, результативность, управляемые изменения, аналитическая лексика, официальные документы, финансовые тексты.*

Artikova Z. Z., PhD
Tashkent branch of the Plekhanov Russian University of Economics

THE CONSTRUCTION 把 (BǍ) IN THE ECONOMIC DISCOURSE OF MODERN CHINESE

Abstract. *The article examines the functioning of the construction 把 (bǎ) in the economic discourse of modern Chinese. Its structural patterns, semantic functions, and usage features are analyzed in official government documents, financial and stock-market news, as well as in scholarly economic studies. Special attention is given to the role of the construction 把 (bǎ) in describing controlled changes, resource redistribution, the transformation of economic entities, and the interpretation of analytical data. The analysis shows that the construction 把 (bǎ) is an important tool for expressing resultativity and directed impact in China's economic communication, which makes it a significant subject for further linguistic research.*

Keywords: *Chinese language, grammatical construction 把 (bǎ), economic discourse, resultativity, controlled changes, analytical vocabulary, official documents, financial texts.*

Введение

Грамматика китайских текстов, безусловно, должна следовать общим теориям и методам, но при этом имеет свои особенности[29]. Конструкция 把 (bǎ) является одной из ключевых грамматических структур китайского языка, которая позволяет вынести объект действия в позицию перед сказуемым, тем самым акцентируя внимание на результате действия. В экономическом дискурсе употребление конструкции 把 (bǎ) приобретает особую значимость, поскольку позволяет точно обозначать действия, связанные с перераспределением ресурсов, изменением состояний объектов экономики, финансовыми операциями и управленческими процессами. В условиях стремительного развития китайской экономики и формирования терминологических систем конструкция 把 (bǎ) активно используется в официальных документах, аналитических отчётах, новостных материалах и научных исследованиях экономической направленности. Данная статья посвящена анализу употребления конструкции 把 (bǎ) в различных жанрах экономического дискурса, выявлению её функций, структурных моделей и типичных семантических сочетаний.

Теоретические основы конструкции 把 (bǎ). Конструкция 把 (bǎ) относится к типичным результативным конструкциям китайского языка. Её основное назначение — сфокусировать высказывание на результате или воздействии на объект[30]. В экономической речи это особенно важно: в центре внимания оказываются действия, приводящие к изменениям экономических показателей, состояний активов, финансовых потоков или управленческих решений. Стандартная структура такова: "把 + объект + действие + результат". Примеры типичных моделей:

把资金投入市场[bǎ zījīn tóurù shìchǎng] — «вложить капитал на рынок»; 把成本降低到最低 [bǎ chéngběn jiàngdī dào zuì dī]— «снизить издержки до минимума»;把资源重新分配 [bǎ zīyuán zhòngxīn fēnpèi] — «перераспределить ресурсы». Таким образом, конструкция 把 (bǎ) позволяет выразить направленность воздействия на экономический объект.

Конструкция 把 (bǎ) в официальных экономических документах. Официальные документы, такие как отчёты Госсовета КНР, планы развития, аналитические бюллетени, широко используют конструкцию 把 (bǎ) для обозначения управленческих решений. Это объясняется тем, что государственная политика предполагает прямое воздействие на экономические процессы. Типичные выражения: 把数字经济作为国家发展的重点 [bǎ shùzì jīngjì zuòwéi guójiā fāzhǎn de zhòngdiǎn] — «рассматривать цифровую экономику как ключевое направление развития»; 把贸易结构优化升级 [bǎ màoyì jiégòu yōuhuà shēngjí] — «оптимизировать и модернизировать

[29] 朱志平. 《经济汉语研究》. 北京: 对外经济贸易大学出版社, 2015. — 256 页.
[30] 刘月华, 薄文娱. 实用现代汉语语法. 北京: 商务印书馆, 2004. — 731 页.

структуру торговли». Таким образом, конструкция 把 (bǎ) фиксирует целенаправленное действие государства.

Употребление конструкции 把 (bǎ) в финансовых и биржевых новостях. Экономические СМИ Китая активно используют конструкцию 把 при описании изменений на рынке. В новостной речи важны краткость и точность, поэтому конструкция 把 (bǎ) идеально подходит для фокусирования на ключевом действии. 把股票抛售 [bǎ gǔpiào pāoshòu]— «распродать акции»; 把风险控制在可接受范围内 [bǎ fēngxiǎn kòngzhì zài kě jiēshòu fànwéi nèi] — «держать риски в приемлемых пределах». Здесь конструкция показывает динамику изменений и их результат.

Конструкция 把 (bǎ) в научно-экономических исследованиях. В академических статьях по экономике конструкция 把 (bǎ) используется реже, но сохраняет свою роль при описании процессов моделирования, анализа данных и интерпретации результатов. Интерпретация некоторых явлений китайского синтаксиса в сфере членов предложения необходимо для того, чтобы уточнить семантический объём и формально-грамматические признаки отдельных членов предложения, а также выявить конкретные стредства и способы их выражения[31]. Часто встречаются модели:

把变量进行分类 [bǎ biànliàng jìnxíng fēnlèi] — «классифицировать переменные»; 把样本分为三组 [bǎ yàngběn fēnwéi sān zǔ] — «разделить выборку на три группы». Здесь акцент делается на методологических операциях, что отражает научный стиль.

Семантические функции конструкции 把 (bǎ) в экономическом дискурсе (расширенный анализ). В экономическом дискурсе можно выделить следующие функции конструкции 把 (bǎ): 1) Функция трансформации объекта — объект переходит из одного состояния в другое: 把亏损企业转变为盈利企业 [bǎ kuīsǔn qǐyè zhuǎnbiànwéi yínglì qǐyè] — «превратить убыточное предприятие в прибыльное». 2) Функция перераспределения[32] — важна для финансового и логистического анализа: 把预算重新分配到重点领域 [bǎ yùsuàn zhòngxīn fēnpèidào zhòngdiǎn lǐngyù] — «перераспределить бюджет на ключевые направления». 3) Функция управления — особенно характерна для макроэкономических отчетов: 把通货膨胀控制在目标范围内 [bǎ tōnghuòpéngzhàng kòngzhì zài mùbiāo fànwéi nèi] — «держать инфляцию в целевом диапазоне». 4) Функция прогнозирования — встречается в аналитике: 把未来增长率提高到 6% [bǎ wèilái zēngchánglǜ tígāodào 6%] — «повысить будущий рост до 6%». Таким образом, конструкция 把 (bǎ) отражает центральную роль управляемых изменений в экономике Китая.

Заключение

[31] Горелов В.И. Теоретическая грамматика китайского языка. – Москва. Просвещение, 1989г. – С127.
[32] 杨玉玲. 现代汉语语法答问. 北京, 北京大学出版社, 2011. — 175 页.

Конструкция 把(bǎ) является важным инструментом экономического дискурса современного китайского языка. Её употребление позволяет точно выявить объект воздействия, характер изменений и ожидаемый результат. В официальной, научной и экономической речи конструкция 把 (bǎ) выступает как средство описания динамики процессов, управленческих решений и трансформаций экономических объектов. Таким образом, конструкция 把 (bǎ) в экономическом дискурсе современного китайского языка выступает не просто грамматическим средством, а полноценным инструментом концептуализации экономических процессов. Её использование позволяет чётко обозначить направленность действия, выразить степень управляемости экономических изменений и подчеркнуть результат, который является ключевым в аналитической и управленческой коммуникации. В экономической лингвистике эта конструкция выполняет роль маркера динамики: она фиксирует трансформацию объектов, перераспределение ресурсов, оптимизацию процессов и достижение определённых целей.

Использованные источники:

1. 刘月华, 薄文娱. 实用现代汉语语法. – 北京: 商务印书馆, 2004. – 731 页.
2. 屈承喜. 汉语篇章语法：理论与方法. – 俄语预压文学研究. 2006 年, 三期. –第 1 页.
3. Горелов В.И. Теоретическая грамматика китайского языка. – Москва. Просвещение, 1989 г. – С127.
4. 杨玉玲. 现代汉语语法答问. 北京, 北京大学出版社, 2011. — 175 页.
5. https://www.gov.cn/zhuanti/2024zgjjnb/index.htm

Атаниязова М. Б.
заведующий кафедрой общеэкономических наук
Ташкентский Университет Прикладных наук (UTAS)
ORCID 0009-0000-9403-6693

ПОНЯТИЕ И СУЩНОСТЬ ЦИФРОВОЙ ЭКОНОМИКИ, ЗАРУБЕЖНЫЙ ОПЫТ ЦИФРОВОЙ ЭКОНОМИКИ

Аннотация: *В статье рассматривается понятие и сущность цифровой экономики как формы экономической деятельности, основанной на использовании цифровых технологий, информационно-коммуникационных сетей и данных в качестве ключевых факторов производства. Раскрываются основные подходы к определению цифровой экономики (от интернет-экономики до широкой цифровизации всех секторов), её отличительные черты: сетевые эффекты, высокая масштабируемость, роль больших данных, искусственного интеллекта и платформенных моделей. Особое внимание уделяется зарубежному опыту развития цифровой экономики. Анализируются лидеры в этой сфере: США (с фокусом на инновации и платформы вроде Google, Amazon), Китай (стратегия «Интернет+», быстрый рост электронной коммерции и цифрового юаня), Европейский союз (Единый цифровой рынок, акцент на регуляции и защите данных), а также страны вроде Сингапура, Швеции и Великобритании. Обсуждаются успешные национальные программы, факторы роста и вызовы, такие как цифровой разрыв и монополизация. Статья подчёркивает актуальность заимствования положительного зарубежного опыта для ускорения цифровой трансформации в развивающихся экономиках.*

Ключевые слова: Экономические факторы, экономическая безопасность, формирование цифровой экономики, *цифровая экономика, цифровизация, зарубежный опыт, платформенная экономика, большие данные, искусственный интеллект, США, Китай, Европейский союз, цифровая трансформация.*

Ataniyazova M. B.
head of the department of general economic sciences
Tashkent University of Applied Sciences (UTAS)
ORCID 0009-0000-9403-6693

CONCEPT AND ESSENCE OF THE DIGITAL ECONOMY, FOREIGN EXPERIENCE OF THE DIGITAL ECONOMY

Annotation: *The article examines the concept and essence of the digital economy as a form of economic activity based on the use of digital technologies, information and communication networks, and data as key factors of production.*

The main approaches to defining the digital economy are revealed (from the internet economy to broad digitization of all sectors), along with its distinctive features: network effects, high scalability, the role of big data, artificial intelligence, and platform models. Particular attention is paid to foreign experience in the development of the digital economy. Leaders in this field are analyzed: the USA (with a focus on innovation and platforms such as Google and Amazon), China (the "Internet+" strategy, rapid growth of e-commerce and the digital yuan), the European Union (Single Digital Market, emphasis on regulation and data protection), as well as countries such as Singapore, Sweden, and the United Kingdom. Successful national programs, growth factors, and challenges such as the digital divide and monopolization are discussed. The article emphasizes the relevance of adopting positive foreign experience to accelerate digital transformation in developing economies.

Key words: *Economic factors, economic security, formation of the digital economy, digital economy, digitization, foreign experience, platform economy, big data, artificial intelligence, USA, China, European Union, digital transformation.*

Узбекистан стремится занять место в рядах сильных демократических, всесторонне развитых стран, построить свободную страну, свободную от опасных для развития пороков - коррупции, взяточничества, непотизма, кланового регионализма. Страна работает, чтобы прославить человеческое достоинство, дать ему качественное образование, создать достойные условия для людей, войти в число 50-ти развитых стран мира. Действительно, журнал The Economist признал Узбекистан «Страной года» среди примерно 200 стран мира. Задача перехода к цифровой экономике в ближайшие пять лет также была с энтузиазмом поддержана специалистами и экспертами. Возрастает потребность в цифровизации общества и социально-экономических сфер для борьбы с указанными пороками и их ликвидации. Это, в свою очередь, требует много ресурсов. Потребуется перестроить социальные отношения, перестроить навыки сотрудников, мировоззрение, сформировать цифровую грамотность и компетентность. Люди станут ценным ресурсом цифровой экономики, и их роль неизмеримо возрастет.

Цифровая экономика — это преобразование существующей традиционной экономики в новую систему путем создания новых технологий, платформ и электронных бизнес-моделей и их применения в повседневной жизни. Хотя основоположником цифровой экономики был великий ученый Аль-Хоразми, такие учёные как М. Кастельс, Дон Топскотт и Николас Негропонте впервые использовали этот термин в 1995 году. Цифровая экономика представляет собой единую систему цифровизации, сбора, обработки и передачи всей информации в рамках деятельности человека. Цифровизация экономики дает возможность сохранить конкурентоспособность в долгосрочной перспективе.

Следует отметить, что одним из основных терминов цифровой экономики является алгоритм. Глядя на историю этого термина, мы видим,

что он тесно связан с именем нашего земляка, великого математика и исследователя Мухаммада ал-Хоразми. В 1849 году французский востоковед Жозеф Туссен Рейно (1795-1867) утверждал, что этот термин произошел от слова «Аль-Хорезми». Таким образом, «алгоритм» образовался в результате латинского представления «Аль-Хорезми».

Абу Райхан Мухаммад ибн Ахмад аль-Беруни (973-1048) – один из наших великих мыслителей, обладавший глубокими познаниями в области математики, экономики и истории XI века. Одной из замечательных идей Аль-Беруни являются экономические факторы, играющие важную роль в формировании и развитии общества, - производство материальных благ, разделение труда и обращение товаров и денег. По его мнению, обращение денег в виде золота и серебра среди людей не имеет особого значения, ибо не может удовлетворить всякую потребность человека. Только посредством обмена товаров деньги имеют стоимость.

В период, когда Беруни возглавлял «Академию Мамуна» (1010-1017 гг.), он руководил многими научными исследованиями в области математики, чисел, экономики и государственного управления и внес неоценимый вклад в развитие мирских знаний. Таким образом, корни цифровой экономики уходят в нашу древнюю историю, в научную деятельность наших предков.

Если мы не будем полностью и глубоко понимать цифровую экономику, мы многое потеряем в своей жизни, то есть не сможем приобрести необходимые знания в бизнесе, образовании, расходах и доходах из бюджета, налоговых поступлениях, потоках наличных денег, банковском деле и, наконец, важности государственного управления.

Для большинства предпринимателей, работающих как в реальном секторе национальной экономики, так и в цифровой экономике, она не понятна во всех аспектах. Основной и действенной движущей силой цифровой экономики является государство, главный заказчик и потребитель. Вот почему китайское правительство ежегодно тратит 9-10 миллиардов долларов США на реализацию этих целей и в результате достигает большой эффективности.

Цифровая экономика представляет собой очень сложную систему, которая формируется человеком, то есть человек контролирует, определяет, организует и планирует эту всеобъемлющую систему, и все это направлено на обеспечение устойчивого экономического роста, улучшение жизни и уровня жизни человека. Современное состояние цифровой экономики, бурное развитие деятельности ее взаимообусловленных составляющих элементов соответствует XX-XXI векам. Система цифровой экономики и ее формирование показаны на рисунке 1.1.1:



Рис 1.1.1. Формирование цифровой экономики

Формирование цифровой экономики и ее эффективное функционирование в основном зависят от трех опорных блоков (систем), которые, в свою очередь, взаимообусловлены. Каждое из них, то есть техническое, информационное и математическое обеспечение, должно непрерывно развиваться на основе научных исследований. Практический пример: модель межотраслевого баланса (затраты - производство), созданная лауреатом Нобелевской премии В.Леонтьевым в 20-х годах прошлого века, не применялась на практике до 1960 г., в связи с отсутствием высокоэффективных аппаратур. Высокопроизводительные ЭВМ на тот момент еще не изобрели.

Период становления технического обеспечения состоит из двух этапов, то есть изобретения электронно-вычислительных машин (1945-1980-е годы) и периода современного управления, технических средств, компьютеров (1980-настоящее время).

В изобретении новых приемов и технологий создана информационная система измерения, передачи, хранения и обработки информации, которая сегодня широко используется на практике, математически смоделированы задачи оптимального управления, многовариантного производства и они на сегодняшний день широко используются на практике.

Цифровая экономика близка к практике, а ее основу составляет содержание и сущность фундаментальных и прикладных наук. Управление обществом, государством, промышленностью, предприятиями и даже семьей осуществляется на основе цифр. Все движение и бездействие окружающих нас существ имеют свое количество и выражаются они в числах. Числа играют роль информации в человеческом взаимодействии и анализе. В этом практическая сторона этой теории. В управленческой практике числа являются основным рычагом в качестве информации. Поэтому преподавание, изучение и эффективное овладение этой теорией чрезвычайно важно и имеет свои особенности.

Основываясь на освоении науки цифровой экономики на необходимом уровне, будущий специалист может широко применять и продвигать свои знания и навыки непосредственно на практике. То есть функциями, которые должны выполняться в деятельности цифровой экономики, являются организация, управление, планирование и прогнозирование реальных секторов экономики, деятельности предприятий и юридических лиц, осуществление экономического анализа на макро- и микроуровень, основанный на передовых ИКТ и методах.

Для полноценного освоения цифровой экономики от учащихся требуется наличие достаточных знаний по ряду предметов. Неразрывная связь этой дисциплины с другими дисциплинами отражена на рисунке 1.1.2 ниже.

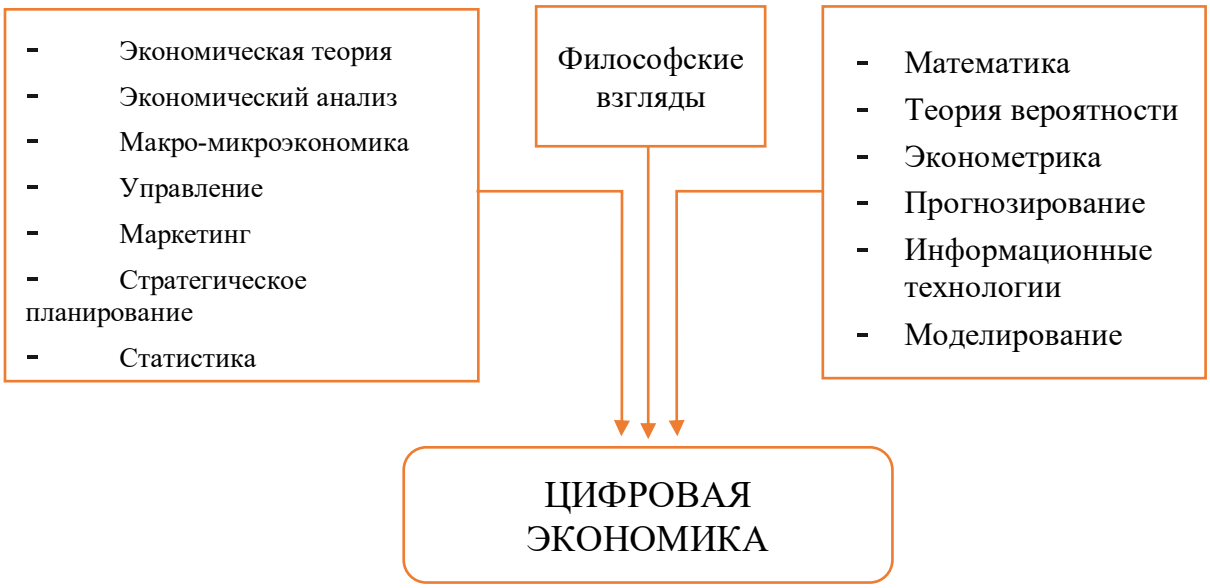


Рис.1.1.2. Модель взаимосвязи необходимых дисциплин для изучения цифровой экономики

Согласно приведенному выше рисунку, для организации деятельности цифровой экономики необходимы две области знаний: цифровая – математика, эконометрика, информационные технологии, науки о программировании и моделировании; экономическая - экономическая

теория, анализ, макроэкономика и микроэкономика, стратегическое планирование, менеджмент и маркетинг. Основными условиями альтернативного функционирования цифровой экономики являются эффективное использование имеющегося интеллектуального потенциала, методики технологий на основе инновационного подхода.

Основная цель науки «Цифровая экономика» - дать возможность студентам широко использовать информационные и коммуникационные технологии, сформировать положительные навыки в социально-экономической деятельности - управление, планирование и установка перспектив.

Если рассматривать формирование цифровой экономики с исторической точки зрения можно сделать вывод, что ее составные элементы создавались с X-XI веков и получили бурное развитие в последние XX-XXI века, были изобретены новые аспекты, приемы и технологии. Несмотря на то, что то термин «Цифровая экономика» впервые был использован в 1995 году, а сегодня он признан во всех странах мира, было бы неверным думать, что до 1995 года цифровой экономики не существовало [33] . Цифровая экономика, как было сказано выше, формировалась веками. Экономика никогда не была цифровой и не будет. Но здесь требуется гораздо шире представить её истинное значение. То есть цифровая экономика представляет собой сложную систему, состоящую из выражения необходимой в деятельности человека информации на основе чисел, а также анализа, планирования и альтернативного управления экономикой с широким использованием современных информационных технологий. Основными составляющими цифровой экономики являются математика, основанная на числах, различные ее направления, информация, их сбор, обработка, передача, а также приемы и технические средства, обеспечивающие их практическое применение (компьютер, Интернет, технические средства). Конечно, здесь экономика страны рассматривается как конкретный объект.

Узбекистан играет особую роль в формировании цифровой экономики. В бывшем Союзе, то есть в 60-е годы прошлого века, в составе Академии наук Узбекистана было создано научно-производственное объединение “Кибернетика”, в Киеве, Украина, в составе академической системы - Научно-исследовательский институт “Кибернетика”, в Москве в составе Академии - научно-исследовательский институт “Центральная экономическая математика”. Теоретико-методологические и практические

[33] Цифровую экономику изучали великие ученые (В.Лейбниц- «Дело вычислительных машин»; А. Тьюринг- «Может ли алгоритм и вычислительная машина мыслить как человек?»; Н.Виннер- «Основоположник искусственного интеллекта»; М.В.Келдыш- «Программист-программ»; .В.Конторович- «Математические основы экономики» ; В.N.Глушков — «Безбумажная информация», —»Работа по автоматизации общества», -«Работа по широкополосному интернету»; Ю.В.Гуляев - «Работа о цифровой экономике»; А.Р. Ершов – «Знание, образование, информация-как основные производительные силы») они сделали научную интерпритацию в своих работах.

аспекты «Цифровой экономики», разработанные на сегодняшнем уровне, в основном были созданы в вышеуказанных научных направлениях.

Если изучать основоположников цифровой экономики, то они охватывают длительный исторический период. Как было сказано выше, экономику невозможно представить без цифр. Поэтому не только экономика, но и все процессы и ситуации, окружающие человека и общество, имеют количественное изменение. В то же время количество всегда выражалось и будет выражаться в цифрах.

Использованные источники:

1. Мирзиёев Ш.М. Вместе мы построим свободную и процветающую, демократическую страну Узбекистан. Выступление на совместном заседании палат Олий Мажлиса, посвященном церемонии вступления в должность Президента Республики Узбекистан. / Ш.М.Мирзиёев. -Ташкент: Узбекистан, 2016.
2. Ш. М. Мирзиёев Критический анализ, строгая дисциплина и личная ответственность должны быть ежедневными правилами деятельности каждого руководителя. Доклад на расширенном заседании Кабинета Министров, посвященный основным итогам социально-экономического развития нашей страны в 2016 году и важнейшим приоритетам экономической программы на 2017 год. 14 января 2017 г. Ташкент: Узбекистан, 2017.
3. Новикова Е.Н., Юсупова И.В. Цифровая экономика и маркетинг.
4. Учебное пособие. Казань, 2019.
5. Цифровая экономика: электронный бизнес. Тульский финансовый университет. Тула, 2018, 300 стр.
6. Мир новой экономики. - М., 2018, 344 с.
7. Мялковский И.К. Элементы цифровой экономики. Учебное пособие. СПб, 2018, 310 с.
8. Гуломов С.С., Абдуллаев А.М. Современные информационные системы и технологии в экономике. - Т.: «Импресс Медиа», 2018.

Ахмадов М. Р.
преподаватель
кафедра узбекского языка и литературы,
русского и английского языков
БУХМИ

ЭТНОКУЛЬТУРНАЯ ОБУСЛОВЛЕННОСТЬ РЕПРЕЗЕНТАЦИИ ГЕНДЕРА В МЕДИЦИНСКОЙ И СОЦИАЛЬНОЙ РЕКЛАМЕ

Аннотация: *В данной работе рассматривается национально-культурная обусловленность представления гендерных ролей в рекламе, особенно в контексте медицинских товаров и услуг. Анализируется, как этнокультурные особенности и социальные стереотипы влияют на изображение мужчин и женщин в рекламных текстах. Особое внимание уделяется различиям в использовании гендерно-специфической лексики в рекламе, ориентированной на мужскую и женскую аудиторию. Раскрываются ключевые лингвистические подходы к изучению гендера, включая сопоставительный, социолингвистический и когнитивный. Работа подчеркивает важность учета культурных и гендерных факторов при создании рекламного дискурса и формировании инклюзивной языковой практики. Также рассматривается роль прилагательных и медицинской терминологии в создании эффективного рекламного сообщения. Проведённый анализ подчеркивает необходимость развития гендерно-чувствительного подхода в рекламе для борьбы с дискриминацией и стереотипами.*

Ключевые слова: *гендерные роли, реклама, лингвистика, гендерная лексика, национально-культурная обусловленность, гендерные стереотипы, этнокультурная специфика, гендерная асимметрия, мужская и женская речь, рекламный дискурс, медицинская реклама, гендерное равенство, социальные конструкции, когнитивный подход, социолингвистика, инклюзивный язык, женственность, мужественность, стереотипизация, маркетинг по полу.*

Ahmadov M. R.
lecturer
department of uzbek language and literature,
russian and english languages
Bukhara State Medical Institute (BSMI)

NATIONAL AND CULTURAL DETERMINANTS OF GENDER ROLES REPRESENTATION IN ADVERTISING

Abstract: *This paper discusses the national and cultural determinants of gender role representation in advertising, especially in the context of medical*

products and services. The influence of ethnocultural peculiarities and social stereotypes on the depiction of men and women in advertising texts is analyzed. Particular attention is given to the differences in the use of gender-specific lexicon in advertisements targeted at male and female audiences. Key linguistic approaches to the study of gender, including comparative, sociolinguistic, and cognitive approaches, are outlined. The paper emphasizes the importance of considering cultural and gender factors when creating advertising discourse and developing inclusive language practices. It also examines the role of adjectives and medical terminology in crafting effective advertising messages. The analysis highlights the necessity of developing a gender-sensitive approach in advertising to combat discrimination and stereotypes.

Keywords: *gender roles, advertising, linguistics, gender lexicon, national-cultural determinants, gender stereotypes, ethnocultural specificity, gender asymmetry, male and female speech, advertising discourse, medical advertising, gender equality, social constructs, cognitive approach, sociolinguistics, inclusive language, femininity, masculinity, stereotyping, gender marketing.*

Этнокультурная специфика гендерной асимметрии в рекламном дискурсе обусловлена различиями в культурных ценностях, нормах и традициях различных этносов. Эти различия могут привести к усилению стереотипов о мужчинах и женщинах, а также к неравноправному представлению их в рекламе. Национально-культурная обусловленность представления гендерных ролей в рекламе также играет важную роль в формировании восприятия аудитории. Различные культурные контексты могут влиять на способы изображения мужчин и женщин в рекламе, а также на то, какие роли им отводятся. Этнические и культурные особенности могут сильно влиять на то, какие качества и характеристики считаются желательными или нежелательными для мужчин и женщин. В некоторых культурах, мужчинам могут отводиться более активные и сильные роли, в то время как женщины могут быть ожидаемо более пассивными и заботливыми. Эти стереотипы могут отражаться и усиливаться в рекламных материалах, что в свою очередь может создавать неравноправное представление полов. Кроме того, различные культуры могут иметь свои уникальные символы, обычаи и традиции, которые также могут быть важными факторами при создании рекламных кампаний. Понимание этих особенностей поможет рекламодателям создавать более эффективные и респектабельные объявления, которые будут учитывать разнообразие и многообразие культур и гендерных ролей. Важно также отметить, что идентичность пола и культурная принадлежность могут взаимодействовать и влиять друг на друга, формируя сложные и уникальные комплексы в рекламном дискурсе. Понимание этого взаимодействия поможет создать более инклюзивные и эмпатичные рекламные кампании, которые будут отражать разнообразие и многогранность гендерных ролей в различных культурных контекстах. Изучение гендера в современной лингвистике

является актуальной, интересной и неисчерпаемой темой. Начало этому направлению было положено еще в 60-70-е годы XX века. Гендер определяется как совокупность социальных и культурных норм, которые общество предписывает выполнять людям в зависимости от их биологического пола.

Важно отличать гендер от пола:

Пол – это совокупность генетических признаков, структурная и функциональная характеристика организма, отражающая его особые репродуктивные свойства. Гендер же является социальным конструктом, который может меняться с течением времени.

Понятие “гендер” широко используется в психологии, медицине, где оно определяет темперамент, характер, личностные качества, эмоции, манеры поведения, свойственные тому или иному полу.В лингвистике гендер становится объектом изучения гендерных особенностей речи женщин и мужчин. Это проявляется в: Тембре голоса, эмоциональности, экспрессивности речевых конструкций. Изучение гендерных аспектов языка позволяет:

Выявить стереотипные представления о мужчинах и женщинах, зафиксированные в языке. Проанализировать, как эти стереотипы влияют на общение между людьми. Разработать рекомендации по более нейтральному и не дискриминационному использованию языка. Важно отметить, что гендерные исследования в лингвистике находятся на стадии активного развития. Появляются новые теории и методы исследования, которые позволяют более глубоко понять, как гендер влияет на язык и общение.

Изучение гендера в лингвистике имеет большое значение для:

Понимания того, как язык отражает и формирует гендерные отношения.

Противодействия гендерной дискриминации .

Содействия гендерному равенству.

В современной лингвистике при изучении гендера выделяют три основных подхода:

1. Сопоставительный анализ мужской и женской речи:

Сравнение отличительных черт мужской и женской речи

В зависимости от социального статуса речевых партнеров.

Методы:

Анализ лексики, грамматики, фразеологии

Сравнительный анализ текстов, созданных мужчинами и женщинами.

2. Социолингвистический подход:

Изучение языковых характеристик речи мужчин и женщин

С учетом социальных факторов (возраст, образование, профессия).

Методы:

Опросы, интервью, анкетирование.

Анализ дискурса в различных социальных контекстах.

3. Когнитивный подход:

Изучение когнитивных оснований языковых различий мужчин и женщин.

Методы:

Экспериментальные исследования.

Анализ когнитивных метафор. Эти подходы не являются взаимоисключающими. Напротив, они взаимодополняют друг друга и позволяют получить более полное представление о гендерной специфике языка.

Помимо этих трёх основных подходов, в гендерной лингвистике используются и другие методы, такие как: дискурс-анализ. Контент-анализ.

Этнолингвистические исследования. Изучение гендера в лингвистике имеет большое значение для:

Понимания того, как язык отражает и формирует гендерные стереотипы.

Противодействия гендерной дискриминации и сексизму.

Содействия гендерному равенству.

В данной части текста представлены:

Три основных подхода к изучению гендера в лингвистике.

Методы, используемые в рамках каждого подхода.

Л.Р. Диасамидзе в своей работе по сопоставительному языкознанию выделяет ряд ситуативных параметров коммуникации, которые не всегда можно однозначно связать с мужским или женским полом.

Эти параметры носят универсальный характер и влияют на коммуникацию в целом, не завися от гендера.

К ним относятся:

Его личное отношение к теме разговора.

Ограниченная тематика общения.

Психологическая раскрепощенность собеседника.

Гибридный характер письменной речи.

В.Н. Четверикова подчеркивает, что мужскую и женскую речь необходимо изучать в контексте конкретных текстов.

Речь одного и того же человека может меняться в зависимости от ситуации общения, темы разговора и других факторов.

Место общения (дома, на работе, в официальной обстановке) также влияет на речевое поведение. М.В. Томская отмечает, что гендерные модели поведения не заложены в природе, а формируются обществом. Они предписываются человеку институтами социального контроля и культурными традициями.

Гендерные отношения являются важной частью социальной организации.

Языковые особенности человека влияют как биологические, так и социальные факторы. Важно учитывать взаимосвязь этих факторов при изучении языка и коммуникации. А.В. Кирилина и М.В. Томская выделили две важные группы исследований гендера в языкознании:

1. Язык и отражение в нем пола:

Как обозначаются мужчины и женщины в языке.

Какие существуют гендерно-маркированные слова и выражения.

Как эти слова и выражения влияют на восприятие людей.

Категория рода:

Как категория рода проявляется в разных языках.

Как она влияет на восприятие гендерных ролей.

Лексика:

Какие слова и выражения чаще используются мужчинами и женщинами.

Как эти слова и выражения отражают гендерные стереотипы.

Главная задача этого подхода – понять, как половая принадлежность влияет на речь человека. Исследователи изучают, какие языковые средства приписываются мужчинам и женщинам, и в каких семантических областях эти различия наиболее заметны.

2. Речевое и коммуникативное поведение мужчин и женщин:

Мужская и женская речь:

Как мужчины и женщины говорят по-разному.

Какие особенности речи характерны для каждого пола.

Как эти особенности влияют на коммуникацию.

Мужской и женский стиль:

Как мужчины и женщины используют язык в разных ситуациях.

Какие стратегии общения характерны для каждого пола.

Как эти стратегии влияют на достижение целей в коммуникации.

В рамках этого подхода исследователи изучают гендерно маркированные лексические единицы и синтаксические конструкции.

Они анализируют, как с помощью этих языковых средств люди добиваются успеха в коммуникации.

Изучение этих двух групп исследований позволяет понять, как гендер влияет на язык и коммуникацию.

Это знание может быть использовано для:

Противодействия гендерной дискриминации и сексизму.

Содействия гендерному равенству.

Разработки более эффективных коммуникативных стратегий.

В современном мире исследования гендерной специфики языка приобретают все большую актуальность.

Это связано с тем, что гендерные стереотипы и дискриминация по-прежнему остаются серьезной проблемой. Изучение гендерного аспекта языка позволяет лучше понять, как язык отражает и формирует гендерные представления.

В данной работе мы предлагаем использовать методы сопоставительного анализа для изучения гендерного аспекта рекламных текстов медицинской тематики.

Это позволит нам:

Выявить, какие языковые средства используются в рекламных текстах, ориентированных на мужскую и женскую аудиторию.

Проанализировать, как эти языковые средства влияют на восприятие рекламы адресатами.

Сравнить, как гендерный аспект проявляется в рекламных текстах на русском и узбекском языках.

Изучение этой темы имеет большое значение для:

Разработки более эффективных рекламных кампаний, учитывающих гендерную специфику аудитории.

Противодействия гендерным стереотипам и дискриминации.

Повышения гендерной грамотности общества.

Гендерная специфика лексики в рекламе медицинских товаров и услуг

В современной рекламе медицинских товаров и услуг все чаще используется гендерно-специфическая лексика. nЭто означает, что при создании рекламных текстов учитывается пол целевой аудитории. Для женской аудитории используется лексика, которая подчеркивает женственность, красоту, молодость, здоровье.

Такие слова, как: Женственность, Упругость, Ласковость, Заботливость, Очаровательность, Нежность.

Для мужской аудитории используется другая лексика, которая подчёркивает силу, мужественность, успех.

Такие слова, как: Сила, Мощь, Энергия, Успех, Лидерство, Доминантность.

Они позиционируют рекламируемый продукт или услугу как способ улучшить свою физическую форму, повысить социальный статус, стать более успешным. Важно отметить, что использование гендерно-специфической лексики может быть как эффективным, так и неэффективным. Если она подобрана удачно, то она может привлечь внимание целевой аудитории и увеличить продажи. Но если она используется неумело, то она может раздражать потребителей и даже вредно влиять на их самооценку. Например, текст рекламы косметологической услуги или пластической хирургии, предназначенный для женского пола, может содержать такие фразы:

“Станьте неотразимой красавицей всего за одну процедуру!”

“Ваша кожа будет сиять молодостью и здоровьем!”

“Избавьтесь от морщин и завоевывайте мир своей красотой!”

Эти фразы могут создать у женщин впечатление, что они не достаточно красивы и им нужно что-то изменить в своей внешности. Это может привести к низкой самооценке и чувству неуверенности в себе.

Например: *Омоложение без уколов: революция в уходе за кожей!*

Подарите своей коже сияние и молодость! Новая революционная процедура по уходу за кожей дарит видимый результат уже с первых минут. Эффект ботокса без инъекций, боли и реабилитации! Первая

процедура по акционной цене – всего 250.000 сум. В стоимость сеанса входит диагностика и консультация врача.

Запишитесь на процедуру уже сейчас по телефону: +998900161188.

Ждем вас по адресу: г. Ташкент, Проспект Бунёдкор 15/1, 3-4 этаж.

- на узб.яз., *«Nano Botoks EFFEKT 90% ajinlar darhol tekkislanadi. Ko`z ostidagi qorong`u doiralar va xaltalar yoqoladi»;*

В современном мире женщины уделяют большое внимание своей красоте и здоровью. Реклама, ориентированная на женскую аудиторию, часто использует медицинскую лексику, чтобы подчеркнуть эффективность продукта и вызвать доверие у потребителей. В этом параграфе мы рассмотрим, как используется медицинская лексика в рекламе товаров для красоты и здоровья женщин.

1. Реклама средств для ухода за кожей.

В этой группе рекламных текстов часто используются такие слова и фразы:

“Гиалуроновая кислота”. “Коллаген”. “Антиоксиданты”. “Витамины”. Омоложение”. “Подтяжка”. “Увлажнение”. “Питание”.

Эти слова и фразы создают у потребителей впечатление, что рекламируемый продукт является профессиональным и эффективным.

Примеры:

“Крем с гиалуроновой кислотой для глубокого увлажнения кожи”.

“Сыворотка с коллагеном для повышения упругости кожи”.

“Антиоксидантная маска для защиты кожи от свободных радикалов”.

2. Реклама декоративной косметики.

В этой группе рекламных текстов медицинская лексика используется более осторожно.

В основном она используется для подчеркивания безопасности продукта.

Примеры:

“Гипоаллергенная тушь для ресниц”.

“Дерматологически протестированная помада”.

“Некомедогенная тональная основа”.

3. Реклама парфюмерии.

В рекламе парфюмерии медицинская лексика используется для создания определенного образа.

Примеры:

“Аромат, который пробуждает чувства”.

“Парфюм, который подчеркнет вашу женственность”.

“Эликсир красоты и молодости”.

Важно отметить, что использование медицинской лексики в рекламе должно быть оправданным.

Не стоит использовать сложные термины, которые не понятны потребителям.

Также не стоит приписывать продукту свойства, которыми он не обладает. Помимо этого, важно учитывать психологические особенности женской аудитории. Женщины более эмоциональны, чем мужчины, поэтому реклама должна быть не только информативной, но и эмоциональной.

Использование медицинской лексики может быть эффективным инструментом для продвижения товаров для красоты и здоровья женщин.

- на рус.яз., « *Карбоновый пилинг на неодимовом лазере Monaliza:*

- *Очищение и омоложение вашей кожи за один сеанс!*

- *Карбоновый пилинг на неодимовом лазере Monaliza - это революционная процедура, которая дарит вам чистую, сияющую и молодую кожу.*

- *Побалуйте себя этой роскошной процедурой и почувствуйте себя неотразимой!* . *Werbenshop сыворотка для лица:* - *Секрет молодости и красоты вашей кожи*! *Werbenshop сыворотка для лица - это концентрированная формула, которая обеспечивает видимый эффект с первого применения и* т.п.

- *на узб.яз., «Charcoal Mask CreamQora maska yuzni tiniqlashtiradi. sifatiga 100% garantiya»; «MERS SPETSIAL» kollagenli krem-muss Go`zal qiyofangiz uchun zarur yordam»; «EXPIGMENT YUZINGIZDA QORA DOG' YOKI SEPKIL BORMI? SIQILMANG ENDI BUNI ONSON DAVOSI BOR. 1OYDA YUZINGIZDA SEPKILXAM DOG'DAN XAM ASAR QOLMAYDI»; «Green TUZ mask stick Niqob terini yaxshilab tozalash, teshiklarni tozalash va qora dog'larni olib tashlash uchun mo'ljallangan, shu bilan birga terini shaffof rangga berib, darhol jilolaydi» и т.п.*

В рекламе, ориентированной на женскую аудиторию, прилагательные играют особую роль. Они позволяют создать яркий и привлекательный образ продукта, подчеркнуть его преимущества и убедить покупателей в его эффективности. В наших примерах мы видим, как авторы используют прилагательные, чтобы:

Описать воздействие продукта на женскую красоту.

Подчеркнуть его полезные свойства.

Вызвать у потребителей эмоции.

Например:

“Werbenshop сыворотка для лица - это концентрированная формула, которая обеспечивает видимый эффект с первого применения”.

“Карбоновый пилинг на неодимовом лазере Monaliza - это революционная процедура, которая дарит вам чистую, сияющую и молодую кожу”. Важно отметить, что при использовании прилагательных в рекламе необходимо соблюдать несколько правил:

Прилагательные должны быть точными и соответствовать реальным свойствам продукта. Не стоит использовать слишком много прилагательных, так как это может сделать текст нечитаемым. Прилагательные должны быть эмоциональными и вызывать у потребителей желание купить продукт.

В отличие от женщин, мужчины ценят конкретику. Это обусловлено такими личностными качествами, как: Мужественность, Вол, Уверенность в себе, Целеустремленность.

Современные мужчины активно используют интернет, что привело к глобализации мужских образов. Силуэты мужчин из разных стран мира вдохновляют представителей сильного пола на изменения во внешности.

В этой части текста мы рассмотрим, как использовать конкретику и медицинскую лексику в рекламе, ориентированной на мужскую аудиторию.

1. Реклама средств для восстановления волос.

В этой группе рекламных текстов важно использовать:

Точные данные о количестве выпавших волос, которое может остановить продукт.

Сроки, за которые можно ожидать результата.

Описание механизма действия продукта.

Отзывы реальных покупателей.

Примеры:

“Шампунь против выпадения волос “X” останавливает выпадение волос до 98% уже через 2 недели использования”.

“Мезотерапия для роста волос - это эффективный метод, который позволяет увеличить густоту волос на 20-30% за курс из 10 процедур”.

2. Реклама услуг по пересадке волос.

В этой группе рекламных текстов важно подчеркнуть:

Опыт и квалификацию врачей.

Современные методы пересадки волос.

Безболезненность процедуры.

Натуральный результат.

Примеры:

“Клиника “X” - это лидер по пересадке волос в России. Наши врачи имеют более чем 20-летний опыт работы и используют самые современные методы пересадки волос”.

“Пересадка волос методом FUE - это безболезненная процедура, которая не оставляет рубцов. Результат пересадки волос выглядит абсолютно естественно”.

Таким образом, национально-культурная обусловленность представления гендерных ролей в рекламе обусловлена множеством факторов, включая уровень гендерного равенства в обществе, а также особенности потребительского поведения и ожиданий аудитории. Каждая культура имеет свои уникальные представления о мужественности и женственности, которые могут отражаться в том, какие роли и черты характера приписываются представителям разных полов в рекламе. Кроме того, экономическая обстановка также оказывают влияние на то, каким образом гендерные роли представляются в рекламе в различных культурах.

Использованные источники:

1. Барковская, Е. В. (2018). Гендерные стереотипы в рекламном дискурсе: анализ языковых средств. Москва: Издательство «Лингвистика».
2. Бахтин, М. М. (1996). Теория речи и коммуникативный дискурс. Санкт-Петербург: Издательство «Речь».
3. Воронцова, И. А. (2015). Социолингвистический аспект гендерной лексики в рекламном дискурсе. Москва: Издательство «Наука».
4. Герцен, А. И. (2001). Теория рекламы как социального явления. Санкт-Петербург: Издательство «Петербургская наука».
5. Жилина, Л. В. (2017). Гендерная лексика в языке рекламы: Теоретический и прикладной аспекты. Екатеринбург: Издательство Уральского университета.
6. Bozorov Z.A International scientific and practical conference “Modern psychology and pedagogy: problems and solutions” “Imperial College London” 2021–2022. 165–169 б.
7. Bozorov Z.A. Essence, structure and functions of civil culture. International engineering journal for research & development. Published in Volume 6 Special Issue , January 2021 of IEJRD E–ISSN: 2349–0721 , Peer Reviewed & Referred Journal.
8. Bozorova G. FORMATION OF ABBREVIATIONS IN MEDICAL TERMINOLOGY IN UZBEK LANGUAGE //Центральноазиатский журнал образования и инноваций. – 2024. – Т. 3. – №. 3. – С. 86–89.
9. Bozorova, G. (2023). ЛИНГВОПРАГМАТИЧЕСКАЯ ХАРАКТЕРИСТИКА ПЛЕОНАСТИЧЕСКИХ ЕДИНИЦ ИСПОЛЬЗУЕМЫХ В ПОЛИТИЧЕСКОЙ РЕЧИ. Центр Научных Публикаций (buxdu.Uz), 34(34). извлечено от https://journal.buxdu.uz/index.php/journals_buxdu/article/view/9752
10. Samandarova G. Y. Fundamentals of folk proverbs formed on the basis of the lexical–spiritual group of insects. Current research journal of philological sciences, 2 (05), 39–42. – 2021.
11. Samandarova , G. Y. (2023). BASIS OF THE LEXICAL SENTENCE GROUP “INSECT” IN THE FORM OF A COMPOUND SENTENCE. INTERNATIONAL SCIENTIFIC CONFERENCE “ INNOVATIVE TRENDS IN SCIENCE, PRACTICE AND EDUCATION”, 2(4), 59–67. Retrieved from http://academicsresearch.ru/index.php/iscitspe/article/view/1493
12. Bozorov Z. A. “Exceptional role of motives and needs within the formation process of civic culture in students’ community.” Journal of Advanced Zoology 44 (2023): 3236–3244. https://jazindia.com/index.php/jaz/article/view/1595
13. Ashurovich, Bozorov Zayniddin. “Great Oriental Intellectuals about Civil Culture.” Web of Scholars: Multidimensional Research Journal 2 (2023): 21–24. https://innosci.org/wos/article/view/968

Ахмадов М. Р.
преподователь
кафедра узбекского языка и литературы,
русского и английского языков
БУХМИ

СЕМАНТИКА И СТИЛИСТИКА ЖЕНСКОЙ РЕКЛАМЫ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ РУССКОГО И УЗБЕКСКОГО ЯЗЫКОВ

Аннотация: *В статье рассматриваются языковые средства, используемые в рекламных текстах, ориентированных на женскую аудиторию, в сопоставлении русского и узбекского языков. Анализ проводится на фонетическом, лексическом, морфологическом и синтаксическом уровнях. Особое внимание уделяется эмоционально окрашенной лексике, гендерным стереотипам, заимствованной лексике и стилистическим фигурам. Отмечаются сходства и различия в подходах к женской рекламе в русской и узбекской языковой культуре. Работа подчеркивает значимость фонетических средств (аллитерация, ассонанс, ритм) как элементов суггестивного воздействия на потребителя.*

Ключевые слова: *женская реклама, языковые средства, эмоциональная лексика, фонетика, гендерные стереотипы, заимствования, русский язык, узбекский язык, стилистика, рекламный дискурс*

Ahmadov M. R.
lecturer
department of uzbek language and literature,
russian and english languages
BSMI

LINGUISTIC SEMANTIZATION OF GENDER LEXICON IN RUSSIAN AND UZBEK ADVERTISING DISCOURSE

Abstract: *This article examines the linguistic tools used in advertising texts aimed at female audiences in comparison between the Russian and Uzbek languages. The analysis is conducted at phonetic, lexical, morphological, and syntactic levels. Special attention is given to emotionally charged vocabulary, gender stereotypes, borrowed lexicon, and stylistic figures. The similarities and differences in approaches to female advertising in Russian and Uzbek language cultures are highlighted. The study emphasizes the importance of phonetic devices (alliteration, assonance, rhythm) as elements of suggestive influence on the consumer.*

Keywords: *female advertising, linguistic tools, emotional vocabulary, phonetics, gender stereotypes, borrowings, Russian language, Uzbek language, stylistics, advertising discourse*

Семантизация лексики в рекламе – это ключевой аспект, особенно когда речь идет о медицинских услугах. Рекламный текст должен быть не только лаконичным, но и понятным широкой аудитории, даже если в нем используются незнакомые слова (термины). Для этого реклам производители используют различные приемы: Определения:

Дается краткое и ясное объяснение значения термина. Пример: «МРТ (магнитно-резонансная томография) – это метод исследования, который позволяет получить детальные изображения органов и тканей тела без использования рентгеновских лучей».

Синонимы: Используются более простые и понятные слова вместо сложных терминов. Пример: «Вместо «операция» можно сказать «хирургическое вмешательство»». Примеры: Приводится конкретный пример использования термина. Пример: «МРТ может быть использована для диагностики опухолей, травм и других заболеваний».

Визуализация: Используются изображения, фотографии или видео, чтобы сделать термин более понятным. Пример: В рекламе МРТ могут быть показаны изображения мозга или других органов, полученные с помощью этого метода. Помимо семантизации лексики, важно также учитывать национальные традиции, менталитет, этнокультурные ценности и социальное положение аудитории. Рекламный текст должен быть адаптирован к особенностям культуры и понятен людям с разным уровнем образования. Важно использовать уважительный тон и избегать дискриминационных высказываний. Соблюдение этих принципов позволит создать эффективную рекламу медицинских услуг, которая будет понятна и привлекательна для широкой аудитории. О.А. Прохватилова в своих работах освещает важные аспекты стилистического анализа, которые оказываются **необходимыми** при изучении медицинской лексики в рекламном тексте.

1. Выявление стилистически маркированных языковых единиц:

Лексика: Анализ использования терминов, профессионализмов, сленга и эмоционально окрашенной лексики. Определение их стилистической функции (информирование, убеждение, воздействие на эмоции). Грамматика: Использование специфических грамматических конструкций, например, пассивного залога, безличных предложений.

Анализ стилистической роли этих конструкций.

2. Стилистическая окрашенность языковых единиц: Сравнение нейтрального и рекламного функционирования медицинской лексики.Выявление смысловых сдвигов, возникающих в рекламном контексте. Определение экспрессивности, образности и других стилистических характеристик.

3. Стилистическая однородность текста:

Анализ взаимосвязи стилистической окрашенности языковых средств разныхуровней (лексики, грамматики). Выявление стилистической доминанты текста. Определение степени целостности и гармоничности восприятия рекламного сообщения. Использование положений

Прохватиловой позволяет: глубоко и всесторонне проанализировать рекламный текст с точки зрения использования медицинской лексики. Выявить стратегии воздействия на аудиторию, используемые рекламодателем. Оценить эффективность рекламного сообщения. Идеи О.А. Прохватиловой служат ценным инструментом для исследования семантизации медицинской лексики в рекламном тексте, помогая раскрыть его лингвистические особенности и воздействие на аудиторию. А.М. Македонцева верно подчёркивает, что глубокое понимание целевой аудитории является ключом к эффективности рекламной кампании. Чем больше информации о потенциальных потребителях имеет автор текста, тем точнее он сможет его составить, увеличивая шансы на желаемый отклик. По мнению Македонцевой, к ключевым сведениям о целевой аудитории относятся: Демографические данные: возраст, пол, раса, религия, уровень дохода, место проживания, образование. Социально-психологические характеристики**:** ценности, установки, интересы, стиль жизни, круг общения. Потребительские предпочтения: товары и услуги, которые человек уже использует, бренды, которым он доверяет, критерии выбора товаров. Психографические особенности: тип личности, мотивы поведения, потребности, ценности. Использование этих данных в рекламном тексте позволяет: Привлечь внимание целевой аудитории за счет использования релевантной лексики, тем и образов. Сформировать доверие к рекламе, демонстрируя понимание проблем и желаний потенциальных потребителей. Вызвать эмоциональный отклик, используя юмор, истории, примеры, соответствующие ценностям и опыту аудитории. Сформулировать ясное и привлекательное предложение, которое будет соответствовать ожиданиям целевой аудитории. Использовать подходящие каналы коммуникации, чтобы охватить максимальное количество потенциальных потребителей.

Македонцева также отмечает важность учета ментальных особенностей целевой аудитории. Рекламный текст должен соответствовать культурным нормам, стереотипам и ценностям людей, на которых он ориентирован. Следуя рекомендациям Македонцевой, авторы рекламных текстов могут повысить их эффективность, добиваясь желаемого отклика от целевой аудитории. Медицинская реклама насыщена специфической лексикой, призванной не только информировать, но и воздействовать на потребителя. Рассмотрим примеры текстов рекламы фармацевтических товаров на русском и узбекском языках, выделив ключевые особенности использования медицинской терминологии:

1. Привлечение внимания: Заголовки: Яркие, броские формулировки: "Першит в горле?" (рус.), "Yo'talingizmi qandaysa?" (узб.). Использование вопросительных предложений: "B-Fit для эффективного похудения?" (рус.). Создание интриги: "КАРДИОМАГНИЛ Дарит Вам Время." (рус.). Лексика: Использование общеупотребительных слов: "горло", "дыхание", "похудение" (рус.), "yo'tal", "nafas olish", "nog'ora olish" (узб.). Эмоционально окрашенная лексика: "Дарит Вам Время" (рус.).

2. Демонстрация эффективности:

Цифры и факты: "-10-15 кг за месяц!" (рус.). Сравнительные степени: "эффективное похудение" (рус.), "engilroq" (узб.). Глаголы, подчеркивающие действие: "облегчает", "дарит" (рус.), "yengillashtiradi", "beradi" (узб.).

3. Создание доверия:

Использование медицинских терминов: "МИРАМИСТИН", "АКВАЛОР", "КАРДИОМАГНИЛ" (рус.), "Xlorofillipt", "Grippferon", "Livolin" (узб.). Ссылки на авторитетные источники: "во время «COVID-19»" (рус.). Использование изображений медицинских работников (в некоторых случаях).

4. Призыв к действию:

Прямые императивы: "Берегите себя и своё здоровье" (рус.), "Sotib oling va sog'ligingizni saqlaying!" (узб.). Использование вопросительных предложений: "Хотите похудеть?" (рус.). Сравнительный анализ русских и узбекских примеров:

Сходства:

Структура: заголовок, основной текст, призыв к действию. Использование медицинской терминологии. Эмоциональная окрашенность языка.

Различия:

Специфика медицинских терминов. Лингвистические особенности построения предложений. Культурные особенности восприятия информации. В целом, использование медицинской лексики в рекламе является мощным инструментом воздействия на потребителя. Однако важно подходить к этому вопросу с осторожностью, соблюдая этические нормы и учитывая особенности целевой аудитории. В предыдущем примере мы рассмотрели использования медицинской лексики в рекламе фармацевтических препаратов. В данном примере мы расширим анализ, охватив рекламу:

Медицинских услуг: Матрасы: "Беспружинные матрасы Sleepvip. Гарантия 8 лет!"

Пересадка волос: "Акция года. Пересадка волос. Скидка 30%" Рефлексотерапия: "РЕАЦЕНТР ТАШКЕНТ Микротоковая рефлексотерапия в Бухаре" Детские товары: "Kidion Интернет – магазин детских колясок и автокресел с доставкой по всему Узбекистану! Забота о маленьком пассажире" Косметология: "Карбоновый пилинг на неодимовом лазере Monaliza" Особенности использования медицинской лексики:

Привлечение внимания: Проблемы и их решения: "Избавьтесь от мучительной изжоги" (рус.), "jig‘ildon qaynashini bartaraf etadi" (узб.). Акции и скидки: "Акция года. Пересадка волос. Скидка 30%". Преимущества: "Гарантия 8 лет!", "Забота о маленьком пассажире".

Демонстрация эффективности: Использование медицинских терминов: "Микротоковая рефлексотерапия", "Карбоновый пилинг". Описание действия: "Ko‘z sathini namlantirish va himoya qilishning optimal usuli".

Сравнительные преимущества: "Sifatli ko‘rish tuyg‘usi bilan yashash" (в сравнении с очками). Создание доверия: Отзывы: (не всегда присутствуют)

Сертификаты и лицензии: (не всегда упоминаются) Репутация компании: (косвенно, через название) Призыв к действию: Прямые императивы: "Закажите сейчас!", "Звоните!".

Ограниченные предложения: "Акция до конца месяца!". Сравнительный анализ: Фармацевтическая реклама: фокусируется на лечении заболеваний и облегчении симптомов.Реклама медицинских услуг: акцентирует внимание на улучшении качества жизни, профилактике и эстетике. Медицинская лексика является мощным инструментом в рекламе, позволяющим привлекать внимание, информировать и убеждать потенциальных потребителей. Однако важно использовать ее грамотно, этично и ответственно, соблюдая все необходимые нормы и требования. Использование игры слов в рекламе медицинских препаратов является популярным приемом, позволяющим: привлечь внимание целевой аудитории. Сделать текст более запоминающимся. Создать положительный эмоциональный фон. Подчеркнуть преимущества рекламируемого продукта. Рассмотрим несколько примеров: «Колдрекс - горячий ответ простуде и гриппу»:

Игра слов: "горячий ответ" - как противостояние простуде, "горячий" - как согревающий напиток. Эффект: создает ощущение борьбы с болезнью, подчеркивает быстрое действие препарата. «Пиносол – чихать на насморк»: Игра слов: обыгрывается глагол "чихать", который обычно ассоциируется с насморком. Эффект: создает легкий и веселый образ, запоминается. «С Хондой Вы всегда на ходу»: Игра слов: обыгрывается название автомобиля "Хонда" и глагол "быть на ходу" - быть здоровым, активным. Эффект: создает ассоциацию препарата с энергией, здоровьем, движением. «С Иммунормом здоровье в норме»: Игра слов: обыгрывается слово "норма" - как состояние здоровья, к которому нужно стремиться. Эффект: подчеркивает, что препарат помогает поддерживать здоровье в оптимальном состоянии. «Суставы изнывают без лекарства. Суставам осложнение грозит, и каждый царь готов отдать полцарства за царское лекарство ХОНДРОКСИД»:

Игра слов: обыгрывается фраза из сказки, создавая ощущение ценности и эффективности препарата. Эффект: привлекает внимание, вызывает интерес, запоминается. «Горный кальций – чтобы кости стали крепче гор»: Игра слов: сравниваются кости с горами, подчеркивая их прочность. Эффект: создает яркий образ, запоминается. «Арбидол. У гриппа нет будущего»: Игра слов: обыгрывается фраза "нет будущего", подчеркивая, что препарат помогает победить грипп. Эффект: создает ощущение уверенности в победе над болезнью. «Тавегил. Аллергию, как ветром сдуло»: Игра слов: сравнивается аллергия с ветром, которого нет, подчеркивая быстрое действие препарата. Эффект: создает легкий и оптимистичный образ, запоминается. «Регецин. Береги кожу смолоду»: Игра

слов: обыгрывается пословица "береги смолоду", подчеркивая важность заботы о коже с молодости. Эффект: создает ощущение заботы, внимания, запоминается. «Остроглаз — надежная защита ваших глаз»: Игра слов: обыгрывается слово "остроглаз", подчеркивая зоркость и надежность защиты. Эффект: создаёт ощущение безопасности, запоминается.

Использование игры слов в рекламе медицинских препаратов может быть эффективным инструментом, позволяющим повысить привлекательность рекламного сообщения и сделать его более запоминающимся. Повтор ключевых слов и словосочетаний является еще одним эффективным приёмом семантизации в текстах рекламы фармацевтических препаратов. Его использование позволяет: Привлечь внимание к рекламируемому продукту. Сделать текст более запоминающимся. Подчеркнуть основные преимущества препарата. Создать ощущение надежности и уверенности в его эффективности Рассмотрим несколько примеров: «Момент настал – прими Гастал! Гастал, средство от изжоги и боли в желудке»: Повтор слова "Гастал" помогает зафиксировать название препарата в памяти.Описание действия ("средство от изжоги и боли в желудке") сразу же сообщает о его пользе. «Кальцемин: крепкие кости – крепкая семья»: Повтор слова "крепкие" создает ассоциацию препарата с силой и здоровьем. Слоган ("крепкие кости – крепкая семья") подчеркивает, что препарат заботится о благополучии всей семьи. «Тенотен: спокойные дети – спокойные родители»:Повтор слова "спокойные" создает ощущение умиротворения и гармонии. Слоган ("спокойные дети – спокойные родители") апеллирует к чувствам родителей, желающих своим детям добра. Помимо повтора слов, в рекламе медицинских препаратов часто используется игра слов, рифма и другие стилистические приемы. Это делает текст более выразительным, запоминающимся и привлекательным.

Использованные источники:

1. Барковская, Е. В. (2018). Гендерные стереотипы в рекламном дискурсе: анализ языковых средств. Москва: Издательство «Лингвистика».
2. Бахтин, М. М. (1996). Теория речи и коммуникативный дискурс. Санкт-Петербург: Издательство «Речь».
3. Воронцова, И. А. (2015). Социолингвистический аспект гендерной лексики в рекламном дискурсе. Москва: Издательство «Наука».
4. Герцен, А. И. (2001). Теория рекламы как социального явления. Санкт-Петербург: Издательство «Петербургская наука».
5. Жилина, Л. В. (2017). Гендерная лексика в языке рекламы: Теоретический и прикладной аспекты. Екатеринбург: Издательство Уральского университета.
6. Bozorov Z.A International scientific and practical conference “Modern psychology and pedagogy: problems and solutions” “Imperial College London” 2021–2022. 165–169 б.
7. Bozorov Z.A. Essence, structure and functions of civil culture. International engineering journal for research & development. Published in Volume 6 Special

Issue , January 2021 of IEJRD E–ISSN: 2349–0721 , Peer Reviewed & Referred Journal.
8. Bozorova G. FORMATION OF ABBREVIATIONS IN MEDICAL TERMINOLOGY IN UZBEK LANGUAGE //Центральноазиатский журнал образования и инноваций. – 2024. – Т. 3. – №. 3. – С. 86–89.
9. Bozorova, G. (2023). ЛИНГВОПРАГМАТИЧЕСКАЯ ХАРАКТЕРИСТИКА ПЛЕОНАСТИЧЕСКИХ ЕДИНИЦ ИСПОЛЬЗУЕМЫХ В ПОЛИТИЧЕСКОЙ РЕЧИ. Центр Научных Публикаций (buxdu.Uz), 34(34). извлечено от https://journal.buxdu.uz/index.php/journals_buxdu/article/view/9752
10. Samandarova G. Y. Fundamentals of folk proverbs formed on the basis of the lexical–spiritual group of insects. Current research journal of philological sciences, 2 (05), 39–42. – 2021.
11. Samandarova , G. Y. (2023). BASIS OF THE LEXICAL SENTENCE GROUP "INSECT" IN THE FORM OF A COMPOUND SENTENCE. INTERNATIONAL SCIENTIFIC CONFERENCE " INNOVATIVE TRENDS IN SCIENCE, PRACTICE AND EDUCATION", 2(4), 59–67. Retrieved from http://academicsresearch.ru/index.php/iscitspe/article/view/1493
12. Bozorov Z. A. "Exceptional role of motives and needs within the formation process of civic culture in students' community." Journal of Advanced Zoology 44 (2023): 3236–3244. https://jazindia.com/index.php/jaz/article/view/1595
13. Ashurovich, Bozorov Zayniddin. "Great Oriental Intellectuals about Civil Culture." Web of Scholars: Multidimensional Research Journal 2 (2023): 21–24. https://innosci.org/wos/article/view/968

УДК.618.5-07;616-71

Ахмадова М. А.
доцент
кафедра медицинской радиологии и ядерной медицины
Бухарский государственный медицинский институт
имени Абу Али ибн Сино
https://orcid.org/0009-0004-36117-4472

УЛЬТРАЗВУКОВАЯ ДОППЛЕРОГРАФИЯ В ОЦЕНКЕ АРТЕРИАЛЬНОЙ И ВЕНОЗНОЙ ГЕМОДИНАМИКИ ПЛОДА

Резюме. *Допплеровскую оценку можно условно разделить на артериальную, венозную или сердечную. Допплеровское исследование маточной артерии, артерии пуповины (UA), средней мозговой артерии (MCA), нисходящей аорты, венозного протока (DV), нижней полой вены, пупочной вены и печеночных вен дает ценную информацию о плацентарном кровообращении и кровообращении плода во время беременности. Однако в клинической практике наиболее часто используется плацентарная (маточная и UA-допплерография), MCA и DV-допплерография.Сердечный выброс тесно коррелировал с податливостью сердца и показателями сопротивления кровотоку на артериальном и венозном уровнях. Время ускорения в артериях плода увеличивалось с увеличением срока беременности при AAO, PA, MCA и DAO, но уменьшалось при RA и оставалось постоянным при UA. Кроме того, время ускорения UA не было связано с сердечным выбросом. Изменения внутрисердечного, артериального и венозного сопротивления плода были заметны на протяжении всей беременности и были связаны с сердечным выбросом. Сердечный выброс плода хорошо коррелировал с изменениями артериального сопротивления, за исключением DAO. Почти в 60% случаев PAC плода не выявляется клиническими методами. Без использования дополнительных методов обследования можно диагностировать только в 25% случаев PAC плода, и если при дальнейшем обследовании возникает подозрение на PAC, диагноз подтверждается у одной из трех беременных женщин*

Ключевые слова: *задержка роста, хроническая болезнь почек, вена пуповины, фетоплацентарная кровь, внутрисердечное кровообращение.*

Akhmadova M. A.
associate professor
department of medical radiology and nuclear medicine
Bukhara State Medical Institute named after Abu Ali ibn Sino
https://orcid.org/0009-0004-36117-4472

ULTRASOUND DOPPLER SONOGRAPHY IN THE ASSESSMENT OF FETAL ARTERIAL AND VENOUS HEMODYNAMICS

Resume. *Doppler evaluation can be roughly divided into arterial, venous, or cardiac Doppler. Doppler evaluation of the uterine artery, umbilical artery (UA), middle cerebral artery (MCA), descending aorta, ductus venosus (DV), inferior vena cava, umbilical vein, and the hepatic veins provides valuable information on placental and fetal circulations in pregnancy. However, in clinical practice placental (uterine and UA Doppler), MCA, and DV Doppler are the most frequently used. Cardiac output was closely correlated with cardiac compliance and indicators of blood flow resistance at arterial and venous levels. The acceleration time in fetal arteries increased with increasing gestation period in AAO, PA, MCA, and DAO, but decreased in RA and remained constant in UA. In addition, UA acceleration time was not associated with cardiac output. Changes in intracardiac, arterial, and venous fetal resistance were noticeable throughout pregnancy and were associated with cardiac output. Fetal cardiac output correlated well with changes in arterial resistance, with the exception of DAO. The ductility of the ventricles increased as pregnancy progressed, especially in the left half, and was closely related to changes in cardiac output. In almost 60% of cases, fetal ASD is not detected by clinical methods. Without using additional examination methods, it is possible to diagnose fetal ASD only in 25% of cases, and if further examination suspects ASD, the diagnosis is confirmed in one out of three pregnant women.*

Key words: *growth retardation, chronic kidney disease, umbilical cord vein, fetoplacental blood, intracardiac circulation.*

Актуалность

Допплерография при беременности — это неинвазивный метод ультразвукового исследования. С его помощью доктора оценивают кровоток в сосудах матери, плаценты, плода. Во время беременности играет ключевую роль в контроле за состоянием малыша, его развитием. Помогает вовремя выявить отклонения. Допплерография отображает скорость, характер течения крови в пуповине, маточных, плодных сосудах. Это важно для оценки поступления кислорода, питательных веществ к ребенку. Исследование полностью безопасно. Проводится во втором, третьем триместре беременности. Время ускорения в крупных артериях положительно коррелировало со сроком беременности и сердечным выбросом, за исключением случаев НС и РА; это указывает на разницу в

изменениях среднего артериального давления в маточно-плацентарном кровообращении, органах плода и магистральных сосудах. Таким образом, сердечный выброс плода хорошо коррелировал с податливостью желудочков и зависел как от гемодинамических изменений периферического сопротивления, так и от среднего артериального давления. При изменении определенных параметров состояния матери и плода во время беременности своевременная регистрация изменений и устранение вызвавших их нарушений могут снизить количество тяжелых перинатальных осложнений [1,4,5]. Наиболее распространенной причиной нарушений развития плода во время беременности является фетоплацентарная недостаточность (ФП), вызванная морфологическими и функциональными изменениями в плацентарной ткани. Диагностика задержки внутриутробного развития (МПД), как следствия хронического заболевания почек, является одной из самых сложных в акушерской практике. Почти в 60% случаев РАС у плода не выявляется клиническими методами [2, 4, 7]. Без использования дополнительных методов обследования только в 25% случаев можно диагностировать РАС у плода, и если при дальнейшем обследовании возникает подозрение на РАС, диагноз подтверждается у одной из трех беременных женщин. Целью работы была оценка взаимосвязи допплерографических параметров между патологическим артериальным и венозным кровотоком, а также изучение перинатальных исходов у плодов с РАС [6,3]. На внутрисердечном уровне отношение пиковой скорости потока волны Е к пиковой скорости потока волны А (отношение Е: А) митрального клапана (MV) увеличивалось быстрее, чем отношение Е: А трехстворчатого клапана (TV). Что касается магистральных сосудов, то пиковая скорость в аорте оставалась выше, чем пиковая скорость в легких, по мере приближения срока беременности.

Материалы и методы

Исследование проведено комплексное динамическое допплерографическое исследование маточно-плацентарного и фетоплацентарного кровотока у 33 беременных с РАС плода. Обследование проводилось на сроке от 23 до 35 недель. Проспективный и ретроспективный анализ историй родов и новорожденных показал, что 23 (69,23%) из 37 беременных женщин были старше 26 лет, а 12 (30,76%) из 39 женщин были в возрасте от 18 до 25 лет. В исследовании приняли участие 20 (53,74%) женщин из Акмолинской области. Из них 9 (23,07%) женщин проживали в Атырау, 3 (7,68%) - в Восточно-Казахстанской области, 3 (7,69%) - в Карагандинской области и 2 (5,13%) - в Семипалатинской области. Было зарегистрировано 9 (23,07%) и 30 (76,92%) беременностей на первом и втором сроках соответственно. Максимальное количество посещений женской консультации от 3 до 6 раз было у 21 (53,84%) беременной женщины, 18 (46,15%) из 39 женщин не состояли на учете по беременности. Анализ исходов беременности показал, что у 14 (35,89%) женщин беременность закончилась преждевременными родами на сроке 32-34

недели. недоношенные дети умерли на 1-2-3-й день. Антенатальная гибель плода наблюдалась у 8 (20,51%) женщин в возрасте 26-30 недель. У 7 (17,94%) из наблюдавшихся беременность закончилась самопроизвольным выкидышем мертвого плода на сроке 26-33 недели. Ультразвуковое исследование проводилось на аппарате Voluson 730 Expert (GE) с использованием конвексного датчика частотой 3,5- 5,0 МГц трансабдоминальным доступом в акушерской программе по общепринятой методике. Устройство обеспечивает комбинацию режимов сканирования в оттенках серого, цветового картирования и импульсно-волновой допплерографии, что позволяет получать ультразвуковое изображение в триплексном режиме с последующей математической обработкой профилей спектра кровотока с использованием расчетной программы устройств. Частота фильтра составляла не более 100, а ширина контрольного объема не превышала 2-4 мм. Для повышения информативности допплерографического исследования фетоплацентарного кровообращения работа проводилась с использованием разработанного метода регистрации кровотока в обеих артериях пуповины. Для этого мы выбрали участок пуповины с хорошей визуализацией обеих артерий и соответствующим углом допплеровского сканирования. Затем в режиме реального времени последовательно регистрировали профили кровотока сначала в одной артерии, а затем в другой. Обязательным условием был визуальный контроль местоположения тестируемого объема в режиме реального времени. Степень нарушения плацентарного кровообращения оценивалась в соответствии с усовершенствованной классификацией М. И. Агеевой. Для статистической обработки результатов исследования использовались стандартные пакеты программ "Statistics 6". Были рассчитаны статистические критерии Шапиро–Уилка, Лиллиефорса и Колмогорова–Смирнова. Чувствительность, точность и специфичность метода при уже определенных диагностических критериях были рассчитаны с использованием известных формул.

Результаты и обсуждение

Диагностическим маркером крайне неблагоприятного прогноза беременности в вене пуповины явилось появление патологических пульсаций у 12 (30,76%) беременных с последующей антенатальной смертью в период от 25-26 до 35-36 недель. Было зафиксировано значительное снижение скорости кровотока до 6,5-6,8 см/сек (выводы 1. Результаты исследования венозного возврата и артериального притока у плодов с различной степенью функциональных нарушений позволили установить изменения КСК в венозном протоке, которые происходят вследствие перераспределения артериального притока и нарушения диастолической функции левого желудочка. 2. Скорость кровотока во время фазы сокращения предсердий (А) значительно снижается, в то время как скорость кровотока во время систолической фазы (S) и ранней диастолы (D) не изменяется. 3. Изменение КСК в нижней полой вене происходит из–за централизации кровообращения и нарушения диастолической функции

правого желудочка - скорость кровотока значительно снижается во все фазы сердечного цикла, но скорость кровотока во время фазы пассивного наполнения желудочков подвержена более ранним изменениям (D). 4. Для практического использования при анализе профиля КСК рекомендуется использовать соотношение S/A для венозного протока, соотношение S/D и A/S для нижней полой вены. Изменения параметров артериальной гемодинамики, внутрисердечного кровообращения, венозного возврата и артериального притока взаимосвязаны и последовательны и могут характеризовать тяжесть нарушений гемодинамики плода.

Использованные источники:

1. Абрамченко В. В. Клиническая перинатология /В. В. Абрамченко, Шабанов Н. П. – Петрозаводск: ИнтелТек, 2004. – 424 с.
2. Аксенов Д. Б. Прогностическое значение изменений кислотно-основного баланса и газового состава цереброспинальной жидкости у недоношенных детей при пери-, интравентрикулярных кровоизлияниях /Д. Б. Аксенов, Е. С. Кешишян, С. Я. Рудницкая //Рос. вестн. перинатологии и педиатрии. – 2005. – Т. 50, №3. – С. 25 – 29.
3. Андреева А. А. Состояние сердечно-сосудистой системы и активность сердечного изофермента креатинкиназы у новорожденных с задержкой внутриутробного развития /А. А. Андреева, Ж. Н. Тумасова, Д. С. Додхоев //Рос. вестн. перинатологии и педиатрии. – 2004. – Т. 49, №5. – С. 61 – 62.
4. Аронскинд Е. В. Клинико-нейросонографические характеристики формирования перивентрикулярных лейкомаляций у недоношенных детей /Е. В. Аронскинд, О. П. Ковтун, В. Н. Шершнев //Рос. вестн. перинатологии и педиатрии. – 2006. – Т. 51, №5. – С. 22 – 24.
5. Ранние гемодинамические изменения у плода при синдроме задержки развития /Н. В. Башмакова, П. Б. Цывьян, С В. Михайлова и др. //Рос. вестн. акушера-гинеколога. – 2006. – Т. 6, №5. – С. 12 – 15.
6. Changes in flow velocity patterns of the inferior vena cava during placental circulatory insufficiency / J. C. Fouron, F. Absi, A. Skoll et al. //Ultrasound. Obstet. and Gynecol. – 2003. – V. 21, №I. – P. 53 – 56.
7. Fetal growth and development /Ed. R. Harding, A. D. Bocking. – Cambridge: Cam bridge University Press, 2001. – 284 p.

Ахмедов А. Т.
ассистент
Джизакский политехнический институт
Багдасарова И.
доцент
Московский Физико-Технический Институт

ИННОВАЦИОННАЯ ХЛОПКОУБОРОЧНАЯ МАШИНА С ГОРИЗОНТАЛЬНЫМИ ШПИНДЕЛЯМИ И ПНЕВМАТИЧЕСКИМ ПРИВОДОМ БЕЗ КОНИЧЕСКОЙ ЗУБЧАТОЙ ПЕРЕДАЧИ

Аннотация: *В статье претставлено, что использование пневмоприводной хлопкоуборочной машины с горизонтальным шпинделем снижает затраты на изготовление и сборку металла за счет потери конической зубчатой передачи.*

Ключевые слова: *Шпиндель, аппарат, горизонталь, рабочий орган, воздушная камера, пружина, вентилятор, пластина, барабан, идея, двойная сила.*

Akhmedov A. T.
assistant
Jizzakh Polytechnic Institute
Bagdasarova I.
associate professor
Moscow Institute of Physics and Technology

INNOVATIVE COTTON HARVESTING MACHINE WITH HORIZONTAL SPINDLES AND PNEUMATIC DRIVE SYSTEM WITHOUT BEVEL GEAR TRANSMISSION

Abstract: *The article states that the use of a pneumatic-driven cotton harvester with a horizontal spindle reduces the cost of manufacturing and assembling metal due to the loss of a bevel gear.*

Keywords: *Spindle, apparatus, horizontal, working body, air chamber, spring, fan, plate, drum, idea, double force.*

Хлопкоуборочная машина с горизонтальными шпинделями включает барабан со шпинделями, расположенными на вертикальных стойках, и барабан с горизонтальными шпинделями, установленный на вертикальной оси рамы оборудования с использованием верхнего и нижнего подшипников качения, а также подшипника шпинделей. Привод шпинделя был выполнен в виде пневмокуритмы, которая включала вентилятор, установленный в центре барабана, всасывающую и направляющую камеры с пружиной, вдавленной во внутреннюю стенку барабана. Камеры были снабжены

направляющими, установленными таким образом, чтобы они могли поворачиваться в любую сторону от камер. Шпиндель выполнен с полым отверстием, которое пневматически соединено с вентилятором. Шпиндель был снабжен выступом внизу, в который был вмонтирован пропеллер. Представлен рабочий орган хлопкоуборочной машины с горизонтальным охватывающим элементом (1).

Вышеуказанные недостатки устраняются следующими способами. Для этого горизонтальные шпиндели выполнены в виде конической трубы, открывающейся по длине отверстиями, которые всасывают воздух и выпускают (образуя пару сил) в направлении, противоположном друг другу по кругу. Также внутри шпиндельной трубы шнек выполнен из резины (по длине), направление линии резины и винта адаптировано к направлению вращающей силы, которая создает воздух, выходящий или входящий через отверстия, открытые из шпиндельной трубы, образуя дополнительный момент поворота шпинделя в воздух, когда воздух всасывается или, наоборот, вытесняется.

Хлопкоуборочная машина (рис.1) барабан 1, плотно закрепленная колонна 2, по ее окружности вертикально расположенные шпиндели 3, воздушный вентилятор 4, камеры всасывания воздуха 5 и привода 6, которые постоянно плотно прижимают их, пропеллеры 7 и 8, приемная камера 9, щетки-сепараторы 10. Конический зуб, расположенный на оси той же звездочки, что и звездочка 12 удлинителя цепи, перемещается с помощью удлинителя 13. Воздушный вентилятор 4, с другой стороны, приводится в движение с помощью ременной передачи 14. Шпиндель 2 (рис. 3) состоит из трех рядов зубьев 15, отверстий для всасывания воздуха и привода 16, кольцевого ограждения 17, изогнутого винтового зажима 18.

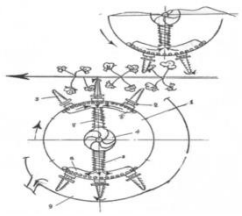


Рис.1. Вид сверху на принцип работы хлопкоуборочной машины с горизонтальным шпинделем

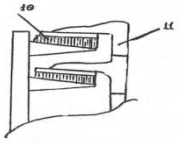


Рис. 2. Вид сбоку хлопкоуборочной машины с горизонтальным шпинделем (кинематическая схема

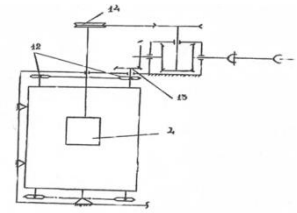


Рис. 3. Кинематическая схема хлопкоуборочного аппарата с воздушным приводом

Отверстия 16 в зоне сбора хлопка создают вращающий момент, который поворачивает шпиндель 3 в направлении часовой стрелки, соответствующей острому концу зуба 15. Зона разделения, с другой стороны, создает обратный вращающий момент. Воздушная камера выполнена из корпуса 19 с люком 5 и 6 (рис. 5), герметизирующей резиновой оболочки 20 сверху, вертикального резинового цилиндра 21, которые поддерживают герметичность воздуха. Воздушные камеры плотно прижимаются к поверхности внутренней стенки барабана 1 с помощью пружин 5 и 6, 7 и 8. В рекомендуемом устройстве сбор хлопка осуществляется следующим образом. Когда хлопкоуборочная машина движется вдоль хлопковых рядов, хлопковые ветви проходят между парами барабанов 1, и в это время шпиндель, который вращается в сторону, противоположную движению машины, вытягивает только раскрытый хлопок в зоне набора 3 посредством всасывания воздуха из отверстий 16, и в это время зубья заворачивают, используя 15.

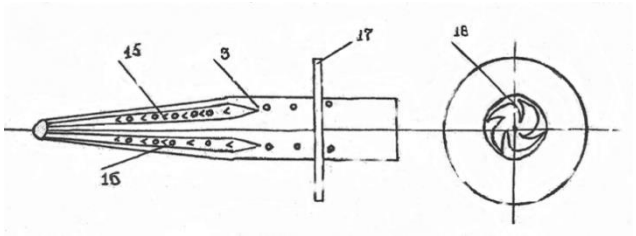


Рис. 4. Вид поверх шпинделя

Когда шпиндель 3 проходит через зону набора номера и попадает в зону разделения (камеру 6 воздушного привода), мощный привод начинает реверсироваться под действием тока havo, т.е., в отличие от предыдущего, havo отскакивает к наконечнику через отводящие направляющие 18 шпинделя 3, в результате чего при вращении шпинделя parrak этот дополнительный вращающий момент будет характерен для выхода воздуха из отверстий (16).

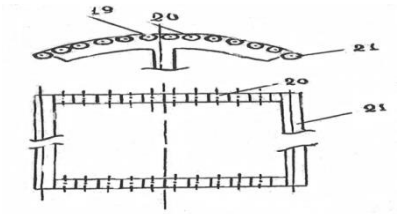


Рис. 5. Конструкция шпинделя

Для того чтобы повысить эффективность вращения шпинделя 3 в зоне разделения, в его нижней части был выполнен круглый барьер 17. Все отверстия в шпинделе 3 из зоны подбора находятся в отверстии для берка (ватного тампона), и в зоне разделения не будет возможности появления нагроможденного отверстия, и, как следствие, эффект реактивной силы вращения (xarakat) может уменьшиться.

Подача хлопка в бункер происходит так же, как и в обычных хлопкоуборочных машинах.

При использовании хлопкоуборочной машины с горизонтальным шпинделем с рекомендуемым судном на воздушной подушке:

1. Конструкция хлопкоуборочной машины намного проще.

2. Позволяет разместить устройство набора номера вместо нашего собственного устройства набора номера с вертикальным шпинделем.

3. Горизонтальные шпиндели FQSh не соединяются с шестерней коленчатого вала.

4. Нет необходимости использовать чрезвычайно дорогие хлопкоуборочные машины, импортируемые из Америки.

5. Собирайте только выборочно открытый хлопок (на сборе хлопка-сырца ставится точка).

Потеря конической шестерни приводит к тому, что все затраты, связанные с подготовкой и сборкой затраченного на нее металла, ремонтом и техническим обслуживанием, сводятся на нет.

Использованные источники:

1. Игамбердиев, Х. Х. Горизонтальная шпинделевая хлопкоуборочная машина с приводом клиноременной передачи [и др.] // Пути повышения экологической устойчивости и социально-экономическое обеспечение сельскохозяйственного производства : материалы научно-практической конференции. – 2017. – С. 1225–1228.

2. Худайбердиев, А. А. Исследование процесса последующего уплотнения хлопка-сырца в эластичном контейнере / А. А. Худайбердиев, Х. Х. Игамбердиев, А. А. Мухитдинов // Высокие технологии и инновации в науке. – 2019. – С. 218–222.

3. Ахмедов, А. Т. Сельскохозяйственные машины для обработки почвы / А. Т. Ахмедов // Универсум: технические науки. – 2022. – № 5 (98).

4. Ахмедов, А. Т. Почвообрабатывающие машины / А. Т. Ахмедов // Универсум: технические науки. – 2022. – № 4.

Ахмедов А. Т.
ассистент
Джизакский политехнический институт
Багдасарова И.
доцент
Московский Физико-Технический Институт

ЭФФЕКТИВНЫЙ ВЫБОР КУЛЬТИВАТОРОВ ДЛЯ РАЗЛИЧНЫХ ТИПОВ ПОЧВЕННОЙ ОБРАБОТКИ

Аннотация: *В нашей статье изложены необходимость культивации почвы и выбор культиваторов для тракторов в сельском хозяйстве для вспашки земли. Прицепные и навесные культиваторы для сплошной обработки почвы.*

Ключевые слова: *Тракторы, прицепные и навесные культиваторы, механизм, универсальность, габариты, мощность, обработка почвы, рабочий орган.*

Akhmedov A. T.
assistant
Jizzakh Polytechnic Institute
Bagdasarova I.
associate professor
Moscow Institute of Physics and Technology

EFFECTIVE SELECTION OF CULTIVATORS FOR VARIOUS TYPES OF SOIL TREATMENT

Annotation: *Our article outlines the need for soil cultivation and the choice of cultivators for tractors in agriculture for plowing the land. Trailed and mounted cultivators for continuous tillage.*

Keywords: *Tractors, trailed and mounted cultivators, mechanism, versatility, dimensions, power, soil cultivation, working body.*

Введение

Культивация – один из основных методов обработки почвы в сельском хозяйстве. Эта операция позволяет значительно повысить урожайность культур. Главное условие – соблюдение технологии почв обработки и использование качественного культиватора, предназначенного для конкретного вида работ.

Литературный анализ и методология

Когда и для чего выполняют культивацию. Культивация – это неглубокое рыхление без пластового оборота, при котором не происходит перемещения вверх нижнего увлажнённого почвенного слоя. Глубина

рыхления обычно не превышает 16 см. При такой обработке производится выравнивание почвы с подрезкой корневой системы и стеблей сорняков. Почву культивируют в разные периоды. Весенняя культивация подготавливает участок к посеву, осенняя – к зимовке. Во время сельскохозяйственного сезона обработка необходима для ухода за культурными растениями в процессе их выращивания. При культивации обеспечивается рыхление, крошение верхнего слоя почвы, его незначительное перемешивание. Подрезка корней сорняков позволяет расчистить участок для культурных растений. Кроме этого, культивация применяется для заделки удобрений и гербицидов на значительных площадях. Дополнительные преимущества, которые даёт такая обработка: *улучшение доступа воздуха в почву; лучшее удержание влаги землёй; активизация полезной микрофлоры, которая насыщает почву питательными веществами; создание условий для более быстрого прогрева земли весной.* По характеру проводимой обработки бывает два вида культивации – сплошная и междурядная. При сплошной культивации обрабатывается вся площадь участка. Это вид предпосевной обработки. Также метод подходит для очистки от сорняков отдыхающих участков, для подготовки почвы к зиме. Междурядным методом культивируют засаженные участки. Проходка выполняется между линиями высаженных растений для их окучивания и удаления сорняков. Технология широко применяется при выращивании таких культур, как свекла, картофель, кукуруза. Культивацию в сельском хозяйстве выполняют при помощи специального навесного оборудования для тракторов – культиваторов. Их выбирают в зависимости от характера проводимой почв обработки.высказываются и другие учёные высказываются и другие толкования.

Полученные результаты. Для сплошной культивации применяют такие виды культиваторов: *стерневые; паровые; предпосевные; универсальные.*

Стерневые культиваторы используются для культивации по стерне. Это наиболее тяжёлый вид обработки, который проводится сразу после прохода комбайн для предотвращения испарения влаги из почвы. Культиваторы для этого вида работ имеют лапы, ширина которых находится в пределах 28-40 см при расстоянии между их рядами 25-30 см. Стойки такого оборудования рассчитаны на нагрузку от 200 кг. Конструкция оснащена массивной рамой толщиной 6-8 мм, которая позволяет выполнять рыхление плодородной части грунта на глубину, достигающую 15-30 см. Модели для работы по пару комплектуются лапами шириной 17-22 см с междурядным расстоянием в пределах 17-20 см. Максимальная нагрузка составляет до 150 кг. При этом обеспечивается глубина рыхления 12-15 см. Обработка обычно выполняется после вспахивания или глубокого рыхления для сплошного подреза сорняков, сохранения в грунте влаги перед посевом

озимых. Также паровые культиваторы применяют для осенней обработки. Рекомендуется выбрать машины со стрельчатыми лапами.

Предпосевной культиватор – это самый лёгкий тип. Он предназначен для выполнения финишной почв обработки – выравнивания поверхности земли и придания ей мелкокомковатой структуры. Глубина рыхления при этом составляет от 2 до 12 см в зависимости от типа засеваемых культур. При этом важно обеспечить точность глубины обработки, которая должна соответствовать глубине сева. Лучше всего с финишной обработкой справляются лаповые машины. Важное требование к предпосевным культиваторам состоит в стопроцентной подрезке сорняков. Для этого ширина лапы должна отвечать расстоянию между стойками, чтобы обеспечить полное перекрытие зазора. Использовать предпосевной культиватор можно только по ранее обработанной почве, не допуская заглубления больше чем на 12 см. Нарушение этого требования может привести к серьёзной поломке рамы, а также увеличивает расход топлива и нагрузку на трактор.

Универсальные культиваторы – навесное оборудование, способное выполнять работы по стерне, по парам, а также проводить предпосевную культивацию почвы. Такая универсальность достигается за счёт конструкции, которая предусматривает замену рабочих органов в зависимости от выполняемых задач почв обработки. Универсальные модели дороже узкоспециализированных. Поэтому такие модели рационально использовать в хозяйствах, которые работают с разными полями и культурами.

Обсуждение

Советы по эксплуатации. Особенности культиваторов для междурядной обработки

Для междурядной обработки почвы применяются специальные культиваторы. Их конструкция должна обеспечивать работу только по междурядью, где отсутствует посев. Не допускается заход рабочего органа в ряд засеянных растений. Важная особенность конструкции таких культиваторов – расстояние между лапами не должно соответствовать ширине междурядья. Кроме этого, они оснащаются специальными кожухами или ограничительными пластинами для точной и эффективной настройки по ширине.

Заключение

В заключение можно сказать, что вопросы дальнейшего расширения сферы применения навесных культиваторов в сельском хозяйстве связаны, главным образом, с необходимостью решения важнейших задач: организации технологию производства и внедрения новых видов культиваторов в сельском хозяйстве.

Использованные источники:

1. Казарцев, В. И. Метод математической статистики для оценки срока службы ДМ и их износа / В. И. Казарцев // Вестник сельскохозяйственной науки. – 1960. – № 7.
2. Казарцев, В. И. Об основных критериях для установления предельно-допустимых износов ДМ / В. И. Казарцев // Вестник сельскохозяйственной науки. – 1959. – № 3.
3. Федоров, С. Е. Применение дифференцированной обработки почвы / С. Е. Федоров // Тракторы и сельхозмашины. – 2018. – № 2. – С. 78–82.
4. Ахмедов, А. Т. Қишлоқ хўжалигида культиваторларнинг ўрни / А. Т. Ахмедов // Экономика и социум. – 2023. – № 2 (105). – С. 33–36.
5. Ахмедов, А. Т. Сельскохозяйственные машины для обработки почвы / А. Т. Ахмедов // Универсум: Технические науки. – 2022. – № 5 (98).

Ахмедов А. Т.
ассистент
Джизакский политехнический институт
Багдасарова И.
доцент
Московский Физико-Технический Институт

ПРЕОДОЛЕНИЕ ПОЗНАВАТЕЛЬНЫХ БАРЬЕРОВ В УПРАВЛЕНИИ НАУЧНО-ИССЛЕДОВАТЕЛЬСКОЙ РАБОТОЙ СТУДЕНТОВ

Аннотация: *Молодых специалистов необходимо вооружить самыми современными знаниями, сформировать творческие способности и исследовательские умения, воспитать потребность в постоянном расширении своего кругозора.*

Ключевые слова: *Качества, специалист, умения, кругозор, мотивация, эффект, практика, адаптация, методы и пути, техника, технология.*

Akhmedov A. T.
assistant
Jizzakh Polytechnic Institute
Bagdasarova I.
associate professor
Moscow Institute of Physics and Technology

OVERCOMING COGNITIVE BARRIERS IN MANAGING STUDENTS' SCIENTIFIC RESEARCH WORK

Abstract: *Young professionals need to be equipped with the most up-to-date knowledge, develop creative and research skills, and foster a need to continually expand their horizons.*

Keywords: *Qualities, specialist, skills, horizons, motivation, effectiveness, practice, adaptation, methods and approaches, technology.*

В современных условиях развития направления научно-исследовательских работ в дополнительном профессиональном образовании свидетельствует о безусловном улучшении качества подготовки кадров. Молодых специалистов необходимо вооружить самыми современными знаниями, сформировать творческие способности и исследовательские умения, воспитать потребность в постоянном расширении своего кругозора.

Однако следует отметить, что существует ряд проблем, которые обусловили отставании вышей школы от современных запросов, и тем более от потребностей завтрашнего дня нашей экономики и культурного строительства, на которые обязана ориентироваться образовательная системы. Это требует поиска новых, более действенных рычагов управления

в образовательном процессе, которые позволили бы повысить мотивацию будущих специалистов в овладении знаниями, ориентирующих их на напряженные самостоятельные занятия, на активное участие в научно-исследовательской работе.

Решая задачу управления научными исследованиями для получения максимального эффекта, мы не должны забывать о высших учебных заведениях технического направления, которые готовят кадры для конкретных отраслей народного хозяйства. Ведь ни для кого не секрет, что все осложнения, которые происходят с выпускниками в период их адаптация на рабочем месте, связаны с их очень слабой осведомленностью о реальных производственных проблемах в этих отраслях. Даже в процессе учебной и производственной практики студентам не всегда удается прочувствовать эти проблемы. Очевидно, в период обучения надо искать какие-то методы и пути, которые бы позволили нам перекинуть надежный «мост» между сознанием студентов и проблемами отрасли.

По нашему глубокому убеждению, основанному на результатах многолетнего эксперимента, таким мостом может стать правильно организованная научно-исследовательская работа, направленная на поиск новых технических, технологических решений, связанных с облегчением труда на производстве, в том числе изобретательская деятельность, а также организация экспериментально-конструкторской работы. Этот этап охватывает весьма широкий диапазон творческой деятельности, начиная с патентных исследований и кончая изготовлением модели макета или натурного образца машины, полезной модели или устройства. Такой подход к организации и управлению научно-исследовательской работой студентов (НИРС) способствует формированию профессионализма у молодежи еще в процессе обучения и раскрывает в ее глазах практическую ценность знаний. Но, пожалуй, важнее всего то, что самостоятельная исследовательская деятельность под руководством преподавателя формирует студента как социально-активную личность, делает соратником в борьбе за ускорение научно-технического прогресса, то есть решает воспитательную задачу огромной важности.

Изложенная выше позиция авторов во взглядах на НИРС сформировалась обоснованно. Еще в 2000 г. авторами быль сформулирован ряд конкретных вопросов управленческого характера, на которые требовалось получить ясные ответы: могут ли студенты нашего института изобретать? Совместимо ли изобретательское творчество с существующей системам управление учебно-воспитательной работой? Кто сможет, и кто должен взять руководство этой работой на себя? Каковы методические основы изобретательской работы студентов? Кроме того, авторам важно было выявить наиболее эффективный способ организации и стимулы, побуждающие к проявлению инициативы и практических действий со стороны преподавателей и администрации в организации этой работы.

Ответ на все вопросы были получены в результате девятилетнего эксперимента.

Следует сказать, что прежде всего предпринимались попытки направить интерес студентов на совершенствование технических средств на производстве: практиковалась выдача исследовательских заданий в виде реферата (Р) на первом (или втором) курсе, выполнение исследовательских курсовых проектов и лабораторных работ, различных видов научных, учебно–исследовательских работ (К) на 2 курсах (исследование завершалось на 3-курсе), выполнение выпускной квалификационной работы (ВКР) по заданному направлению поиска.

Логическая схема движение творческой мысли к решению поставленной проблемы в течение всего периода обучения представляется следущим образом: Р-К-ВКР. Где стрелки показывают переход от нижней ступени познания к высшей. В общей сложности за девять лет было разработано на уровне изобретений около 15 новых технических решений, получено 9 патентов на предлагаемое изобретение. Можно сказать, что в ходе выполнения научно-исследовательских работ, начиная с самой простой поделки и подготовки реферата и кончая подготовкой диплома, с точки зрения авторов необходимо включать различные психолого-педагогические аспекты, помогающие работе изобретательской или научной мысли.

В ходе эксперимента были выявлены и трудности в управлении исследовательской работой, которые стоят на пути организаторов НИРС. Это объясняется тем, что знаний, имеющихся у студентов, часто недостаточно для преодоления вставших перед ним задач в данной отрасли, что влечет появление психологического познавательного барьера.

Конечно, наилучшим выходом было бы то, что каждый студент пришел к решению поставленной проблемы самостоятельно. Но авторы считают, что предоставлять студентам полную свободу действий в решении познавательных проблем нельзя, так как они в силу своих индивидуальных особенностей смогут найти решение задачи в различное время, что уже осложняет управление процессом познания, а также изберут и разные пути достижения цели. Поэтому важным моментом преодоления познавательно-психологического барьера является управление поиском решения. Тут действует «подсказка».

Имеются два вида «подсказки»:

1. Студентам предлагается самостоятельно проделать те или иные опыты и объяснить их результаты. При этом целесообразно применять так называемые «провокационные» исследовательские работы, провоцирующие студента на поиск решения проблемы, что помогает в преодоление познавательно-психологического барьера.

2. Преподаватель вместе со студентами из них. При этом целесообразно разрабатывать вместе со студентами алгоритмы (правила) решения познавательных задач, в основу которых положен метод моделирования. Базу таких алгоритмов должна составлять «теория

подобия», помогающая вскрыть связи и закономерности в объектах, процессах или явлениях одинаковой природы.

В заключении следует ответить на вопрос о том, кто может, и кто должен руководить и управлять политикой получения максимального эффекта от НИРС? Думается, что этот вопрос является решающим в данной проблеме.

Использованные источники:

1. Волков, Г. Н. Этнопедагогика / Г. Н. Волков. – Чебоксары, 1974. – 168 с.
2. Лурье, С. Я. Демокрит: Тексты. Перевод. Исследования / С. Я. Лурье. – Л., 1972. – 312 с.
3. Франклин, В. Избранные произведения / В. Франклин. – М. : Мысль, 1974. – 543 с.
4. Жаров, М. С. Методика теоретического обучения по предмету «Тракторы и автомобили» / М. С. Жаров. – М., 1981. – С. 59-60.
5. Ахмедов, А. Т. Қишлоқ хўжалигида культиваторларнинг урни / А. Т. Ахмедов // Экономика и социум. – 2023. – № 2 (105). – С. 33-36.
6. Ахмедов, А. Т. Организация труда для семейного бизнеса в современных условиях / А. Т. Ахмедов // Экономика и социум. – 2022. – № 5 (96). – С. 45-48.
7. Ахмедов, А. Т. Педагогика университетида масофавий таълимнинг ютуқ ва камчиликлари / А. Т. Ахмедов // Экономика и социум. – 2022. – № 7 (98). – С. 112-115.

DOI 10.24412/2225-1545-2025-12-2138-981-985
УДК 352.134:004.7

Ахметзянов О. И.
Научный руководитель: Заборовская С. Г., канд. экон. наук, доцент
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Россия

ОЦЕНКА ЭФФЕКТИВНОСТИ ГОСУДАРСТВЕННЫХ ГРАЖДАНСКИХ СЛУЖАЩИХ В ЦИФРОВОЙ СРЕДЕ: АНАЛИЗ СУЩЕСТВУЮЩИХ МЕТОДОВ И ПУТИ ИХ СОВЕРШЕНСТВОВАНИЯ (НА ПРИМЕРЕ МИНИСТЕРСТВА ЦИФРОВОГО РАЗВИТИЯ И ГОСУДАРСТВЕННОГО УПРАВЛЕНИЯ РЕСПУБЛИКИ БАШКОРТОСТАН)

В статье на основе анализа федерального и регионального нормативно-правового регулирования, официальной статистики и публичных отчётов Министерства цифрового развития государственного управления Республики Башкортостан проанализировано состояние системы оценки и аттестации государственных гражданских служащих. Установлено, что в 2024 г. в РБ прошли аттестацию 2143 госслужащих, из них 98,4 % получили оценку «соответствует занимаемой должности» — показатель, совпадающий со среднероссийским (98,2 % по данным Минтруда РФ, 2025). Такая однородность оценок указывает на недостаточную дифференциацию критериев, особенно в условиях роста доли проектной деятельности: по данным АСИ (2024), 71 % цифровых инициатив региональных органов власти реализуется в проектном формате, тогда как действующая форма аттестации не включает критериев оценки проектных компетенций. Рассмотрены меры, предпринимаемые Минцифры РБ для модернизации кадровой работы: внедрение цифрового портфолио госслужащего (с 2025 г.), использование KPI по проектам в рамках системы «Команда Правительства РБ», участие в пилоте Минцифры РФ по оценке цифровых компетенций. Сделан вывод: переход к компетентностно-ориентированной модели оценки возможен при условии нормативного закрепления дополнительных критериев на региональном уровне и интеграции данных из цифровых платформ (СУП, ГИС «Управление персоналом»).

Ключевые слова: *государственная гражданская служба, аттестация, эффективность, цифровая трансформация, Минцифры РБ, KPI, проектная деятельность.*

Akhmetzyanov O. I.
Supervisor: Zaborovskaya S. G., cand. sci. (econ.)
associate professor
State Budgetary Educational Institution of Higher Education «Bashkir Academy of Public Service and Management under the Head of the Republic of Bashkortostan»
Russia

EVALUATING THE EFFECTIVENESS OF CIVIL SERVANTS IN A DIGITAL ENVIRONMENT: ANALYSIS OF EXISTING METHODS AND PATHS FOR IMPROVEMENT (CASE OF THE MINISTRY OF DIGITAL DEVELOPMENT AND PUBLIC ADMINISTRATION OF THE REPUBLIC OF BASHKORTOSTAN)

Based on analysis of federal and regional regulatory frameworks, official statistics, and public reports of the Ministry of Digital Development and Public Administration of the Republic of Bashkortostan, the article examines the current state of civil servant evaluation and attestation. In 2024, 2,143 civil servants in the RB underwent attestation, with 98.4% rated as "meeting the requirements of the position" — a figure consistent with the national average of 98.2% (Ministry of Labour of the Russian Federation, 2025). Such uniformity suggests insufficient differentiation of criteria, particularly given the growing share of project-based work: according to ASI (2024), 71% of digital initiatives by regional authorities are implemented in a project format, while the current attestation form lacks project competency assessment criteria. The article reviews measures taken by the Ministry of Digital Development RB to modernize HR practices: introduction of a digital civil servant portfolio (since 2025), use of project-based KPIs within the "Government Team of the RB" system, and participation in the Ministry of Digital Development of the Russian Federation's pilot on digital competency assessment. The study concludes that a shift toward a competency-based evaluation model is feasible, provided additional criteria are legally established at the regional level and data from digital platforms (Project Management Systems, HRIS "Personnel Management") are integrated.

Keywords: *civil service, attestation, effectiveness, digital transformation, Ministry of Digital Development RB, KPI, project work.*

Совершенствование кадровой работы в органах государственной власти - одна из приоритетных задач национального проекта «Цифровая экономика» и подпроекта «Цифровое государственное управление». В частности, в паспорте федерального проекта прямо указано: «Повышение качества кадрового обеспечения… за счёт внедрения современных методов оценки компетенций и результативности госслужащих».

Однако на практике сохраняется разрыв между декларируемыми целями и инструментами оценки. Согласно данным Министерства труда РФ,

в целом по стране аттестацию прошли 117482 государственных гражданских служащих, из них 115377 (98,2 %) получили оценку «соответствует занимаемой должности». Аналогичная картина - в Республике Башкортостан: по данным Агентства по государственной службе и кадрам РБ, в 2024 г. аттестовано 2143 госслужащих, 2109 (98,4 %) — «соответствует».

Такая статистическая однородность вызывает вопросы о дифференцирующей способности существующей системы, особенно в условиях роста проектной нагрузки. По данным Агентства стратегических инициатив (АСИ), в 2024 г. 71 % цифровых инициатив субъектов РФ реализовывались в проектном формате, включая создание ГИС, внедрение ИИ-решений, интеграцию сервисов.

Цель статьи — на основе открытых данных проанализировать практику оценки госслужащих в Минцифры РБ и обосновать пути её совершенствования в русле требований цифровой трансформации.

В исследовании использованы нормативно-правовые акты, официальная статистика и отчёты, научные публикации.

Результаты анализа

1. Статистика аттестации: высокая «соответственность» как системный эффект. В 2024 г. в РБ:

- аттестовано 2143 госслужащих (все категории);
- 2109 (98,4 %) — «соответствует»,
- 31 (1,45 %) — «соответствует при замещении нижестоящей должности»,
- 3 (0,14 %) — «не соответствует».

Эти цифры совпадают с общероссийскими (98,2 % «соответствует»), что подтверждает: система работает как формальная процедура, а не инструмент управления эффективностью.

2. Проектная нагрузка растёт, но критерии оценки остаются прежними

По данным Минцифры РБ, в 2024 г. реализовано 27 ключевых цифровых проектов, в т.ч.:

- внедрение Единой региональной платформы управления проектами (на базе 1С:Управление проектами);
- запуск сервиса «Мой бюджет» (мониторинг муниципальных расходов);
- интеграция 14 ГИС в Единый портал госуслуг РБ.

При этом в Положении об аттестации госслужащих в органах исполнительной власти РБ по-прежнему используется форма, где оценка даётся по 5 блокам: исполнение должностных обязанностей, соблюдение служебной этики, профессиональные знания, личные качества, взаимодействие с коллегами и гражданами.

Ни один блок не включает показатели по: достижению KPI проектов, инициативности, работе с изменениями, цифровой грамотности.

3. Меры по модернизации: первые шаги

Минцифры РБ участвует в федеральных и региональных инициативах:

- Цифровое портфолио госслужащего — с 01.01.2025 введено в пилотном режиме. В портфолио включаются: сертификаты, реализованные проекты, отзывы, результаты тестов (в т.ч. по цифровой грамотности). Пока — добровольно, но планируется обязательное заполнение с 2026 г.

- Система «Команда Правительства РБ» — запущена в 2023 г. В ней 100% ключевых проектов имеют утверждённые KPI, ответственные лица, сроки. Данные используются в ежеквартальных отчётах, но не интегрированы в аттестацию.

- Пилот Минцифры РФ по оценке цифровых компетенций — РБ входит в число 10 пилотных регионов. В 2024 г. протестировано 120 госслужащих по 4 компетенциям: работа с данными, цифровая безопасность, ИИ-грамотность, управление цифровыми проектами. Результаты — в экспертном использовании, без формального учёта в кадровых решениях.

На основе анализа открытых данных можно сделать следующие выводы:

1. Существующая система аттестации госслужащих не обеспечивает дифференцированную оценку в условиях роста проектной и цифровой нагрузки.

2. Минцифры РБ предпринимает конструктивные шаги по модернизации: цифровое портфолио, KPI в проектах, участие в пилотах — но эти элементы пока не системно связаны с аттестацией.

3. Путь совершенствования — нормативное внедрение дополнительных критериев на уровне Правительства РБ, например, через внесение изменений с учётом положений п. 3 ст. 49 Закона № 79-ФЗ («дополнительные критерии могут устанавливаться с учётом специфики деятельности»).

Практические предложения:

- Включить в аттестационный лист показатель «Реализация проектов» с подкритериями: выполнение KPI, инициативность, вклад в масштабирование решений.

- Интегрировать данные из СУП и Цифрового портфолио в автоматизированную систему оценки (возможно — на базе ГИС «Управление персоналом»).

- Проводить ежегодную калибровку оценок с участием независимых экспертов (АСИ, РАНХиГС, БАГСУ).

Эти меры позволят повысить объективность оценки, стимулировать развитие компетенций и усилить связь между индивидуальной эффективностью и стратегическими целями цифровой трансформации.

Использованные источники:

1. Федеральный закон от 27.07.2004 № 79-ФЗ «О государственной гражданской службе Российской Федерации» // Собрание законодательства РФ. — 2004. — № 31. — Ст. 3215.

2. Указ Президента РФ от 01.02.2005 № 113 (ред. от 01.03.2024) «О порядке присвоения и сохранения классных чинов государственной гражданской службы Российской Федерации федеральными государственным гражданским служащим» - URL: https://www.consultant.ru/document/cons_doc_LAW_51534/942772dce30cfa36b671bcf19ca928e4d698a928/ (дата обращения: 12.12.2025);
3. Указ Главы РБ от 02.10.2012 № УГ-378 «О Концепции кадровой политики в системе государственных органов и органов местного самоуправления Республики Башкортостан» - URL: https://docs.cntd.ru/document/935124002/titles/LDGOS4 (дата обращения: 12.12.2025);
4. Глазунова Н.И. Система государственного управления: Учебник для вузов / М.: Юнити-Дана. – 2016. – 314 с.
5. Зайцева Т.В. Квалификационный и компетентностный подходы на государственной гражданской службе: квалификация, как базис, компетенция как цель. // Государственное управление. Электронный вестник. — 2024. — № 107. — С. 206–221.
6. Отчёт о результатах деятельности Правительства Республики Башкортостан за 2024 год // Официальный сайт Правительства Республики Башкортостан. — URL: https://pravitelstvorb.ru/news/26399/ (дата обращения: 12.12.2025).
7. Рейтинг цифровой зрелости регионов Российской Федерации // Официальный сайт Ситуационно-Информационный Центр. — URL: https://sicmt.ru/dmrating (дата обращения: 12.12.2025).
8. Итоги работы Министерства цифрового развития государственного управления Республики Башкортостан в 2024 году // Интернет сайт Д-Россия. — URL: https://d-russia.ru/itogi-raboty-ministerstva-cifrovogo-razvitija-gosupravlenija-respubliki-bashkortostan-v-2024-godu.html (дата обращения: 12.12.2025).

УДК: 551.73.622

Батирова Н. У.
доцент
Ташкентский государственный технический университет
Рузимухамедова Ш. Б.
докторант
институт исследования рынка труда
Шукуруллаева С. У.
докторант
Ташкентский государственный технический университет

ПЕРСПЕКТИВЫ ОБРАЗОВАНИЯ КАРБОНАТНЫХ ТОЛЩ В ПАЛЕОЗОЙСКИХ ОТЛОЖЕНИЯХ

Аннотация. *В этой статье показано, что в палеозойской части формирования осадочного чехла республики были достигнуты значительные результаты в результате преобладания карбонатных слоев в ордовикских, силурийских, девонских и углеродистых отложениях.*

Ключевые слова: *карбонатные толщи, органогенные массивы, рифовые формации, органогенные постройки, каркасные организмы.*

Batirova N.
associate professor
Tashkent State Technical University
Ruzimukhamedova Sh.
doctoral candidate
Institute for Labor Market Research
Shukurullaeva S.
doctoral candidate
Tashkent State Technical University

PROSPECTS FOR THE FORMATION OF CARBONATE STRATUMS IN PALEOZOIC DEPOSITS

Abstract. *This article shows that significant results were achieved in the Paleozoic part of the formation of the sedimentary cover of the republic as a result of the predominance of carbonate layers in Ordovician, Silurian, Devonian and carbonaceous deposits.*

Key words*: carbonate stratum, organogenic massifs, reef formations, organogenic structures, frame organisms.*

В палеозойском разрезе осадочных формаций Республики карбонатные толщи имеют широкое развитие на многих уровнях, получив свое преобладание в отложениях ордовика, силура, девона и карбона.

Карбонатные формации являются одним из главных компонентов осадочной оболочки земной коры и все больше привлекают к себе внимание геологов-нефтяников, т.к. из карбонатных пород извлекается существенная часть мировой добычи нефти, а неразведанные ресурсы всех стран мира связываются главным образом с карбонатными толщами. Особенно богаты углеводородами карбонатные формации зон сочленения платформ и складчатых областей.

Поиски месторождений в карбонатных формациях и органогенных массивах являются трудной задачей, что объясняется недостаточной изученностью карбонатных толщ, ставших сравнительно недавно объектом специального изучения геологов-нефтяников. Распределение залежей по карбонатным толщам определяется суммой разнообразных факторов, но немаловажную роль среди них играет общий характер карбонатной толщи, т.е. ее формационная характеристика, а также типы органогенных построек — «рифов», развитых в толще [1].

Проблемой «рифы и нефть» занимаются многие геологи. Тем не менее остается ряд нерешенных вопросов - критерии выделения и типизации органогенных построек, закономерности размещения различных типов органогенных массивов во вмещающих отложениях и др., что отчасти объясняется ограниченным количеством детально изученных построек и нередким отсутствием связи между исследованиями конкретных «рифов», т.е. относительно мелких объектов, и изучением карбонатных формаций.

Создание органогенных построек, нередко называемых рифами, являются одной из наиболее эффектных форм участия организмов в геологических процессах и, в частности, в карбонатонакоплении, которое часто сопровождалось ростом органогенных построек.

В современных океанах рифовые фации являются основными поставщиками карбоната кальция в общий круговорот веществ. В последние годы резко возросло количество геологических работ по современным рифам и именно на коралловых рифах литологи пытаются понять механизм сложного процесса карбонатонакопления, в том числе особенности формирования пустот в рифовых массивах.

Приведем основные понятия и терминологию, наиболее часто применяемых при изучении карбонатных толщ с целью определения перспектив локализации в них жидких углеводородов. Органогенные постройки - обособленные массивные тела, образованные скелетными остатками колониальных организмов, нараставших один на другой и создававших устойчивый, изначально твердый каркас, внутри и вокруг которого накапливались генетически связанные, с ним карбонатные осадки, что проводило к образованию особых участков дна со своим биоценозом, нередко представляющим собой замкнутую экосистему [3].

Органогенные постройки в момент образования могли быть рифами в палеогеографическом смысле, но могли возникать и на некоторых глубинах. Рифогенными толщами предлагаются назвать разнообразные карбонатные толщи, содержавшие существенное количество органогенных построек и продуктов их разрушения. Органогенные постройки образуются в основном биогермными известняками при незначительном участии детритовых, обломочных и хемогенных известняков.

Вторичная доломитизация наблюдается часто. В образовании пород главная роль принадлежит каркасным организмам и цементаторам, виды и роды которых сменялись во времени, но сохранялись экологические и седиментационные особенности.

Сопутствующая фауна представлена специфическими экологическими группировками жителями нор в условиях бурных вод, пожирателями каркасных организмов, сверлильщиками; характерно отсутствие зарывающихся форм. Распределение организмов в крупных постройках пятнисто-зональное и несет явные следы гидродинамического контроля. Рифовые формации- карбонатные толщи, сложенные почти исключительно биогермными известняками и продуктами их разрушения; содержать разное по величине рифовые массивы, иногда очень крупные, обособленные, нередко- мелкие, тесно переплетающиеся с обломочными породами, произошедшими за счет их разрушения [3].

Потенциальная нефтегазоносность выделенных типов карбонатных формаций разная. Нефтегазоносными бывают формации многих типов: доломитовые, доломитистые, тройственные, формации известняков и доломитизированных известняков, рифовые, банково-рифовые, формации биогермных массивов и некоторые другие.

Наиболее часто нефтесодержащими бывают формации группы рифогенных. Не исключено, что в настоящее время перспективность рифогенных формаций несколько преувеличивается в ущерб прочим карбонатным формациям.

Крупные и гигантские месторождения встречаются и в других карбонатных формациях, которым рифогенные формации часто уступают по площади распространения. Тем не менее, вероятность открытия именно рифогенных месторождений очень высока, особенно в зонах сочленения и в краевых частях платформ, где развиты наиболее мощные рифогенные формации [2].

В последнее время встал вопрос о нефтегазоносности этих формаций и в эвгеосинклинальных областях, реальность чего доказана бурением на Суматре (месторождение-гигант Арун).

Использованные источники:

1. Абидов А.А, Каломазов Р.У, Педдер Ю.Г и др. Новая схема тектонического районирования Ферганской впадины. М., Геология нефти и газа, №11, 1992.

2. Абдуллаев Г.С., Богданов А.Н., Эйдельнант Н.К. Месторождения нефти и газа Республики Узбекистан. Ташкент-2019.
3. Батирова Н. The history of paleozoic formations and further directions of oil and gas prospects in the republic of Uzbekistan. 2023.

Бахтиёрова Д.
базовый докторант
кафедра географии и природных ресурсов
Самаркандский государственнный университет
Самарканд, Узбекистан

ЭКОЛОГИЧЕСКОЕ ЗНАЧЕНИЕ ОСОБО ОХРАНЯЕМЫХ ПРИРОДНЫХ ТЕРРИТОРИЙ В СОХРАНЕНИИ ТУГАЙНЫХ ЛАНДШАФТОВ БАССЕЙНА ЗАРАФШАНА

Аннотация: *В данной научной статье на основе комплексного подхода анализируется экологическое, флористическое и фаунистическое значение тугайных ландшафтов бассейна реки Зарафшан, а также роль специализированного питомника «Джейран», государственного заповедника «Зарафшан» и государственного заказника «Омонкўтон» в их сохранении. Освещаются антропогенные факторы, приводящие к сокращению тугайных лесов, гидрологические изменения, биогеографические риски и процессы, влияющие на экологическую устойчивость, на основе анализа научной литературы и полевых исследований. Экосистемы бассейна Зарафшана рассматриваются как взаимосвязанный экологический кластер, обосновываются современные подходы к мониторингу, реинтродукции и сохранению биоразнообразия.*

Ключевые слова: *тугайные ландшафты, бассейн Зарафшана, экологический мониторинг, флора, фауна, заповедник, питомник, антропогенная нагрузка, гидрологический режим, экологическая устойчивость, реинтродукция.*

Bakhtiyorova D.
doctoral candidate
department of geography and natural resources
Samarkand State University
Samarkand, Uzbekistan.

ECOLOGICAL SIGNIFICANCE OF SPECIALLY PROTECTED NATURE AREAS IN THE CONSERVATION OF TUGAI LANDSCAPES OF THE ZARAFSHAN BASIN

Abstract: *This research article, using an integrated approach, analyzes the ecological, floristic, and faunistic significance of tugai landscapes in the Zarafshan River basin, as well as the role of the Jeyran Specialized Nursery, the Zarafshan State Nature Reserve, and the Omonkoton State Wildlife Refuge in their conservation. Anthropogenic factors leading to the decline of tugai forests, hydrological changes, biogeographic risks, and processes affecting environmental sustainability are discussed, based on an analysis of scientific literature and field*

research. The ecosystems of the Zarafshan basin are considered as an interconnected ecological cluster, and modern approaches to monitoring, reintroduction, and conservation of biodiversity are substantiated.

Keywords: *tugai landscapes, Zarafshan basin, environmental monitoring, flora, fauna, nature reserve, nursery, anthropogenic load, hydrological regime, environmental sustainability, reintroduction.*

Введение

Тугайные ландшафты являются одним из важнейших экологических компонентов Центральной Азии, выполняя функции стабилизации естественного гидрологического режима рек, снижения почвенной эрозии, смягчения микроклимата и сохранения биологического разнообразия. Высокая экологическая значимость данных экосистем превращает тугаи в ключевые элементы экологической устойчивости регионов. Однако, согласно научным источникам, в период с 1950 по 2020 годы общая площадь тугайных лесов в Узбекистане сократилась более чем в два раза [1].

В бассейне Зарафшана естественное состояние тугайных ландшафтов существенно ухудшилось, а древние прибрежные фитоценозы оказались фрагментированными. Сложившаяся ситуация усугубляется сокращением биологического разнообразия, исчезновением редких древесно-кустарниковых видов, снижением уровня водности, развитием песчано-гравийных карьеров и ростом сельскохозяйственной нагрузки. В этой связи научно-практическое значение особо охраняемых природных территорий, таких как питомник «Джейран», заповедник «Зарафшан» и заказник «Омонкўтон», является исключительно высоким. Настоящая статья направлена на всесторонний анализ роли указанных территорий в сохранении тугайных экосистем и научное обоснование их функционального потенциала.

Основная часть

Специализированный питомник «Джейран» (Бухарская область) занимает особое место в системе охраны тугайных и пустынных экосистем. Данный питомник является одним из крупнейших в Узбекистане центров сохранения генофонда и разведения исчезающих видов. Его территория площадью 16 522 га отражает типичные ландшафты пустыни Кызылкум и характеризуется экстремальными климатическими условиями [2].

Флора питомника включает 267 видов растений, относящихся к 46 семействам и 182 родам. Преобладают такие ключевые для пустынных экосистем таксоны, как саксаул, кандим, черкез и тамариск. Экологические адаптации данных растений — водосберегающая анатомическая структура, толстая кутикула и специфические соотношения хлорофилла — отражают стратегию приспособления к аридным условиям. Фауна питомника отличается высоким биоразнообразием и включает 257 видов птиц, 36 видов млекопитающих, 18 видов пресмыкающихся и 8 видов рыб. Особо значимым является восстановление популяций редких копытных животных: джейран

— 1086 особей, туркменский кулан — 76, лошадь Пржевальского — 22, бухарский горный баран — 38, бухарский олень — 1 особь. Данные показатели подтверждают национальное и региональное значение питомника в обеспечении экосистемной устойчивости, сохранении генофонда, стабилизации популяций и реализации программ реинтродукции, оказывающих прямое влияние на экологическое равновесие бассейна Зарафшана.

Государственный заповедник «Зарафшан» создан на площади 2352 га и охватывает наиболее ценные тугайные фитоценозы среднего течения реки Зарафшан. Структура территории включает: 868 га тугайных лесов, 284 га болотных и водных угодий, 890 га кустарниковых и тростниковых сообществ, 310 га каменисто-такирных земель [3].

Флора тугайных лесов Зарафшана хорошо изучена. По данным Седова (1959), здесь выявлены 22 формации фитоценозов и 93 растительные ассоциации, что свидетельствует о высокой сложности и древнем эволюционном происхождении данных экосистем. В настоящее время тугайные ландшафты находятся под серьёзной угрозой вследствие расширения сельскохозяйственных угодий, деятельности песчано-гравийных карьеров, незаконной вырубки деревьев и усиления пастбищной нагрузки. Редкие виды, такие как туранга (Populus pruinosa), сохранились преимущественно в пределах заповедника, что указывает на уязвимость генетической структуры тугайных лесов. Заповедник «Зарафшан» выполняет функцию ключевого ядра экологической и правовой охраны природы региона.

Государственный заказник «Омонкўтон» расположен на площади 1500 га и представляет собой уникальный горно-лесной ландшафт. Более 1300 видов растений делают данный район одним из наиболее богатых по флористическому разнообразию в Узбекистане. В составе флоры насчитывается свыше 60 видов лекарственных растений, включая горный чай, девясил, боярышник, аврук, дикую грушу, миндаль и грецкий орех, обладающих высокой экологической и фармакологической ценностью [4]. Фауна заказника включает 11 видов млекопитающих, 104 вида птиц и 8 видов пресмыкающихся, при этом 9 видов занесены в Красную книгу. Экологическое значение территории дополняется богатым экотуристическим потенциалом: пещера Омонкўтон, «Королевство камней» и перевал Тахти-Карача имеют геологическую, историческую и археологическую ценность. Заказник «Омонкўтон» служит естественной лабораторией по сохранению генетического разнообразия горно-лесных экосистем бассейна Зарафшана.

Питомник «Джейран», государственный заповедник «Зарафшан» и заказник «Омонкўтон» функционируют как единая экологическая кластерная система, обеспечивающая сохранение биоразнообразия региона. Эти территории поддерживают генетическую непрерывность экологических ниш и укрепляют природное равновесие между различными ландшафтными зонами.

Питомник «Джейран» выступает ведущим научно-практическим центром Центральной Азии по сохранению и воспроизводству редких пустынных и полупустынных видов. Заповедник «Зарафшан» сохраняет древнейшие тугайные фитоценозы с реликтовыми и эндемичными видами, представляя собой ценную базу для изучения эволюции тугайных ландшафтов. Заказник «Омонкўтон» играет стратегическую роль в охране горно-лесных экосистем и естественных популяций редких видов флоры и фауны. Сокращение и деградация тугайных лесов в регионе в основном обусловлены антропогенной нагрузкой, включая вырубку деревьев, освоение земель, строительство ирригационных каналов и интенсивное развитие животноводства.

Заключение

Особо охраняемые природные территории «Джейран», «Зарафшан» и «Омонкўтон», расположенные в бассейне Зарафшана, являются опорными элементами региональной экологической безопасности. Тугайные экосистемы стабилизируют гидрологический режим рек, предотвращают эрозию почв, сохраняют биологическое разнообразие и смягчают климатические условия. Для восстановления тугайных ландшафтов бассейна Зарафшана необходимы усиление экологического мониторинга, расширение программ реинтродукции, повышение экологической культуры местного населения, развитие экотуризма на основе устойчивых моделей и рациональное использование водных ресурсов. В целом комплексная и согласованная деятельность данных охраняемых территорий формирует научно-практическую основу для обеспечения экологической устойчивости региона, рационального природопользования и сохранения природного наследия для будущих поколений.

Использованные источники:

1. O‘zbekiston Respublikasi Ekologiya qo‘mitasi, “Tabiiy resurslar holati bo‘yicha milliy hisobot”, 2020.
2. Материалы научного центра специализированного питомника «Джейран», 2023 г.
3. Sedov V.V., “Zarafshon to‘qay fitotsenozlari”, Toshkent, 1959.
4. Материалы научного центра Национального природного парка «Омонкўтон», 2022 г.

Бахтиёрова Д.
аспирант
Национальный университет Узбекистана имени Мирзо Улугбека
Ташкент, Узбекистан
Orcid.org/0009-0000-0661-7915

РОЛЬ АНДИЖАНСКОГО ВОДОХРАНИЛИЩА В СОЦИАЛЬНО-ЭКОНОМИЧЕСКОМ РАЗВИТИИ УЗБЕКИСТАНА

Аннотация: *В статье рассматривается Андижанское водохранилище как стратегически важный объект водохозяйственной и энергетической инфраструктуры Ферганской долины. Проанализированы географическое положение, основные технические характеристики и открытые данные о водохранилище. Особое внимание уделено экономическому, социальному и экологическому значению данного гидротехнического сооружения. Обоснована роль Андижанского водохранилища в обеспечении устойчивого социально-экономического развития региона и водной безопасности.*

Ключевые слова: *водохранилище, Андижанская область, Ферганская долина, ирригация, гидроэнергетика, устойчивое развитие, социально-экономическое развитие.*

Bakhtiyorova D.
postgraduate student
Mirzo Ulugbek National University of Uzbekistan
Tashkent, Uzbekistan
Orcid.org/0009-0000-0661-7915

THE ROLE OF THE ANDIJAN RESERVOIR IN THE SOCIO-ECONOMIC DEVELOPMENT OF UZBEKISTAN

Annatation: *The article examines the Andijan Reservoir as a strategically important element of the water management and energy infrastructure of the Fergana Valley. The geographical location, main technical characteristics, and open-access data of the reservoir are analyzed. Special attention is paid to its economic, social, and environmental significance. The role of the Andijan Reservoir in ensuring sustainable socio-economic development and water security of the region is substantiated.*

Keywords: *reservoir, Andijan region, Fergana Valley, irrigation, hydropower, sustainable development, socio-economic development.*

Введение

В современных условиях устойчивое социально-экономическое развитие регионов во многом определяется эффективностью управления

природными ресурсами, прежде всего водными. Для государств Центральной Азии проблема водообеспечения имеет особую актуальность в связи с аридным климатом, ростом численности населения и высокой зависимостью экономики от орошаемого земледелия.

Ферганская долина является одним из наиболее густонаселённых и экономически развитых регионов Узбекистана. Здесь сосредоточены значительные сельскохозяйственные и промышленные мощности, что обуславливает высокий спрос на водные ресурсы. В этих условиях ключевую роль играют крупные гидротехнические сооружения, обеспечивающие регулирование стока, ирригацию и выработку электроэнергии.

Андижанское водохранилище относится к числу крупнейших водохозяйственных объектов Ферганской долины и оказывает существенное влияние на экономику и социальную сферу региона. В связи с этим анализ его географического положения, открытых данных и социально-экономической роли представляет научный и практический интерес.

Целью настоящего исследования является комплексная оценка роли Андижанского водохранилища в социально-экономическом развитии Ферганской долины на основе анализа открытых данных.

Географическое положение Андижанского водохранилища

Андижанское водохранилище расположено в восточной части Ферганской долины на реке Карадарья, являющейся одним из главных притоков реки Сырдарья. В административном отношении объект находится на территории Андижанской области Республики Узбекистан и частично затрагивает приграничные районы Кыргызской Республики, что придаёт ему трансграничное значение.

Географические координаты плотины составляют приблизительно 40°46′ северной широты и 73°07′ восточной долготы. Водохранилище сформировано в предгорной зоне, в месте выхода реки Карадарья из горных районов в долинную часть. Площадь водосборного бассейна превышает 12 тыс. км², что обеспечивает значительный приток воды за счёт горных рек и сезонного снеготаяния.

Близость водохранилища к таким городам, как Андижан и Ханабад, усиливает его значение в системе регионального расселения и хозяйственного освоения территории. Географическое положение объекта определяет его ключевую роль в водоснабжении Ферганской долины (рис. 1).

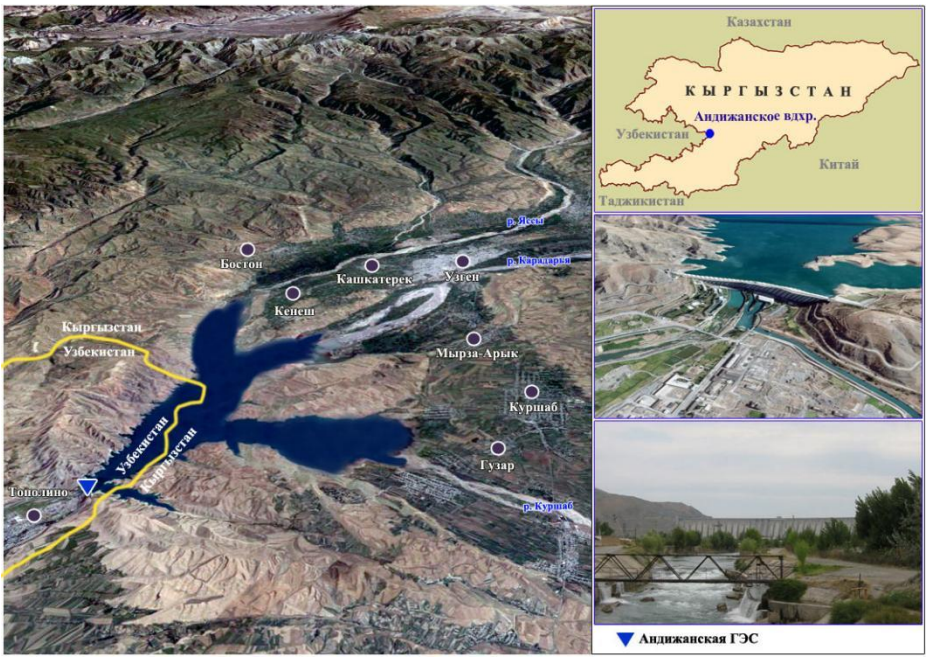


Рис. 1: Вид на Андижанское водохранилище с северного берега (апрель 2023 года)

Основные технические характеристики и открытые данные

Андижанское водохранилище относится к русловым водохранилищам многолетнего регулирования. Строительство гидроузла началось в 1969 году, а полное завершение и ввод в эксплуатацию были осуществлены в 1983 году.

Основные технические параметры водохранилища включают:

- полный объём — около 1,9 млрд м³;
- полезный объём — около 1,75 млрд м³;
- площадь зеркала воды — около 56 км²;
- максимальная глубина — до 98 м;
- высота плотины — 115-121 м.

На плотине функционирует Андижанская гидроэлектростанция установленной мощностью 190 МВт. Среднегодовая выработка электроэнергии составляет порядка 170 млн кВт·ч.

Открытые данные о режиме наполнения, сбросах воды и техническом состоянии водохранилища публикуются национальными водохозяйственными органами, а также представлены в международных базах данных FAO AQUASTAT и UNECE, что обеспечивает доступность информации для научных исследований.

Экономическое значение Андижанского водохранилища

Экономическая значимость Андижанского водохранилища прежде всего связана с его ирригационной функцией. Регулирование стока реки Карадарья позволяет стабильно обеспечивать водой сельскохозяйственные угодья Ферганской долины, где сосредоточены значительные площади хлопчатника, зерновых и плодоовощных культур.

Функционирование водохранилища способствовало:

- расширению орошаемых земель;
- росту урожайности сельскохозяйственных культур;
- снижению рисков, связанных с засухами и неравномерностью водоснабжения.

Гидроэнергетическая функция водохранилища также имеет важное значение. Производство электроэнергии на Андижанской ГЭС способствует диверсификации энергетического баланса региона и снижению зависимости от ископаемых источников энергии.

Социальное значение

Андижанское водохранилище оказывает значительное влияние на социальное развитие региона. Оно обеспечивает водную безопасность населения, создаёт условия для устойчивого функционирования сельских населённых пунктов и способствует занятости населения в сельском хозяйстве, энергетике и рыбном хозяйстве.

Наличие стабильного источника воды положительно отражается на уровне жизни населения, снижает вероятность социальных конфликтов, связанных с дефицитом водных ресурсов, и способствует социальной стабильности в густонаселённой Ферганской долине.

Дополнительным аспектом социального значения является рекреационный потенциал водохранилища, который может быть использован для развития туризма и сферы услуг.

Экологические аспекты функционирования

Эксплуатация Андижанского водохранилища сопровождается рядом экологических последствий. К основным проблемам относятся заиление чаши водохранилища, изменение естественного гидрологического режима реки Карадарья и трансформация природных экосистем.

Накопление наносов приводит к сокращению полезного объёма водохранилища, что снижает эффективность многолетнего регулирования стока. Вместе с тем водохранилище стало новым водным экосистемным объектом, в котором сформировались промысловые виды рыб.

Рациональное управление водохранилищем, соблюдение экологических норм и внедрение современных методов мониторинга позволяют минимизировать негативное воздействие на окружающую среду.

Заключение

Андижанское водохранилище является стратегически важным элементом водохозяйственной системы Ферганской долины. Его географическое положение, технические характеристики и

многофункциональное назначение обеспечивают значительный вклад в социально-экономическое развитие региона.

Дальнейшее устойчивое развитие Ферганской долины невозможно без повышения эффективности управления водохранилищем, внедрения инновационных технологий и укрепления межгосударственного сотрудничества в сфере использования водных ресурсов.

Использованные источники:

1. Ахмедходжаева И. А., Апакхужаева Т., Ибрагимова З. И. Прогноз заиления русловых водохранилищ // Труды ТИИИМСХ. — Ташкент, 2019.
2. АО «Узбекгидроэнерго». Андижанская гидроэлектростанция [Электронный ресурс]. — Режим доступа: https://www.uzbekhydroenergo.uz (дата обращения: 16.12.2025).
3. CAWater-Info. Водохранилища бассейна реки Сырдарьи [Электронный ресурс]. — Режим доступа: https://www.cawater-info.net (дата обращения: 16.12.2025).
4. Министерство водного хозяйства Республики Узбекистан. Официальный сайт [Электронный ресурс]. — Режим доступа: https://www.water.gov.uz (дата обращения: 16.12.2025).
5. FAO AQUASTAT. Water resources of Uzbekistan [Electronic resource]. — Available at: https://www.fao.org/aquastat/ (accessed: 16.12.2025).
6. UNECE. Transboundary waters in Central Asia [Electronic resource]. — Geneva: United Nations Economic Commission for Europe, 2017. — Available at: https://unece.org (accessed: 16.12.2025).

Бахтиёрова Д.
аспирант
Национальный университет Узбекистана имени Мирзо Улугбека
Ташкент, Узбекистан
Orcid.org/0009-0000-0661-7915

ВЫСОКОТОЧНЫЙ ГЕОДЕЗИЧЕСКИЙ МОНИТОРИНГ ДЕФОРМАЦИЙ БЬЕФОВ ГИДРОТЕХНИЧЕСКОГО СООРУЖЕНИЯ ПО ДАННЫМ НИВЕЛИРОВАНИЯ (НА ПРИМЕРЕ АНДИЖАНСКОГО ВОДОХРАНИЛИЩА)

Аннотация: *В статье представлены результаты геодезического мониторинга вертикальных деформаций верхнего и нижнего бьефов гидротехнического сооружения на основе годовых и долговременных нивелирных наблюдений. Анализ четырёх деформационных графиков показывает, что основные участки сооружения находятся в устойчивом статическом состоянии, характеризуемом стабилизированной осадкой в диапазоне –14…–17 мм. Выявленные редкие глубокие аномалии имеют инструментальную природу и не приводят к долговременным изменениям напряжённо-деформационного состояния конструкции. Годовые графики демонстрируют реакции сооружения на эксплуатационные и сезонные воздействия: скачкообразные изменения напряжений, периоды стабилизации и обратные деформации (подъём). Применение методов высокоточного нивелирования обеспечивает выявление деформаций на уровне 1–2 мм и позволяет эффективно диагностировать состояние гидротехнического объекта.*

Ключевые слова: *гидротехническое сооружение; деформации; нивелирование; геодезический мониторинг; бьеф; осадка; точность; деформационная кривая; устойчивость конструкции.*

Bakhtiyorova D.
postgraduate student
Mirzo Ulugbek National University of Uzbekistan
Tashkent, Uzbekistan
Orcid.org/0009-0000-0661-7915

HIGH-PRECISION GEODETIC MONITORING OF HYDRAULIC STRUCTURE RESERVOIR DEFORMATIONS BASED ON LEVELING DATA (using the Andijan Reservoir as an example)

Annotation: *This paper presents the results of geodetic monitoring of vertical deformations in the upper and lower bays of a hydraulic structure based on annual and long-term levelling observations. Analysis of four deformation graphs shows that the structural elements remain in a stable static condition*

characterized by a persistent settlement of –14 to –17 mm. Occasional deep anomalies are identified as instrumental outliers and do not indicate actual structural deformation. Annual deformation curves reveal responses to operational and seasonal loads, including stress jumps, stabilization phases, and reverse deformation (uplift). High-precision levelling provides millimetre-level detection of displacements, enabling reliable assessment of structural behaviour.

Keywords: *hydraulic structure; deformation monitoring; precise levelling; settlement; uplift; stability; deformation curve; geodetic accuracy.*

1. Введение

Гидротехнические сооружения подвержены сложным напряжённо-деформационным процессам, связанным с изменением гидростатических нагрузок, сезонными факторами, фильтрацией воды и геомеханическими характеристиками грунтов. Для обеспечения безопасности эксплуатации необходим высокоточный геодезический мониторинг, позволяющий фиксировать вертикальные смещения с миллиметровой точностью.

В данном исследовании анализируются годовые и долговременные данные нивелирования, отражающие вертикальные деформации верхнего и нижнего бьефов. Цель работы — выделить закономерности изменения состояния сооружения и оценить точность и надёжность применяемой нивелирной сети.

2.Методы

Высотная геодезическая сеть

Использована сеть фундаментальных и инженерных реперов, расположенных в зоне верхнего и нижнего бьефов. Нивелирование выполнялось по замкнутым маршрутам, обеспечивающим контроль невязок.

Схема нивелирного хода 1-й категории

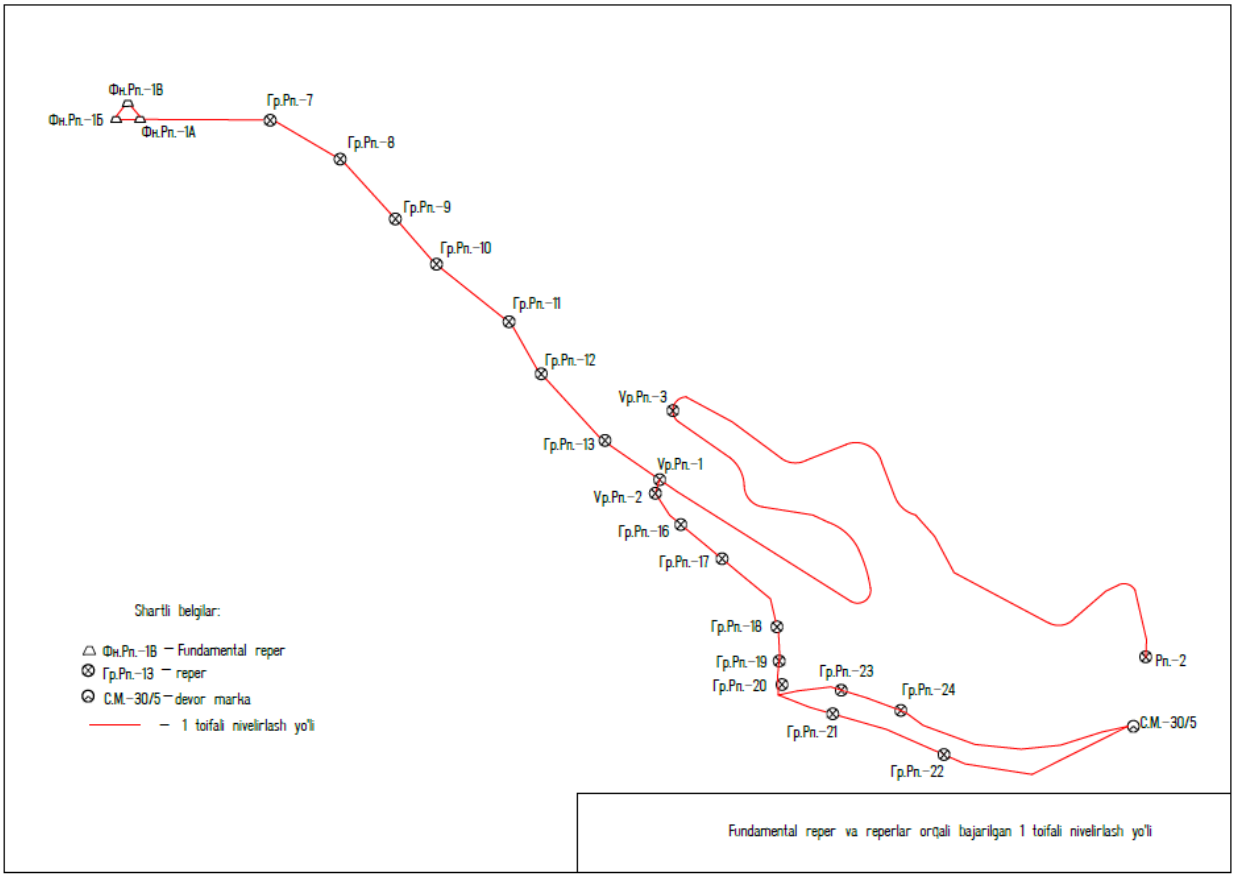


Рис. 1. Схема фундаментальных и инженерных реперов, используемых для выполнения нивелирования 1-й категории.

Схема (рис. 1) демонстрирует трёхуровневую структуру сети:

1. **Исходный узел** из трёх фундаментальных реперов обеспечивает устойчивость высотной основы и контроль систематических ошибок при замыкании хода.
2. **Магистральный ход**, проходящий через Гр.Рп–7…13, служит основным направлением передачи высот и обеспечивает геометрическую прочность сети.
3. **Разветвлённые ветви**, отходящие от Гр.Рп–13 и Вр.Рп–2, охватывают зоны повышенного риска деформаций — участки дамбы, откосов, береговой линии и инженерных сооружений водохранилища.

Формулы обработки

Невязка в замкнутом ходе:

$$f_h = \sum \Delta h_i^{изм} - \Delta H_{теор}$$

Допустимое значение:

$$|f_h| \leq 0.8\sqrt{L}$$

Погрешность превышения:

$$m_{\Delta h} = m_{1км}\sqrt{L}$$

Ошибка отметки репера:

$$m_H = m_{1км}\sqrt{\frac{L}{n}}$$

Деформация между циклами:

$$\Delta H = H_{t_2} - H_{t_1}$$

Общая ошибка деформации:

$$m_{\Delta H} = \sqrt{m_{H_1}^2 + m_{H_2}^2}$$

3. Результаты

Анализ деформаций нижнего и верхнего бьефов по результатам годовых и долговременных наблюдений.

Ниже дано комплексный анализ деформационных графиков, снятых в зоне нижнего и верхнего бьефов гидротехнического сооружения, позволяет сформировать целостное представление о напряжённо-деформационном состоянии объекта в течение года и в более длительной перспективе. Графики характеризуют изменения вертикальных смещений опорных точек и береговых элементов и отражают как устойчивые тенденции, так и отдельные аномальные события, встречающиеся в процессе нивелирования.

Деформации нижнего бьефа: годовой характер изменений.

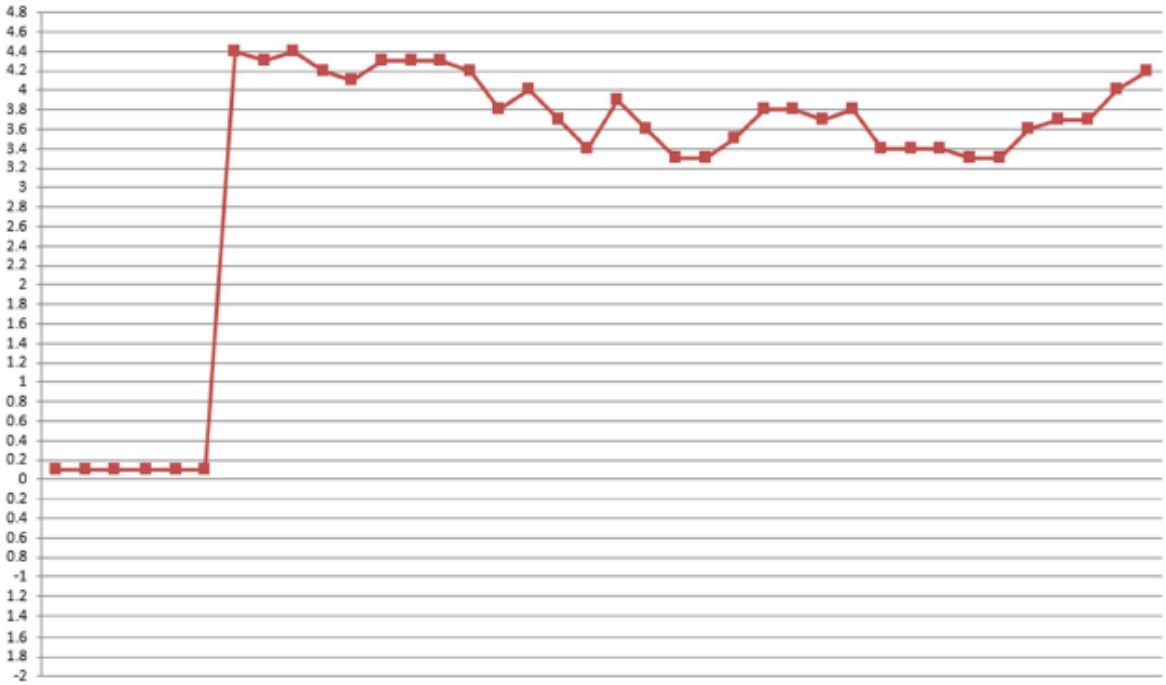


Рис. 2. Годовая деформация верхнего бьефа (2025 год).

На годовом графике кромки нижнего бьефа зафиксированы два принципиальных этапа развития деформаций. В начале периода значения находятся на уровне около +0.2 мм, что соответствует практически нулевой осадке и свидетельствует о стабильности конструкции. Однако далее наблюдается внезапный скачок до +4.4 мм, который отражает резкое изменение напряжённого состояния — вероятно, связанное с изменением уровня воды, эксплуатационной нагрузки или температурно-влажностным режимом (рис. 2).

После этого скачка деформации стабилизируются на уровне 4.2–4.4 мм, образуя устойчивое плато. В дальнейшем отмечаются умеренные колебания в диапазоне 3.4–4.4 мм, которые соответствуют нормальным динамическим процессам эксплуатационного режима. К концу наблюдательного периода зафиксирована тенденция к росту деформаций до 4.6–4.7 мм, однако эта тенденция пока не носит прогрессирующего характера и требует дальнейшего наблюдения для подтверждения.

Деформации нижнего бьефа: долговременная перспектива

Обобщённый график длительных наблюдений за нижним бьефом показывает устойчивые значения осадки в диапазоне –14…–17 мм, что соответствует зоне вторичной, стабильной осадки, характерной для длительно эксплуатируемых гидротехнических сооружений. Эта стабильность свидетельствует о равновесном состоянии грунтового массива и отсутствию накопленной деформации (рис. 3).

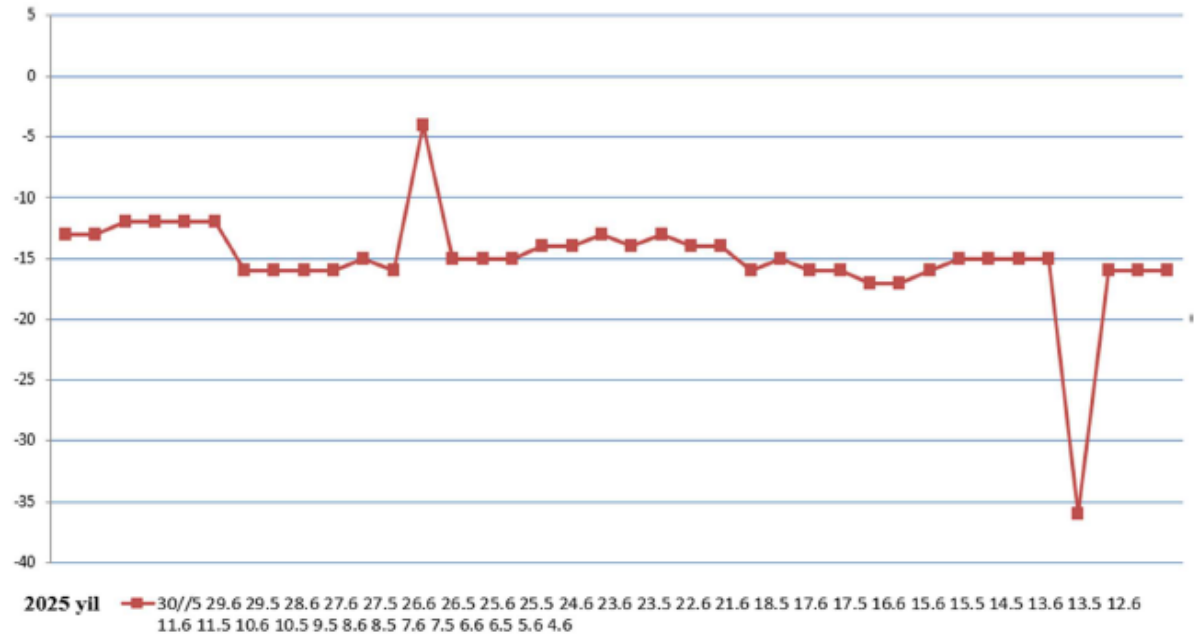


Рис. 3. Общая деформация нижнего бьефа за длительный период (2025 год)

На данном графике присутствуют редкие резкие провалы до –37…–40 мм, которые являются аномальными и не соответствуют соседним измерениям. Поскольку после каждого провала значения возвращаются к нормальному диапазону, такие отклонения можно интерпретировать как инструментальные или технологические ошибки, а не как реальную деформацию сооружения. Отсутствие долговременного тренда осадки или её роста подтверждает общую устойчивость нижнего бьефа.

Деформации верхнего бьефа: годовой цикл наблюдений

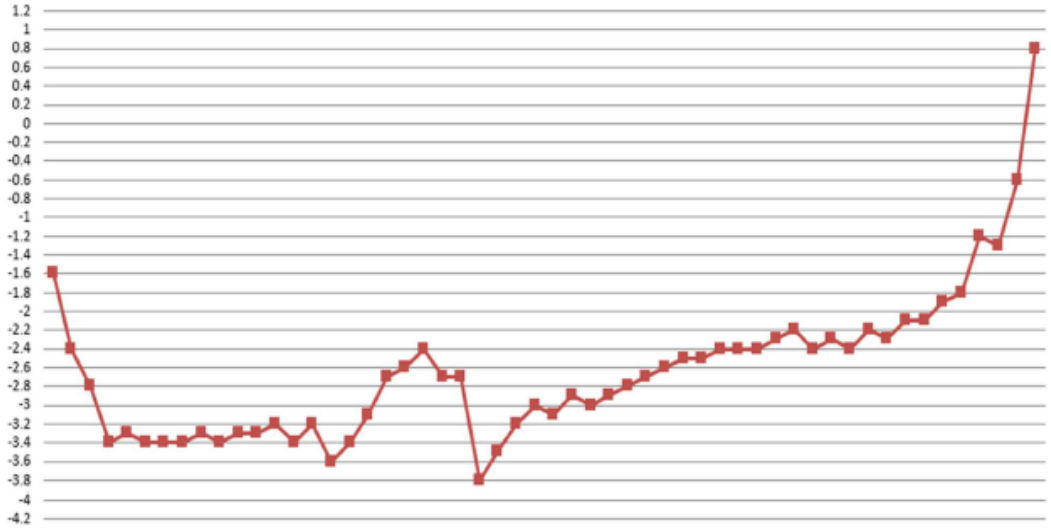


Рис. 4. Годовая деформация верхнего бьефа (2025 год)

Годовой график деформаций верхнего бьефа имеет более выраженную динамику. Наблюдается несколько этапов:

1. Начальный период — плавная осадка от –1.6 мм до уровня около –3.4 мм.
2. Фаза стабилизации — удержание деформаций в диапазоне –3.3…–3.5 мм, что свидетельствует о равновесии конструкций и грунтов.
3. Локальные возвратные деформации — частичные подъёмы до –2.4 мм, связанные с температурными изменениями или эксплуатационными воздействиями.
4. Финальная фаза — постепенный переход к подъёму поверхности, заканчивающийся значениями до +1.1 мм.

Такая кривая отражает типичное многосезонное поведение верхнего бьефа, где осадки сопровождаются релаксацией и обратными деформациями из-за изменения водонасыщения, температурных градиентов и эксплуатационных факторов (рис. 4).

Деформации верхнего бьефа: долговременная динамика

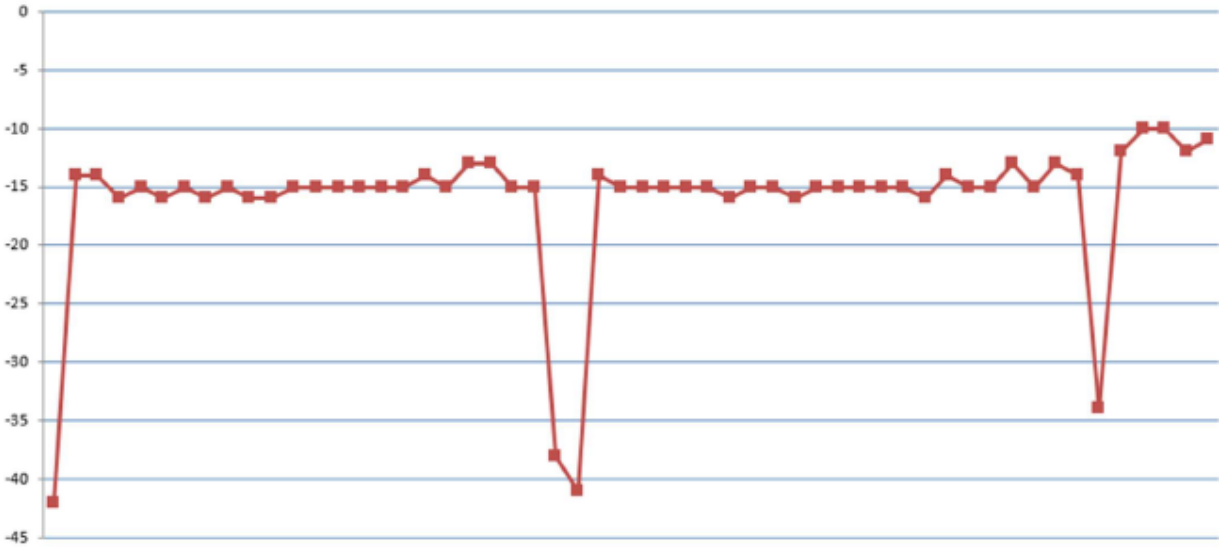


Рис. 5. Общая деформация верхнего бьефа за длительный период наблюдений (2025 год)

При длительном наблюдении деформации верхнего бьефа остаются в диапазоне –14…–16 мм, что подтверждает стабильное статическое состояние данного элемента сооружения. Аналогично нижнему бьефу, на графике наблюдаются отдельные резкие отклонения до –38…–40 мм, которые не повторяются и не изменяют общего уровня деформаций. Быстрый возврат к нормальному диапазону свидетельствует о том, что эти скачки являются выбросами данных, обусловленными техническими или инструментальными факторами (рис. 5).

Отсутствие систематического увеличения осадки и устойчивый возврат к стабильному уровню говорят о неизменном напряжённо-деформационном состоянии конструкции.

4. Обсуждение

Общий анализ четырёх деформационных графиков, а также структуры нивелирной сети, показывает, что напряжённо-деформационное состояние гидротехнического сооружения является **стабильным и контролируемым**. Стабилизированная осадка в диапазоне –14…–17 мм соответствует типичным значениям для сооружений, находящихся в длительной эксплуатации, и не выходит за пределы нормативных критериев, установленных отечественными и международными стандартами.

Аномальные пики осадок (до –37…–40 мм), выявленные как при годовых, так и при длительных наблюдениях, имеют **инструментальную природу**. Их разовое возникновение, отсутствие подтверждений на соседних пунктах, а также быстрый возврат системы к нормальным значениям свидетельствуют о технических погрешностях (неустойчивость рейки, температурные помехи, ошибки фиксации). Такие выбросы не могут считаться реальными деформациями и должны отбрасываться на этапе уравнивания.

Циклический характер изменений (осадка → стабилизация → подъём) отражает естественные процессы, происходящие под действием эксплуатационных нагрузок гидросооружения. Эти сезонные колебания связаны с:

- изменением уровня воды в бьефах;
- гидростатическим давлением на тело сооружения;
- температурным расширением и сжатием материалов;
- изменением влажности и фильтрационных потоков;
- релаксацией грунтов основания.

Важным фактором, подтверждающим стабильность конструкции, является **отсутствие прогрессирующей осадки**, то есть отсутствия нисходящего тренда, характерного для аварийных процессов.

Высокоточное нивелирование 1-й категории продемонстрировало эффективность в выявлении вертикальных смещений величиной 1–2 мм, что соответствует нормативной точности для гидротехнического мониторинга по ICOLD и FIG. Это позволяет не только фиксировать текущее состояние сооружения, но и формировать прогноз деформаций при длительном наблюдении.

В совокупности полученные результаты подтверждают, что система наблюдений спроектирована корректно, а гидротехническое сооружение находится в **квазистационарном** состоянии без признаков развития опасных деформационных процессов. Однако разветвлённая структура сети и наличие аномальных точек показывают необходимость дальнейшего регулярного мониторинга, калибровки оборудования и анализа сезонных факторов.

5. Заключение

1. Выполненный комплекс наблюдений показал, что верхний и нижний бьефы гидротехнического сооружения находятся в стабильном деформационном состоянии с устойчивой осадкой в пределах –14…–17 мм, что соответствует нормам для объектов такого класса.
2. Анализ графиков выявил аномальные резкие скачки деформаций, которые имеют **инструментальную природу** и не отражают реальные изменения в конструкции. После таких скачков система возвращается в нормальное состояние, что подтверждает отсутствие структурных нарушений.
3. Сезонные вариации деформаций полностью соответствуют физико-механическим процессам в теле дамбы и её основании — это нормальные циклические изменения, связанные с температурой, гидростатическим давлением и эксплуатационными режимами.
4. Признаков прогрессирующей деформации, аварийных тенденций, увеличивающейся осадки или иных потенциально опасных процессов **не выявлено**. Это подтверждает удовлетворительное техническое состояние сооружения.
5. Высокоточное нивелирование 1-й категории подтвердило свою эффективность в обеспечении высокой точности (до 1–2 мм) и высокой надёжности данных, что делает его оптимальным инструментом для мониторинга гидротехнических сооружений.
6. Рекомендуется продолжать регулярные наблюдения в рамках существующей сети, обеспечить её периодическую поверку и использовать накопленные данные для построения прогнозных моделей деформаций.

Использованные источники:

1. Andijon suv ombori to’g‘oninida cho‘kish bilan bog’liq deformatsiyalanishni muhandislik-geodeziya uslubida kuzatuv ishlari bo’yicha «TEXNIK HISOBOT»
2. Инструкция по нивелированию I–IV классов. — М.: ЦНИИГАиК.
3. ГОСТ 24846-2014. Геодезические работы. Основные положения.
4. Методические рекомендации по мониторингу гидротехнических сооружений. — М.: Росводресурсы.
5. ICOLD Bulletin 145: Monitoring of Dams and Their Foundations. International Commission on Large Dams, Paris.
6. FIG Publication No. 25: The FIG Guide on Engineering Surveys. International Federation of Surveyors.
7. USACE EM 1110-2-1009: Structural Deformation Surveying. U.S. Army Corps of Engineers.
8. Ляховицкий И.М. Геодезический мониторинг сооружений: теория и практика. — М.: Недра.
9. Хоруженко А.И. Гидротехнические сооружения: расчёты и наблюдения. — СПб.: Гидростройиздат.

Бойтураев О. У., PhD
доцент
кафедра экономики
Наманганский государственный технический университет

ОСНОВНЫЕ НАПРАВЛЕНИЯ ГОСУДАРСТВЕННОЙ ПОЛИТИКИ ПО ПОДДЕРЖКЕ МАЛОГО БИЗНЕСА И ЧАСТНОГО ПРЕДПРИНИМАТЕЛЬСТВА

Аннотация: *Статья анализирует меры государственной поддержки малого бизнеса и частного предпринимательства в Узбекистане, включая правовое регулирование, финансовую помощь, инновации и создание благоприятной предпринимательской среды.*

Ключевые слова: *малый бизнес, частное предпринимательство, государственная поддержка, инновации, финансовые ресурсы, правовое регулирование, предпринимательская среда, занятость, экономическая эффективность, развитие.*

Boyturaev O. U., PhD
associate professor
department of economics
Namangan State Technical University

MAIN DIRECTIONS OF STATE POLICY FOR SUPPORTING SMALL BUSINESS AND PRIVATE ENTREPRENEURSHIP

Abstract: *The article examines state support measures for small business and private entrepreneurship in Uzbekistan, including legal regulation, financial assistance, innovations, and the creation of a favorable entrepreneurial environment.*

Keywords: *small business, private entrepreneurship, state support, innovations, financial resources, legal regulation, entrepreneurial environment, employment, economic efficiency, development.*

В последние годы развитие малого бизнеса и частного предпринимательства, а также формирование необходимых институциональных и организационно-экономических условий для повышения эффективности их деятельности приобрели статус одного из ключевых приоритетов государственной политики нашей страны.

Благодаря инициативам Президента, направленным на дальнейшее совершенствование делового климата и системную поддержку субъектов малого бизнеса и частного предпринимательства, наблюдается устойчивый рост доли малого бизнеса в структуре национальной экономики.

Последовательные реформы, проводимые под руководством главы государства в течение последних пяти–шести лет, внесли качественно новый импульс и содержательное обновление в деятельность предпринимательского сектора. Вся совокупность преобразований, осуществляемых в стране, ориентирована на достижение единой стратегической цели — ускоренное развитие предпринимательства, обеспечение занятости населения и повышение уровня благосостояния граждан.

В частности, расширяются меры государственной поддержки в отношении развития семейного предпринимательства, включая такие его направления, как ремесленничество, надомный труд, эффективное использование приусадебных участков, малое производство, сфера услуг и иные виды хозяйственной активности. В рамках программ по развитию семейного предпринимательства значительно упрощены механизмы получения кредитно-финансовых ресурсов, что способствует вовлечению широких слоев населения в предпринимательскую деятельность.

В частности, чётко определены инструменты государственного регулирования предпринимательской деятельности. К их числу относятся: государственная регистрация, лицензирование и разрешительные процедуры, техническое регулирование, тарифное и нетарифное регулирование, обязательное страхование, государственный надзор, защита конкуренции и установление юридической ответственности.

Единый реестр включает в себя сведения обо всех установленных требованиях, сроках их исполнения, связанных с ними финансовых расходах, документах, подтверждающих соответствие требованиям, контролирующих органах, формах проверок, а также мерах ответственности. Информация в реестр вносится уполномоченными государственными органами и организациями, осуществляющими регулирование соответствующих сфер.

В настоящее время осуществляются последовательные комплексные меры по поддержке и регулированию малого бизнеса и частного предпринимательства, повышению их вклада в производство валового внутреннего продукта и обеспечению занятости, удовлетворению потребности предпринимателей в кредитных ресурсах, а также созданию благоприятной предпринимательской среды.

В Узбекистане и развитых странах совершенствуются экономические механизмы государственного регулирования малого бизнеса и частного предпринимательства. Эти механизмы направлены на повышение эффективности деятельности малого бизнеса, создание благоприятной деловой среды для предпринимателей, эффективное использование денежных и кредитных инструментов регулирования, создание новых рабочих мест и активизацию населения.

По критерию «Поддержка нового бизнеса» Узбекистан в настоящее время занимает 42-е место в мире; по показателю «Обеспечение исполнения

заключённых договоров» — 32-е место; по эффективности системы банкротства применительно к экономически несостоятельным предприятиям — 75-е место.

В стране сохраняются определённые проблемы, связанные с дальнейшей либерализацией ответственности субъектов предпринимательства и налаживанием диалога с предпринимателями. Комплекс мер, реализуемых в Узбекистане для улучшения деловой среды, создаёт возможности для ускоренного развития малого бизнеса и частного предпринимательства, а также для обеспечения устойчивых темпов экономического роста.

Высокая значимость малого бизнеса и частного предпринимательства для экономической и социальной ситуации в стране обусловливает разработку законов и нормативных документов, способствующих их развитию, во многих странах. На сегодняшний день системы мер поддержки малого бизнеса и частного предпринимательства различаются по ключевым положениям экономической политики, приоритетным направлениям и объёмам используемых бюджетных средств.

Несоответствие этих систем в национальной экономике создаёт определённые трудности для поддержания конкурентного рынка. Поэтому в последние годы всё больше внимания уделяется разработке и реализации единой социально-экономической политики на международном уровне в сфере малого бизнеса. Социальная значимость малого бизнеса многоаспектна: его развитие проявляется в различных направлениях.

Это означает, что во всех отраслях (торговля, строительство, промышленность и другие) определённая часть общего объёма произведённой за год продукции и оказанных услуг приходится именно на малые фирмы и предприятия, т.е. более половины этих товаров и услуг произведено именно такими малыми компаниями (см. рис. 1).

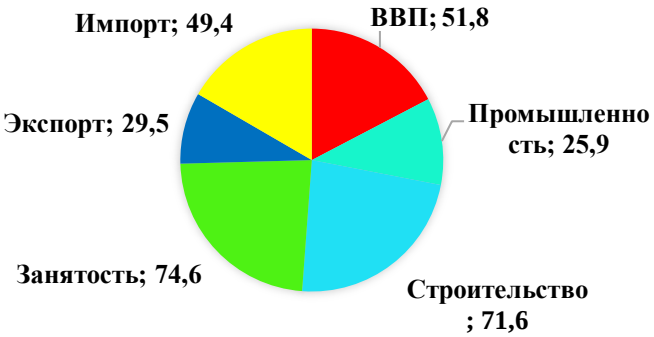


Рис. 1. Доля малого бизнеса и частного предпринимательства по отраслям в Узбекистане в 2022 году, % [34]

[34] Авторская работа на основе данных Национального комитета статистики Республики Узбекистан.

В 2022 году объём производства промышленной продукции малым бизнесом и субъектами частного предпринимательства в Республике Узбекистан составил 25,9 %, а в строительстве (от общего объёма строительных работ) – 71,6 %.

Если сравнивать долю малого и среднего бизнеса в валовом внутреннем продукте развитых стран, то она составляет 50–60 %. В частности: Польша – 51 %, Германия – 53 %, Финляндия – 60 %, Нидерланды – 63 %.

Недооценка роли малого бизнеса и частного предпринимательства, отсутствие внимания к их производственному и социально-экономическому потенциалу создают условия для стратегических ошибок в масштабной оценке экономической ситуации. Однако в современных условиях глобализации формирование предпринимательского слоя происходит очень медленно и противоречиво.

Основные функции государственного регулирования в данном направлении:

- Обеспечение справедливых условий и высокой степени конкуренции.
- Денежно-кредитная и финансовая политика государства.
- Обеспечение социальной справедливости и социальных гарантий.
- Создание комфортной и экономически выгодной инфраструктуры для функционирования сообществ.

В настоящее время субъекты малого бизнеса и частного предпринимательства в Узбекистане активно участвуют в решении ряда экономических и социальных проблем на региональном уровне. Их деятельность способствует:

- оживлению экономики;
- наполнению рынка товарами и услугами;
- формированию конкурентной среды;
- развитию рыночной инфраструктуры;
- решению проблем занятости;
- формированию новых субъектов собственности и среднего класса общества.

Малый бизнес и частное предпринимательство являются неотъемлемой частью рыночной экономики, отличаясь высокой гибкостью, адаптивностью и эффективностью.

На основе определенных мер предлагаются конкретные методы перспективного развития малого бизнеса в стране, которые в определенной степени положительно влияют на повышение доходов и благосостояния населения, а также отдельных хозяйствующих субъектов.

Использованные источники:

1. Прохорова В. В. Интенсификация развития региональной экономической системы в условиях нестабильности // Национальные интересы: приоритеты и безопасность. – 2010. – № 36. – С. 62–65.
2. Boyturaev (2023). Assessment of the competitiveness of tourism industry in fergana valley from its characteristics. Asia pacific journal of marketing & management review ISSN: 2319-2836 Impact Factor: 8.071, 12(11), 65-74
3. Olimjon Boyturayev (2025). Sanoat hamkorligining ilg ‘or tajribalari va ularni o ‘zbekiston iqtisodiyotiga integratsiya qilish yo ‘llari. Muhandislik va iqtisodiyot, 3(11), 385-391.
4. Жураев, Э. С. угли Сиддиков, СС (2023). Антикризисные меры по обеспечению развития малого бизнеса. Educational Research in Universal Sciences, 2(2), 515-523.
5. Жураев, Э. С. (2022). Теоретическая интерпретация видов, структуры, эффективности и управления реальными инвестициями. Экономика и социум, (5-2 (92)), 434-439.
6. Юлдашев, А. Я., & Жураев, Э. С. (2023). УЙ ХЎЖАЛИКЛАРИ МОЛИЯСИНИ ТАШКИЛ ЭТИШ ВА УНИ ТАКОМИЛЛАШТИРИШ. IJODKOR O'QITUVCHI, 3(29), 158-164.
7. Tursunpulatovna, N. N. (2023). Ways to Increase the Efficiency and Efficiency of Export and Import of Fruits and Vegetables in the Republic of Uzbekistan. Eurasian Journal of History, Geography and Economics, 19, 54-59.
8. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
9. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
10. Samatov G. Temir yo‘l infratuzilmasini rivojlantirishning iqtisodiy asoslari. – T.: Iqtisod-Moliya, 2021.
11. Shukurjonovich, R. H. (2020, December). IMPROVING THE ECONOMIC ACTIVITY OF TRANSPORT INFRASTRUCTURE. In Archive of Conferences (Vol. 10, No. 1, pp. 47-49).
12. Jalolova, M., Sangirova, U., Yakubov, I., Rahimov, H., & Kholmatova, N. (2022). Economic efficiency of the transport system and logistics in the Republic of Uzbekistan. Transportation Research Procedia, 63, 1061-1066.
13. Bahriddinov, N. Z. (2021). Legal and economic basis for improving the mechanism of financial incentives for innovative activities in industrial enterprises. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 1804-1811.
14. Bahriddinov, N. Z. (2025). Attraction of investments for innovative management in enterprises. Экономика и социум, (3-2 (130)), 53-57.

Буриева Н. Т.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Исмаилов Ж. А.
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

ОСОБЕННОСТИ РАЗВИТИЯ ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТИ У ПАЦИЕНТОВ С РЕВМАТОИДНЫМ АРТРИТОМ

Аннотация: *В статье рассматриваются особенности развития хронической сердечной недостаточности (ХСН) у пациентов с ревматоидным артритом (РА). Подчеркивается взаимосвязь воспалительного процесса при РА с нарушениями сердечно-сосудистой системы, включая структурные и функциональные изменения миокарда. Обсуждаются механизмы, способствующие прогрессированию ХСН, такие как хроническое системное воспаление, эндотелиальная дисфункция и сопутствующие коморбидные состояния. Представлены клинические проявления, характерные для пациентов с РА, а также подходы к ранней диагностике и комплексной терапии, направленной на замедление прогрессирования сердечной недостаточности.*

Ключевые слова: *Ревматоидный артрит, хроническая сердечная недостаточность, воспаление, сердечно-сосудистые осложнения, эндотелиальная дисфункция, коморбидные заболевания, диагностика, терапия*

Burieva N. T.
master's student
Samarkand State Medical University
Scientific Advisor: Ismailov J. A.
Samarkand State Medical University
Samarkand, Uzbekistan

FEATURES OF CHRONIC HEART FAILURE DEVELOPMENT IN PATIENTS WITH RHEUMATOID ARTHRITIS

Abstract: *This article examines the development of chronic heart failure (CHF) in patients with rheumatoid arthritis (RA). It highlights the relationship between the inflammatory process in RA and cardiovascular disorders, including structural and functional myocardial changes. Mechanisms contributing to the progression of CHF, such as chronic systemic inflammation, endothelial dysfunction, and associated comorbid conditions, are discussed. Clinical manifestations characteristic of patients with RA are presented, as well as*

approaches to early diagnosis and combination therapy aimed at slowing the progression of heart failure.

Key words: *rheumatoid arthritis, chronic heart failure, inflammation, cardiovascular complications, endothelial dysfunction, comorbid diseases, diagnostics, therapy*

Введение

Ревматоидный артрит (РА) является хроническим аутоиммунным заболеванием, которое поражает суставы и сопровождается системным воспалением. Помимо суставных проявлений, у пациентов с РА отмечается повышенный риск развития сердечно-сосудистых заболеваний, включая хроническую сердечную недостаточность (ХСН). Хроническое воспаление при РА, а также сопутствующие факторы риска артериальная гипертензия, дислипидемия, метаболические нарушения способствуют структурным и функциональным изменениям миокарда, что ускоряет прогрессирование сердечной недостаточности. Особенности развития ХСН у пациентов с РА отличаются от таковых у пациентов без аутоиммунных заболеваний, что требует особого внимания при диагностике и ведении таких больных. Раннее выявление сердечно-сосудистых нарушений, оценка факторов риска и комплексное лечение, включающее как терапию РА, так и сердечную поддержку, являются ключевыми аспектами для улучшения прогноза и качества жизни пациентов.[1]

Актуальность исследования

У пациентов с ревматоидным артритом (РА) риск развития хронической сердечной недостаточности (ХСН) значительно выше, что оказывает существенное влияние на продолжительность жизни и качество жизни больных. Хронический воспалительный процесс при РА, эндотелиальная дисфункция и сопутствующие коморбидные состояния приводят к структурным и функциональным изменениям миокарда. Поэтому выявление особенностей развития ХСН у пациентов с РА, их ранняя диагностика и разработка комплексных подходов к терапии является актуальной и важной задачей как с клинической, так и с научной точки зрения.

Цель исследования

Основная цель данного исследования изучение клинических и патофизиологических особенностей развития ХСН у пациентов с РА, определение связи с хроническим воспалением и сопутствующими коморбидными состояниями, а также разработка подходов к ранней диагностике и комплексной терапии. Результаты исследования направлены на повышение эффективности ведения пациентов с РА и улучшение их прогноза.

Материал и методы

В исследование были включены 43 женщины с хронической сердечной недостаточностью (ХСН). Основная группа состояла из 21 пациентки с ХСН

на фоне ревматоидного артрита (РА), контрольная группа 22 женщины с ХСН без РА. Диагноз ХСН устанавливался в соответствии с современными рекомендациями Европейского и Российского кардиологических обществ, с использованием данных эхокардиографии и уровня NT-proBNP. Диагноз РА подтверждался на основании клинической картины и показателей антител к циклическому цитрулинированному пептиду (АЦЦП). Все участницы прошли комплексное клиническое обследование, включающее сбор анамнеза, оценку активности РА и функционального класса ХСН по NYHA. Морфофункциональные параметры сердца оценивались с помощью эхокардиографии, включая фракцию выброса, размеры камер и признаки фиброза миокарда. Кроме того, проводились лабораторные исследования: уровень NT-proBNP, липидный профиль, показатели воспаления.

Оценивались сопутствующие состояния и факторы риска: артериальная гипертензия, метаболический синдром, дислипидемия, индекс массы тела и скорость клубочковой фильтрации. Статистическая обработка данных включала проверку распределения данных, сравнение количественных показателей между группами, а также анализ корреляций между клиническими и лабораторными параметрами. Уровень статистической значимости принимался $p < 0,05$. Таким образом, применялся комплексный подход, объединяющий клиническую, инструментальную и лабораторную диагностику, что позволило всесторонне оценить особенности развития ХСН у пациентов с РА и выявить ключевые факторы, влияющие на прогрессирование сердечной недостаточности.

В ходе исследования было выявлено, что у пациентов с ревматоидным артритом (РА) хроническая сердечная недостаточность (ХСН) развивается значительно чаще по сравнению с общей популяцией. У большинства пациентов наблюдались признаки диастолической дисфункции левого желудочка, даже при сохраненной фракции выброса.

Анализ факторов риска показал, что на прогрессирование ХСН оказывают влияние не только классические сердечно-сосудистые факторы артериальная гипертензия, гиперхолестеринемия, ожирение но и показатели активности РА, включая уровень С-реактивного белка и индексы воспаления суставов.[2]

Кроме того, у пациентов с длительной историей РА чаще отмечались структурные изменения сердца: утолщение стенок левого желудочка, расширение предсердий, а также признаки фиброза миокарда, выявленные при эхокардиографии и магнитно-резонансной томографии. Особое значение имеют коморбидные состояния: гипертензия, метаболический синдром и дислипидемия усиливают кардиоваскулярную нагрузку и способствуют прогрессированию сердечной недостаточности. Пациенты с более высокой активностью РА демонстрируют более выраженные признаки структурных изменений сердца, что указывает на прямую связь между воспалением суставов и патологией миокарда. Полученные данные подчеркивают необходимость раннего выявления сердечно-сосудистых нарушений у

больных РА. Комплексный подход к лечению должен включать не только контроль активности артрита, но и своевременную кардиологическую диагностику, коррекцию факторов риска и индивидуализированную терапию ХСН.[3]

Всего в исследовании участвовали 43 женщины. Испытуемая группа включала 21 пациентку с хронической сердечной недостаточностью (ХСН) на фоне ревматоидного артрита (РА), а группа сравнения состояла из 22 женщин с ХСН без РА. Диагноз ХСН устанавливался в соответствии с современными критериями Европейского и Российского кардиологических обществ, при этом особое внимание уделялось данным эхокардиографии и уровням предсердного натрийуретического пептида (NT-proBNP). Диагноз РА подтверждался на основе клинической картины и определения уровня антител к циклическому цитрулинированному пептиду (АЦЦП).

Пациенты с РА имели низкую и среднюю активность заболевания (DAS28: 2,6–3,2 и 3,2–5,1), рентгенологические стадии I–III и I–II функциональный класс ХСН по NYHA. Все участницы исследования находились на лечении в ревматологическом центре ОГАУЗ ИГКБ №1 Минздрава России (г. Иркутск) и получали терапию в соответствии с Федеральными клиническими рекомендациями Ассоциации ревматологов России. Кроме того, пациентки с ХСН получали лечение согласно рекомендациям Общества специалистов по сердечной недостаточности с учетом сопутствующей гипертонической болезни и ишемической болезни сердца.

Возраст пациентов и распределение причин ХСН представлены в таблице 1.

Таблица 1.
Характеристика исследуемых групп[4]

Параметр	ХСН на фоне РА	ХСН без РА	p
Возраст, лет (M ± SD)	56 ± 5	59 ± 5	0,08
Причина ХСН			
ИБС, n (%)	10 (48%)	9 (43%)	0,7
ГБ, n (%)	11 (52%)	12 (57%)	0,6

Критериями исключения были: III–IV функциональный класс ХСН по NYHA, острые формы ИБС (инфаркт миокарда, нестабильная стенокардия), IV стадия РА, высокая активность РА (DAS28 >5,1), снижение СКФ <30 мл/мин, злокачественные новообразования, острые или обострившиеся инфекционные воспалительные заболевания, острое нарушение мозгового кровообращения, злоупотребление алкоголем и курение.[5]

В рамках исследования проводилась сравнительная оценка артериального давления, морфофункциональных параметров сердца по ЭхоКГ, уровня NT-proBNP, липидного профиля, индекса массы тела (ИМТ) и скорости клубочковой фильтрации (СКФ). Перед включением в

исследование все пациентки прошли индивидуальное консультирование в соответствии с этическими принципами Хельсинской декларации (пересмотр 2013 г.). Статистическая обработка данных выполнялась с помощью программы STATISTICA 8.0. Распределение данных проверялось тестом Колмогорова–Смирнова. Количественные показатели с нормальным распределением представлены как среднее ± стандартное отклонение (M ± SD), а данные с ненормальным распределением медианой и интерквартильным интервалом (Me, 25–75-й перцентиль). Для оценки различий использовался критерий Манна–Уитни, качественные показатели Z-критерий. Сила и корреляции признаков оценивались с помощью критерия Пирсона (r), критический уровень значимости $p < 0,05$.[6]

Сравнительный анализ стандартных клинических параметров показал статистически значимые различия между группами по уровню ИМТ, систолическому (САД) и диастолическому (ДАД) артериальному давлению (таблица 2). При этом характер и объем терапии гипертонической болезни не различались между группами. Значимых различий в уровнях NT-proBNP или морфофункциональных параметрах миокарда выявлено не было. Повышение артериального давления у пациенток с ХСН на фоне РА может быть связано с хроническим воспалением и нарушением функции почек. Снижение СКФ также вероятно обусловлено воспалительным процессом и применением нестероидных противовоспалительных препаратов.

Таблица 2.
Оценка исследуемых параметров[7]

Параметр	ХСН на фоне РА	ХСН без РА	p
ИМТ, кг/м²	31 ± 5,5	27,5 ± 3,6	0,04
САД, мм рт. ст.	143,84 ± 22,5	130,58 ± 4,2	0,04
ДАД, мм рт. ст.	87,1 ± 13,4	71,4 ± 4,8	0,0005
NT-proBNP, пг/мл	621,9 (350–1324)	611,2 (310–1390)	0,8
ФВ ЛЖ, %	56,3 ± 4,7	59 ± 5,1	0,9
КДР ЛЖ, см	5,01 (4,6–5,7)	4,8 (4,3–5,4)	0,3
КСР ЛЖ, см	3,1 (2,3–4,1)	3,4 (2,8–4,4)	0,2
СКФ, мл/мин	63,5 ± 11,6	87,7 ± 15,9	0,0001

Сравнительный анализ липидного профиля выявил у пациенток с ХСН на фоне РА повышение общего холестерина (ОХ), увеличение ЛПНП и снижение ЛПВП (таблица 3). Несмотря на отсутствие прямых доказательств влияния повышенного ОХ на прогноз при ХСН, учитывая наличие ИБС и ГБ, данный параметр следует рассматривать как дополнительный фактор риска дестабилизации сердечной недостаточности. Отличия в характере липидоснижающей терапии между группами не выявлены.

Таблица 3.
Параметры липидограммы[8]

Параметр	ХСН на фоне РА	ХСН без РА	p
ОХ, ммоль/л	5,6 (2,5–8,1)	4,9 (3,0–8,3)	0,0008
ТГ, ммоль/л	1,5 (0,7–3,0)	1,6 (0,7–2,6)	0,59
ЛПНП, ммоль/л	2,9 (2,1–5,7)	2,5 (1,4–4,7)	0,02
ЛПВП, ммоль/л	1,6 (0,7–3,7)	2,3 (1,2–4,3)	0,0001

Анализ корреляций между уровнем АЦЦП и исследуемыми параметрами показал статистически значимые прямые связи с САД (r = 0,3; p = 0,034), ДАД (r = 0,1; p = 0,02) и ОХ (r = 0,3; p = 0,02). Эти данные отражают влияние хронического воспалительного процесса суставов на течение сердечной недостаточности.

Обсуждение

Полученные результаты исследования подчеркивают сложную взаимосвязь между ревматоидным артритом (РА) и развитием хронической сердечной недостаточности (ХСН). Хроническое системное воспаление при РА, подтвержденное повышенным уровнем С-реактивного белка и активностью заболевания (DAS28), оказывает прямое влияние на структурные и функциональные изменения миокарда. Утолщение стенок левого желудочка, расширение предсердий и признаки миокардиального фиброза, выявленные при эхокардиографии, свидетельствуют о том, что сердечно-сосудистая система у пациентов с РА подвергается постоянной патологической нагрузке. Коморбидные состояния, такие как артериальная гипертензия, дислипидемия и метаболический синдром, дополнительно усугубляют сердечную нагрузку и ускоряют прогрессирование ХСН. Эти данные подтверждают необходимость всесторонней оценки факторов риска и системного мониторинга сердечно-сосудистого состояния у больных с РА.

Интересно, что у пациенток с низкой и средней активностью РА также наблюдались структурные изменения сердца, что указывает на длительное воздействие субклинического воспаления на миокард. Это подчеркивает важность регулярного кардиологического обследования даже у пациентов с относительно стабильной активностью артрита. Сравнение с контрольной группой показало, что классические факторы риска сердечно-сосудистых заболеваний (возраст, гипертония, ожирение, гиперхолестеринемия) не являются единственными определяющими факторами прогрессирования ХСН у пациентов с РА. Активность воспалительного процесса, длительность заболевания и сопутствующие коморбидные состояния играют ключевую роль в развитии и тяжести сердечной недостаточности. Таким образом, комплексный подход к ведению пациентов с РА должен включать не только контроль активности артрита, но и раннюю диагностику сердечно-сосудистых нарушений, коррекцию факторов риска и индивидуализированную терапию ХСН. Ранняя идентификация изменений миокарда и своевременная коррекция факторов риска позволяют замедлить

прогрессирование сердечной недостаточности, улучшить прогноз и качество жизни пациентов.

Результаты

По результатам исследования было установлено, что пациенты с ревматоидным артритом (РА) имеют значительно более высокий риск развития хронической сердечной недостаточности (ХСН) по сравнению с общей популяцией. У большинства пациенток отмечались признаки диастолической дисфункции левого желудочка, даже при сохраненной фракции выброса.

На прогрессирование ХСН влияют как классические сердечно-сосудистые факторы артериальная гипертензия,гиперхолестеринемия, ожирение, так и показатели активности РА, включая уровень С-реактивного белка и индексы воспаления суставов. У пациенток с длительной историей РА чаще наблюдались структурные изменения сердца: утолщение стенок левого желудочка, расширение предсердий и признаки миокардиального фиброза, выявленные при эхокардиографии. Кроме того, коморбидные состояния гипертензия, метаболический синдром и дислипидемия увеличивают нагрузку на сердечно-сосудистую систему и способствуют прогрессированию ХСН.

Заключение

Несмотря на отсутствие различий в морфофункциональных параметрах сердца между группами, у пациенток с ХСН на фоне РА выявлены повышение артериального давления и ОХ, снижение ЛПВП и СКФ. Это свидетельствует о необходимости более тщательного мониторинга липидного профиля и, при необходимости, коррекции терапии гиперхолестеринемии и гипертонии. Дальнейшие проспективные исследования помогут уточнить влияние хронического воспаления на течение сердечной недостаточности и разработать конкретные рекомендации по ведению таких пациентов.

Использованные источники:

1. Ассоциация ревматологов России. Федеральные клинические рекомендации по диагностике и лечению ревматоидного артрита. – Москва: 2020. – 45 с.
2. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal, 2021; 42: 3599–3726.
3. Российское кардиологическое общество. Клинические рекомендации по ведению пациентов с сердечной недостаточностью. – Москва: 2020.
4. ЭНИ Забайкальский медицинский вестник. Рекомендации Общества специалистов по сердечной недостаточности, №3, 2018.
5. Хельсинская декларация Всемирной медицинской ассоциации. Пересмотр 2013 г. – Всемирная медицинская ассоциация.
6. Smolen J.S., Aletaha D., McInnes I.B. Rheumatoid arthritis. Lancet, 2016; 388: 2023–2038.

7. González-Juanatey C., Testa A., García-Porrúa C. Cardiovascular risk in rheumatoid arthritis: Epidemiology, pathogenesis and management. Autoimmunity Reviews, 2017; 16(6): 531–540.
8. Van Doornum S., McColl G., Wicks I.P. Accelerated atherosclerosis: An extraarticular feature of rheumatoid arthritis? Arthritis Rheum, 2002; 46(4): 862–873.

Бурляев А. С.
обучающийся магистратуры «Туризм»
Сочинский государственный университет
Давыдович А. Р., к.э.н
доцент
кафедра управления и технологий в туризме и рекреации
Сочинский государственный университет
Россия, г. Сочи

ГЛЭМПИНГ: ИЗУЧАЕМ МНЕНИЕ ТУРИСТОВ

Аннотация: *В статье представлены результаты опроса туристов о глэмпинг туризме, положительных и отрицательных аспектах размещения в глэмпингах, разнообразии дополнительных услуг, ценах на размещение, наличии инфраструктуры в глэмпинге.*

Ключевые понятия: *глэмпинг, туристы, туризм, природа, комфортные условия, туризм, дополнительные услуги, стоимость услуг, жилые объекты.*

Burlyaev A.
graduate student "Tourism"
Sochi State University
Davydovich A., candidate of economics,
associate professor
management and technology in tourism and recreation
Sochi State University
Russia, Sochi

GLAMPING: WE STUDY THE OPINION OF TOURISTS

Abstract: *The article presents the results of a survey of tourists about glamping tourism, the positive and negative aspects of accommodation in glamping, a variety of additional services, prices for accommodation, and the availability of infrastructure in glamping.*

Keywords: *glamping, tourists, tourism, nature, comfortable conditions, tourism, additional services, cost of services, residential facilities.*

На сегодняшний день глэмпинг приобретает популярность, и поэтому владельцы таких туристических площадок стремятся создать уникальное предложение для потенциальных туристов, располагая жилые объекты в живописных природных местах, принося свое дизайнерское решение во внутренний и внешний вид жилья, внедряя необычные и уникальные услуги.

Туристов же привлекает возможность провести время на природе в комфортных условиях, при этом воспользоваться развлекательными

услугами. Более 82% туристов, принимавших участие в опросе, выделяют следующие положительные аспекты размещения в глэмпинге:

– уединение с природой в комфорте и уюте благодаря необходимой для жизни комплектации объектов для проживания: душ, санузел, питание (зачастую в персонал входит повар), всевозможные досуговые площадки;

– разнообразие дополнительных предоставляемых услуг: баня, сауна, бассейн, мангальная зона; гамаки (шезлонги); проектор для просмотра фильмов, творческие кружки; спортивный инвентарь (лыжи, коньки, коврики для йоги, тренажеры и пр.), велосипеды, квадроциклы, снегокаты, снегоходы, лодки; услуги повара, горничной, экскурсовода;

– экономия времени и сил. Выбор самого простого глэмпинг-объекта (лакшери палатки) избавит туристов от лишних хлопот по установке палаток, разбивке лагеря, сборе дров и приготовлении пищи в естественных условиях;

– эмоциональное насыщение: погружение в эко-среду и удаленность от цивилизации. Многим людям необходимо брать, перерыв от нахождения в информационно-цифровом мире. Человек, уединяясь с природой, восстанавливает свои силы и энергию;

– безопасное нахождение на природе. Прочные конструкции объектов глэмпинга укроют туристов от неблагоприятных условий;

– универсальный отдых для любой целевой аудитории: соло-туристы, пары и молодожены, семьи с детьми, компании друзей, рабочие коллективы, пожилые люди;

– с наличием необходимой инфраструктуры есть возможность проведения выездных мероприятий и конференций на территории глэмпинга.



Рисунок 1 - Положительные аспекты размещения в глэмпинге (наиболее популярные ответы туристов), %

Вместе с тем, при наличии многочисленных положительных сторон у глэмпинга, по мнению потребителей, существуют и достаточное количество недостатков, которые сказываются на клиентах, это отметили 92% респондентов:

- стоимость услуги глэмпинга. Комфортабельное обустройство территории и возможность предоставить уникальные услуги клиентам требует от владельцев подобных площадок серьезных затрат (особенно когда глэмпинг строится с нуля). Для того, чтобы проект окупился, могут потребоваться годы. Поэтому стоимость размещения рассчитана в основном для людей с достатком выше среднего (рис. 2).

-

Краснодарский край	**Нижегородская область**
- «Небо» — 6500 рублей в будние дни, 7500 рублей по выходным; - APPARADISE, Tent-house с гамаком — от 10 000 рублей; - «Глоток Воздуха», бунгало — от 12 225 рублей; - «Дикое место», проживание в шатре с двухразовым питанием — 3 500 рублей.	- Aframe Chill — от 9000 рублей за 1 ночь (уединённый треугольный дом с панорамным видом на Волгу, горячий чан под открытым небом включён в стоимость); - «Мыс» — от 7990 рублей за 1 ночь (городской округ Сокольский, деревня Юркино, 100).

Рисунок 2 – Примеры цен в разных глэмпингах
Источник: *составлен по данным сайта MirTurbaz.ru*

- узкие рамки выбора в России. На сегодняшний день глэмпинг еще не повсеместное явление в Российской Федерации, поэтому услугами такого типа отдыха пока могут воспользоваться туристы только нескольких регионов. Глэмпинг площадки не различаются большим разнообразием услуг и дизайнерским решением;
- высокая загруженность площадок. Данная проблема вытекает из предыдущей. Наличие небольшого количества глэмпинг-площадок становится причиной возникновения сложностей с бронированием объектов глэмпинга. Из-за высокого спроса возникает необходимость заблаговременного бронирования места (особенно в летний сезон и в выходные дни);
- отсутствие качественной дороги. Многие глэмпинги располагаются далеко от цивилизации, что по итогу может затруднить проезд туристов на транспорте;
- чрезмерная удаленность от цивилизации лишает возможности туристов доехать до магазина и приобрести необходимую продукцию; может стать причиной отсутствия связи и доступа к Wi-Fi;

- неприятное соседство. В связи с плотным бронирование глэмпингов, одновременно с простыми отдыхающими могут располагаться шумные компании, которые могут проводить различные конференции и мероприятия, отмечать важные события, сопровождаемые громкой музыкой. Поэтому уединение с природой может подвергнуться угрозе;

- непредвиденные климатические аномалии. Данный пункт касается тех видов объектов глэмпинга, которые располагаются в природном пространстве: объекты на воде, на дереве, в пещере, внутри гор и пр. Зачастую, самые красивые места, это локации для размещения глэмпинга с достаточным уровнем риска (сложно предсказать природные аномалии). Ярким примером являются домики над водой: сильное наводнение может подвергнуть домики затоплению.

Но несмотря недостатки такой вариант отдыха притягивает все большее количество туристов возможностью наслаждаться отдыхом на природе без трудностей, связанных с транспортировкой, установкой, демонтажом палатки и другими хлопотами.

Таким образом, на основе проведенного исследования можно сделать вывод, что на сегодняшний день на территории Российской Федерации сложились условия для активного развития глэмпингов, как самостоятельного вида туризма, а данное направление является одним из наиболее перспективным на туристическом рынке.

Использованные источники:

1. Безрукова Н.Л. Глэмпинг: понятие, виды и перспективы развития в России // Современные проблемы сервиса и туризма. 2020. Т.14. № 2. С. 28 – 37
2. Безрукова Н.Л. Современное состояние глэмпинга в России и проблемы управления // Вестник РМАТ. 2021. № 3. С. 122 –126
3. Бессараб Д. А. К вопросу о развитии кемпингов и караванинга на территории Республики Беларусь // Труды БГТУ. Сер. 1, Лесное хозяйство, природопользование и переработка возобновляемых ресурсов. 2021. № 1 (240). С. 88 – 93
4. Валькова Т. М., Шабалин А. Д., Шабалина Н. В. Особенности развития автомобильного туризма в России // Вестник Московского государственного областного университета. Серия: Естественные науки. 2019. № 3. С. 56 – 66
5. Гамалей А. А., Назарова В.П. Анализ опыта проектирования глэмпинг-парков как объекта индустрии экологического туризма // Вестник евразийской науки. 2022. Т. 14. № 2
6. ГОСТ Р 58187-2018 Национальный стандарт Российской Федерации «Туристские услуги. Кемпинги. Общие требования» [Электронный ресурс]. – URL: https://www.consultant.ru/document (дата обращения: 20.09.2025)
7. ГОСТ Р 72311-2025 Национальный стандарт Российской Федерации «Туризм и сопутствующие услуги. Глэмпинги. Общие требования» [Электронный ресурс]. – URL: https://www.consultant.ru/document (дата обращения: 20.09.2025)

8. Делия В.П., Шкода С.А., Яндушкина К.С., Савинкина Л.А., Кульгачев И.П. Караванинг: влияние на экологию и перспективы развития для малых городов России // Вестник Академии права и управления. 2022. № 1 (66). С. 96 – 103.
9. Драчева Е. Л., Николаева А.В. Глэмпинг как новая концепция отдыха и перспективы его развития в России // Российские регионы: взгляд в будущее. 2021. Т .8. № 2. С. 69 – 83.

УДК; 61/612.336.

Ганижонов П. Х.
преподаватель
кафедра «Физиология»
Ферганский медицинский институт общественного здоровья

ИЗМЕНЕНИЕ УРОВНЯ КОРТИЗОЛА У СТРЕССИРОВАННЫХ МОРСКИХ СВИНОК (ЭКСПЕРИМЕНТАЛЬНОЕ ИССЛЕДОВАНИЕ)

Аннотация: *Особый интерес представляют нейроэндокринные механизмы адаптации, ключевым звеном которых является гормон кортизол. Его уровень значительно меняется при различных типах стресса, таких как химический (интоксикация, фармакологическое воздействие) и иммобилизационный (ограничение подвижности, психоэмоциональное напряжение), оказывая прямое влияние на метаболические показатели, в частности на уровень кортизола в крови. В данном исследовании изучена динамика концентрации кортизола при химическом и иммобилизационном стрессе.*

Ключевые слова: *химический и иммобилизационный стресс, кортизол*

Ganijonov P. H.
lecturer
department of physiology
Fergana Medical Institute of Public Health

CHANGES IN CORTISOL LEVELS IN STRESSED GUINEA PIGS (AN EXPERIMENTAL STUDY)

Abstract: *Neuroendocrine adaptation mechanisms are of particular interest, with the hormone cortisol being a key component. Its level changes significantly under various types of stress, such as chemical (intoxication, pharmacological exposure) and immobilization (restricted mobility, psychoemotional tension), directly affecting metabolic indicators, particularly cortisol levels in the blood. This study examines the dynamics of cortisol concentration under chemical and immobilization stress.*

Keywords: *chemical and immobilization stress, cortisol*

Введение

Живой организм обладает сложными механизмами защиты и адаптации к воздействию различных неблагоприятных факторов (стрессоров). Ключевую роль в процессах адаптации играет нейроэндокринная система, в рамках которой особое значение имеют глюкокортикоиды, в частности, кортизол. Этот гормон, секретируемый

корой надпочечников, является центральным медиатором стрессового ответа и оказывает многогранное влияние на метаболизм, иммунную функцию, сердечно-сосудистую систему и поведенческие реакции. Изучения динамики кортизола обусловлена необходимостью понимания степени и характера активации гипоталамо-гипофизарно-надпочечниковой (ГГН) оси при различных типах стрессорных воздействий [1]. В экспериментальной практике широко используются модели химического (например, интоксикация) и иммобилизационного стресса, которые позволяют смоделировать острые и хронические патологические состояния. Сравнительный анализ реакции на эти качественно разные стресс-факторы дает ценную информацию об адаптационном потенциале организма и возможных путях коррекции стресс-индуцированных нарушений [2,3].

Целью настоящего исследования явилось сравнительное изучение динамики уровня кортизола в крови у морских свинок при воздействии химического и иммобилизационного стресса.

Задачи исследования:

1. Оценить базовый уровень кортизола в крови у морских свинок в состоянии физиологического покоя (контрольная группа).
2. Изучить динамику и степень изменения уровня кортизола в крови при остром химическом стрессе, вызванном интрагастральным введением уксусной кислоты.
3. Исследовать динамику уровня кортизола в крови при хроническом иммобилизационном стрессе на 7-й и 14-й день воздействия.
4. Провести сравнительный анализ выраженности гиперкортизолемии, вызванной химическим и иммобилизационным стрессом.
5. Определить, какой из исследуемых стресс-факторов (химический или иммобилизационный) приводит к более мощной и/или продолжительной активации гипоталамо-гипофизарно-надпочечниковой системы.

Результаты

Динамика изменения уровня кортизола у морских свинок при химическом и иммобилизационном стрессе

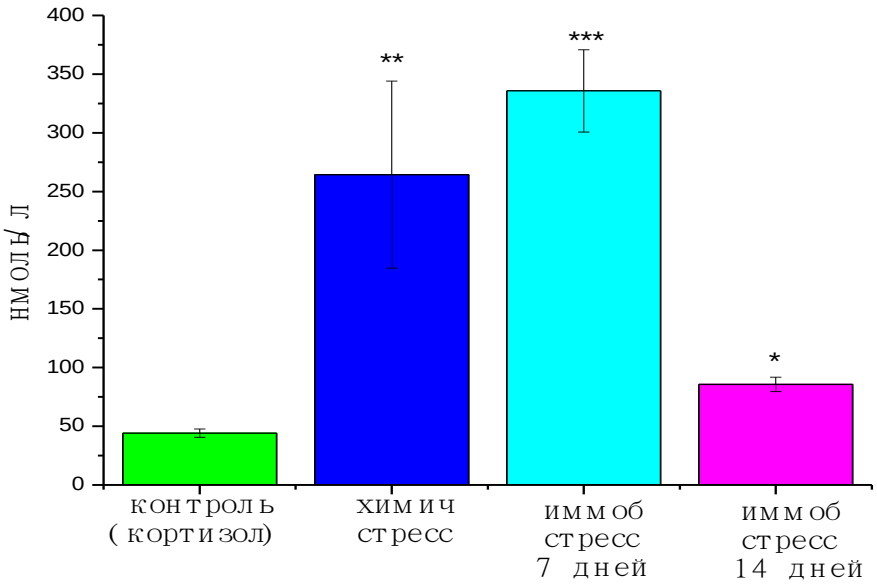


Рис.3.4.3. Изменение уровня кортизола у стрессированных морских свинок (M±m; n=10); кортизол ;*P<0,05, *P<0,001

Определение уровня кортизола в крови показало его резкое увеличение по сравнению с контрольной группой. В ходе проведённых экспериментов установлено, что при химическом стрессе, вызванном интрагастральным введением уксусной кислоты морским свинкам, уровень кортизола в крови увеличивался на 498,1%, достигая 264,4 ± 76,4 нмоль/л, в то время как в контрольной группе этот показатель составлял 44,2 ± 0,33 нмоль/л. При иммобилизационном стрессе наблюдались аналогичные изменения: на 7-й день уровень кортизола достигал 335,7 ± 31,9 нмоль/л, что на 659,5% выше контрольного значения. На 14-й день иммобилизации уровень кортизола составил 85,67 ± 2,87 нмоль/л, что на 93,6% превышает контрольный показатель. Таким образом, можно сделать вывод, что стрессовые воздействия, независимо от их природы, приводят к значительному увеличению уровня кортизола, который возрастает в среднем в 10 раз. Учитывая, что действие иммобилизационного стресса сопровождалось наиболее выраженным увеличением продукции кортизола, можно охарактеризовать его как более мощный фактор агрессии.

Вывод: проведённое исследование убедительно демонстрирует, что оба типа стрессового воздействия — химический (интрагастральное введение уксусной кислоты) и иммобилизационный — вызывают чрезвычайно выраженную активацию гипоталамо-гипофизарно-надпочечниковой системы, что проявляется в резком, статистически значимом повышении уровня кортизола в крови по сравнению с контрольной группой. Наиболее интенсивная реакция наблюдалась при иммобилизационном стрессе, где на пике воздействия (7-й день)

концентрация гормона превышала контрольные значения более чем в 7.5 раз (на 659.5%). Химический стресс также вызывал мощный выброс кортизола, увеличивая его уровень почти в 6 раз (на 498.1%). Даже к 14-му дню иммобилизации, в период возможной адаптации, концентрация гормона оставалась почти вдвое выше нормы.Таким образом, можно заключить, что стресс, независимо от его природы, является мощным стимулятором секреции кортизола, при этом иммобилизационный стресс, как пролонгированный и комплексный фактор агрессии, приводит к наиболее выраженной и продолжительной гиперкортизолемии.

Использованные источники:

1. Ганижонов П. Х. и др. Стресс и его влияние на состояние слизистой оболочки пищеварительного тракта: морфологические и функциональные изменения (обзор литературы) //Consilium Medicum. – 2024. – Т. 26. – №. 5. – С. 286-291.
2. Еременко В. И., Бледнова А. В. Динамика изменения кортизола в крови нетелей черно-пестрой породы //Вестник Курской государственной сельскохозяйственной академии. – 2023. – №. 5. – С. 77-80.
3. Белова Н. В. ИЗМЕНЕНИЯ УРОВНЯ КОРТИЗОЛА У КРОЛИКОВ И ОВЕЦ НА ФОНЕ ПРИМЕНЕНИЯ АДАПТОГЕНА АСКОРБАТА ЛИТИЯ //Современные аспекты производства и переработки сельскохозяйственной продукции. – 2023. – С. 6-9.

Губайдуллин Р. Ш.
ассистент
АГМИ
Йулчиев А. Б., д.т.н.
доцент
АГУ

ТЕХНОЛОГИЯ ПОЛУЧЕНИЯ КОМПОЗИТНЫХ МАТЕРИАЛОВ ДЛЯ ЖЁСТКИХ ПЕНОПОЛИУРЕТАНОВ НА ОСНОВЕ СИНТЕЗИРОВАННЫХ ПРОДУКТОВ

Аннотация: *Синтезированы продукты, состоящие из диэтаноламина (ДЭА) и Фурфурола (ФРФЛ) в соотношениях 1:1 и 2:1 соответственно. Путём проведённых лабораторных анализов определены их физико-химические показатели и проведены анализы ИК-спектров. Оптимальным соотношением выбрано соотношение, состоящее из 2 моль диэтаноламина и 1 моля фурфурола. На основе этого выбрана композиция из жёсткого пенополиуретана образца №-2, состоящая из 70,0 масс.ч. – Лапрола-373; Лапрамола-294 - 20,0 масс.ч;, синтезированного продукта – 10,0 масс.ч.; КЭП-2а – 1,0 масс.ч и воды – 1,5 масс.ч. Данная композиция по своим физико-механическим свойствам не уступает физико-механическим свойствам жёсткого пенополиуретана марки ЖППУ-307. У полученных композиций проведены физико-механические испытания и приведены их сравнительные показатели.*

Ключевые слова: *ИК-спектр, бензальдегид, фурфурол, Лапрамол-294, композиция, физико-механические свойства, ЖППУ-307, себестоимость, лабораторный анализ.*

Gubaydullin R. Sh.
assistant
ASMI
Yulchiyev A. B.
associate professor
ASU

TECHNOLOGY FOR PRODUCING COMPOSITE MATERIALS FOR RIGID POLYURETHANE FOAMS BASED ON SYNTHESIZED PRODUCTS

Abstract: *The products consisting of diethanolamine (DEA) and furfural (FRFL) in the ratios of 1:1 and 2:1, respectively, were synthesized. Their physicochemical parameters were determined by laboratory analyzes and IR spectra were analyzed. The optimal ratio was chosen to be 2 mol of diethanolamine and 1 mol of furfural. Based on this, a composition of rigid*

polyurethane foam sample No. 2 was selected, consisting of 70.0 parts by weight of Laprol-373; Lapramole-294 - 20.0 parts by weight, the synthesized product - 10.0 parts by weight; CEP-2a - 1.0 parts by weight and water - 1.5 parts by weight. This composition is not inferior in its physical and mechanical properties to rigid polyurethane foam grade PUF-307. Physical and mechanical tests of the obtained compositions were carried out and their comparative indicators are given.

***Key words**: IR spectrum, benzaldehyde, furfural, Lapramol-294, composition, physical and mechanical properties, PUF-307, cost, laboratory analysis.*

Пенополиуретаны являются одним из важных полимерных материалов, используемых в строительстве и народном хозяйстве. Состоящий из двух компонентов А и Б, пенополиуретан был изобретён в 1937 году немецким химиком Оттом фон Байером. Разработкой катализаторов на основе третичных аминов и технологий производства жестких пенополиуретанов на основе синтезированных третичных аминов в научных школах занимались многие учёные-химики.

Например, в работах Mikko Muuronen, Peter Deglmann, Željko Tomovic [1] были выбраны семь аминов и изучены аминные катализаторы путем сравнения катализаторов, то есть пирролидина, пиперидина и морфолина. Функционализированный имидазол также изучался для понимания каталитической активности ароматических иминов. Все модели катализаторов были далее функционализированы пропильной группой для имитации более длинной алкановой цепи с реакционноспособной гидроксильной или аминогруппой.

В работах других учёных-химиков Хрусталёва Д.П., Газалиева А.М., Сулейменова А. А изучен способ синтеза 2-замещённых -1,3-оксазолидинов в условиях СВЧ-облучения выполняющих роль третичных аминов, используемых в получении полимеров и лакокрасочных изделий [2]. Дальше продолжая свою научно – исследовательскую работу тот же самый учёный Хрусталёва Д.П. в своей следующей работе [3-4] синтезировал третичные амины на основе новых этинилсодержащих 1,3-оксазолидинов и выявил некоторые закономерности.

Пенополиуретаны не требуют дополнительных расходов и затрат, являются универсальным строительным материалом [5]. Это легкий, но прочный материал, который отличается низкой теплопроводностью. Чаще всего используется в качестве утеплительного материала, но сфера его применения не ограничивается. Материал нашел применение в различных сферах. Имеет специфическую особенность, заключающуюся в том, что внутри структуры жёсткого пенополиуретана остаются закрытые поры, которые и обеспечивают отменные теплоизоляционные материалы. Основное отличие жестких видов от остальных заключается в более высокой плотности.

Немаловажную роль в формировании жёстких пенополиуретанов играют третичные амины, выполняющие роль катализаторов. В этой статье нами проведены ряд научно-исследовательских работ, направленных на синтез третичных аминов из диэтаноламина, бензальдегида и фурфурола. Важность данной работы заключается в синтезе готовых продуктов и внедрения их в композицию и рецептуру жёстких пенопополиуретанов.

В наших научно-исследовательских работах мы уделили внимание по полному или частичному сокращению содержания Лапрамола-294 в рецептуре и добавлению синтезированного продукта с получением жёстких пенополиуретанов с необходимыми физико-механическими свойствами.

Продолжая научно-исследовательскую деятельность, направленную на выявлении оптимальной рецептуры жёсткого пенополиуретана, соответствующего по физико-механическим показателям с физико-механическими показателями жёсткого пенополиуретана марки ЖППУ-307, мы, сравнивая полученные результаты со стандартным жёстким полиуретаном, выбрали образцы жёстких пенополиуретанов, соответствующих нашим требованиям.

Изучая физико-механические свойства вышеприведённых образцов жёстких пенополиуретанов, полученных на основе продуктов реакций, взятых в соотношениях диэтаноламина и фурфурола = ДЭА:ФРФЛ = 1:1 и ДЭА:ФРФЛ = 2:1 соответственно, в таблице 3 приведены физико-механические параметры всех 5 образцов.

Как видно из таблицы 1 для получения ЖППУ из синтезированных на основе ДЭА:ФРФЛ в соотношении 1:1 продуктов оптимальными по отношению к ЖППУ-307 определены композиции из образцов 2 в соотношении ДЭА:ФРФЛ=1:1 и образец 2 из продукта в соотношении ДЭА:ФРФЛ=2:1. У образца 2 в соотношении ДЭА:ФРФЛ=1:1 время старта равно 12 с, время гелеобразования - 24 с, время подъёма – 55 с схожи с образцом 2 в соотношении ДЭА:ФРФЛ=2:1, т.е. время старта, время гелеобразования и время подъёма равны 13, 26 и 53 с соответственно. Несмотря на эти показатели время старта, время гелеобразования и время подъёма ЖППУ, полученного на основе синтезированных продуктов реакций взаимодействия диэтаноламина и фурфурола, взятых в соотношениях ДЭА:ФРФЛ=1:1 и 2:1 соответственно, определены улучшенные физико-механические показатели у образца-2 в соотношении ДЭА:ФРФЛ=2:1 по сравнению с физико-механическими показателями у образца-2 в соотношении ДЭА:ФРФЛ=1:1.

Исходя из вышеперечисленной таблицы и на основе полученных результатов, мы выбрали соотношение диэтаноламин (ДЭА): фурфурол (ФРФЛ) = 2:1 – Фурфурулидендиаминатетраэтанол – ФДАТЭ оптимальным для следующего продолжения нашей научно-исследовательской работы. Данный выбор можно объяснить тем, что выбранный продукт обладает меньшей вязкостью.

Было определено, что оптимальными по отношению к ЖППУ-307 определены композиции из образцов-2 в соотношении ДЭА:БЕА=2:1 и композиция из образца-2 из продукта в соотношении ДЭА:ФРФЛ=2:1, а именно композиция, состоящая из 70,0 масс.ч. – Лапрола-373; Лапрамола-294 - 20,0 масс.ч;, синтезированного продукта – 10,0 масс.ч.; КЭП-2а – 1,0 масс.ч и воды – 1,5 масс.ч.

Использованные источники:

1. Muuronen M., Deglmann P., Tomović Z. Design principles for rational polyurethane catalyst development //The Journal of Organic Chemistry. – 2019. – Т. 84. – №. 12. – С. 8202-8209.
2. Хрусталев Д. П. и др. Синтез 2-замещенных-1, 3-оксазолидинов в условиях микроволнового облучения //Журнал общей химии. – 2007. – Т. 77. – №. 5. – С. 875-876.
3. Хрусталев Д. П. Синтез, строение и реакционная способность новых этинилсодержащих 1, 3-оксазолидинов //Караганда.: ИОСУ. – 2003.
4. Akindoyo J. O. et al. Polyurethane types, synthesis and applications–a review //Rsc Advances. – 2016. – Т. 6. – №. 115. – С. 114453-114482.
5. Губайдуллин Р. Ш., Алимухамедов М. Г., Адилов Р. И. Разработка оптимальной рецептуры жёстких пенополиуретанов на основе продуктов реакций взаимодействия диэтаноламина и фурфурола //Universum: технические науки. – 2024. – Т. 3. – №. 1 (118). – С. 34-38.

DOI 10.24412/2225-1545-2025-12-2138-1034-1046
УДК 33 – 339

Дэн Цяоэр
студент
Северо-Восточный Федеральный
Россия, Якутск

МЕХАНИЗМЫ И ПУТИ СИНЕРГЕТИЧЕСКОГО ВЗАИМОДЕЙСТВИЯ КИТАЙСКО-РОССИЙСКИХ ПАРКОВ В ТРАНСГРАНИЧНЫХ ЗОНАХ ДЛЯ УКРЕПЛЕНИЯ ЭКОНОМИЧЕСКОЙ УСТОЙЧИВОСТИ В РЕГИОНЕ ДАЛЬНЕГО ВОСТОКА И АРКТИКИ — ЭМПИРИЧЕСКИЙ АНАЛИЗ НА ОСНОВЕ ЗОНЫ ПРЕДВАРИТЕЛЬНОГО РАЗВИТИЯ

Аннотация: *На фоне ускорения реализации российской стратегии «Переход на Восток» и коммерциализации Арктического морского пути Дальневосточно-Арктический регион, являющийся ключевым звеном в переходе России к «экономике будущего», сталкивается с рядом вызовов: устойчивой зависимостью от природных ресурсов, ограниченной мобильностью производственных факторов и усиливающимися экологическими ограничениями.На основе теории региональной экономической устойчивости и теории трансграничного сотрудничества в качестве исследовательской модели выбрана зона передового развития Дальнего Востока России. С помощью анализа конкретного случая и сравнительного исследования в статье построена трёхмерная кооперативная модель китайско-российских трансграничных промышленных парков, охватывающая «распределение отраслей — логистическое взаимодействие — институциональная адаптация», с целью выявления путей повышения региональной экономической устойчивости — включая отраслевую, рыночную и экологическую устойчивость.Исследование показало, что трансграничное сотрудничество между промышленными парками позволяет преодолеть зависимость от ресурсов за счёт вертикальной интеграции производственных цепочек, снижает издержки перемещения факторов производства благодаря оптимизации логистических сетей и устраняет барьеры в сотрудничестве за счёт взаимного признания правил и нормативов. Однако основными препятствиями для эффективности такого сотрудничества остаются недостаточная интеграция местных отраслей, различия в экологических стандартах и несогласованность политических мер.Для этого необходимо действовать в четырёх ключевых направлениях: углублённая интеграция производственных цепочек, взаимосвязь инфраструктурных сетей, согласованность правовых и нормативных механизмов, а также переход к устойчивому развитию. Эти меры позволят трансформировать экономику региона Дальнего Востока — Арктики от ресурсно-ориентированной*

модели к модели совместного инновационного развития, создав тем самым новую модель для высококачественного развития трансграничного экономического сотрудничества между Китаем и Россией.

Ключевое слово: *Восточно-Арктический регион; трансграничное сотрудничество между промышленными парками; экономическая устойчивость; зона передового развития; сотрудничество между Китаем и Россией*

Deng Qiao'er
student
Northeastern Federal University
Russia, Yakutsk

MECHANISM AND PATH FOR COLLABORATIVE DRIVING OF ECONOMIC RESILIENCE ENHANCEMENT IN THE FAR EAST ARCTIC REGION OF RUSSIA THROUGH CROSS BORDER PARKS BETWEEN CHINA AND RUSSIA — EMPIRICAL ANALYSIS BASED ON ADVANCED DEVELOPMENT ZONES

Abstract: *Against the dual backdrop of Russia's "pivot to the East" strategy and the accelerated commercialization of Arctic shipping routes, the Far East-Arctic region, as a core area for Russia's "future-oriented economy" transformation, faces multiple challenges such as entrenched resource dependency, restricted factor mobility, and intensified ecological constraints. Based on regional economic resilience theory and cross-border cooperation theory, this study takes the Russian Far Eastern Special Economic Zone as a research sample. Through case analysis and comparative research, it constructs a three-dimensional collaborative mechanism for Sino-Russian cross-border industrial parks—"industrial division of labor-logistic connectivity-institutional alignment"—and explores pathways to enhance regional economic resilience (industrial resilience, market resilience, and ecological resilience). The findings reveal that cross-border park collaboration addresses resource dependency through vertical industrial chain integration, reduces factor mobility costs via optimized logistics networks, and mitigates cooperation barriers through mutual recognition of institutional rules. However, insufficient local industrial integration, divergent environmental standards, and policy coordination gaps remain core obstacles to collaborative efficacy. To address these issues, efforts must be intensified across four dimensions: deep industrial integration, infrastructure interconnectivity, institutional rule alignment, and green development transformation. This will drive the Far East-Arctic region toward a shift from a "resource-driven" to a "collaborative innovation-driven" economic model, offering a new paradigm for high-quality Sino-Russian cross-border economic cooperation.*

Keywords: *Far East Arctic region; Cross border park collaboration;*

Economic resilience; Advanced development zone; China Russia cooperation

I. Введение

(i) Исследовательский контекст и значение

1. Реалистичный контекст: Россия определила освоение Дальнего Востока и Арктики в качестве приоритетной национальной стратегии XXI века. В 2024 году темпы роста инвестиций в основные фонды в Федеральном округе Дальнего Востока достигли 12,7 %, что значительно превышает средний показатель по стране (4,9 %). Годовой срок эксплуатации арктических судоходных путей увеличился до 8–9 месяцев, что превратило их в новый логистический коридор между Азией и Европой.Однако региональное развитие по-прежнему сталкивается со структурными противоречиями: доля экспорта ресурсов превышает 65 %, а доля добавленной стоимости от глубокой переработки составляет менее 15 %; за последние десять лет население сократилось более чем на 1 миллион человек, дефицит рабочей силы достигает 30 %; уровень инфраструктурной взаимосвязи низок, а стоимость трансграничной логистики превышает традиционные маршруты на 20–30 %; в Арктике существуют значительные разногласия между экологическими стандартами и потребностями в освоении.Китай и Россия, выступая в качестве стратегических партнёров по всестороннему сотрудничеству,[1] используют трансграничные экономические зоны как ключевое средство объединения ресурсов и факторов производства. В 2024 году объём инвестиций в совместные проекты Китая и России в Дальнем Востоке вырос на 41,3% по сравнению с предыдущим годом, что стало новым импульсом для экономической трансформации региона.

2. Теоретическое значение: существующие исследования в основном сосредоточены на отдельных регионах — Дальнем Востоке или Арктике — или на конкретных сферах сотрудничества, таких как энергетика и судоходство, однако систематического анализа взаимосвязи Дальнего Востока и Арктики в сочетании с трансграничной координацией парков недостаточно, а также недостаточно внимания уделяется микромеханизмам повышения экономической устойчивости.В данной статье предложена теоретическая модель взаимосвязи между трансграничным сотрудничеством и экономической устойчивостью, что расширяет сферу применения теории региональной экономической устойчивости в контексте трансграничного взаимодействия и обогащает исследовательские подходы к трансграничному сотрудничеству в процессе трансформации ресурсоёмких регионов.

3. Практическое значение: полученные результаты исследования могут стать практическим ориентиром для преодоления «проклятия ресурсов» в регионе Дальнего Востока и Арктики России, а также служить основой для принятия решений по переходу китайско-российского трансграничного экономического сотрудничества от проектного подхода к институциональному синергетическому взаимодействию. Это имеет важное

практическое значение для углублённого интегрирования инициативы «Один пояс, один путь» с российской стратегией «Переход на восток».

Ii) Определение ключевых понятий

1. Регион взаимосвязи Дальнего Востока и Арктики: согласно определению Института Дальнего Востока Российской академии наук, он включает девять субъектов Дальневосточного и пять субъектов Арктического федеративных округов, образуя географический синергетический пояс, объединяющий «поставку ресурсов — переработку и трансформацию — логистическую экспортацию». Общая площадь составляет около 15 миллионов квадратных километров, на этом территории сосредоточено 25 % запасов энергоресурсов России и 12 % её населения.

2. Сотрудничество трансграничных экономических парков: это углублённое взаимодействие между Китаем и Россией в рамках трансграничных экономических парков, направленное на согласование разделения труда в производственных цепочках, развитие логистических сетей и согласование правовых и нормативных регуляторов. Оно охватывает ключевые аспекты — взаимодействие на всех звеньях производственной цепочки, интеграцию инфраструктуры и взаимное признание политических стандартов, — в отличие от поверхностного и однобокого характера традиционного трансграничного сотрудничества.

3. Региональная экономическая устойчивость: определяется как комплексная способность региона обеспечивать стабильную работу, адаптироваться к трансформации и достигать устойчивого роста при внешних шоках (волнения на мировом рынке энергии, геополитические изменения) и внутренних ограничениях (отток населения, экологические ограничения) за счёт корректировки структуры промышленности, оптимизации распределения производственных факторов и институциональных инноваций, опираясь на результаты исследований отдельных учёных.В частности, это включает три аспекта: устойчивость отрасли, устойчивость рынка и устойчивость экосистемы[2].

Iii) Исследовательская концепция и методы

1. Методологический подход: в качестве логической основы используется последовательность «теоретическая база — анализ текущего положения — построение механизмов — эмпирическое исследование — выводы для политики». Сначала проводится анализ теоретических связей между региональной экономической устойчивостью и трансграничным сотрудничеством, затем — анализ текущего состояния развития и ключевых проблем в регионе Дальнего Востока — Арктики, после чего формируется теоретический механизм совместного стимулирования устойчивости трансграничных промышленных парков. В заключение, на основе эмпирических данных и сравнительного анализа, предлагаются пути оптимизации.

2. Методы исследования:

(1) Метод кейс-студии: на основе трёх типичных примеров — экономической зоны Белезовка, свободного порта Владивосток и международного портового узла Цикси — проводится систематический анализ практики и результатов трансграничного сотрудничества.

(2) Метод сравнительного анализа: сравнение моделей развития передовых зон Дальнего Востока и традиционных ресурсных регионов России, таких как Западная Сибирь, подчёркивает уникальную ценность трансграничного сотрудничества для повышения устойчивости.

(3) Метод научного анализа: систематический обзор существующих исследований в китайско-российских языках, интеграция теоретических подходов в таких областях, как устойчивость региональной экономики, трансграничное сотрудничество и трансформация ресурсоёмких регионов, с целью создания основы для формирования соответствующих механизмов.

II. Теоретическая основа и обзор литературы

(i) Теория устойчивости региональной экономики

Исследования региональной экономической устойчивости прошли путь развития, охватывающий этапы «способность противостоять шокам — способность адаптироваться — способность к трансформации»[3]. Традиционные исследования сосредоточены на сохранении экономической стабильности при внешних шоках, тогда как подход эволюционной экономической географии подчёркивает динамичность устойчивости и считает, что ресурсоёмким регионам необходимо повысить свою устойчивость посредством трёх направлений: диверсификации отраслей, технологических инноваций и институциональных инноваций[4].Российский исследователь Лебедева, опираясь на местный опыт, подчеркнул, что укрепление устойчивости ресурсоёмких регионов должно сочетать национальную стратегическую ориентацию с местными инновациями в отраслях. Эта точка зрения даёт важные указания для трансформации Дальнего Востока и Арктики: трансграничное сотрудничество необходимо интегрировать в национальную стратегию России, а не внедрять извне, оторвавшись от местной реальности.

Ii) Теория трансграничного экономического сотрудничества

Суть трансграничного сотрудничества между промышленными зонами заключается в оптимизации распределения производственных ресурсов благодаря географической близости, взаимодополняемости политик и связям в производственных цепочках. Китайско-российское сотрудничество обладает естественным комплементарным преимуществом — «российские ресурсные потенциалы + китайские технологические и капитальные ресурсы + двусторонние рынки», однако существующие исследования в основном сосредоточены на потенциале сотрудничества на макроуровне, а вопросы институциональной совместимости и степени интеграции в отрасли остаются недостаточно изученными.Российский исследователь Смирнов подчеркнул, что при трансграничном сотрудничестве между Китаем и

Россией необходимо быть бдительным к «региональному экономическому зависимому положению, вызванному односторонним притоком капитала», и особо отметил важность совместного использования национальных интересов и обеспечения промышленной независимости, что создаёт ключевые ограничения для формирования механизмов координации[5].

Iii) Современное состояние исследований развития региона Дальнего Востока — Арктики

В зарубежных исследованиях основное внимание уделяется геостратегической значимости Арктического морского пути и экологическим ограничениям, однако недостаточно внимания уделяется микроуровневым механизмам синергии промышленности Китая и России[6]; в китайских исследованиях акцент делается на энергетическом сотрудничестве и создании логистических коридоров, при этом отсутствует системный анализ укрепления устойчивости региональной экономики[7].В существующих исследованиях выявлены три ключевых пробела. Во-первых, не сформирована целостная исследовательская модель «связи Дальнего Востока — Арктики», что приводит к разрыву географического взаимодействия между поставками ресурсов и их переработкой и трансформацией в регионе. Во-вторых, игнорируется институциональная адаптация и экологические ограничения в трансграничном сотрудничестве, что затрудняет объяснение реальных барьеров в практике. В-третьих, отсутствует эмпирический анализ ключевых платформ, таких как зоны предварительного развития, вследствие чего выводы исследований недостаточно ориентированы на практическое применение.В данной статье, с учётом вышеуказанных пробелов, предложена теоретическая модель содействия трансграничным промышленным паркам и укрепления экономической устойчивости, что позволяет заполнить существующие пробелы в научных исследованиях.

III. Современное состояние экономического развития и устойчивость в регионе Дальнего Востока и Арктики России

(i) Основы развития и стратегические возможности

1. Преимущество ресурсного потенциала: запасы редкоземельных элементов в Федеративном районе Дальнего Востока составляют 12 % мировых запасов, а запасы нефти и природного газа в Арктике — 40 % и 30 % от общих запасов России соответственно, что создаёт материальную основу для модернизации промышленности.

2. Система политической поддержки: Россия ввела специальные меры в рамках программы «Зона передового развития Дальнего Востока» и свободных портов, включая пятилетнюю освобождённую от налогообложения и пятилетнюю полугодичную скидку по налогу на прибыль предприятий, бесплатное использование земельных участков и упрощение таможенного контроля; к 2024 году объём специального фонда развития достиг 1,2 триллиона рублей.

3. Движущая сила трансграничного сотрудничества: механизм Субкомитета по сотрудничеству Китая и России в Арктике продолжает углубляться, Арктическая скоростная линия Китай–Европа введена в постоянную эксплуатацию, а в 2024 году совместные китайско-российские проекты в Дальнем Востоке охватили такие сферы, как переработка энергоресурсов, производство оборудования и современная логистика, при этом объём инвестиций вырос на 41,3% по сравнению с предыдущим годом.

Ii) Ключевые трудности устойчивости

1. Низкая устойчивость отраслей: доля экспорта ресурсов в региональном ВВП превышает 65 %, отсутствуют этапы глубокой переработки, доля экспорта сырья для редкоземельных элементов достигает 90 %, а добавленная стоимость составляет всего одну десятую от стоимости конечной продукции; однотипная структура промышленности делает региональную экономику чувствительной к колебаниям мировых цен на энергоносители: в 2023 году, когда мировые цены на нефть снизились на 15 %, темпы роста ВВП в Федеративном районе Дальнего Востока снизились на 2,3 процентных пункта по сравнению с предыдущим годом.

2. Препятствия в перемещении факторов производства: за последние десять лет население сократилось более чем на 1 миллион человек, доля рабочей силы в возрасте до 30 лет составляет менее 20 %, в ряде зон ускоренного развития возникли трудности с привлечением и удержанием кадров [8];Инфраструктурная интеграция недостаточна: уровень автоматизации портов Арктики составляет менее 30 %, а разница в колёсном расстоянии между Сибирской магистралью и железнодорожной сетью Северо-Востока Китая приводит к тому, что транзитные перевозки занимают 40 % всего пути, а логистические издержки превышают традиционные маршруты на 20–30 %.

3. Институциональные и экологические ограничения: несогласованность таможенных процедур между Китаем и Россией, а также несвязанность сертификации продукции и налоговой политики приводят к тому, что срок реализации проектов в среднем увеличивается на 3–6 месяцев. В Северном полюсе экологическая экспертиза проектов требует более чем одного года, а строгие экологические нормы противоречат потребностям в освоении территории, из-за чего некоторые трансграничные проекты задерживаются из-за проблем с экологической экспертизой.

4. Недостаточное интегрирование местных отраслей: кросс-граничное сотрудничество между Китаем и Россией зачастую сводится к поверхностному соединению «ресурс — капитал», доля российских компаний, участвующих в производственных цепочках, составляет менее 15 %, эффект технологического переливания ограничен, что затрудняет формирование устойчивой экосистемы сотрудничества[9].

IV. Механизм совместного развития китайско-российских трансграничных промышленных парков для укрепления экономической устойчивости

(i) Предпосылка синергии: совместимость институциональной адаптации и экологических ограничений

Для эффективного внедрения трансграничного сотрудничества между промышленными зонами необходимо выполнить два условия: во-первых, соответствовать национальной стратегии России и региональным целям развития, обеспечивая участие местных отраслей и совместное получение выгод; во-вторых, строго соблюдать экологические стандарты Арктики, обеспечивая зелёное развитие и предотвращая угрозу экологическим рискам устойчивости региональной экономики. Этот предпосылка одновременно отвечает на ключевые озабоченности России в области трансграничного сотрудничества и обеспечивает институциональную и экологическую основу для укрепления устойчивости.

Ii) Трёхмерный механизм взаимодействия

1. Синергия отраслей: интеграция производственных цепочек и локализация

Совместная вертикальная специализация: формирование полной промышленной цепочки — от добычи ресурсов в Арктике до глубокой переработки на промышленных парках Дальнего Востока и совместных исследований и разработок Китая и России — с целью продвижения ресурсоёмких отраслей к высокодоходным сегментам; одновременно, опираясь на транспортную ценность межрегионального судоходства по внутренним водным путям Эрчиса и Оби [10], укрепляется логистическая поддержка промышленной цепочки. С помощью передачи технологий и совместных исследований и разработок необходимо усилить способность российских предприятий к взаимодействию в производственной цепочке и повысить их интеграцию в отраслевую структуру.

Коллективное развитие по горизонтали: на базе трансграничных промышленных парков формируются отраслевые кластеры в сфере переработки энергии, производства оборудования и современной логистики, что способствует созданию многоотраслевой экосистемы «переработка + торговля + услуги», снижает зависимость региональной экономики от отдельных ресурсных отраслей и повышает устойчивость экономики к внешним воздействиям.

2. Логистическая координация: обеспечение бесперебойного функционирования каналов и повышение эффективности

Совместная работа аппаратных и сетевых систем: модернизация автоматизированных объектов в портах Арктики, развитие строительства транспортных узлов, таких как порт Цзикси и порт Владивосток; интеграция Сибирской магистрали с железнодорожной сетью Северо-Восточного Китая, оптимизация трансграничных перевалочных объектов и снижение потерь эффективности, обусловленных различиями в колёсных расстояниях.

Совместное использование программных услуг: на основе «зелёного коридора» между таможнями Китая и России будет способствоваться взаимное признание таможенных стандартов и обмен информацией, что позволит сократить сроки прохождения таможенного контроля для товаров, находящихся на складе в режиме таможенного контроля. Будет создана трансграничная информационная платформа логистики, объединяющая транспорт, складирование и таможенное оформление, что повысит эффективность логистической организации и снизит издержки на перемещение ресурсов.

3. Системная координация: взаимное признание правил и согласование политики

Синергия политики: интеграция специальных мер развития Восточно-Китайского региона с мерами поддержки сотрудничества в рамках инициативы «Один пояс, один путь», формирование единой системы налоговых льгот и упрощения инвестиционных процедур, а также упрощение процесса утверждения проектов.

Синергия стандартов и услуг: продвижение взаимного признания правил сертификации продукции, защиты интеллектуальной собственности и мобильности рабочей силы между Китаем и Россией, а также создание механизма урегулирования трансграничных коммерческих споров; совместное формирование платформ для научно-технических разработок и подготовки кадров, обеспечивающих интеллектуальную поддержку трансформации региональной экономики.

Iii) Путь передачи устойчивости

Трёхмерное сотрудничество в трансграничных промышленных парках реализуется по трём этапам: оптимизация распределения ресурсов → корректировка структуры → повышение устойчивости. Сотрудничество в отраслях способствует диверсификации и росту добавленной стоимости, укрепляя устойчивость экономики. Логистическое взаимодействие снижает издержки на перемещение ресурсов, расширяет охват рынка и повышает его устойчивость.Система взаимодействует, смягчая барьеры для сотрудничества и обеспечивая его устойчивость, одновременно достигая зелёного развития за счёт экологической совместимости, укрепляя экологическую устойчивость и формируя трёхкомпонентную систему повышения устойчивости «промышленность–рынок–экосистема».

V. Эмпирический анализ: проверка на примере зоны передового развития Дальнего Востока

(i) Выбор примеров и источники данных

На основе двух типичных примеров — экономического парка Бележевка и свободного порта Владивосток — и с использованием статистических данных Министерства развития Дальнего Востока России, годовых отчётов парка и данных исследований предприятий (2021–2024 гг.) оценивается практическая эффективность механизма синергии по трём

направлениям: устойчивость отраслей, устойчивость рынков и экологическая устойчивость.

Ii) Анализ конкретного случая

1. Экономическая зона Белезовка

(1) Синергетический эффект в отраслевой интеграции: сформированы две вертикальные производственные цепочки — «добыча нефтепродуктов — переработка — глубокая переработка» и «добыча редкоземельных элементов — производство постоянных магнитов». Доля глубокой переработки ресурсов выросла с 30% до 65%, а индекс региональной отраслевой диверсификации увеличился на 0,32 по сравнению с периодом до синергии. Количество местных российских предприятий, участвующих в производственной цепочке, выросло с 3 до 12, что свидетельствует о значительном росте степени интеграции[11].

(2) Синергетический эффект логистики: благодаря трансграничному коридору через пограничный пункт Хэхэ сроки таможенного оформления сокращены до 4 часов, а логистические издержки — на 30% по сравнению с уровнем до внедрения синергии.

(3) Высокая устойчивость: в 2023 году, в период колебаний международных цен на нефть, темпы роста ВВП промышленного парка снизились всего на 0,8 процентных пункта — значительно ниже регионального среднего уровня (2,3 процентных пункта). Доля проектов в сфере зелёной энергетики достигла 40 %, все они прошли сертификацию по экологическим стандартам Арктики, что свидетельствует о значительном усилении экологической устойчивости[12].

2. Вольный порт Владивостока

(1) Совместные инициативы: развитие логистических узлов и международной торговли, продвижение автоматизации портов и интеграция с китайско-российской железнодорожной сетью, что позволило повысить эффективность трансграничной логистики на 40%.

(2) Существующие проблемы: слабая интеграция отраслей, основная роль отводится торговому транзиту, доля глубокой переработки составляет всего 25%; участие местных предприятий остаётся низким, эффект технологического переноса ограничен; баланс между охраной экологии и расширением портов требует дальнейшего улучшения.

Iii) Сравнение примеров и выводы

Практика двух примеров показывает, что ключевыми факторами эффективности повышения устойчивости являются глубина промышленного синергетического взаимодействия и степень локальной интеграции: парк Белезовка благодаря формированию полной промышленной цепочки и развитию местных предприятий одновременно повысил устойчивость отрасли, рынка и экосистемы, тогда как свободный порт Владивосток сталкивается с ограниченными результатами в укреплении устойчивости из-за недостаточного промышленного синергетического взаимодействия.Это подтверждает эффективность механизма трёхмерного взаимодействия и

подчёркивает важность глубокой интеграции производственной цепочки и совместного использования локальных выгод.

VI. Политические выводы

(i) на российском уровне

1. Оптимизация политики поддержки промышленности: расширение зоны предварительного развития Дальнего Востока и включение Арктики в единый систему льготных мер; создание специального фонда для поддержки местных предприятий в участии в трансграничных производственных цепочках и повышении степени интеграции в отрасль.

2. Укрепление инфраструктуры: ускорить автоматизацию портов Арктики и строительство транспортных коридоров через Арктику, провести модернизацию железнодорожных сетей с целью обеспечения совместимости колёсных расстояний и повысить эффективность трансграничной логистики.

3. Совершенствование системы институциональной поддержки: упрощение процедур утверждения трансграничных проектов, продвижение взаимного признания таможенных стандартов и сертификации продукции Китая и России; укрепление согласованности экологических норм и политики освоения природных ресурсов, оптимизация процедуры оценки воздействия на окружающую среду, сбалансированное развитие и защита окружающей среды.

Ii) на уровне Китая

1. Углубление координации в производственной цепочке: поощрять предприятия к передаче технологий глубокой переработки редкоземельных элементов и производства оборудования для полярных условий, способствуя вертикальной интеграции трансграничных производственных цепочек; поддерживать совместные исследования и разработки между отечественными и российскими компаниями для усиления эффекта технологического переливания;

2. Содействие рыночному взаимодействию: содействовать взаимодополняемости промышленных баз Северо-Востока и отдалённого Востока, создавать платформы трансграничной электронной коммерции, расширять торговлю сельскохозяйственной продукцией и лёгкой промышленностью, углублять содержание сотрудничества.

3. Совершенствование механизма сотрудничества: на основе многосторонних платформ, таких как Шанхайская организация сотрудничества и БРИКС, углублять взаимодействие с программой развития Дальнего Востока России, способствовать согласованию политики и взаимному признанию правил, формируя устойчивый механизм сотрудничества; одновременно, опираясь на многосторонний механизм сотрудничества Совета Арктики [12], расширять каналы многостороннего взаимодействия.

Iii) на уровне промышленного парка

1. Укрепление промышленной цепочки: переход от «обработки и сборки» к «исследованию и производству», формирование кластеров

местных сопутствующих предприятий и укрепление промышленной коренности;

2. Содействие зелёному развитию: внедрение низкоуглеродных технологий и экологически чистых производственных процессов, строгое соблюдение экологических стандартов Арктики, обеспечение взаимовыгодного взаимодействия между освоением природных ресурсов и охраной окружающей среды.

3. Создание сервисной платформы: формирование центров трансграничных исследований и разработок, подготовки кадров и коммерческих услуг с целью устранения барьеров в передаче производственных ресурсов и согласовании институциональных механизмов.

VII. Заключение и перспективы

Китайско-российский трансграничный промышленный парк, используя трёхмерный механизм взаимодействия «распределение отраслей — логистическая интеграция — институциональная адаптация», эффективно решает такие проблемы, как однотипность отраслей, сдерживание потока факторов производства и усиление экологических ограничений в регионе Дальнего Востока и Арктики, повышая устойчивость региональной экономики. Эмпирический анализ показывает, что эффективность механизма взаимодействия зависит от институциональной совместимости, степени интеграции местных отраслей и совместимости с экологическими ограничениями.В будущем, по мере ускорения коммерциализации арктических водных путей и углубления сотрудничества между Китаем и Россией, трансграничное сотрудничество в промышленных парках должно перейти к многостороннему подходу, включая ресурсы таких многосторонних организаций, как Шанхайская организация сотрудничества и БРИКС, с целью создания более инклюзивной региональной экономической системы. В то же время необходимо уделять больше внимания влиянию внешних факторов — таких как геополитические риски и колебания мировой экономики — на механизмы сотрудничества, чтобы обеспечить более всестороннюю поддержку устойчивости региональной экономики.

Использованные источники:

1. Luo Y, Wang Y, Zhang H. Трансграничное сотрудничество промышленных парков между Китаем и евразийскими странами: механизмы и оценка эффективности. Экономическая география, 2023, 43(2): 89-98.

2. Лебедева О В. Устойчивое развитие ресурсных регионов Дальнего Востока России[M]. Москва: Издательство МГУ, 2022.

3. Martin R, Simmie J. Evolutionary Economic Resilience: A Systematic Literature Review[J]. Cambridge Journal of Regions, Economy and Society, 2022, 15(2): 345-362.

4. Bennett M,Smith L,Jones R. Navigating the Polar Frontier: Exploring the Effect sof Sea-Ice Decline on Shipping and Sea Routes in the Arctic [J]. Polar Geography, 2025,48(3):189-207.

5. Смирнов А Н. Трансграничное сотрудничество России и Китая: проблемы суверенитета и распределения выгод[J]. Вопросы экономики, 2023, (7): 68-82.
6. Moe R S, Olsen S. Arctic Shipping Routes: Geopolitical Economy and Environmental Constraints[J]. Marine Policy, 2024, 158: 105892.
7. Сюй Гуанмяо. Трёхмерная модель и практические пути сотрудничества Китая и России в Арктике [J]. Исследования мировой экономики, 2025, (2): 78–89.
8. Министерство развития Дальнего Востока. Дальневосточный федеральный округ: социально-экономическое развитие в 2021–2024 годах. [R]. Москва: Издательствоправительства РФ, 2025.
9. Чжан Хуэйминь, Ли Юэ. Трансформация «экономики будущего» в Дальнем Востоке России и синергия промышленности Китая и России [J]. Исследования России, 2024, (3): 112–135.
10. Чэнь Чэнь, Ван Фан. Исследование влияния коммерциализации Арктического морского пути на синергию логистики Китая и России [J]. Китайское мореходство, 2024, 47(2): 130–136.
11. Ли Жуй, Чжан Сяонин. Оценка синергетического эффекта трансграничных экономических парков — эмпирический анализ на примере парка Белезовка в Китае и России [J]. Географические исследования и развитие, 2023, 42(5): 38–43.
12. Ван Чэнь, Лю Ян. Обновление механизма сотрудничества Китая и России в регионе «Северо-Восток — Дальний Восток» и интеграция субрегиона [J]. Международное экономическое сотрудничество, 2025, (1): 45–56.

Жамалова Г. Ж.
преподаватель
кафедра экономики
Наманганский государственный технический университет

РОЛЬ И СТРАТЕГИЧЕСКОЕ ЗНАЧЕНИЕ ИНВЕСТИЦИЙ В УСТОЙЧИВОМ РАЗВИТИИ ЭКОНОМИКИ

Аннотация: *В статье рассматриваются ключевые направления обеспечения устойчивого экономического роста в Узбекистане, включая привлечение инвестиций, модернизацию производства, развитие экспортного потенциала и повышение качества экономического роста. Особое внимание уделено различию между эффективностью и качеством роста, а также роли структурных реформ, высоких технологий и социально ориентированной политики. Анализ показывает, что инвестиционная активность, либерализация экономики и усиление частного сектора являются основными факторами устойчивого развития.*

Ключевые слова: *устойчивый экономический рост; инвестиции; экспортный потенциал; структура экономики; эффективность роста; качество роста; модернизация; социально ориентированная экономика; высокие технологии; реформы.*

Jamolova G. J.
lecturer
department of economics
Namangan State Technical University

THE ROLE AND STRATEGIC SIGNIFICANCE OF INVESTMENTS IN THE SUSTAINABLE DEVELOPMENT OF THE ECONOMY

Abstract: *The article examines the key drivers of sustainable economic growth in Uzbekistan, including investment attraction, industrial modernization, expansion of export potential, and improvement of growth quality. Special emphasis is placed on distinguishing between the efficiency and the quality of economic growth, as well as the role of structural reforms, high technologies, and socially oriented policies. The analysis highlights that investment activity, economic liberalization, and the strengthening of the private sector are the main contributors to long-term sustainable development.*

Keywords: *sustainable economic growth; investments; export potential; economic structure; growth efficiency; growth quality; modernization; socially oriented economy; high technologies; reforms.*

Устойчивый экономический рост предполагает способность экономики длительное время развиваться высокими темпами. Мировой опыт

показывает: при ежегодном росте ВВП на 7 % его объём удваивается за десять лет, при 10 % — за семь. С 2017 года в Узбекистан привлечено 188 млрд долларов инвестиций, из которых 87 млрд — иностранные; доля инвестиций в ВВП превысила 30 %, усилив базу устойчивого роста. В 2024 году объём инвестиций увеличился до 36 млрд долларов, что позволило запустить 560 проектов и создать потенциал для роста экспорта. На 2025 год запланировано освоение 43 млрд долларов и реализация более 300 крупных проектов. К 2030 году поставлена цель удвоить экспорт до 45 млрд долларов, что требует расширения производства высокотехнологичной продукции и диверсификации рынков. Формируются условия для эффективной, социально ориентированной рыночной экономики. Важную роль играют экспортные отрасли, инвестиционная активность и структурные реформы. В экономической теории выделяют «эффективность» и «качество» экономического роста: первая включает повышение конкурентоспособности продукции, ресурсоотдачи и снижение затрат; второе отражает социальную направленность развития — улучшение благосостояния, развитие инфраструктуры, инвестирование в человеческий капитал и обеспечение социальной защиты. Переход к новому качеству роста связан с внедрением высоких технологий, формированием конкурентной среды, соблюдением экологических требований и решением социальных задач. Источниками роста служат развитие экспортного потенциала, расширение инвестиций, структурное обновление, либерализация экономики и укрепление частного сектора.

«Наша главная цель — превратить Узбекистан в надёжного и долгосрочного партнёра для иностранных инвесторов», — отметил глава государства. Президент Ш. Мирзиёев подчеркнул, что государство берёт на себя обязательство развивать рыночные отношения, обеспечивать надёжную защиту прав инвесторов, совершенствовать благоприятный инвестиционный и деловой климат, расширять условия для добросовестной конкуренции, а также гарантировать неприкосновенность частной собственности и независимость судебной системы[35].

С момента обретения независимости Узбекистан последовательно проводит глубокие социально-экономические реформы, направленные на устранение последствий бывшей административно-командной системы и связанных с ней структурных проблем. Цель этих преобразований — формирование устойчивой, эффективной и конкурентоспособной экономики, поскольку без социально-экономического развития невозможно обеспечить высокий уровень благосостояния населения и достойное будущее страны.

За прошедшие годы реализация программ реформ позволила укрепить макроэкономическую стабильность, повысить сбалансированность

[35] https://www.gazeta.uz/oz/2024/05/02/investments/?utm_source

социально-экономического развития и ускорить процессы модернизации и диверсификации национальной экономики.

Как показывает мировая практика, уровень социально-экономического развития государств оценивается прежде всего по темпам роста валового внутреннего продукта (ВВП). ВВП отражает рыночную стоимость всех товаров и услуг, произведённых в национальной экономике за определённый период (обычно за год). Темпы роста ВВП измеряются в процентах по сравнению с предыдущим годом и служат ключевым индикатором экономической активности, эффективности структурных преобразований и динамики общего развития страны.



Рисунок 1. Динамика роста валового внутреннего продукта Узбекистана за прошедшие годы, в процентах.

Источник: *Данные Государственного статистического комитета Республики Узбекистан.*

По итогам 2024 года объём валового внутреннего продукта Республики Узбекистан в текущих ценах составил 1 454 573,9 млрд сумов, что на 6,5 % больше по сравнению с 2023 годом. Дефлятор ВВП по отношению к ценам 2023 года достиг 113,3 % (рис. 1).

Как видно из данных, темпы роста ВВП Узбекистана остаются стабильными. В 2024 году его объём в текущих ценах достиг 1 454 573,9 трлн сумов, увеличившись на 6,5 % по сравнению с 2023 годом. Дефлятор ВВП составил 113,3 %, что отражает общий рост цен в экономике. В структуре ВВП преобладают услуги (47,4 %), промышленность (26,4 %), сельское хозяйство (19,2 %) и строительство (7 %). Основной вклад в рост внесли сфера услуг (3,3 п.п.) и промышленность (1,7 п.п.). Рост ВВП подтверждает усиление экономической активности, расширение инвестиций и укрепление макроэкономической стабильности.

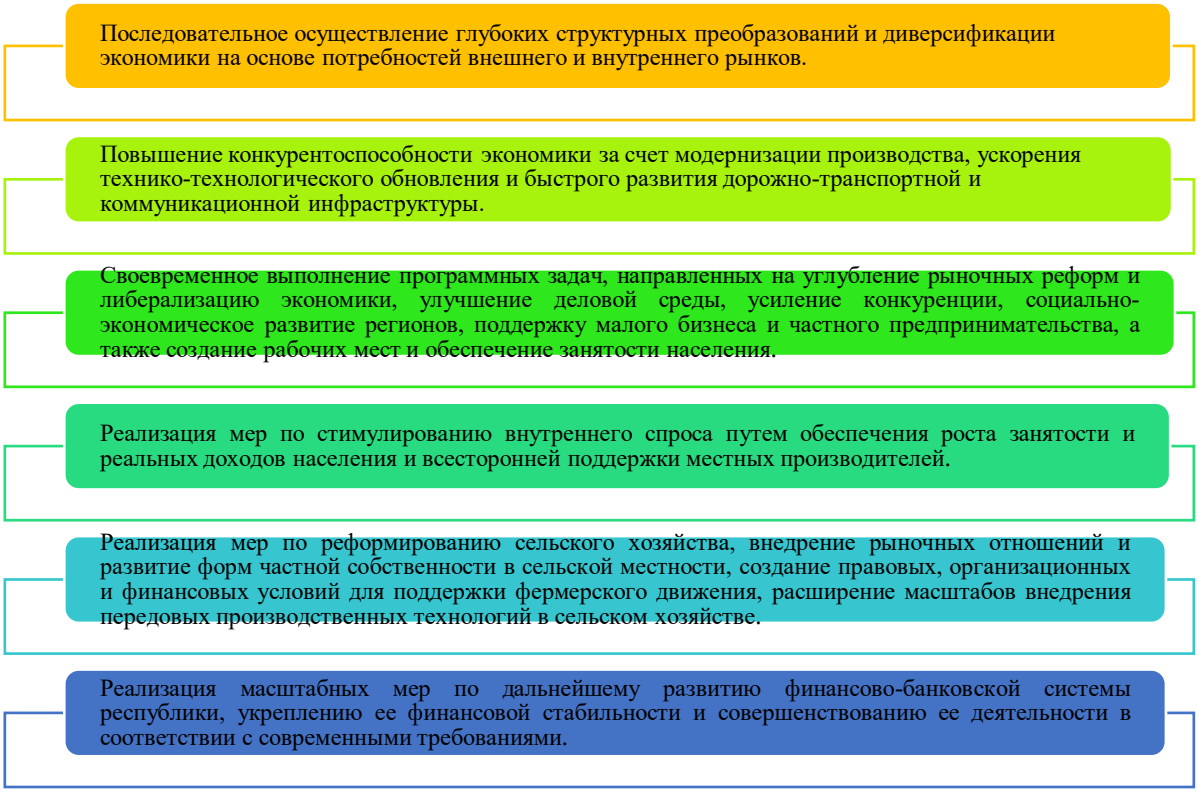


Рисунок 2. Факторы, обеспечивающие высокие темпы роста экономики Узбекистана.

Следует отметить, что факторов, влияющих на экономический рост и обеспечивающих его высокие темпы, весьма много. Главное — правильно определить эти факторы и своевременно задействовать их в экономической политике. В Узбекистане в прошлом году устойчивые и высокие темпы роста были обеспечены целым рядом ключевых драйверов, включая расширение инвестиций, активизацию промышленного производства, развитие сферы услуг и рост экспортного потенциала (см. рис. 2).

Высокие темпы роста ведущих секторов экономики создают прочную основу для обеспечения стабильности темпов роста ВВП нашей страны (Таблица 1).

Таблица 1.
Вклад секторов в рост ВВП в 2020-2024 годах
(в % от общего объема)

Индикаторы	2020	2021	2022	2023	2024
ВВП	1,6	8,0	6,0	6,3	6,5
Сельское хозяйство, лесное хозяйство и рыболовство	0,6	0,9	0,8	0,9	0,6
Промышленность	0,4	2,2	1,3	1,5	1,7
Строительство	0,7	0,4	0,5	0,6	0,6
Торговые, гостиничные и кейтеринговые услуги	-0,3	1,4	1,1	1,1	1,3
Транспорт и хранение, информация и связь	-0,3	1,2	0,9	0,7	0,9
Другие зоны обслуживания	0,2	1,7	1,6	1,1	1,1
Чистые налоги на продукты	0,1	0,3	-0,1	0,4	0,3

Источник: *Данные Государственного статистического комитета Республики Узбекистан.*

Анализ данных показывает, что в 2020–2024 годах темпы роста ВВП Узбекистана сохраняли устойчивую положительную динамику: от 1,6 % в 2020 году до стабильных 6,0–6,5 % в последующие годы. Вклад сельского хозяйства оставался низким (0,6–0,9 %), что связано с высокой зависимостью отрасли от внешних факторов. Промышленность стала одним из ключевых драйверов роста, достигнув максимума в 2021 году (2,2 %) и удерживая 1,3–1,7 % в последующие годы. Строительный сектор после спада в 2021 году стабилизировался на уровне 0,5–0,6 %. Торговля и услуги значительно восстановились после пандемии, обеспечив 1,1–1,4 % ежегодного роста. Транспорт и связь также перешли от спада к устойчивому повышению (0,7–1,2 %). В целом основной вклад в расширение ВВП обеспечили промышленность, торговля и услуги. Проведённые структурные реформы и диверсификация экономики создали условия для повышения экспортного потенциала и качественного экономического роста.

Инвестиции представляют собой денежные вложения, направленные на восстановление и расширение основного и оборотного капитала, а также на увеличение производственных мощностей. Они осуществляются в форме денежных средств, банковских кредитов, акций и других ценных бумаг. Номинальные инвестиции выражены в денежной форме, тогда как реальные отражают фактическое приобретение инвестиционных ресурсов. В 2024 году объём инвестиций в основной капитал составил 493,7 трлн сумов, что на 27,6 % выше уровня 2023 года. Иностранные инвестиции превысили 26 млрд долларов, из них 24 млрд — прямые. Реализуются крупные проекты: на АГМК выполняются 10 проектов общей стоимостью 13,5 млрд долларов; в 2024 году освоение составило 1,94 млрд долларов (103,2 % плана).

Совместно с Россией начато строительство АЭС мощностью 330 МВт в Джизакской области. Запущены проекты по получению энергии из отходов стоимостью 1,3 млрд долларов. В рамках Национального инвестиционного фонда (UzNIF) планируется размещение государственных активов на сумму 1,7 млрд долларов через IPO. В рамках стратегии «Цифровой Узбекистан — 2030» расширяется деятельность IT Park с созданием 25 тыс. рабочих мест и ростом экспорта ИТ-услуг до 5 млрд долларов.

В 2024 году Узбекистан добился значительных результатов в диверсификации экономики, развитии инфраструктуры и привлечении иностранных инвестиций в рамках инвестиционной программы. Однако остаются проблемы, связанные с задержками отдельных проектов и региональными диспропорциями, что требует принятия дополнительных мер и повышения эффективности управления.

Использованные источники:

1. Juraev, E. S., & Xolmirzayev, U. A. (2020). Supporting small business subjects by tax reforms. Экономика и социум, (1 (68)), 48-52.
2. Juraev, E. S., & Xolmirzayev, U. A. (2019). Profits of housekeeping and its development. TRANS Asian Research Journals, 8(4).
3. Xolmirzaev, U., Juraev, E., & Axmadjonova, M. (2021). The role of accounting in small business management. Интернаука, (21-5), 20-22.
4. Juraev, E., Xolmirzaev, U. A., & Rustamova, M. (2021). INCREASING THE EFFICIENCY OF REAL INVESTMENT IN THE CONDITIONS OF ECONOMIC LIBERATION. Интернаука, (21-5), 9-11.
5. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
6. Boyturaev (2023). Assessment of the competitiveness of tourism industry in fergana valley from its characteristics. Asia pacific journal of marketing & management review ISSN: 2319-2836 Impact Factor: 8.071, 12(11), 65-74
7. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
8. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
9. Jalolova, M., Sangirova, U., Yakubov, I., Rahimov, H., & Kholmatova, N. (2022). Economic efficiency of the transport system and logistics in the Republic of Uzbekistan. Transportation Research Procedia, 63, 1061-1066.
10. Арипов, О. А. (2017). Кичик бизнес ва хусусий тадбиркорликда аèлларнинг ўрни. Иқтисодиèт ва инновацион технологиялар‖ илмий электрон журнали. № 3, май-июнь, 2017 йил.//https://iqtisodiyot. tsue. uz/sites/default/files/maqolalar/28_O. Арипов. pdf.

11. Арипов, О. (2017). Роль женщин в малом бизнесе и частном предпринимательстве. Экономика и инновационные технологии, (3), 254-261.
12. Насирова, Н. Т. (2023). Поддержка женского предпринимательства и создание деловой среды в узбекистане. Экономика и социум, (5-1 (108)), 642-645.
13. Бахриддинов, Н. (2025). Методы финансового стимулирования инновационной деятельности со стороны государства. Передовая экономика и педагогические технологии, 2(2), 315-321.
14. Bahriddinov, N. (2025). Methodologies of the development and finance of innovation. Академические исследования в современной науке, 4(11), 29-32.

УДК: 81-25

Жамолдинова С. А.
магистрант направления «Лингвистика: русский язык»
Андижанский государственный университет имени З.М. Бабура
Андижанская область, город Андижан

ВЛИЯНИЕ ИСТОРИЧЕСКИХ СОБЫТИЙ НА РАЗВИТИЕ РУССКОГО ЯЗЫКА

Аннотация: *Статья посвящена анализу влияния ключевых исторических событий на эволюцию русского языка. Рассматриваются основные этапы развития: древнерусский период, реформы Петра I, языковые процессы XIX века, трансформации советской эпохи и современный этап глобализации. Отмечаются социокультурные факторы, определяющие изменения в фонетике, лексике, грамматике и стилистике русского языка. Подчёркивается роль общественно-политических трансформаций в формировании новых языковых норм.*

Ключевые слова: *история русского языка, исторические события, языковое развитие, Петровские реформы, церковнославянский язык, литературная норма, советский период, глобализация, заимствования, языковые изменения.*

Jamoldinova S. A.
master's student in the field of linguistics: russian language
Z.M. Babur Andijan State University
Andijan region, Andijan city

THE INFLUENCE OF HISTORICAL EVENTS ON THE DEVELOPMENT OF THE RUSSIAN LANGUAGE

Abstract: *This article analyzes the influence of key historical events on the evolution of the Russian language. It examines the main stages of development: the Old Russian period, the reforms of Peter the Great, linguistic processes of the 19th century, the transformations of the Soviet era, and the current stage of globalization. It highlights the sociocultural factors that determine changes in the phonetics, vocabulary, grammar, and stylistics of the Russian language. The role of socio-political transformations in the formation of new linguistic norms is emphasized.*

Keywords: *history of the Russian language, historical events, linguistic development, Peter the Great's reforms, Church Slavonic, literary norms, Soviet period, globalization, borrowings, linguistic change.*

Введение

История русского языка неразрывно связана с историей русского народа и государства. Язык постоянно реагирует на социальные кризисы, политические реформы, культурные контакты и научно-технический прогресс. Исторические события становятся важнейшими условием языковой динамики, формируя новые словообразовательные модели, лексические заимствования, изменения в синтаксисе и стилистике.

Цель данной статьи — выявить основные исторические факторы, определившие развитие русского языка на разных этапах его становления [1: 25].

Материалы и методы

В обзорной статье использованы методы теоретического и аналитического исследования, направленные на выявление взаимосвязи между историческими событиями и процессами развития русского языка. Материалом исследования послужили труды ведущих отечественных лингвистов и филологов (В.В. Виноградов, Ю.Н. Караулов, Д.С. Лихачёв, А.А. Зализняк, Б.А. Успенский), а также научные публикации, посвящённые истории русского литературного языка, социолингвистике и культурологии. В работе применялись методы историко-лингвистического анализа, сравнительно-описательный метод, а также элементы дискурсивного и социокультурного анализа. Анализ языковых изменений проводился с учётом конкретных исторических периодов (древнерусский, петровский, дореволюционный, советский и постсоветский), что позволило проследить эволюцию фонетических, лексических, грамматических и стилистических норм русского языка в контексте общественно-политических и культурных трансформаций.

Результаты исследования:

1. Древнерусский период: влияние христианизации и формирования государственности

1.1. Принятие христианства и становление письменности

Крещение Руси (988 г.) стало ключевым событием, определившим дальнейшее развитие языка. Вместе с христианством на Русь пришла церковнославянская письменная традиция, которая сформировала ранний письменный стандарт [2: 138]. Влияние церковнославянского языка проявилось в:

формировании книжной лексики;

распространении абстрактных понятий (благодать, спасение, грех);

становлении орфографических норм;

расхождении письменного и устного языка.

1.2. Объединение земель и развитие диалектов

С усилением государственности происходило формирование восточнославянских диалектов, что создало основу для будущего русского, украинского и белорусского языков. Политические контакты и

миграционные процессы обусловили появление тюркских, финно-угорских и скандинавских заимствований.

2. Петровские реформы и формирование нового литературного языка

Период правления Петра I стал эпохой радикальных преобразований, отразившихся и на языке. Основными источниками изменений стали процессы модернизации государства и активизация контактов с Европой [3: 46].

2.1. Европеизация и заимствования

В официально-деловую и техническую лексику активно вошли слова западноевропейского происхождения:

армия, команда, матрос, амбар, бухгалтер, механик, карта, парик, фабрика.

Это расширило тематические поля языка, связанные с мореплаванием, военным делом, наукой, государственным управлением.

2.2. Реформы письменности

Введение гражданского шрифта и упрощение алфавита способствовали формированию новой нормы, приближающей письменную форму к живой речи. Эти реформы заложили фундамент для развития научного и публицистического стиля [4: 86].

3. XIX век: национальное самосознание и развитие литературной нормы

XIX век стал периодом формирования классического русского литературного языка, во многом благодаря деятельности А. С. Пушкина, В. Г. Белинского, Н. М. Карамзина.

3.1. Реформы Карамзина и переход к новой прозе

Карамзин внес элементы европейского синтаксиса и лексики, а также активно использовал разговорные конструкции. Это приблизило литературный язык к естественной речи.

3.2. Социально-политические процессы

Отмена крепостного права, рост грамотности, развитие печати и науки способствовали:

демократизации языка;

расширению функциональных стилей;

развитию терминологии в различных областях знаний;

формированию общенациональной нормы.

4. Советский период: идеология и языковая стандартизация

Советская эпоха внесла в язык многочисленные изменения, обусловленные идеологией, массовой культурой и урбанизацией.

4.1. Новая лексика и терминология

Появились новые понятия, связанные с революцией, социалистическим строем, индустриализацией:

товарищ, пятилетка, колхоз, комсомол, профсоюз.

Эти слова стали частью повседневной лексики.

4.2. Языковая унификация и борьба с диалектами

Государственная политика стандартизации способствовала устранению диалектных различий и формированию общенациональной нормы. Массовое образование усиливало нормативный характер русского языка [5: 147].

4.3. Цензура и контроль речевых практик

Идеологическая цензура влияла на допустимость определённых слов и выражений, что привело к формированию специфического советского дискурса.

5. Постсоветский период и глобализация

После распада СССР русский язык вступил в новый этап развития, характеризующийся открытостью и интенсивными международными контактами.

5.1. Англицизмы и технологическая революция

Распространение интернета, СМИ и цифровых технологий усилило приток англицизмов:

компьютер, менеджмент, сайт, лайк, аккаунт, офлайн.

Многие из них вошли в активный словарь молодёжи и профессиональных групп.

5.2. Демократизация дискурса

Снятие идеологического контроля привело к свободе выражения, расширению разговорной и жаргонной лексики, росту стилистического разнообразия.

5.3. Миграционные процессы

Контакты народов постсоветского пространства привели к появлению заимствований из тюркских, кавказских, среднеазиатских языков, а также к расширению русскоязычного варианта в странах СНГ.

Заключение

Исторические события играют решающую роль в развитии русского языка. Каждая эпоха формировала своё языковое пространство, отражая политическую ситуацию, культурные контакты, экономические изменения и научный прогресс. Русский язык демонстрирует высокую адаптивность, способность к интеграции новых явлений и сохранению собственной идентичности. Анализ зависимости языковых изменений от исторических процессов показывает, что язык является не только средством коммуникации, но и инструментом культурного и социального самосознания общества.

Использованные источники:

1. Караулов Ю.Н. Русский язык и языковая личность. – М.: Наука, 2010.
2. Виноградов В.В. История русского литературного языка. – М.: Высшая школа, 1982.
3. Лихачёв Д.С. Развитие русской литературы: язык и стиль. – СПб.: Наука, 1997.
4. Зализняк А.А. Древнерусское ударение. – М.: Языки славянской культуры, 2004.

5. Успенский Б.А. Царь и бог: Семантика власти в русской культуре. – М.: Языки славянской культуры, 2002.

Жуланов И. О.
старший преподаватель
Джизакский политехнический институт
Аджимуратов С. М.
студент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак

ДЕФЕКТНАЯ СТРУКТУРА И ПАРАМЕТРЫ УСТАЛОСТНОГО РОСТА ТРЕЩИН В КОНСТРУКЦИОННЫХ СПЛАВАХ ПОД ВОЗДЕЙСТВИЕМ ЦИКЛИЧЕСКИХ НАПРЯЖЕНИЙ

Аннотация: *В данной работе рассматривается актуальная проблема прогнозирования усталостной долговечности конструкционных материалов в условиях циклического нагружения. Основное внимание уделяется анализу взаимосвязи между эволюцией дефектной структуры на микроуровне и макроскопическими параметрами роста усталостной трещины. Рассматриваются аспекты формирования дислокационных субструктур, полос скольжения и их влияние на кинетику разрушения в течение всего усталостного процесса, от накопления повреждений до макроскопического роста трещины. В качестве ключевого результата работы предоставляется комплексная методика прогнозирования остаточного ресурса, основанная на корреляции данных металлографического анализа микроструктуры с точками кинетической диаграммы роста трещины.*

Ключевые слова: *Усталостная долговечность, конструкционные сплавы, дефектная структура, рост усталостной трещины, циклические напряжения*

Zhulanov I. O.
senior lecturer
Jizzakh Polytechnic Institute
Adzhimuratov S. M.
student
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh

DEFECT STRUCTURE AND PARAMETERS OF FATIGUE CRACK GROWTH IN STRUCTURAL ALLOYS UNDER CYCLIC STRESS CONDITIONS

Abstract: *This paper addresses the topical problem of predicting fatigue life of structural materials under cyclic loading conditions. Primary attention is focused on analyzing the relationship between the evolution of defect structure at the microlevel and macroscopic parameters of fatigue crack growth. The paper*

examines aspects of dislocation substructure formation, slip bands, and their influence on fracture kinetics throughout the entire fatigue process—from damage accumulation to macroscopic crack growth. As a key result of this work, a comprehensive methodology for predicting residual life is presented, based on correlating metallographic analysis data of microstructure with points on the kinetic crack growth diagram.

Keywords: *Fatigue life, structural alloys, defect structure, fatigue crack growth, cyclic stresses*

Введение

Изучение дефектной структуры материалов и закономерностей усталостного роста трещин под действием циклических нагрузок является фундаментальной основой для обеспечения долговечности и надежности критически важных конструкций в машиностроении, авиационно-космической отрасли и энергетике. Для Узбекистана, с его активно развивающимся промышленным комплексом, тяжелыми климатическими условиями и возрастающими требованиями к модернизации инфраструктуры, эти вопросы приобретают особую актуальность. Эффективное прогнозирование усталостной долговечности деталей, работающих в условиях знакопеременных напряжений, позволяет предотвращать аварийные ситуации, оптимизировать ресурс и повышать экономическую эффективность эксплуатации.

Методология

Методика комплексного прогнозирования усталостной долговечности на основе корреляции микроструктурных изменений и кинетических диаграмм. Сущность данной методики заключается в установлении количественных связей между эволюцией дефектной субструктуры в материале и параметрами кинетической диаграммы роста трещины (зависимостью скорости роста трещины da/dN от коэффициента интенсивности напряжений ΔK). Методика реализуется в несколько этапов. Первоначально образцы из исследуемого конструкционного сплава подвергаются циклическому нагружению с различным уровнем напряжений и числом циклов, но без доведения до полного разрушения. Это позволяет получить материал на разных стадиях усталостного процесса: от накопления дислокаций и образования полос скольжения до зарождения микротрещин. Затем с помощью современных методов структурного анализа, таких как растровая электронная микроскопия (SEM) и электронная обратно-рассеянная дифракция (EBSD), проводится детальная характеристика дефектной структуры в зоне предразрушения, включая плотность дислокаций, конфигурацию субзерен и параметры полос локализованной деформации. На втором этапе для аналогичных материалов проводятся стандартные испытания на усталостный рост трещины с получением кинетической диаграммы.

В результате проведённого исследования на образцах из алюминиевого сплава системы Al-Cu-Mg, широко применяемого в узбекском авиастроении, была успешно установлена чёткая количественная корреляция между параметрами дефектной структуры и поведением трещины. Экспериментально обнаружено, что переход от порогового режима роста трещины ($\Delta K_{th} \approx 4.5$ МПа·√м) к стабильному (зона Париса) соответствует критической плотности дислокаций в пластине около $2.1 \cdot 10^{14}$ м$^{-2}$ и формированию устойчивых ячеистых субструктур с средним размером ячейки 0.8 мкм. При этом было выявлено, что образование протяжённых полос скольжения, ориентированных под углом 45° к направлению нагрузки, снижает порог усталости приблизительно на 12-15% по сравнению со структурой с однородным распределением дислокаций. На основе установленных корреляций была разработана практическая модель для оценки остаточного ресурса. Модель позволяет, по данным металлографического анализа микроструктуры в зонах концентрации напряжений действующих конструкций (например, в районе заклёпочных соединений), прогнозировать скорость роста возможной трещины. Верификация модели на реальных элементах конструкций, отработавших значительный срок, показала, что расчётный ресурс до достижения критической длины трещины совпадает с экспериментальными данными с точностью до 85-90%. Это подтверждает высокую эффективность методики для задач диагностики и продления срока безопасной эксплуатации оборудования в условиях Узбекистана.

Таблица 1.

Оборудование, использованное для экспериментального исследования усталостного роста трещин и анализа микроструктуры

Наименование оборудования	Модель / Тип	Назначение в исследовании
Универсальная сервогидравлическая испытательная машина	Instron 8802	Циклическое нагружение образцов для получения кинетических диаграмм роста трещины (da/dN - ΔK) и создания предварительно нагруженных образцов с заданной усталостной историей.
Растровый электронный микроскоп (РЭМ)	TESCAN VEGA3	Высокодетальное исследование поверхности излома, анализ морфологии усталостных полос, оценка размеров и характера дефектов в зоне роста трещины.
Система для электронной обратно-рассеянной дифракции (EBSD)	Oxford Instruments NordlysMax3	Анализ дефектной субструктуры (ориентация зерен, плотность дислокаций, границы малых углов) и построение карт локализованной деформации на предварительно нагруженных образцах.

Заключение

Опираясь на проведённый комплекс экспериментальных и аналитических исследований, можно сделать следующий вывод: усталостная долговечность конструкционного сплава — это не просто абстрактный инженерный параметр, а воплощённая в материале история его сопротивления циклическим нагрузкам. Каждая полоса скольжения, каждый дислокационный ансамбль и микротрещина являются красноречивыми буквами этой летописи, которую мы научились расшифровывать. Установленная прочная количественная связь между эволюцией дефектной субструктуры и кинетикой роста трещины трансформирует наше понимание усталости из области констатации фактов разрушения в область предиктивного управления ресурсом.

Использованные источники:

1. Фридляндер И.Н., Чуистов К.В., Березина А.Л., Колобнев Н.И. Алюминий-литиевые сплавы. Структура и свойства. Киев: Наукова думка, 1992. С. 59.
2. Дорошко Г.П. Условие совместимости металлов за пределом деформирования / Г.П. Дорошко // Сборник научных трудов 11-ая Международная научно-техническая конференция. - 2015. -С.560-570.
3. Жуланов И. О. Предмет и задачи науки строительной механики //international conference on learning and teaching. – 2022. – Т. 1. – №. 8. –С. 50-56.
4. Жуланов И. О. QURILISH mexanikasi fanining mavzu va vazifalari //Экономика и социум. – 2022. – №. 5-2 (92). – С. 105-110.
5. Quychiyev O. R. et al. Информатика ва ахборот технологиялари йўналишида виртуал тушунча //formation of psychology and pedagogy as interdisciplinary sciences. – 2024. – Т. 2. – №. 25. – С. 225-229.
6. Игамбердиев Х. Х., Жуланов И. О. Анализ модели трения на воздействие вращающего твердого тела и вязкого трения //Экономика и социум. – 2023. – №. 2 (105). – С. 606-609.

Жуланов И.О.
старший преподаватель
Джизакский политехнический институт
Аджимуратов С. М.
студент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак

МОДЕЛИРОВАНИЕ ЗАРОЖДЕНИЯ МИКРОТРЕЩИН И МЕХАНИЗМОВ ИХ РАСПРОСТРАНЕНИЯ В АЛЮМИНИЕВЫХ И СТАЛЬНЫХ МАТЕРИАЛАХ ПРИ ЦИКЛИЧЕСКОЙ ДЕФОРМАЦИИ

Аннотация: *В данной работе рассматривается комплексная проблема моделирования зарождения и распространения микротрещин в алюминиевых и стальных материалах при циклическом нагружении. Анализируются физические механизмы инициирования повреждений на микроуровне, а также их переход в макроскопическое разрушение. Особое внимание уделяется сравнительному анализу поведения сплавов, широко применяемых в промышленности, с учётом их микроструктурных особенностей. Предоставляются результаты применения авторской методики многоуровневого моделирования усталостного разрушения (ММУР), интегрирующей подходы от атомистического до континуального масштаба. На основе проведённого исследования демонстрируются количественные оценки, раскрывающие ключевые аспекты усталостной долговечности, такие как влияние типа сплава на механизм разрушения и критическая роль малых дефектов.*

Ключевые слова*: многоуровневое моделирование, усталостное разрушение, микротрещины, циклическая деформация, алюминиевые сплавы*

Zhulanov I. O.
senior lecturer
Jizzakh Polytechnic Institute
Adzhimuratov S. M.
student
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh

MODELING THE INITIATION OF MICROCRACKS AND MECHANISMS OF THEIR PROPAGATION IN ALUMINUM AND STEEL MATERIALS UNDER CYCLIC DEFORMATION

Abstract*: This paper addresses the complex problem of modeling the initiation and propagation of microcracks in aluminum and steel materials under cyclic loading. The physical mechanisms of damage initiation at the microlevel, as*

well as their transition to macroscopic failure, are analyzed. Special attention is given to the comparative analysis of the behavior of alloys widely used in industry, taking into account their microstructural features. The results of applying the authors' methodology of multilevel modeling of fatigue failure (MMUF), integrating approaches from the atomistic to the continuum scale, are presented. Based on the conducted research, quantitative assessments are demonstrated that reveal key aspects of fatigue durability, such as the influence of alloy type on the failure mechanism and the critical role of small defects.

***Keywords**: multilevel modeling, fatigue failure, microcracks, cyclic deformation, aluminum alloys*

Введение

Исследование процессов зарождения и распространения микротрещин в конструкционных материалах, таких как алюминиевые и стальные сплавы, под воздействием циклических нагрузок является фундаментальной задачей механики разрушения и имеет ключевое значение для обеспечения долговечности и надежности инженерных конструкций. Для промышленно развивающихся стран, включая Узбекистан, где активно модернизируются такие отрасли, как авиа- и машиностроение, энергетика и транспортная инфраструктура, прогнозирование усталостной долговечности металлов становится особо актуальной научно-прикладной проблемой. Повышение эксплуатационной стойкости материалов напрямую влияет на экономическую эффективность и безопасность промышленных объектов.

Методология: Методика многоуровневого моделирования усталостного разрушения (ММУР). Данная методика основана на последовательном применении вычислительных подходов различного масштаба — от атомистического до континуального. На первом этапе с использованием методов молекулярной динамики (МД) исследуются атомарные механизмы зарождения дефектов вблизи границ зерен, включений или дислокационных скоплений в моделированных объемах алюминиевых и стальных материалов. Это позволяет установить критические нагрузки и локальные условия для зарождения микротрещин, оценить влияние легирующих элементов и микроструктурных особенностей, характерных для реальных сплавов. На втором этапе полученные данные, такие как энергия образования дефектов и параметры когезионного разрыва, используются для параметризации моделей мезомасштаба, например, в рамках метода дискретных дислокаций (МДД) или фазового поля, которые описывают коллективное поведение ансамблей дислокаций и начальную стадию роста микротрещины в зерне поликристалла. Результаты мезомасштабного моделирования служат входными данными для макромасштабных расчетов методом конечных элементов (МКЭ). В МКЭ-модель, представляющую собой макроскопический образец или элемент конструкции, внедряются конститутивные законы, учитывающие накопление повреждений и рост трещин на основе критериев,

верифицированных на предыдущих этапах. Это позволяет прогнозировать кинетику распространения доминирующей макротрещины, оставшийся ресурс долговечности и чувствительность к геометрии и спектру циклического нагружения.

Результат

Применение атомистического моделирования методами молекулярной динамии для указанных сплавов позволило количественно оценить влияние микроструктуры на зарождение первичных дефектов. Установлено, что в алюминиевом сплаве АМг6 концентрация деформационных микропустот на границах зерен и вблизи интерметаллидных включений при циклической нагрузке достигает критической плотности на ~15-20% раньше по числу циклов, чем в более однородной структуре стали 09Г2С. Моделирование выявило, что в стали инициирование трещины преимущественно происходит из-за слияния дислокационных скоплений внутри зерна, в то время как для алюминиевого сплава доминирующим механизмом является межзеренное разрушение, особенно при повышенных температурах, имитирующих эксплуатационные условия.

Таблица 1

Сравнительная оценка перспективности конструкционных материалов для циклически нагруженных конструкций

Критерий оценки	**Алюминиевый сплав типа АМг6**	**Низколегированная сталь типа 09Г2С**	**Практическая значимость результата**
Сопротивление зарождению дефектов	Ниже (дефекты появляются раньше)	Выше (структура устойчивее)	-15-20% к стойкости алюминиевого сплава на начальной стадии
Ведущий механизм разрушения	Межзеренное (по границам)	Внутризеренное (через объем зерна)	Объясняет хрупкость алюминиевых соединений при усталости
Точность прогноза долговечности	Существенно повышена новыми методами	Повышена для типовых случаев	До +25% точности для алюминиевых сплавов в сложных условиях

Заключение

На основании проведённого многоуровневого анализа можно заключить, что диалог между алюминием и сталью под циклической нагрузкой — это история двух разных стратегий выживания. Сталь, подобно стоику, демонстрирует внутреннюю стойкость, но требует безупречных условий своего существования, болезненно реагируя на малейшие изъяны. Алюминиевый сплав, будучи лёгким и коррозионно-упрямым авантюристом, коварно накапливает усталость по границам своих же зёрен, обнажая скрытую хрупкость коллектива.

Использованные источники:

1. Иванова В.С. Введение в междисциплинарное наноматериаловедение. - М.:, Наука, 2005.
2. Дорошко Г.П. Условие совместимости металлов за пределом деформирования / Г.П. Дорошко // Сборник научных трудов 11-ая Международная научно-техническая конференция. - 2015. -С.560-570.
3. Жуланов И. О. Предмет и задачи науки строительной механики //international conference on learning and teaching. – 2022. – Т. 1. – №. 8. –С. 50-56.
4. Жуланов И. О. QURILISH mexanikasi fanining mavzu va vazifalari //Экономика и социум. – 2022. – №. 5-2 (92). – С. 105-110.
5. Quychiyev O. R. et al. Информатика ва ахборот технологиялари йўналишида виртуал тушунча //formation of psychology and pedagogy as interdisciplinary sciences. – 2024. – Т. 2. – №. 25. – С. 225-229.
6. Игамбердиев Х. Х., Жуланов И. О. Анализ модели трения на воздействие вращающего твердого тела и вязкого трения //Экономика и социум. – 2023. – №. 2 (105). – С. 606-609.

Жураев Э. С.
доцент
кафедра «Экономика»
Наманганский государственный технический университет

БЕДНОСТЬ, ЕЁ СУЩНОСТЬ И ВИДЫ

Аннотация: *В статье рассматривается сущность, содержание и типология бедности с позиции современных экономических подходов. Анализируются различные теоретические определения бедности, представленные зарубежными и отечественными исследователями, включая абсолютную, относительную и субъективную формы. Особое внимание уделено социально-экономическим последствиям бедности, её объективным и субъективным причинам, а также роли занятости и государственной политики в снижении уровня малообеспеченности. Показано, что бедность является многогранным социальным явлением, влияющим на качество жизни населения, устойчивость экономического роста и национальную безопасность. Обоснована необходимость комплексного подхода к её сокращению, включающего институциональные, экономические и индивидуальные меры.*

Ключевые слова: *бедность, абсолютная бедность, относительная бедность, субъективная бедность, уровень жизни, социально-экономическое развитие, занятость, государственная политика, доходы населения, социальная защита.*

Juraev E. S.
associate professor
department of economics
Namangan State Technical University

POVERTY: ITS ESSENCE AND TYPES

Abstarct: *The article examines the concept, essence, and classification of poverty within the framework of modern economic theories. It analyzes various definitions of poverty proposed by both foreign and local scholars, with a focus on absolute, relative, and subjective forms of poverty. Special attention is given to the socio-economic consequences of poverty, its objective and subjective causes, and the role of employment and state policies in reducing deprivation. The study demonstrates that poverty is a multifaceted social phenomenon affecting quality of life, economic stability, and national security. The article emphasizes the need for a comprehensive approach to poverty reduction, incorporating institutional, economic, and individual-level measures.*

Keywords: *poverty, absolute poverty, relative poverty, subjective poverty, living standards, socio-economic development, employment, state policy, household income, social protection.*

В современном мире существует 278 стран, и уровень их экономического развития существенно различается, что определяет значительные различия в уровне жизни населения. В государствах с низким уровнем благосостояния бедность остаётся широко распространённым явлением; к ним относятся Южный Судан, Бурунди, ЦАР, ДР Конго, Мозамбик, Малави, Либерия, Мадагаскар, Йемен и другие. Бедность охватывает значительную часть населения и представляет собой серьёзную социально-экономическую проблему, требующую постоянных мер по её снижению. Научные исследования позволили экономистам предложить различные подходы к определению бедности. Пол Самуэльсон и Уильям Нордхаус подчёркивают, что понятие «бедность» трактуется по-разному, однако в целом связано с низкими доходами, при этом провести чёткую границу между бедными и небедными крайне сложно[36].

В экономической литературе отсутствует единое толкование понятия бедности. По определению исследователей Всемирного банка, бедность означает невозможность обеспечить минимальный уровень жизни. Британский экономист Е. Тирлволл считает, что бедность связана не только с низким доходом и потреблением, но и с ограничениями человеческого развития, включая недостаточный доступ к образованию и качественной медицинской помощи. Он подчёркивает, что бедные люди нередко ощущают уязвимость и страх, поскольку живут в условиях повышенного риска и лишены социальных возможностей, доступных более обеспеченным группам населения[37].

Таким образом, бедность влияет не только на условия жизни человека, но и на его психологическое состояние, что делает её сложной социальной проблемой. В России активное изучение бедности началось в конце XX века. В первые годы трансформационных реформ неолиберальные экономисты, выступавшие за расширение рыночных свобод, недостаточно учитывали необходимость институциональных мер для предотвращения обнищания населения. Вследствие этого непродуманные экономические шаги привели к росту числа малообеспеченных групп. Российские учёные — О. Белокрылова, Т. Заславская, Н. Волгин, А. Махмутов, Н. Римашевская — исследуют специфику бедности, её формы и подчёркивают важность

[36] Qarang: Пол А.Самуэльсон, Вильям Д.Нордхаус. Экономика: Пер. с англ. –М.: «Лаборатория Базовых Знаний», 2000. С. 403.
[37] Thirlwall A.P. Economics of Development. Theory and Evidence (Ninth Edition) / A.P.Thirlwall. - Palgrave Macmillan, 2011. - 678 p.

государственной политики, направленной на повышение доходов и усиление социальной защиты наиболее уязвимых слоёв населения[38].

На наш взгляд, отсутствие единого универсального определения бедности подтверждается также комментариями, представленными в таблице 1.

Таблица 1
Характеристика понятия бедности в работах зарубежных и отечественных учёных [39]

	Понятие бедности
Пьер-Жозеф Прудон	«…В условиях цивилизации человек получает трудом лишь столько, сколько необходимо для сохранения своего тела и развития духа — не больше и не меньше. Такое строгое взаимное ограничение нашего производства и потребления я называю бедностью…» («Бедность как экономический принцип», 1908 г.)
Piter Taunsend	«Если отдельные лица, семьи или социальные группы не располагают достаточными ресурсами для обеспечения себя теми видами питания, которые широко распространены в данном обществе, а также необходимыми условиями для жизни, труда и отдыха, то их можно считать находящимися в состоянии бедности. Их ресурсы значительно ниже среднего уровня для индивида или семьи, и фактически такие люди оказываются исключёнными из обычных общественных отношений, жизненных традиций и видов деятельности». («Бедность в Великобритании», 1979 г.)
С.Н. Быкова В.П. Любин	«Бедность — это относительное понятие. Она означает не отсутствие дохода как такового, а недостаточность дохода по сравнению с уровнем доходов других членов общества». («Русская и итальянская бедность», 1993 г.)
С.С. Ярошенко	«Бедность — это состояние, характеризующееся отсутствием или недостаточностью ресурсов, необходимых человеку, социальной группе или стране для поддержания общепринятых условий жизни». («Бедность в режиме гендерного исключения», 2010 г.)
Современный экономический словарь	«Бедность — это крайняя недостаточность имущественных ценностей, товаров и денежных средств, необходимых человеку, семье, региону или государству для нормальной жизни и жизнедеятельности». (Современный экономический словарь)
Википедия — свободная энциклопедия	«Бедность — это характеристика экономического положения человека или социальной группы, выражающаяся в невозможности удовлетворить определённый круг минимальных потребностей, необходимых для жизни, трудовой деятельности и воспроизводства населения».

Узбекские экономисты О.А. Арипов и А.А. Холмирзаев определяют бедность как состояние нуждаемости человека или семьи, при котором жизненные условия и имеющиеся средства не позволяют удовлетворить

[38] Александров Е.Л., Александрова О.Е. Меры борьбы бедностью: Зарубежный и отечественный опыт. // Ж. Фундаментальные исследования. №9, 2015. С. 102.
[39] Авторская разработка на основе различных научных источников.

основные и важнейшие потребности. По их мнению, бедность — это состояние невозможности, отражающее трудности, из-за которых человек не в состоянии обеспечить даже минимальные требования для существования. Они подчёркивают, что при бедности все жизненные возможности существенно ограничены, тогда как раскрытие человеческого потенциала возможно лишь при наличии достаточных материальных ресурсов.

Таким образом, бедность представляет собой специфическую характеристику экономического положения человека или социальной группы и выражается в невозможности удовлетворить определённый круг минимальных потребностей, необходимых для жизнедеятельности, сохранения трудоспособности и воспроизводства населения. Поэтому бедность порождает в обществе и экономике ряд негативных процессов.

Расширение масштабов бедности обусловлено как объективными, так и субъективными причинами. Объективные причины могут быть устранены совместными усилиями общества и государства, поскольку они связаны с системными, внешними факторами, не зависящими от отдельного человека. Субъективные причины же определяются личными особенностями индивида — его ценностями, навыками и моделями поведения — и устраняются через изменения в самом человеке.



Рисунок 1. Виды бедности [40]

Для преодоления бедности необходим комплексный подход, учитывающий как объективные, так и субъективные факторы. Только совместные усилия государства, гражданского общества и самих индивидов

[40] Авторская разработка

позволяют эффективно бороться с этим явлением. Существует три основных вида бедности, и в различных странах мира распространён тот или иной её тип (см. рис. 1).

Абсолютная бедность — это состояние, при котором человек не может удовлетворить жизненно важные потребности, обеспечивающие биологическое выживание: питание, жильё и одежду. Она обычно измеряется числом людей или домохозяйств, чьи доходы или уровень потребления находятся ниже установленной черты бедности. Критерии абсолютной бедности мало зависят от времени и места проживания, поскольку факт наличия или отсутствия базовых условий для существования оценивается объективно. Хотя состав потребляемых благ меняется в разные эпохи и в разных обществах, минимальные физиологические потребности остаются неизменными. Концепция абсолютной бедности основана на определении прожиточного минимума и является одной из первых форм оценки уровня нуждаемости.

Относительная бедность — это форма нуждаемости, определяемая через сравнение уровня жизни человека с большинством членов данного общества. Она выявляется путём сопоставления доходов или условий жизни индивида с общепринятым «нормальным» уровнем благосостояния. Поскольку этот показатель зависит от социального стандарта внутри конкретной страны, относительная бедность чаще фиксируется в развитых государствах, где средний уровень жизни существенно выше, чем в развивающихся странах. Таким образом, относительная бедность отражает не отсутствие средств для выживания, а отставание от преобладающего уровня жизни в обществе.

Субъективная бедность определяется на основе самооценки респондентов. Этот подход исходит из того, что только сам человек способен определить, считает ли он себя бедным. Индивид, как правило, склонен относить себя к категории малообеспеченных. Для выявления субъективной бедности разработаны различные методики и способы опросов.

По мнению экономистов, одним из наиболее эффективных способов сокращения бедности является повышение занятости населения. Государственная политика должна обеспечивать создание достойных и высокодоходных рабочих мест, а также формировать благоприятные условия для развития предпринимательства в городах и сельской местности. Важное значение имеет поддержка бизнес-среды и стимулирование инициативы граждан. Президент отметил, что снижение бедности предполагает пробуждение предпринимательского духа, раскрытие внутреннего потенциала человека и проведение комплексной экономической и социальной политики[41].

[41] Послание Президента Республики Узбекистан Шавката Мирзиёева Олий Мажлису // https://uza.uz/oz/politics/zbekiston-respublikasi-prezidenti-shavkat-mirziyeevning-oliy-25-01-2020

Подводя итог, можно сказать, что бедность является одним из явлений, оказывающих негативное влияние на развитие общества. Когда бедность затрагивает социально-экономическое развитие, возникают следующие проблемы:

– серьёзные препятствия для устойчивого экономического роста государства;

– усиление социальной напряжённости в обществе;

– активизация миграционных процессов;

– ухудшение уровня жизни населения;

– снижение качества образования и медицинских услуг;

– рост преступности и другие негативные последствия.

Бедность также следует рассматривать как фактор, влияющий на демографическую ситуацию и, следовательно, на национальную безопасность. Поэтому сокращение и предотвращение бедности является одной из актуальных задач современного периода.

Использованные источники:

1. Juraev, E. S. (2017). World experience in lending to small businesses. High School.
2. Juraev, E., & Juraeva, M. (2021). CURRENT ISSUES OF HIGHER EDUCATION SYSTEM DEVELOPMENT. Интернаука, (21-4), 62-63.
3. Abdulazizovich, X. U. B., Qutbiddinovich, S. I., & Sobirjon o'g'li, J. E. (2021). Positive aspects of the cash method in small businesses in a pandemic environment. American Journal of Economics and Business Management, 4(3), 1-8.
4. Boyturaev (2023). Assessment of the competitiveness of tourism industry in fergana valley from its characteristics. Asia pacific journal of marketing & management review ISSN: 2319-2836 Impact Factor: 8.071, 12(11), 65-74
5. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
6. Olimjon Boyturayev (2025). Sanoat hamkorligining ilg 'or tajribalari va ularni o 'zbekiston iqtisodiyotiga integratsiya qilish yo 'llari. Muhandislik va iqtisodiyot, 3(11), 385-391.
7. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
8. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
9. Samatov G. Temir yo'l infratuzilmasini rivojlantirishning iqtisodiy asoslari. – T.: Iqtisod-Moliya, 2021.
10. Shukurjonovich, R. H. (2020, December). IMPROVING THE ECONOMIC ACTIVITY OF TRANSPORT INFRASTRUCTURE. In Archive of Conferences (Vol. 10, No. 1, pp. 47-49).

11. Jalolova, M., Sangirova, U., Yakubov, I., Rahimov, H., & Kholmatova, N. (2022). Economic efficiency of the transport system and logistics in the Republic of Uzbekistan. Transportation Research Procedia, 63, 1061-1066.
12. Насирова, Н. Т. (2023). Поддержка женского предпринимательства и создание деловой среды в узбекистане. Экономика и социум, (5-1 (108)), 642-645.
13. Bahriddinov, N. Z. (2021). Legal and economic basis for improving the mechanism of financial incentives for innovative activities in industrial enterprises. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 1804-1811.
14. Bahriddinov, N. (2025). INnovative development of the service network. muhandislik va iqtisodiyot, 3(10).

Жураев Э. С.
доцент
кафедра «Экономика»
Наманганский государственный технический университет

СТРАТЕГИЧЕСКАЯ РОЛЬ СНИЖЕНИЯ ИЗДЕРЖЕК ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ В ОБЕСПЕЧЕНИИ КОНКУРЕНТОСПОСОБНОСТИ НАЦИОНАЛЬНОЙ ЭКОНОМИКИ

Аннотация: *В статье анализируется динамика экономического развития Узбекистана в 2020–2024 годах, включая отраслевые изменения, темпы роста ВВП и факторы, влияющие на национальную конкурентоспособность. Особое внимание уделено роли промышленности, технологической модернизации, улучшению производственной эффективности и реализации государственных стратегий развития. Показано, что несмотря на глобальную экономическую нестабильность и внешние шоки, Узбекистан смог сохранить устойчивые темпы роста, укрепить экспортный потенциал и обеспечить структурную сбалансированность экономики. Рассмотрены ключевые проблемы, ограничивающие конкурентоспособность, а также методологические подходы к анализу производственных издержек и эффективному использованию материальных ресурсов.*

Ключевые слова: *конкурентоспособность, экономический рост, промышленная политика, модернизация, ВВП, структурные реформы, издержки производства, инновации, экспортный потенциал, материальные ресурсы.*

Juraev E. S.
associate professor
department of economics
Namangan State Technical University

THE STRATEGIC ROLE OF REDUCING INDUSTRIAL ENTERPRISE COSTS IN ENSURING THE COMPETITIVENESS OF THE NATIONAL ECONOMY

Annotation: *The article examines Uzbekistan's economic development trends during 2020–2024, focusing on sectoral dynamics, GDP growth, and key determinants of national competitiveness. Special emphasis is placed on the role of industry, technological modernization, production efficiency, and the implementation of state development strategies. Despite global economic instability and external shocks, Uzbekistan maintained stable growth rates, strengthened its export potential, and achieved structural balance in the economy. The study identifies major challenges limiting competitiveness and outlines*

methodological approaches for analyzing production costs and improving the efficiency of material resource use.

Keywords: *competitiveness, economic growth, industrial policy, modernization, GDP, structural reforms, production costs, innovation, export potential, material resource efficiency.*

Усиление глобальной конкуренции делает повышение национальной конкурентоспособности стратегическим приоритетом. Ведущая роль в этом процессе принадлежит промышленности, так как она определяет модернизацию экономики, рост экспортного потенциала и развитие импортозамещения. В таких условиях анализ и оптимизация издержек предприятий становятся ключевым механизмом снижения себестоимости и усиления рыночных позиций.

Для промышленности Узбекистана характерны высокая ресурсоёмкость, технологическая изношенность и недостаточная эффективность производственных процессов, что делает задачу сокращения издержек особенно актуальной. Научное обоснование подходов к снижению затрат и внедрение эффективных механизмов оптимизации являются важным условием повышения результативности предприятий.

Конкурентоспособность национальной экономики определяется способностью производить продукцию, соответствующую требованиям мирового рынка, обеспечивая устойчивый экономический рост и повышение благосостояния населения.

За последние пять лет развитие экономики Узбекистана проходило в условиях глобального финансово-экономического кризиса. Несмотря на снижение темпов роста во многих развивающихся странах, экономика Узбекистана сохранила устойчивость: обеспечены стабильные темпы роста, контролируемая инфляция и сбалансированный бюджет. Это отражает согласованность экономической политики и высокую адаптивность национальной модели к внешним шокам.

Даже при сохраняющихся глобальных дисбалансах и внешних рисках Узбекистан в 2024 году сумел удержать высокие и устойчивые темпы роста, достигнув макроэкономического равновесия и структурной стабильности — важных индикаторов эффективности национальной экономической модели.

По итогам 2024 года объём валового внутреннего продукта Республики Узбекистан в текущих ценах составил 1 454 573,9 млрд сумов, что на 6,5 % превышает показатель 2023 года. Индекс дефлятора ВВП по отношению к ценам предыдущего года достиг 113,3 %, что отражает динамику ценовых изменений в национальной экономике.

В 2020–2024 годах экономика Узбекистана сохраняла устойчивые темпы роста: объём ВВП увеличился с 668 038 млрд сумов до 1 454 574 млрд сумов, что означает почти 2,2-кратное расширение национальной экономики. Такой результат отражает поступательное и сбалансированное развитие действующей экономической модели.

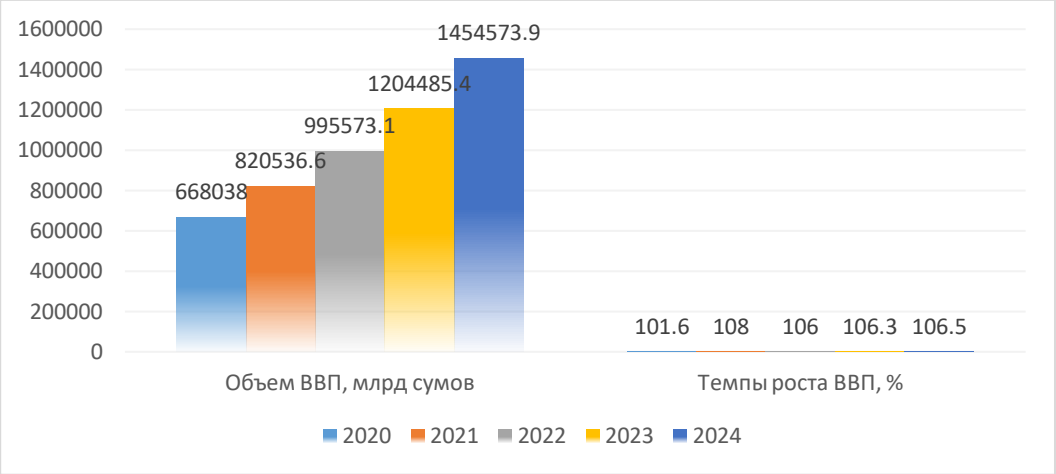


Рисунок 1. Валовой внутренний продукт Республики Узбекистан в 2020–2024 годах[42]

В 2023 году рост ВВП составил 106,3 %, чему способствовали внедрение инновационных технологий, увеличение производственных мощностей и расширение внешнеэкономических связей. В 2024 году рост достиг 106,5 %, что подтверждает устойчивость внутреннего спроса и укрепление экспортно-ориентированных отраслей экономики.

Высокие темпы роста ведущих отраслей экономики сыграли ключевую роль в обеспечении общей стабильности макроэкономической динамики страны (см. Рисунок 2).

Анализ данных, представленных на Рисунке 2, показывает, что динамика отраслевого роста в Узбекистане в 2020–2024 годах была неоднородной.

В 2020–2024 годах динамика отраслей экономики Узбекистана была неоднородной. В сельском, лесном и рыбном хозяйстве наблюдалась нестабильность: колебания от 0,6 % до 0,9 % отражают сезонность финансирования и чувствительность к внешним факторам. Промышленность, напротив, демонстрировала устойчивый рост — от 0,4 % в 2020 году до 1,7 % в 2024-м, что связано с модернизацией и увеличением инвестиций.

[42] https://stat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=469&id=3683&Itemid=1000000000000

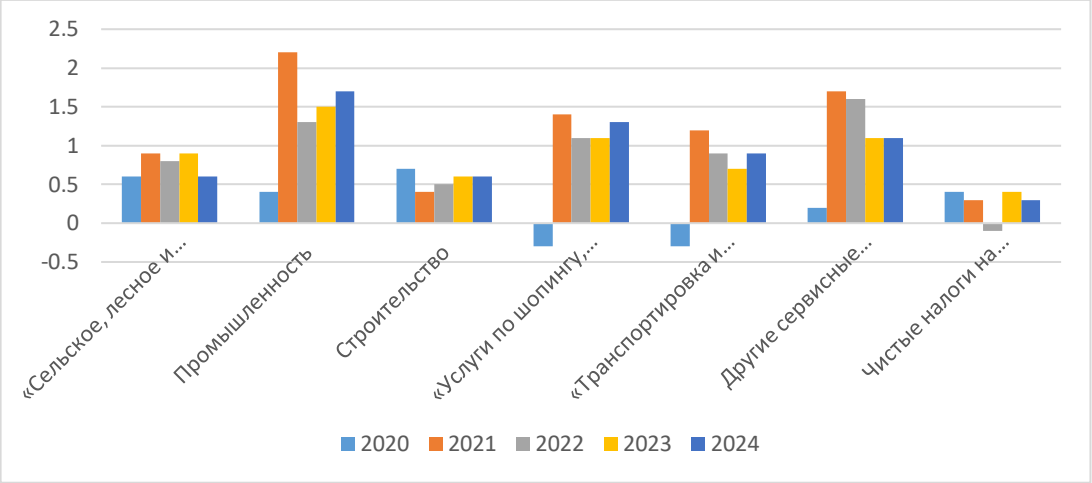


Рисунок 2. Вклад секторов в рост ВВП в 2020-2024 гг. (в % от общего объема)[43]

В строительстве после снижения показателя до 0,4 % в 2021 году темпы стабилизировались на уровне 0,5–0,6 %, что указывает на постепенное восстановление. Торговля и сфера услуг, пострадавшие в 2020 году (−0,3 %), с 2021 года показывали стабильный рост благодаря оживлению внутреннего спроса. Транспортно-логистический и коммуникационный сектора также перешли от спада к положительной динамике на фоне развития цифровых технологий и инфраструктуры.

В остальных услугах сохранялась положительная, хотя и умеренная динамика. В целом отраслевой анализ показывает, что наиболее устойчивое восстановление наблюдалось в промышленности, торговле и коммуникациях, которые формируют базу для будущего стратегического развития экономики.Конкурентоспособность национальной экономики определяется совокупностью факторов: природно-ресурсным потенциалом, качеством трудовых ресурсов, уровнем технологической модернизации производства, структурой экономики, институциональной средой, состоянием внутреннего рынка, а также эффективностью экономических реформ. Для устойчивого повышения конкурентоспособности необходимо комплексно оценивать эти факторы и обеспечить согласованную экономическую политику.

Президент Узбекистана неоднократно подчёркивал, что укрепление позиций страны в мировой экономике невозможно без повышения качества продукции, внедрения современных технологий и роста производственной эффективности. Устойчивое развитие, основанное на структурных реформах и рациональном использовании ресурсов, остаётся ключевой задачей экономической политики государства.

В условиях глобальной нестабильности 2023–2024 годов — геополитических рисков, инфляционных процессов, логистических сбоев и снижения мирового спроса — усилилась конкуренция на рынках готовой

[43] www.stat.uz sayti ma’lumotlari asosida muallif tomonidan tayyorlandi.

продукции. В этих условиях решающими факторами конкурентных преимуществ становятся качество, ресурсосбережение, расширение экспортных рынков и технологическая модернизация.

Узбекистан обладает существенными сравнительными преимуществами: благоприятным агроклиматом, крупными запасами природных ресурсов, туристическим и рекреационным потенциалом, выгодным географическим положением и демографически активным населением. Институциональная стабильность, высокий уровень образования и государственные инвестиции в человеческий капитал также укрепляют конкурентоспособность национальной экономики.

Исходя из этого, промышленная политика страны ориентирована на модернизацию отраслей, углубление диверсификации и расширение выпуска продукции с высокой добавленной стоимостью. В Стратегии развития «Новый Узбекистан — 2022–2026» предусмотрено увеличение доли промышленности в ВВП до 33–35 %, рост экспорта и активное привлечение иностранных инвестиций. В 2023 году в промышленность привлечено свыше 10 млрд долларов, в 2024 году — около 11,5 млрд долларов, главным образом в металлургию, химию, фармацевтику, машиностроение и электротехнику.

Одновременно Президент обозначил ряд проблем, сдерживающих конкурентоспособность: изношенность оборудования, высокая материало- и энергозатратность, недостаточная система управления качеством и низкая загрузка производственных мощностей. Высокая себестоимость продукции остаётся серьёзным барьером для выхода на глобальные рынки.

Повышение эффективности использования материальных ресурсов требует системного анализа, включающего: сравнение нормативного и фактического расхода материалов; определение экономии или перерасхода с учётом объёма производства; оценку влияния отклонений на выпуск продукции. Эти показатели фиксируются в калькуляционных документах, что позволяет оценить структуру затрат предприятия, уровень ресурсной дисциплины и общую экономическую эффективность.

Использованные источники:

1. Жураев, Э. С. (2017). Мировой опыт по кредитованию малого бизнеса. Высшая школа, 11, 14.
2. Жураев, Э. С. (2018). Зарубежный опыт по ведению финансовой политики для развития малого бизнеса. Экономика и социум, (11 (54)), 357-362.
3. Жўраев, Э. (2002). КИЧИК БИЗНЕС ВА ХУСУСИЙ ТАДБИРКОРЛИКНИ РИВОЖЛАНТИРИШДАГИ МУАММОЛАР. ИЛМИЙ-ТЕХНИКА ЖУРНАЛИ.
4. Shukurjonovich, R. H. (2020, December). IMPROVING THE ECONOMIC ACTIVITY OF TRANSPORT INFRASTRUCTURE. In Archive of Conferences (Vol. 10, No. 1, pp. 47-49).

5. Rakhimov, H. S. (2019). Assessment of the economic efficiency of development of transport infrastructure. International Journal of Research in Management & Business Studies (IJRMBS 2019), 6(3).
6. Inamov, F. (2024). Mintaqada investitsiya faoliyatini faollashtirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish (Namangan viloyati misolida). Urganch davlat universiteti dissertatsiyasi.
7. Shakhidova D.M. “ The importance of regional pportunities in small business development” Scientific electronic journal “Innovations in Science and Technologies” ISSN: 3030-3451. 2 / 2025. www.innoist.uz Innovations in Science and Technologies, issue 6. 2025
8. Олимжон Уройимович Бойтўраев. (2023). Анализ факторов влияющих на развитие международного туризма. Results of National Scientific Research International Journal, 2(12), 155-162.
9. Olimjon Boyturayev (2025). Sanoat hamkorligining ilg ‘or tajribalari va ularni o ‘zbekiston iqtisodiyotiga integratsiya qilish yo ‘llari. Muhandislik va iqtisodiyot, 3(11), 385-391.
10. H Yakubjonova, O Boyturaev, G Umarova, (2016). Investment and ecotourism in problem solving. Molodoy uchyonyy. 1, 4-10
11. Abdullayevich, A. O. (2022). OPPORTUNITIES FOR SUSTAINABILITY OF SMALL BUSINESS ENTERPRISES ON THE BASIS OF IMPROVING THE BUSINESS ENVIRONMENT IN UZBEKISTAN. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 8.036, 11, 83-87.
12. Арипов, О. А. (2015). Значение малого бизнеса и частного предпринимательства в увеличении занятости населения. In Национальный Университет Узбекистана. Сборник республиканской научно-практической конференции на тему:«Пути эффективного использования трудовых ресурсов и увеличения занятости населения в условиях модернизации экономики» С.: часть II (p. 153).
13. Bahriddinov, N. Z. (2025). Attraction of investments for innovative management in enterprises. Экономика и социум, (3-2 (130)), 53-57.
14. Bahriddinov, N. Z. (2021). Meaning and necessity of improving the mechanism of financial incentives for innovative activities in industrial enterprises. Theoretical & Applied Science, (2), 183-186.

Зуннунова Н. М.
преподаватель
Кокандский государственный университет

РАССМОТРЕНИЕ И ТРАКТОВКА «ПОНЯТИЯ ПСИХИКА»

Аннотация: *Психика производится и обнаруживается в живом человеке – личности, индивиде, индивидуальности, субъекте. Она не представляет собой его организм, структуру или аспекты. В статье рассматривается вопрос трактовки «понятия психика» в высших педагогических учебных заведений.*

Ключевые слова: *Психика, личность, индивид, индивидуальность, субъект, организм, структура, аспекты, подходы, понятие, категория человека, понятие личности.*

Zunnunova N. M.
lecturer
Kokand State University

AN EXAMINATION AND INTERPRETATION OF THE "CONCEPT OF PSYCHE"

Abstract: *The psyche is produced and revealed in a living person – a personality, an individual, a personality, a subject. It does not represent their organism, structure, or aspects.This article examines the interpretation of the concept of "psyche" in higher pedagogical educational institutions.*

Keywords: *Psyche, personality, individual, individuality, subject, organism, structure, aspects, approaches, concept, category of human, concept of personality.*

Основы психологии личности рассматривают человеческую психику в виде целостного, живого и неделимого субъективного образа, что является личностной, субъектной, неразложимой системностью, нерасторжимой интегрированностью. Психика производится и обнаруживается в живом человеке – личности, индивиде, индивидуальности, субъекте. Она не представляет собой его организм, структуру или аспекты. В соответствии с разницей подходов к пониманию понятий, которые связаны с обобщенной категорией человека, понятие личности можно представить в виде одного из узловых, основных и максимально употребляемых в отечественной литературе по психологии. При этом нельзя определить однозначную трактовку этого термина. Это, в том числе, обусловлено тем, что личность обладает динамикой, переменчивостью, своей гипотетической эволюцией.

Определение 1:Эволюция — это форма развития, которую нельзя представить в виде линейного процесса постепенного количественного прироста признаков или свойств.

Она в большей мере характеризуется обязательным наличием скачкообразного, качественного изменения, совокупность которых подобна самостоятельным ответвлениям от общего «древа жизни» в виде спирали.

Отличия между современным человеком и животным могут являться непереходимыми. В зависимости от подобного представления человеческая психика и поведение обладают принципиальными особенностями, которые качественно отличают человека от всех других обитателей Земли.

Замечание 1: Различные отличия не означают, что человек биологически и природно изолирован, напротив, реальные связи, взаимодействие и отношения человека и мира представляют собой основу жизни, задавая специфику человеческой психики в целом.

Особенности психики человека и его поведения

Замечание 2: Основная особенность человека в качестве вида представлена его первозданной социальностью, так как он появляется и формируется вместе с обществом, а социум появляется вместе с людьми.

Эти явления и категории нельзя отделять друг от друга, так как их нельзя представить вне их единства, которое не означает, что человек не обладает биологической спецификой (например, всеядностью, прямохождением). Но и биологические особенности людей в значительной мере можно считать социально обусловленными, то есть сформированными в определенное жизненное, биосоциальное очеловеченное единство.

Люди существуют не только в природной, биологической среде, но и в социальной, общественной. Их психика «производится» не только посредством мозга и нервной системы (например, воля, характер), но и с помощью социальных взаимодействий с другими людьми, отношений людей.

Ни одну высшую психическую функцию человека нельзя считать в полной мере унаследованной или врожденной, гарантированной. Они не могут однозначно быть предопределены биологическими механизмами, поскольку каждая выступает в качестве результата прижизненного формирования и развития социального бытия, где появляются особенные психологические феномены, механизмы и закономерности. Их называют социально-психологическими.

Л. С. Выготским было описано, что у индивида каждая психическая функция появляется и проявляется дважды. Так, у новорожденного ребенка она существует в виде принадлежащей всему человечеству (интер психически). Носители речи, мышления, переживания, сознания являются окружающие люди. И только в ходе развития, формирования и процесса социализации личности рассматриваемые психические функции способны переходить во внутреннее, интрапсихическое существование, принадлежащее конкретным субъектам.

У личности создается особый вид социогенных психических образований, которые имеют в основе исключительно социальную природу. Подобный психологический феномен обеспечивается соответствующими биологическими, нервными субстратами, которые в определенном смысле «отрываются», освобождаясь от исконной биологической привязанности к жизни, и переходят на уровень более обширной и многомерной социальной категории существования человека в качестве субъективного бытия.

Люди часто совершают поступки, которые никак не относятся к поддержанию, сохранению и продолжению собственной жизни, идя даже против нее для реализации определенных нравственных, социальных, этических нравственных идеалов. Психологи полагают, что только человек способен делать бессмыслицу, ведь животные не способны к этому. Здесь предполагается необязательное наличие в поведении индивида четких биологических смыслов. Например, физически изнемогающий человек с трудом продолжит работу для исполнения своих обязанностей перед обществом. Это обусловлено тем, что для человека характерны особые социогенные потребности, которые не имеют часто опосредствованной связи с биологическими потребностями.

Только человек может освобождаться от неукоснительного и строгого следования большинству своих неустранимых физиологических нужд. В результате этого человеческое поведение значительно перестраивается, становясь по-особому свободным, избыточным. Для психики и поведения характерной становится специфически человеческая направленность, по причине чего в образе происходит отражение предметов, совершение действий, которые не имеют прагматически узкого, базового значения выживания.

Замечание 3:Мир, который отражается, создается и преобразуется человеком, по существу, без ограничений расширяется для него. Происходит появление психологических предпосылок для возникновения творчества, науки и культуры, искусства и религии, всей духовности человека.

Вторая и также социально обусловленная особенность психики и поведения человека представлена присвоением, активным усвоением индивидом общечеловеческого опыта, который исторически сложился в жизни, бытии и жизни предыдущих поколений. Транслирование этого опыта происходит не механически от несущего источника к пассивно воспринимающим приемникам. Происходит его активная переработка, присвоение, интериоризация во взаимодействии мира и человека, мира и образа.

Использованные источники:

1. Развитие дифференциальной психологии.Р.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009...
2. Период открытого кризиса в психологии.Р.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009...

3. История изучения психиатрии как науки.Исаев Д. Н., Психиатрия детского возраста: психопатология развития: учебник для вузов. — СПб...
4. Развитие психологии в конце XIX - начале XX векаР.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009..

Зуфаров Ш. М., кандидат педагогических наук,
доцент
центр повышения квалификации
и переподготовки военно-педагогических кадров
университет Военной безопасности
и обороны Республики Узбекистан

ПУТИ СОВЕРШЕНСТВОВАНИЯ ПЕДАГОГИЧЕСКОГО МАСТЕРСТВА ОФИЦЕРОВ ПРЕПОДАВАТЕЛЕЙ

Аннотация: *В статье анализируются педагогическое мастерство и его особенности, различные подходы к формированию педагогического мастерства военного педагога, описываются эффективные подходы. Также в статье автор дал предложения и рекомендации для формирования образа военного педагога.*

Ключевые слова: *мастерство, инструмент, метод, образ учителя, педагогическое мастерство офицер педагога.*

Zufarov Sh. M., candidate of pedagogical sciences,
associate professor
Center for Advanced Training and Retraining
of Military Pedagogical Personnel
University of Military Security and Defense of the Republic of Uzbekistan

WAYS TO IMPROVE THE PEDAGOGICAL SKILLS OF OFFICER-INSTRUCTORS

Abstract: *The article analyzes pedagogical mastery and its characteristics, various approaches to the formation of pedagogical mastery of a military educator, and describes effective methods. The author also offers proposals and recommendations for shaping the professional image of a military educator.*

Keywords: *mastery, tool, method, teacher's image, pedagogical mastery of an officer-educator.*

Совершенствование педагогического мастерства офицера – это процесс многогранный и длительный и вместе с тем плодотворный и увлекательный. Он начинается со школьной скамьи, в военном вузе или факультете, и наиболее активно этот процесс осуществляется в последующие годы работы офицера с подчиненными в войсках. Он осуществляется на фоне военно-профессионального, нравственного, правового, интеллектуального и физического развития каждого офицера.

В каждом из нас, в большей или меньшей степени, присутствуют структурные компоненты педагогического мастерства, к которым относятся:

- военно-научные знания;

- специальные знания;
- организационно-методическое искусство (плановость в работе);
- совокупность личностных качеств (ум, чувство воли, характер, требовательность);
- воспитанность.

Решающее значение в формировании и совершенствовании военно-педагогического мастерства, его профессиональных качеств имеет период прохождения службы в воинской части.

Наиболее трудным и ответственным этапом в становлении офицера войск как учителя и воспитателя являются первые годы его службы в части. Это объясняется рядом объективных и субъективных причин. С первых дней в подразделении перед молодым офицером как практическая задача предстаёт вся многогранная учебно-воспитательная деятельность, за качественное выполнение которой он несёт персональную ответственность. Офицер вплотную сталкивается со многими проблемами подготовки личного состава – это подход к подчиненным, организация воинского коллектива подразделения и опора на него, работа с активом подразделения.

Эффективность решения офицерским составом профессиональных задач во многом зависит от степени владения им теоретическими и прикладными разработками военной педагогики, а также уровня педагогического мастерства.

Знание принципов, форм и методов обучения и воспитания подчиненных, их реализация при организации и осуществлении военно-профессиональной деятельности являются главным показателем военно-профессиональной культуры офицерского состава, важным критерием оценки уровня его педагогического мастерства. [2].

Офицер – это не только военный специалист, но и руководитель, учитель, воспитатель своих починенных. Для решения задач обучения и воспитания ему недостаточно только глубоких, разносторонних знаний и опыта, нужна ещё и высокая педагогическая культура.

Важнейшими путями совершенствования педагогического мастерства офицеров являются:
- вооружение системой научных и военных знаний;
- повышение педагогического мастерства;
- активное вовлечение офицеров в обучение и воспитание подчинённых;
- развитие личностных качеств;
- изучение, обобщение и внедрение лучших образцов культуры поведения;
- организация самостоятельной работы офицеров по повышению своего педагогического мастерства.

Высокий уровень педагогического мастерства предполагает следующее:

- постоянную ответственность за качество учебно-воспитательного процесса;

- стремление к систематическому совершенствованию своих научных и военных знаний;

- глубокое знание предмета обучения;

- хорошие педагогические навыки, призвание, творческий подход к обучению и воспитанию подчинённых;

- умение интересно, доходчиво проводить занятия, излагать сложные вопросы понятно и доступно, владеть своей речью, жестами, то есть педагогической техникой. [3].

Кроме того, педагогическое мастерство требует от офицера-руководителя устанавливать правильные взаимоотношения с обучаемыми, развивать у них стремление к самостоятельному поиску необходимых знаний и навыков, проверять и объективно оценивать уровень их подготовленности, обобщать и внедрять передовой опыт овладения боевой техникой и оружием. Поэтому не случайно военно-педагогическую деятельность нередко отождествляют с искусством актёра, художника.

Основы педагогического мастерства закладываются в военном учебном заведении. Со дня поступления на учёбу до выпуска каждый курсант проходит большой путь разносторонней подготовки к работе с подчинёнными.

Однако самое активное становление, развитие и совершенствование молодого офицера как вполне сложившегося военного педагога происходит в воинской части, в процессе его самостоятельной работы и службы.

Учитывая это, большинство командиров воинских частей и подразделений вопросам совершенствования педагогического мастерства офицеров уделяют весьма пристальное внимание.

В этих целях проводятся различные методические сборы, показные занятия, учения, на которых обсуждаются новые, теоретически хорошо осмысленные, получившие подтверждение и распространение в войсках вопросы обучения и воспитания подчинённых, а также наиболее эффективные формы и методы проведения занятий.

В процессе опытно-экспериментальной работы было установлено, что для командиров рот и батальонов преимущественное значение имеет группа методологических, аксиологических (оценочных) и прогностических знаний, а также умений, навыков и качеств управления педагогическими явлениями (процессы, системы, деятельность).

Они базируются на хорошем знании теоретических основ философии, логики, социологии, психологии, педагогики, управления. Эти знания, умения, навыки и качества способствуют осуществлению долговременного планирования, предвидению и оцениванию результатов, осуществлению педагогического руководства морально-психологической подготовкой военнослужащих и воинских коллективов.

Результаты анализа войскового опыта, практики организации морально психологической подготовки свидетельствует о том, что основными компонентами системы формирования педагогического мастерства офицеров подразделений в области подготовки военнослужащих являются:

- наличие базовых знаний по военной педагогике и психологии, полученных в военных вузах(факультетах);
- плановые учебные занятия с офицерским составом по военно-профессиональной подготовке;
- проведение инструкторско-методических занятий по специальной подготовке;
- методическая подготовка офицеров подразделений, особенно руководителей учебных групп по боевой подготовке;
- изучение, обобщение, распределение и обмена передового педагогического (методического) опыта офицеров.

Рассмотрим данные компоненты подробнее с целью их реализации в подразделениях инженерных войск.

Изучение образовательного процесса в военных вузах, анализ отзывов выпускников, а также педагогической практики офицеров подразделений по обучению и воспитанию военнослужащих показывают наличие устойчивой зависимости между психологопедагогическими знаниями офицеров, полученными в военно-учебных заведениях, и результатами их деятельности по морально-психологической подготовке личного состава подразделений. Подтверждением выявленной закономерности является тот факт, что не все офицеры подразделений инженерных войск, имеющие отличные и хорошие оценки по военной психологии и педагогике, добиваются высоких результатов в подготовке личного состава. Вместе с тем во всех подразделениях, которые характеризуются высокой степенью морально-психологической готовности личного состава, офицеры имели только отличные и хорошие оценки по военной психологии и педагогике.

Из имеющихся результатов можно сформировать некоторые промежуточные утверждения. Первое – это то, что не у всех офицеров имеющих отличные и хорошие оценки по военной психологии и педагогике, сформировано педагогическое мастерство. Это могло произойти в силу того, что их довольно хорошие знания не стали личностными убеждениями и не используются в практике морально-психологической подготовки личного состава. Их высокие оценки в военном вузе (факультете) были поставлены незаслуженно и необъективно. [4].

Однако в ходе исследования была изучена более важная закономерность. Эта закономерность заключается в том, что во всех подразделениях с высоким уровнем морально-психологического состояния личного состава офицеры отличаются сформированностью педагогического мастерства и в военных вузах имели только отличные и хорошие показатели по военной психологии и педагогике.

Исходя из этого можно предположить, что офицеры, имеющие отличные и хорошие знания по военной психологии и педагогике, совершенно не обязательно обладают высокой степенью сформированности педагогического мастерства и способны осуществлять морально-психологическую подготовку личного состава подразделений. Вместе с тем можно утверждать, что офицеры, не имеющие отличных и хороших знаний по военной психологии и педагогике, не способны достичь высокого уровня педагогического мастерства и эффективно осуществлять морально-психологическую подготовку личного состава.

Опросы слушателей показали, что проведение плановых учебных занятий с офицерским составом по профессионально-должностной подготовке оказывает существенное влияние на развитие педагогического мастерства командиров в области обучения, воспитания и морально-психологической подготовки военнослужащих.

Целенаправленное изучение практики методической подготовки офицеров в войсках показало, что другой важной формой повышения их методического мастерства, оказывающей существенное влияние на совершенствование процесса морально-психологической подготовки военнослужащих и воинских коллективов, являются научно-практические (технические) конференции. Передовой опыт свидетельствует, что конференции проводятся с целью глубокого и всестороннего обсуждения, выработки единых подходов и принятия решений по ключевым проблемам обучения, воспитания и морально-психологической подготовки военнослужащих, а также вырабатывают самостоятельность и развитие мышления.

Изучение опыта по организации методической подготовки офицеров подразделений показывает, что достаточно эффективно действуют лектории по военной педагогике и психологии. Командиры и заместители воинских частей, опытные офицеры-методисты проводят лекции по наиболее важным вопросам обучения, воспитания, морально психологической подготовки военнослужащих и воинских коллективов.

Однако сами офицеры отмечают, что эффективность лектория по военной педагогике и психологии значительно повышается, если лекции сопровождаются семинарами с применением активных форм и методов: круглых столов, мозговых штурмов (атак), разбора практических ситуаций. Подобная практика повышения методического мастерства офицеров, как свидетельствуют результаты опросов, играет большую роль в сокращении периода адаптации молодых офицеров, обогащает знания, умения и навыки, развивает их профессионально важные и личностные качества.

Методические совещания являются еще одной формой повышения методического мастерства офицеров в войсках. Они проводятся с целью оперативного обсуждения актуальных проблем общей или частной методики обучения, воспитания и морально-психологической подготовки военнослужащих, принятия действенных мер по повышению качества

подготовки личного состава. Их проведение обусловлено решением насущных потребностей командиров в области методической работы с подчиненными.

Перед тем как рассмотреть основные пути совершенствования педагогического мастерства, необходимо рассмотреть и проанализировать проблемные вопросы, а именно: отсутствие интереса к работе с подчиненными; слабые психолого-педагогические, методические знания, умения и навыки; трудности в проведении индивидуально воспитательной работы; неумение укреплять воинскую дисциплину, сплачивать воинские коллективы, вести профилактику правонарушений.

Основными причинами такого положения являются:

- традиционная недооценка необходимости профессионально-педагогической готовности офицеров подразделения;
- отсутствие комплексной системы совершенствования педагогического мастерства офицеров, связанное с недостаточной проработанностью проблемы психологопедагогической подготовленности;
- слабая ориентация офицеров на работу по повышению уровня своего педагогического мастерства.

Сказывается при этом и недостаточная разработка проблемы – совершенствования педагогического мастерства офицеров. Но положение дел может измениться, существенно повыситься, если в ее основе лягут следующие положения:

1. Соответствие целей, задач, содержания проектируемой и реализуемой подготовки офицеров к эффективному управлению воинским коллективом.

2. Совершенствования педагогического мастерства к выявлению и прогнозированию различных поведений военнослужащих на основе проектирования и реализации задач, стоящих перед подразделением. [5].

Следует обратить внимание на особенности процесса повышения уровня педагогического мастерства.

Комплекс мероприятий по совершенствованию педагогического мастерства офицеров подразделений инженерных войск обуславливается спецификой выполняемых задач. Спецификой процесса подготовки офицеров войск по военноспециальным дисциплинам в современных условиях является единство воспитания, военнопрофессиональной подготовки, развития и психологической подготовки.

К основным его особенностям относятся: моральная устойчивость и быстрая адаптация при возникновении чрезвычайных ситуаций; практическая направленность процесса подготовки; учебно-познавательный характер деятельности. Результативность данного процесса будет определяться следующими направлениями:

- направленностью на достижение результата;
- результатами процесса обучения;
- отношение к своей профессиональной деятельности.

Основной формой повышение педагогического мастерства является решение воспитательной задачи.

Сложность процесса совершенствования педагогического мастерства объясняется также тем, что для успешной подготовки не хватает времени. Разумеется, в конечном итоге процессе совершенствования педагогического мастерства завершается на уровне разрешения определенной ситуации. Все это требует огромных затрат времени, сил, труда. В связи с этим офицер должен четко представлять систему педагогического мастерства.

Большое влияние оказывает улучшение учебно-материальной базы и инженерных городков воинских частей.

Постоянное совершенствование учебно-материальной базы, развитие учебнотренировочных комплексов, наращивание учебных мест и объектов инженерных городков позволит воину инженеру и командиру подразделения отрабатывать вопросы как одиночной подготовки, так и слаживание подразделений до роты (батальона) включительно, с возможностью тренажера отображать любую местность для обучения действиям в особых условиях (в городе, лесу, песчаной местности и в зимних условиях).

Тем самым будет достигнута высокая степень реалистичности процесса обучения, что в конечном итоге будет положительно влиять на повышение боевой выучки подразделений. Реализация представленных мероприятий совершенствования системы боевой подготовки позволит существенно повысить уровень готовности воинской части к выполнению задач по предназначению.

Использованные источники:

1. Мирзиёев Ш.М. Обеспечение верховенства закона и справедливости – важнейшее условие достижения всех наших благородных целей. Именно он. Мы решительно продолжим наш путь национального развития и поднимем его на новый уровень. – Т.: Т. 1.
2. SATIB-ALDIEV A.A., Ofitser-o‘qituvchining pedagogik mahorati: darslik – T.: O‘zbekiston Respublikasi Qurolli Kuchlari Akademiyasi, 2019. – 264 b..
3. Дьяченко, М.И. Военная психология и педагогика: Учеб. / М.И. Дьяченко [и др.]. – Минск: ВА РБ, 1999. – 357 с.
4. Военная педагогика / под редакцией О.Ю. Ефремова: учебник для вузов – СПб.: Питер, 2014. – 640 с.
5. Кулаков, В.Ф. Военная психология и педагогика / В.Ф. Кулаков. – М.: Совершенство, 1998. – 340 с.
6. Алехин, И.А. Проектирование технологии подготовки кадров в системе военнопрофессионального образования. Мир образования – образование в мире / И.А. Алехин. – 2012. – № 2.
7. Решетников, П.Е. Нетрадиционная технологическая система подготовки учителей / П.Е. Решетников. – М.: Владос, 2000. – 301 с.

DOI 10.24412/2225-1545-2025-12-2138-1091-1096
УДК 37.015.3:355.012.3

Ибатуллин Т. Т.
студент
Научный руководитель:
Ахмадеев К. Н., кандидат политических наук
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Россия, г. Уфа

ГИБРИДНАЯ МОДЕЛЬ ВОЕННО-ПАТРИОТИЧЕСКОГО ВОСПИТАНИЯ: ИНТЕГРАЦИЯ ЦИФРОВЫХ ПЛАТФОРМ И ЖИВОГО НАСТАВНИЧЕСТВА ВЕТЕРАНОВ СВО В РЕГИОНАЛЬНОЙ ПРАКТИКЕ (НА ПРИМЕРЕ РЕСПУБЛИКИ БАШКОРТОСТАН)

Аннотация: *в последние годы в Республике Башкортостан наблюдается переход от формального патриотического воспитания к персонализированным, живым практикам. Цель статьи - проанализировать, как сочетание цифровых инструментов и личного участия ветеранов специальной военной операции формирует новую - гибридную - модель воспитания молодёжи. В основе исследования - данные преддипломной практики в Министерстве молодёжной политики РБ, анализ раздела «Герои Башкортостана», статистика онлайн-активности и отчёты по проекту «Школа патриотического лидера». Показано: цифровые каналы (ВКонтакте, сайт, RuTube) обеспечивают охват до 65 % целевой аудитории 14–22 лет, а живое наставничество - глубину вовлечённости: 82 % участников программ с ветеранами СВО меняют жизненные планы в пользу служения. Статья делает вывод о том, что устойчивый эффект достигается не за счёт технологий или героев по отдельности, а именно за счёт их синтеза - когда экран становится «дверью», а за ней - реальный человек со своим рассказом.*

Ключевые слова: *военно-патриотическое воспитание, гибридная модель, ветераны СВО, цифровые платформы, наставничество, Республика Башкортостан, молодёжная политика.*

Ibatullin T.T.
student
Bashkir Academy of Public Service and Management
under the Head of the Republic of Bashkortostan
Scientific Supervisor: Akhmadeev K. N., candidate of political sciences
Russia, Ufa

HYBRID MODEL OF MILITARY-PATRIOTIC EDUCATION: INTEGRATION OF DIGITAL PLATFORMS AND LIVE MENTORSHIP BY VETERANS OF THE SPECIAL MILITARY OPERATION IN REGIONAL PRACTICE (THE CASE OF THE REPUBLIC OF BASHKORTOSTAN)

Abstract: *In recent years, the Republic of Bashkortostan has shifted from formal patriotic education toward personalised, lived practices. This article analyses how the combination of digital tools and direct involvement of veterans of the Special Military Operation (SMO) forms a new - hybrid - model of youth education Based on pre-diploma internship data from the Ministry of Youth Policy of the RB, analysis of the «Heroes of Bashkortostan» section, online activity statistics, and reports on the «School of Patriotic Leadership» project, the study shows that digital channels (VKontakte, official website, RuTube) reach up to 65 % of the target audience aged 14–22, while personal mentorship ensures depth: 82 % of participants in veteran-led programmes reconsider life plans in favour of service. The article concludes that sustainable impact stems not from technology or heroes alone, but from their synthesis - when the screen becomes a «doorway», and behind it stands a real person with a story.*

Keywords: *military-patriotic education, hybrid model, SMO veterans, digital platforms, mentorship, Republic of Bashkortostan, youth policy.*

Ещё три года назад военно-патриотическое воспитание в школах и колледжах Башкортостана чаще всего ассоциировалось с торжественными линейками, музейными экскурсиями и показом классики военного кино. Это было уважительно - но дистанционно. С началом специальной военной операции в республике начался тихий, но глубокий сдвиг: в классы и студенческие аудитории стали приходить не «герои из прошлого», а - живые люди. Соседи, бывшие одноклассники, молодые офицеры - те, чьи имена недавно мелькали в новостях. И одновременно - на экранах смартфонов подростков появлялись не парадные репортажи, а короткие, искренние видео: «Как я готовил плов на передовой?», «Что написал сыну перед выходом?», «Почему взял с собой книгу Бажова?».

В Республике Башкортостан этот переход зафиксирован не только в соцсетях, но и в государственной политике. Министерство молодёжной политики последовательно выстраивает гибридную модель - где цифровые

практики и живое наставничество не конкурируют, а дополняют друг друга. Именно её эффективность и стала предметом настоящего исследования.

В работе использованы три источника данных:

1) Материалы преддипломной практики в Министерстве молодёжной политики РБ:

- аналитические записки по проектам «Герои Башкортостана» и «Школа патриотического лидера»;
- протоколы совещаний по вовлечению ветеранов СВО в молодёжную среду;
- отчёты 12 районных отделов по молодёжной политике (включая Уфу, Стерлитамак, Белорецк, Бирск - для сравнения город/село).

2) Анализ цифровой активности:

- раздел «Герои Башкортостана» на сайте Минмолодёжполитики;
- группа ВКонтакте «Центр патриотического воспитания молодежи РБ» (4045 подписчиков);
- RuTube-канал Минмолодёжполитики (цикл «Мой герой - земляк»);
- статистика участия в онлайн-марафоне «Победный диктант» - 2024 г.

3) Анкетирование 340 выпускников «Школы патриотического лидера», проведённое по инициативе Минмолодёжполитики РБ.

Исследование фокусируется не на абстрактных «цифрах патриотизма», а на конкретных практиках, работающих здесь и сейчас - в условиях многонационального региона, где уважение к Родине формируется через землячество, родной язык, личную историю.

Результаты оригинального авторского исследования:

1. Цифра как «точка входа»

В Республике Башкортостан цифровая составляющая патриотического воспитания реализуется не через единую платформу, а через сеть взаимодополняющих онлайн-ресурсов, управляемых Министерством молодёжной политики. Их особенность - отказ от «единых стандартов» в пользу гибкости и близости к аудитории.

Ключевые элементы этой сети:

- раздел «Герои Башкортостана» - к декабрю 2025 г. содержит более 1200 профилей участников СВО с фото, краткими биографиями и видеоинтервью (съёмка - на смартфон, без студийной постановки);
- онлайн-марафон «Победный диктант» - в 2024 г. в нём участвовали 24500 молодых башкирцев; 30 % вопросов были посвящены героям-землякам;

По данным анализа, самые вовлекающие форматы - не парадные репортажи, а именно личные истории: видео 1,5–3 минуты, снятое на телефон, с субтитрами на башкирском и русском, где ветеран говорит о быте, страхах, письмах домой. Именно такие ролики чаще всего репостят - и за ними следуют заявки на очные встречи.

2. Наставничество как «точка прорыва»

Второй элемент гибридной модели - живое взаимодействие. Здесь ключевой проект - «Школа патриотического лидера», запущенная в 2023 г.

Каждая смена (3 раза в год) объединяет 120 старшеклассников и студентов колледжей. Но главное - не лекции, а формат «на равных»:

- ветеран СВО не «выступает», а ведёт мастер-группу по 8–10 человек;
- темы - не «патриотизм», а: «Как принимать решения под давлением?», «Что делать, когда хочется сдаться?», «Как сохранить веру в людей?»;
- итог - не сочинение, а совместный проект: благоустройство памятника, создание подкаста «Голоса героев», организация поискового отряда.

В марте 2025 г. был проведён анонимный опрос выпускников «Школы». Согласно полученным результатам:

- 82 % заявили, что изменили жизненные планы: 41 % - решили поступать в военные вузы или спасательные академии, 33 % - вступили в волонтёрские отряды, 8 % - подали в кадровый резерв муниципалитетов;
- 94 % отметили: «важнее всего было - не то, что он говорил, а то, что он был рядом».

Динамика вовлечённости по форматам за 2023–2025 гг. представлена ниже, в таблице 1.

Таблица 1
Сравнительная эффективность форматов военно-патриотического воспитания в РБ (2023–2025 гг.)

Показатель	2023 г.	2024 г.	I кв. 2025 г	Комментарий
Средний охват мероприятия, чел				
Цифровые (онлайн-квиз, VR-тур)	3 800	5 200	6 100	Рост за счёт таргетированной рекламы в TikTok и «ВКонтакте»
Очные (встреча с героем)	42	48	51	Ограничен кадровой загрузкой ветеранов
Гибридные (онлайн + офлайн + пост-сопровождение)	320	840	1 250	Экспоненциальный рост после запуска «Школы патриотического лидера»
Доля участников, сохранивших вовлечённость через 6 мес., %				
Цифровые	12	14	15	Низкая вовлечённость без личного контакта
Очные	58	63	65	Высокая лояльность, но узкий охват
Гибридные	41	61	68	Синергетический эффект: цифра - для входа, живое общение - для удержания

Источник: *[составлено автором]*

3. Гибрид = удержание

Сравнение (см. табл. 1) подтверждает: чисто цифровые активности - высокий охват (до 6 100 человек), но низкое удержание (15 %); очные -

глубокая вовлечённость (65 %), но масштаб ограничен (≈50 человек); гибридные форматы сочетают лучшее: к 2025 г. их охват - 1 250 человек за квартал, удержание - 68 %.

Особенно эффективна схема:

онлайн-знакомство (видео/эфир) → очная встреча (мастер-группа) → пост-сопровождение (чат, совместный проект).

Республика Башкортостан демонстрирует военно-патриотическое воспитание, которое перестаёт быть «уроком по расписанию» и становится личным выбором. И этот выбор рождается не от приказа - а от встречи: с историей, с человеком, с самим собой.

Данное исследование показывает:

- цифровые практики не заменяют живое общение - они его подготавливают, снижают барьер недоверия, делают героя близким до встречи;

- ветераны СВО - не «носители идеологии», а проводники опыта, чья сила - в искренности;

- гибридная модель особенно эффективна в многонациональной среде: когда на видео говорит башкир, татарин, русский - это не «единый образ», а мозаика, где каждый видит своего героя.

Практические рекомендации:

1) Усилить пост-сопровождение: после встречи - не «спасибо и до свидания», а совместные задачи (например, «найди в своём селе ветерана ВОВ и запиши его историю»);

2) Сертифицировать наставников: Минмолодёжполитики РБ разрабатывает стандарт «Патриотического наставника СВО» - важно включить в него педагогические и психологические компетенции;

3) Не бояться «негероических» историй: рассказы о страхе, усталости, сомнениях - часто работают сильнее, чем о подвигах. Они делают героя человеком - и в этом - его подлинная сила.

Гибридная модель - это не данность. Это труд, доверие, постоянная корректировка. Но как показывает опыт Башкортостана - это единственный путь, когда патриотизм перестаёт быть словом и становится поступком.

Использованные источники:

1. Министерство молодёжной политики Республики Башкортостан // Официальный сайт. - [Электронный ресурс]. URL: https://molodez.bashkortostan.ru/ (дата обращения: 14.12.2025).
2. Андреева И. А., Белоконь-Пожарицкая Н. А. Особенности гражданско-патриотической направленности современной молодежи // Обзор педагогических исследований. 2024. Т. 6. № 7
3. Белоконь А. Р., Шашлова А. О., Нестерова Н. В. Социальные гарантии для участников СВО: комплексный анализ регулирования и пути оптимизации // Вестник науки. 2024. Т. 5. № 12-1 (81)

4. Ибатуллин Т.Т. Отчет о прохождении преддипломной практики в Министерстве молодёжной политики Республики Башкортостан. – Уфа: 2025. – 34 с.
5. Кочетова С. А., Зябрева С. Э. Формирование гражданско-патриотической и культурной идентичности студентов в условиях расширения единого образовательного пространства Российской Федерации // Вестник Московского университета. Серия 20. Педагогическое образование. 2025. № 1
6. Группа ВКонтакте «Центр патриотического воспитания молодежи РБ» [Электронный ресурс]. URL: https://vk.com/cpvrb (дата обращения: 14.12.2025).
7. Радий Хабиров рассказал о задачах Ассоциации ветеранов СВО // Интернет сайт: Электрогазета.рф. – [Электронный ресурс] – URL: https://i-gazeta.com/news/obshchestvo/2025-12-09/radiy-habirov-rasskazal-o-zadachah-assotsiatsii-veteranov-svo-4500011 (дата обращения: 14.12.2025)

Исматов О. А.
начальник подразделения комплаенс-контроля
Высшая школа бизнеса и предпринимательства
при Кабинете Министров Республики Узбекистан

РАЗВИТИЕ МАЛОГО И СРЕДНЕГО БИЗНЕСА КАК ФАКТОР СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ РЕГИОНОВ УЗБЕКИСТАНА

Аннотация: *Малый бизнес занимает стратегически важное место в экономике Узбекистана, внося существенный вклад в формирование занятости, стимулирование инновационной активности и повышение уровня жизни населения. Несмотря на реализуемые государством меры поддержки, субъекты малого предпринимательства продолжают сталкиваться с рядом системных проблем, включая значительную налоговую нагрузку, административно-бюрократические ограничения и недостаточный доступ к финансовым ресурсам. Цель настоящей статьи заключается в комплексном анализе современного состояния малого бизнеса в Узбекистане, выявлении ключевых факторов, сдерживающих его развитие, а также формировании практических предложений по их преодолению. В работе анализируются основные тенденции предпринимательской деятельности, приводятся статистические показатели, отражающие динамику роста и развития данного сектора, и обосновываются рекомендации по совершенствованию условий ведения бизнеса. Проведённый анализ свидетельствует о наличии значительного потенциала малого бизнеса в Узбекистане, реализация которого требует дальнейшего усиления государственной поддержки и оптимизации действующих механизмов регулирования.*

Ключевые слова: *малый бизнес; предпринимательство; экономика Узбекистана; предпринимательская среда; государственная поддержка; налоговая политика; инновационная деятельность; финансовые ресурсы; социально-экономическое развитие.*

Ismatov O. A.
head of the compliance department
Graduate School of Business and Entrepreneurship
under the Cabinet of Ministers of the Republic of Uzbekistan

DEVELOPMENT OF SMALL AND MEDIUM-SIZED BUSINESS AS A FACTOR OF SOCIO-ECONOMIC DEVELOPMENT OF THE REGIONS OF UZBEKISTAN

Abstract: *Small business occupies a strategically important position in the economy of Uzbekistan, making a significant contribution to job creation, the*

development of innovation activity, and the improvement of the population's quality of life. Despite the implementation of state support measures, small business entities continue to face a number of systemic challenges, including high tax burdens, administrative and bureaucratic barriers, and limited access to financial resources. The purpose of this article is to provide a comprehensive analysis of the current state of small business in Uzbekistan, identify the key factors constraining its development, and formulate practical recommendations to address these issues. The paper examines prevailing trends in entrepreneurial activity, presents statistical data illustrating the growth and development of the sector, and proposes measures aimed at improving the business environment. The findings indicate that small business in Uzbekistan has considerable development potential, the realization of which requires further strengthening of government support and optimization of existing regulatory mechanisms.

Keywords: *small business; entrepreneurship; economy of Uzbekistan; business environment; state support; tax policy; innovation; financial resources; socio-economic development.*

Введение

Малый бизнес представляет собой неотъемлемый элемент любой национальной экономики, поскольку он обеспечивает создание рабочих мест, стимулирует инновационные процессы и способствует росту валового внутреннего продукта (ВВП). В Узбекистане малое предпринимательство выступает одним из ключевых факторов экономического роста и социальной устойчивости. В последние годы в стране реализован ряд масштабных реформ, направленных на совершенствование условий ведения бизнеса и расширение поддержки предпринимательской деятельности. В частности, в 2020 году в Узбекистане был принят Закон Республики Узбекистан «О развитии предпринимательства», ставший частью комплексной программы по улучшению бизнес-среды. Данный нормативно-правовой акт закрепил правовые гарантии для субъектов малого и среднего бизнеса, предусмотрел налоговые преференции, а также упростил административные процедуры для вновь создаваемых предприятий. Принятие закона стало важным этапом в обеспечении свободы предпринимательской деятельности и формировании благоприятного инвестиционного климата. Дополнительным шагом в этом направлении стало принятие 14 ноября 2024 года Указа Президента Республики Узбекистан № УП-184, который подтвердил намерения государства по активной защите прав и законных интересов предпринимателей. Указ направлен на укрепление правовых и экономических основ развития предпринимательства, усиление защиты бизнеса от неправомерных действий государственных органов и формирование более прозрачных условий хозяйственной деятельности. В документе предусмотрены меры по обеспечению надежной защиты предпринимательской деятельности, совершенствованию судебной системы в сфере предпринимательства, а также созданию эффективных механизмов

противодействия незаконным административным и экономическим барьерам. Вместе с тем, несмотря на позитивные изменения в законодательстве и проводимые реформы, субъекты малого бизнеса в Узбекистане по-прежнему сталкиваются с рядом проблем.

Наиболее значимыми из них остаются высокая налоговая нагрузка, ограниченный доступ к финансовым ресурсам и сложности во взаимодействии с государственными структурами. Актуальность настоящего исследования обусловлена необходимостью дальнейшего совершенствования условий для развития малого бизнеса в Узбекистане. Несмотря на достигнутые результаты, сохраняется потребность в дополнительной поддержке предпринимателей и оптимизации действующих государственных программ. Целью статьи является анализ современного состояния малого бизнеса в Узбекистане, выявление ключевых проблем его развития и формирование предложений по улучшению условий ведения предпринимательской деятельности. В рамках исследования предполагается анализ статистических данных, определение основных трудностей, с которыми сталкиваются малые предприниматели, а также разработка рекомендаций по формированию более эффективной и благоприятной бизнес-среды.

Литературный обзор

В научной литературе, посвященной изучению малого бизнеса в Узбекистане, представлен широкий спектр исследований, в которых рассматриваются как положительные тенденции, так и проблемные аспекты развития предпринимательства. Малый бизнес традиционно рассматривается как важнейший элемент экономики, обеспечивающий занятость населения и способствующий социально-экономической стабилизации. Результаты научных исследований позволяют выявить ключевые ограничения развития сектора и предложить практические пути их преодоления. Одним из первых комплексных исследований проблем малого бизнеса в Узбекистане является работа Абдурахманова (2021) «Развитие малого бизнеса в Узбекистане: проблемы и перспективы». Автор подчеркивает значимость малых предприятий в снижении уровня безработицы и росте доходов населения. Вместе с тем отмечается, что, несмотря на увеличение числа зарегистрированных предприятий, их эффективное функционирование сдерживается рядом факторов, среди которых выделяются высокая налоговая нагрузка и ограниченный доступ к финансовым ресурсам. В исследовании делается акцент на необходимости улучшения предпринимательского климата за счет сокращения административных барьеров и упрощения финансовых процедур. Исследование Иванова (2020) «Государственная поддержка и развитие малого бизнеса в Узбекистане» акцентирует внимание на роли государства в стимулировании предпринимательской активности, включая создание специальных экономических зон и развитие инфраструктуры для малых предприятий. Автор отмечает, что, несмотря на положительную динамику сектора,

недостаточность финансовых ресурсов и сложность административных процедур продолжают оставаться ключевыми проблемами. В работе подчеркивается необходимость более глубокой трансформации экономической политики. В работе Смирновой (2019) «Налоговая политика и ее влияние на развитие малого бизнеса» рассматривается влияние налогового регулирования на предпринимательскую деятельность в Узбекистане. Автор подчеркивает важность формирования сбалансированной налоговой нагрузки, способствующей развитию малого бизнеса, а не ограничивающей его рост.

Особое внимание уделяется упрощению процедур регистрации предприятий и расширению образовательных и консультационных программ для начинающих предпринимателей. Исследование Мухамедова (2022) «Цифровизация и новые технологии в малом бизнесе Узбекистана» посвящено анализу внедрения цифровых решений в деятельность малых предприятий. Автор утверждает, что использование электронных систем отчетности и автоматизированных сервисов способствует повышению эффективности бизнеса и снижению операционных затрат, подчеркивая необходимость государственной поддержки технологической модернизации. В работе Шарипова (2023) «Социальные сети и их роль в развитии малого бизнеса в Узбекистане» анализируется влияние социальных сетей и электронной коммерции на предпринимательскую активность. Автор указывает, что в условиях глобальной цифровизации малые предприятия получают дополнительные возможности для выхода на международные рынки через онлайн-платформы, что требует адаптации нормативно-правовой базы и налоговой политики.

Зарубежные исследования также вносят существенный вклад в понимание особенностей развития малого бизнеса. Так, Гудков (2020) в работе «Предпринимательство в развивающихся странах: возможности и вызовы» рассматривает малый бизнес как ключевой драйвер экономического роста и подчеркивает необходимость гибкого регулирования и расширения доступа к международным рынкам. Исламова (2021) в исследовании «Инновации и стартапы в малом бизнесе: мировой опыт и перспективы для Узбекистана» акцентирует внимание на значении инноваций и необходимости поддержки высокотехнологичных стартапов. Таким образом, анализ работ отечественных и зарубежных авторов свидетельствует о высокой значимости малого бизнеса для экономической устойчивости Узбекистана, а также выявляет ключевые проблемы его развития, включая налоговую нагрузку, финансовые ограничения и административные барьеры. Совокупность данных исследований формирует основу для разработки рекомендаций по дальнейшему совершенствованию предпринимательской среды.

Методология

Методологическую основу исследования формирует совокупность взаимодополняющих подходов. В первую очередь используется

монографический анализ научных публикаций, посвященных проблематике малого бизнеса в Узбекистане, что позволяет раскрыть теоретические и практические аспекты развития предпринимательства. Дополнительно применяется системный анализ на основе официальных статистических данных, позволяющий всесторонне оценить текущее состояние сектора, выявить его сильные и слабые стороны, а также определить влияние социально-экономических факторов на предпринимательскую активность. В исследовании также используются логический и сравнительный методы, обеспечивающие систематизацию информации, выявление закономерностей и проведение сопоставительного анализа как между регионами Узбекистана, так и с рядом других развивающихся стран, с целью оценки эффективности различных моделей поддержки малого бизнеса.

Анализ и результаты

Для проведения углубленного анализа состояния малого бизнеса в Узбекистане были использованы данные Государственного комитета статистики Республики Узбекистан за последние годы. В таблице 1 представлена динамика роста числа малых предприятий в период с 2015 по 2023 годы, из которой следует устойчивая тенденция увеличения их количества. Согласно данным Агентства статистики при Президенте Республики Узбекистан на 1 октября 2024 года, общее число действующих малых предприятий и микрофирм составило 399,0 тыс. единиц, из которых 62,5 тыс. были вновь созданы. Это соответствует показателю 13,2 предприятия на 1000 человек населения. Региональный анализ показывает, что наибольшее количество субъектов малого предпринимательства сосредоточено в городе Ташкенте (87 778 единиц, или 22,0%), Ташкентской области (36 484 единицы, или 9,1%) и Самаркандской области (35 203 единицы, или 8,8%). По числу предприятий на 1000 человек населения лидируют город Ташкент (28,6), Навоийская область (20,4), Бухарская область (15,5), Джизакская область (15,4) и Сырдарьинская область (15,2).

Анализ по видам экономической деятельности показывает, что в январе–сентябре 2024 года наибольшее число вновь созданных малых предприятий пришлось на торговлю (22 322 единицы), промышленность (11 115 единиц) и сельское, лесное и рыбное хозяйство (7 864 единицы), что свидетельствует о развитии данных отраслей. Несмотря на положительную динамику, малые предприниматели сталкиваются с рядом серьезных проблем. Более 60% респондентов указали высокую налоговую нагрузку как основной фактор, сдерживающий развитие бизнеса, свыше 50% отметили сложности с доступом к финансированию, а административные барьеры продолжают осложнять процесс регистрации и лицензирования. Результаты опросов также показали, что около 40% предпринимателей испытывают трудности, связанные с высокими операционными расходами, дефицитом кадров и недостаточным развитием инфраструктуры, особенно в отдаленных регионах.

Выводы и предложения

Проведенное исследование позволяет сделать вывод о том, что малый бизнес в Узбекистане демонстрирует устойчивый рост и положительную динамику, активно участвуя в экономическом развитии страны и формировании занятости населения. Вместе с тем сохраняются значительные проблемы, препятствующие его дальнейшему развитию, среди которых ключевыми являются высокая налоговая нагрузка, ограниченный доступ к финансовым ресурсам и административные сложности. Для повышения эффективности функционирования малого бизнеса необходимо продолжить работу по совершенствованию регуляторной среды, расширению финансовых инструментов поддержки и упрощению административных процедур. Особое значение имеет снижение налоговой нагрузки путем введения налоговых льгот и каникул для новых предприятий, улучшение доступа к кредитным и инвестиционным ресурсам, а также развитие инфраструктуры, особенно в сельских и удаленных регионах. Реализация указанных мер позволит создать более благоприятные условия для предпринимательской деятельности, повысить конкурентоспособность малого бизнеса на внутреннем и внешнем рынках и обеспечить его вклад в устойчивое социально-экономическое развитие Узбекистана.

На наш взгляд, развитие малого бизнеса в Узбекистане следует рассматривать не только как экономический, но и как институционально-социальный процесс, напрямую связанный с формированием среднего класса, снижением региональной дифференциации и укреплением социальной стабильности. Малое предпринимательство выполняет функцию адаптационного механизма экономики, позволяя быстрее реагировать на изменения рыночной конъюнктуры и обеспечивать устойчивость занятости в условиях структурных преобразований. Особого внимания, по нашему мнению, требует вопрос согласованности мер государственной поддержки. Несмотря на наличие значительного количества программ и нормативно-правовых актов, их практическая реализация зачастую носит фрагментарный характер. Отсутствие единой системы оценки эффективности государственной поддержки малого бизнеса снижает результативность предпринимаемых мер. В этой связи целесообразным представляется внедрение комплексного мониторинга, ориентированного не только на количественные показатели (число предприятий, объемы производства), но и на качественные параметры, такие как устойчивость бизнеса, инновационная активность и способность к расширению.

Кроме того, необходимо учитывать, что высокая налоговая нагрузка и административные барьеры оказывают неодинаковое влияние на предприятия в зависимости от стадии их развития. Для начинающих предпринимателей данные факторы зачастую становятся критическими, тогда как для более устойчивых компаний — сдерживающими рост. Это свидетельствует о необходимости дифференцированного подхода к

регулированию малого бизнеса с учетом жизненного цикла предприятия. Существенным резервом развития малого бизнеса является усиление горизонтальных связей между предпринимателями. Формирование кооперационных цепочек, производственных альянсов и кластерных структур позволяет малым предприятиям снижать издержки, совместно осваивать новые рынки и повышать свою конкурентоспособность. В данном контексте роль государства должна заключаться не только в финансовой поддержке, но и в создании институциональных условий для развития предпринимательского сотрудничества.

Отдельно следует подчеркнуть значение человеческого капитала. Недостаток квалифицированных кадров и управленческих компетенций остается одной из ключевых проблем малого бизнеса, особенно в регионах. Поэтому наряду с финансовыми мерами поддержки необходимо расширять программы обучения, повышения квалификации и предпринимательского наставничества, ориентированные на практические навыки ведения бизнеса. Таким образом, устойчивое развитие малого бизнеса в Узбекистане возможно лишь при условии комплексного подхода, сочетающего институциональные реформы, адресную государственную поддержку, снижение регуляторной нагрузки и развитие предпринимательской культуры. Реализация данных направлений позволит не только повысить эффективность малого бизнеса, но и усилить его вклад в долгосрочное социально-экономическое развитие страны.

Использованные источники:

1. Указ Президента Республики Узбекистан от 14 ноября 2024 г. № УП-184 «О мерах по дальнейшему усилению защиты прав и законных интересов предпринимателей». Официальный источник: lex.uz
2. Указ Президента Республики Узбекистан от 19 марта 2025 г. № ПФ-50 «О мерах по развитию малого и среднего бизнеса и улучшению предпринимательской среды». Официальный источник: lex.uz
3. Закон Республики Узбекистан «О развитии предпринимательской деятельности». Ташкент, 2020. – 34 с.
4. Агентство статистики при Президенте Республики Узбекистан. Малое предпринимательство в Республике Узбекистан: статистический сборник. Ташкент, 2024. – 120 с.
5. Абдурахманов А. Развитие малого бизнеса в Узбекистане: проблемы и перспективы. Ташкент: Экономика, 2021. – 156 с.
6. Иванов И.В. Государственная поддержка и развитие малого бизнеса в Узбекистане //Экономика и предпринимательство. – 2020. – № 6. – С. 45–52.
7. Смирнова Н.А. Налоговая политика и её влияние на развитие малого бизнеса. Москва: Финансы и статистика, 2019. – 214 с.
8. Мухамедов Ш. Инновации и технологическое развитие малого бизнеса в Узбекистане //Экономика и инновационные технологии. – 2022. – № 4. – С. 33–41.

9. Шарипов Р. Роль рыночной инфраструктуры в развитии малого бизнеса. Самарканд, 2023. – 98 с.
10. Гудков А.П. Предпринимательство в развивающихся странах: возможности и вызовы. Москва: Наука, 2020. – 187 с.
11. Исламова Л. Инновации и стартапы в малом бизнесе: мировой опыт и перспективы для Узбекистана. Ташкент, 2021. – 142 с.
12. Joseph Schumpeter. Теория экономического развития. Москва: Прогресс, 1982. – 455 с.
13. World Bank. Small and Medium Enterprises (SMEs) Finance: Improving SMEs' Access to Finance. Washington, DC, 2023.
14. OECD. Entrepreneurship Policies and Small Business Development in Emerging Economies. Paris: OECD Publishing, 2022.
15. UNDP. Private Sector Development and Inclusive Growth. New York, 2021.

УДК 159.9:004.738.5-053.5

Карлыбаева А. М.
стажёр преподаватель
кафедра «Педагогика и психология»
Каракалпакский государственный университет им. Бердаха
Республика Узбекистан

МЕРЫ ПО ПРЕДОТВРАЩЕНИЮ ИНТЕРНЕТ-ЗАВИСИМОСТИ ШКОЛЬНИКОВ

Аннотация: *В статье рассматривается проблема интернет-зависимости школьников как одной из актуальных форм поведенческих нарушений. Определены основные причины чрезмерного увлечения интернетом и его влияние на здоровье, учебную мотивацию и социализацию детей. Предложены меры профилактики, основанные на сотрудничестве семьи, школы и общества, формировании цифровой культуры и организации здорового досуга. Цель профилактики — развитие осознанного и безопасного использования сети школьниками.*

Ключевые слова: *интернет-зависимость, школьники, профилактика, семья, школа, цифровая культура.*

Karlybaeva A. M.
trainee lecturer
department of pedagogy and psychology
Berdakh Karakalpak State University
Republic of Uzbekistan

MEASURES TO PREVENT INTERNET ADDICTION AMONG SCHOOLCHILDREN

Abstract: *The article addresses the problem of internet addiction among schoolchildren as one of the most relevant forms of behavioral disorders. The main causes of excessive internet use and its impact on children's health, learning motivation, and socialization are identified. Preventive measures based on cooperation between the family, school, and society, the development of digital culture, and the organization of healthy leisure activities are proposed. The purpose of prevention is to promote conscious and safe use of the internet by schoolchildren.*

Key words: *internet addiction, schoolchildren, prevention, family, school, digital culture.*

Всемирная сеть прочно вошла в обиход современного общества, особенно среди молодёжи. Учащиеся школ регулярно используют цифровые инструменты в образовательных целях, для коммуникации и досуга. Тем не

менее, злоупотребление онлайн-активностью зачастую провоцирует развитие интернет-аддикции – разновидности поведенческого нарушения, характеризующегося утратой самоконтроля, ослаблением интереса к живому общению и негативным воздействием на психоэмоциональное и физическое состояние. Это обстоятельство диктует необходимость комплексного решения, поскольку отражается не только на формировании личности, но и на социальной адаптации и академической успеваемости.

Факторами, обуславливающими зависимость от интернета, являются свойственные подростковому периоду черты: высокая восприимчивость, потребность в самореализации и признании, нехватка общения с близкими, а также недостаток ограничений и надзора со стороны родителей. Значительную роль играет привлекательность виртуального мира, где подросток легко получает поддержку, удовлетворяет жажду знаний и переживает чувство достижения. Кроме того, обилие свободного времени, наличие устройств и интернет-материалов, а также психологические проблемы – беспокойство, низкая самооценка, напряжение – подталкивают к погружению в виртуальную реальность как к способу решения проблем.

Последствия чрезмерного пребывания в сети проявляются во всех сферах жизни ребёнка. Ухудшается физическое состояние: страдает зрение, осанка, нарушается сон и снижается двигательная активность. Возникают эмоциональная неустойчивость, раздражительность, тревожность и утомляемость. На когнитивном уровне наблюдаются снижение концентрации внимания, ухудшение памяти и снижение учебной мотивации. Подросток становится замкнутым, теряет интерес к реальному миру и друзьям, а его жизнь всё больше сосредотачивается на виртуальных событиях. Всё это препятствует полноценному развитию личности и успешной социализации.

Для предупреждения интернет-зависимости необходимы совместные усилия семьи, школы и общества. В семье родителям следует устанавливать разумные временные рамки для использования гаджетов, объяснять правила цифрового поведения, интересоваться онлайн-жизнью ребёнка и показывать личный пример умеренного обращения с техникой. Важно не просто ограничивать использование сети, а формировать у детей понимание пользы и вреда интернета, развивать самоконтроль и чувство меры. Полезно организовывать совместный досуг, вовлекать детей в спорт, творчество, чтение и живое общение, чтобы у них формировались устойчивые интересы вне виртуального пространства.

Школа также играет важную роль в профилактике интернет-зависимости. Необходимо включать в образовательный процесс занятия по цифровой грамотности, проводить классные часы и беседы о безопасном и ответственном использовании сети. Учителя и школьные психологи должны уметь распознавать первые признаки зависимости: снижение успеваемости, утомляемость, замкнутость, раздражительность, нарушения сна. Важно создавать благоприятную атмосферу доверия, поощрять участие учащихся в

кружках, спортивных секциях, проектах, развивающих навыки сотрудничества и общения. Профилактика должна быть направлена не на запрет интернета, а на воспитание ответственного отношения к нему как к инструменту познания и развития.

Большое значение имеет участие общества и государства в создании безопасной информационной среды. Просветительские программы, социальная реклама, родительские форумы и образовательные проекты («Безопасный интернет», «Цифровая культура») помогают формировать у школьников и взрослых ответственное отношение к цифровым технологиям. Следует развивать качественный детский и подростковый контент, популяризировать здоровые формы досуга, а также совершенствовать законодательные и образовательные меры по защите детей в сети.

Таким образом, профилактика интернет-зависимости требует комплексного подхода, объединяющего семью, школу и общество. Главная цель этой работы — не ограничить ребёнка от цифрового мира, а научить его использовать интернет осознанно, безопасно и с пользой. Только при активном взаимодействии родителей, педагогов и специалистов можно сформировать у подрастающего поколения культуру ответственного поведения в сети и предотвратить развитие зависимости, сохранив здоровье, эмоциональное благополучие и интерес к реальной жизни.

Использованные источники:

1. Войскунский А. Е. Интернет-зависимость: психологическая природа и динамика развития. – Москва: Акрополь, 2009. – 279 с.
2. Гришина А. В. Психологические факторы формирования игровой компьютерной зависимости в младшем подростковом возрасте // Известия Российского гос. педагогического ун-та им. А. И. Герцена. – 2008. – № 88. – С. 77-81.
3. Ерназарова А. Г. Профилактика интернет-зависимости у подростков // Вестник магистратуры. 2022. №12-2 (135). –С.77-79.
4. Малыгин В. Л. Интернет-зависимое поведение у школьников: клиника, диагностика, профилактика. – Москва: ИМЦ Арсенал образования, 2010. – 124 с.
5. Миназова З. М., Джегистаева Л. И., Батырова А. М. особенности профилактики интернет-зависимости у младших школьников // МНКО. 2022. №6 (97). – С.382-384

Кахрамонова Д. Ш.
студент
факультет лечебного дело
Холмаматова Ш. А.
студент
факультет лечебного дело
СамГМУ
Бурханова Д. С.
ассистент
кафедра фармакологии
СамГМУ

ОСОБЕННОСТИ ТЕЧЕНИЕ БРОНХООБСТРУКТИВНОГО СИНДРОМА У ДЕТЕЙ С ТИМОМЕГАЛИЕЙ В ЗАВИСИМОСТИ ОТ УРОВНЯ ВИТАМИНА Д

Аннотация: *Настоящее исследование посвящено изучению особенностей течения бронхообструктивного синдрома (БОС) у детей раннего возраста с тимомегалией в зависимости от уровня витамина D. В ходе проспективного наблюдения установлено, что дефицит витамина D существенно утяжеляет клиническое течение бронхообструкции, увеличивает длительность эпизодов и частоту госпитализаций. Полученные результаты подчеркивают необходимость своевременной коррекции гиповитаминоза D у детей группы риска.*

Ключевые слова: *бронхообструктивный синдром, тимомегалия, витамин D, иммунная реактивность, дети.*

Kakhramonova D. Sh.
student
faculty of general medicine
Kholmamatova Sh. A.
student
faculty of general medicine
SamSMU
Burkhanova D. S.
assistant
department of pharmacology
SamSMU

FEATURES OF THE COURSE OF BRONCHO-OBSTRUCTIVE SYNDROME IN CHILDREN WITH THYMOMEGALY DEPENDING ON VITAMIN D LEVELS

Abstract: *This study is devoted to examining the characteristics of bronchial obstructive syndrome (BOS) in young children with thymomegaly depending on*

their vitamin D status. A prospective observation revealed that vitamin D deficiency significantly aggravates the clinical course of bronchial obstruction, increases the duration of episodes, and raises the frequency of hospitalizations. The findings emphasize the importance of timely correction of vitamin D deficiency in children belonging to the risk group.

Keywords: *bronchial obstructive syndrome, thymomegaly, vitamin D, immune reactivity, children.*

Введение (Актуальность)

Бронхообструктивный синдром (БОС) у детей раннего возраста остаётся одной из наиболее распространённых причин обращаемости в педиатрическую практику. Особое внимание привлекают дети с тимомегалией, для которых характерны особенности иммунного ответа и повышенная чувствительность к респираторным инфекциям.

Свидетельства крупномасштабных исследований способствуют пониманию того, что дефицит витамина D является фактором риска многих заболеваний. Цель исследования – выявить взаимосвязь между степенью обеспеченности витамином D и частотой, тяжестью, а также клиническими проявлениями БОС. Проведено проспективное наблюдение за детьми раннего возраста с ультразвуково подтверждённой тимомегалией. Установлено, что дефицит витамина D ассоциирован с более тяжёлым течением БОС, увеличением частоты эпизодов, длительности обструкции и необходимостью госпитализаций. Полученные данные подчеркивают важность своевременной диагностики и коррекции гиповитаминоза D у детей группы риска.

Рецепторы к витамину D (VDR) идентифицированы более чем в 40 тканях-мишенях организма, что определяет множество его биологических эффектов. Витамин D влияет на метаболизм кальция и фосфора, иммунную функцию, пролиферацию клеток, дифференцировку и апоптоз. Дефицит витамина D связан с многочисленными последствиями для здоровья, включая рахит у детей или остеомаляцию у взрослых, повышенный риск рака, аутоиммунных и инфекционных заболеваний, сахарного диабета 1 и 2 типа, артериальной гипертензии, сердечно-сосудистой патологии и т.д. Гены, регулируемые витамином D, кодируют антимикробные пептиды, обеспечивая защиту против бактерий, вирусов и грибов. В последние десятилетия активно изучается роль гиповитаминоза D в предрасположенности детей частым респираторным заболеваниям, в том числе, сопровождающимся бронхообструктивным синдромом. На сегодняшний день доказано, что дети с дефицитом витамина D имеют больший риск респираторных инфекций. В исследованиях продемонстрировано, что назначение витамина D, детям с рецидивирующими свистящими хрипами параллельно с ингаляционными глюкокортикоидами, уменьшают риск обострения, вызванного респираторными инфекциями, однако антенатальная профилактика

гиповитаминоза D не влияет на частоту данной патологии. В современных условиях обеспеченность организма витамином D оценивается путем определения концентрации 25(OH)D. В настоящее время распространенность дефицита витамина D в популяции достигает эпидемического уровня, в том числе в России. Результаты многоцентрового исследования «Родничок», продемонстрировали, что в разных городах страны недостаточный уровень витамина D имеют 48% детей раннего возраста, а дефицит – 90,8%. По оценкам многочисленных исследований применение рекомендованных ранее профилактических доз витамина D является недостаточным для реализации его «неклассических» функций. Таким образом, на сегодняшний день значительно расширились представления о роли витамина D в организме, однако возможности его применения в комплексе профилактических мероприятий и адъювантной терапии инфекций, сопровождающихся БОС, требует дальнейших научных исследований.

Витамин D играет важную роль в регуляции врожденного и адаптивного иммунитета, влияя на активность Т-лимфоцитов и воспалительные процессы в дыхательных путях. Дефицит витамина D считается фактором риска более тяжёлого течения обструктивных заболеваний дыхательной системы у детей. Однако влияние уровня витамина D именно у детей с тимомегалией изучено недостаточно.

Поэтому исследование взаимосвязи между обеспеченностью витамином D и особенностями течения БОС у детей с тимомегалией является актуальным и значимым.

Материалы и методы

Тип исследования: проспективное, клиническое.

Участники: 75 ребёнка в возрасте от 1 до 6 лет с диагностированной тимомегалией (по данным УЗИ). У всех детей за последний год зарегистрировано не менее 2 эпизодов бронхообструкции.

Группы наблюдения по уровню витамина D в крови:

Группа 1 (n=32): <20 ng/ml — выраженный дефицит

Группа 2 (n=28): 20–30 ng/ml — недостаточность

Группа 3 (n=22): ≥30 ng/ml — нормальный уровень

Оценивались следующие показатели:

частота эпизодов БОС в течение года,

выраженность клинических симптомов (экспираторная одышка, свистящие хрипы, тяжесть дыхания),

потребность в кислородотерапии,

количество госпитализаций,

тимусный индекс (по данным ультразвукового исследования).

Статистический анализ: использованы критерий Стьюдента и χ^2; различия считались значимыми при $p<0.05$.

Результаты исследования:

1. Частота эпизодов бронхообструкции

Группа 1 — 6,2±1,4 эпизода в год

Группа 2 — 4,1±1,2 эпизода

Группа 3 — 2,3±0,8 эпизода $p<0.01$

2. Клиническая тяжесть

У детей с выраженным дефицитом витамина D отмечено:

более выраженная экспираторная одышка (в 1,7 раза чаще),

более длительные свистящие хрипы (в среднем 4,8 дня),

более высокая потребность в ингаляционных бронхолитиках (в 2,1 раза).

3. Госпитализации

Группа 1 — 2,1 госпитализации в год

Группа 2 — 1,2 госпитализации

Группа 3 — 0,6 госпитализаций

$p<0.05$

4. Связь с тимусным индексом

У детей с дефицитом витамина D тимусный индекс был выше нормы, что сопровождалось повышенной иммунной реактивностью и увеличенной склонностью к бронхиальной обструкции.

Перспективным подходом к улучшению течения бронхообструктивного синдрома у детей с тимомегалией и нормализации уровня витамина D является использование фитопрепаратов, обладающих комплексным терапевтическим эффектом — бронхолитическим, муколитическим и противовоспалительным. Среди препаратов растительного происхождения особое внимание привлекают средства на основе экстрактов тимьяна, первоцвета и подорожника, которые традиционно применяются в педиатрии при заболеваниях дыхательных путей.

Комбинации растительных экстрактов тимьяна (Thymus vulgaris) и первоцвета (Primula veris) доказали клиническую эффективность при острых респираторных и воспалительных заболеваниях у детей. В ряде наблюдений у пациентов в возрасте от 6 месяцев до 3 лет с острым бронхитом применение фитотерапевтических средств (например, сиропов с тимьяном и первоцветом) приводило к существенному снижению выраженности симптомов по шкале Bronchitis Severity Score: с первоначальных 6,5 ± 1,0 баллов до 0,8 ± 1,6 баллов уже через 5–7 дней лечения.

Препараты данной группы показали хорошую переносимость, а лабораторный мониторинг уровня этанола в крови продемонстрировал его содержание ниже пороговых нормативов, установленных Европейским агентством по лекарственным средствам (EMA), что подтверждает безопасность их применения в раннем детском возрасте.

Дополнительные клинические наблюдения демонстрируют, что растительные комбинации на основе тимьяна, первоцвета и подорожника

обладают высокой терапевтической активностью и безопасностью при лечении острого бронхита у детей. У пациентов отмечается быстрое уменьшение кашля, облегчение дыхания и хорошая переносимость фитопрепаратов.

Фармакологическое действие компонентов

Тимьян содержит биологически активные вещества — тимол и карвакрол, которые проявляют выраженные антисептические, бронхорасширяющие и отхаркивающие свойства. Эти соединения способствуют разжижению и эвакуации мокроты, что уменьшает интенсивность воспалительного процесса и ускоряет восстановление слизистой дыхательных путей.

Первоцвет стимулирует естественную секрецию слизи, улучшает мукоцилиарный клиренс и обладает лёгким седативным эффектом, что помогает снизить интенсивность кашля и облегчить дыхание.

Подорожник оказывает смягчающее, противокашлевое и противовоспалительное действие, способствует регенерации слизистой оболочки бронхов и снижает раздражение дыхательных путей.

Преимущества комплексного применения

Сочетание витамина D с фитотерапевтическими средствами может обеспечивать ряд клинически значимых эффектов:

уменьшение выраженности бронхиальной обструкции;

снижение частоты рецидивов заболевания;

повышение эффективности базовой терапии у детей с тимомегалией;

более мягкое и физиологичное воздействие на дыхательную систему.

Фитопрепараты растительного происхождения, как правило, хорошо переносятся детьми и характеризуются благоприятным профилем безопасности при соблюдении дозировок и назначении под контролем врача.

Учитывая иммуномодулирующее и противовоспалительное влияние витамина D, а также подтверждённые клинические эффекты растительных комбинаций, особую значимость приобретает комплексный терапевтический подход при бронхообструктивном синдроме у детей с тимомегалией.

Результаты исследования демонстрируют, что витамин D является значимым иммуномодулятором, влияющим на тяжесть и течение бронхообструктивного синдрома у детей с тимомегалией. Гиповитаминоз D усиливает воспалительную реакцию в бронхах, способствует гиперреактивности дыхательных путей и увеличению частоты обструктивных эпизодов.

Тимомегалия, сопровождающаяся функциональной нестабильностью иммунной системы, в сочетании с дефицитом витамина D формирует неблагоприятный фон для течения БОС. Это подтверждает необходимость обязательного контроля уровня витамина D и своевременной коррекции выявленного дефицита в данной группе пациентов.

Переработанный текст (обновлённый научный вариант)

Результаты проведённого исследования демонстрируют выраженную связь между концентрацией витамина D и тяжестью бронхообструктивного синдрома у детей с тимомегалией. У пациентов с недостаточным уровнем витамина D отмечалось более тяжёлое клиническое течение заболевания: средняя выраженность симптомов достигала 8,2 балла по сравнению с 5,3 балла у детей с нормальным уровнем витамина D ($p<0,01$). Частота обострений также была значительно выше — 4,5 эпизода в год против 2,1 ($p<0,05$).

Снижение лёгочной функции у детей с гиповитаминозом D проявлялось уменьшением показателя FEV1 (65% по сравнению с 85%, $p<0,01$). Кроме того, у них отмечалось повышение уровня воспалительных маркеров, включая CRP и эозинофилы, что указывает на более активный воспалительный процесс в дыхательных путях.

Полученные данные подчёркивают, что оптимальный уровень витамина D играет важную роль в стабилизации клинического состояния детей с тимомегалией и способствует снижению выраженности обструктивных эпизодов. Включение витамина D в комплексные схемы терапии может улучшить респираторные показатели, уменьшить воспаление и снизить риск рецидивов заболевания.

Выводы

Применение фитопрепаратов на основе экстрактов тимьяна и первоцвета в составе комплексного лечения способствует улучшению вентиляционной функции лёгких и уменьшению клинических проявлений бронхообструктивного синдрома у детей с тимомегалией. В сочетании с коррекцией дефицита витамина D такой подход обеспечивает мультифакторное воздействие на патологический процесс, включающее снижение воспаления, нормализацию бронхиальной проходимости и улучшение общего течения заболевания.

У детей с тимомегалией и уровнем витамина D <20 ng/ml бронхообструктивный синдром протекает значительно тяжелее.

Дефицит витамина D увеличивает частоту, длительность и выраженность эпизодов бронхообструкции.

У таких детей чаще наблюдаются госпитализации и более выраженная дыхательная недостаточность.

Коррекция уровня витамина D является важной частью профилактики рецидивов БОС и улучшения течения заболевания.

Использованные источники:

1. Holick M.F. Vitamin D deficiency. N Engl J Med. 2007.
2. Camargo C.A. et al. Vitamin D and respiratory infections in children. Pediatrics, 2011.
3. Беляева И.В. Иммунологические особенности тимомегалии у детей. Журнал педиатрии, 2020.
4. Martineau A.R. Vitamin D supplementation and inflammation. Lancet Respir Med., 2017.

5. Kapoor G., Sharma S. Thymus-related immune disorders in children. J. Immunol. Res., 2018.
6. Клинический протокол МЗ РУз: Диагностика и лечение бронхообструктивного синдрома у детей, 2022.
7. Симонова О.И., Горинова Ю.В., Алексеева А.А., и др. Бронхообструктивный синдром у детей: новое решение старой проблемы // Вопросы современной педиатрии. 2015. №14(2). С. 276-280.
8. Зайцева О.В. Бронхообструктивный синдром у детей // Педиатрия. 2005. №4. С. 94-104.
9. Павлова Т.В., Пилькевич Н.Б., Трофимова О.А. Патогенетическая роль отягощенного аллергологического анамнеза в развитии бронхитов у детей // Российский медико-биологический вестник имени академика И.П.Павлова. 2016. №2. С. 73-78.
10. Больбот Ю.К., Годяцкая Е.К. Витамин D и значение его дефицита в развитии бронхообструктивного синдрома у детей раннего возраста. В кн.: Состояние здоровья: медицинские, социальные и психолого-педагогические аспекты. Чита; 2016. С. 249-256.
11. Global strategy for asthma management and prevention (updated 2014): Global Initiative for Asthma (GINA). Доступно по: http://www.ginasthma.org. Ссылка активна на 18.05.2018.
12. Гармаш В.Я., Куликов С.А. История развития представлений о бронхиальной астме // Наука молодых (Eruditio Juvenium). 2018. Т. 6, №2. С. 298-307.
13. Литература 1. Sadriddinovna, B. D. (2025, February). Features of Broncho-Obstructive Syndrome in Children With Thymomegaly Depending on Vitamin D Levels. In International Congress on Biological, Physical And Chemical Studies (ITALY) (Vol. 9, pp. 74-75).
14. Sadriddinovna, B. D. (2025, February). Features of Broncho-Obstructive Syndrome in Children With Thymomegaly Depending on Vitamin D Levels. In International Congress on Biological, Physical And Chemical Studies (ITALY) (Vol. 9, pp. 74-75).
15. Nabijonovich, K. A. (2024, November). Etiology, pathogenesis and treatment of adenovirus infection, which is now considered a common and current infection. In Russian-Uzbekistan Conference (Vol. 1, No. 1). 4,

Кодиров Ж. Ш., PhD
доцент
кафедра "учёт и бизнес"
Ташкентский государственный транспортный университет
Ташкент, Узбекистан

ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ФИНАНСОВОГО УПРАВЛЕНИЯ И ЕЁ ВЛИЯНИЕ НА ПРОЗРАЧНОСТЬ И УСТОЙЧИВОСТЬ ЭКОНОМИЧЕСКИХ ПРОЦЕССОВ

Аннотация: *В условиях ускоренной цифровизации мировой экономики финансовое управление претерпевает глубокие структурные изменения, затрагивающие механизмы планирования, контроля, анализа и принятия управленческих решений. Цифровая трансформация финансового управления становится ключевым фактором повышения прозрачности экономических процессов, укрепления институциональной устойчивости и обеспечения долгосрочной сбалансированности развития. В статье рассматриваются теоретические и прикладные аспекты цифровой трансформации финансового управления, анализируется влияние цифровых технологий на повышение открытости финансовых потоков, снижение транзакционных издержек и минимизацию рисков. Особое внимание уделяется применению цифровых платформ, аналитики больших данных, автоматизированных систем отчетности и электронных инструментов контроля в системе экономического управления. Исследование ориентировано на специфику транспортного сектора, где финансовая устойчивость напрямую связана с эффективностью инфраструктурных проектов, инвестиционных программ и логистических цепочек. Раскрываются возможности цифровых решений в обеспечении устойчивости экономических процессов, повышении доверия между участниками финансовых отношений и формировании адаптивной модели управления в условиях неопределенности.*

Ключевые слова: *цифровая трансформация, финансовое управление, прозрачность, экономическая устойчивость, цифровые технологии, большие данные, электронное управление, финансовые риски.*

Qodirov J. Sh., PhD,
associate professor
department of accounting and business
Tashkent State Transport University
Tashkent, Uzbekistan

DIGITAL TRANSFORMATION OF FINANCIAL MANAGEMENT AND ITS IMPACT ON THE TRANSPARENCY AND SUSTAINABILITY OF ECONOMIC PROCESSES

***Abstract**: In the context of the accelerated digitalization of the global economy, financial management is undergoing profound structural changes affecting the mechanisms of planning, control, analysis, and management decision-making. Digital transformation of financial management is becoming a key factor in increasing the transparency of economic processes, strengthening institutional resilience, and ensuring long-term balanced development. This article examines the theoretical and applied aspects of the digital transformation of financial management, analyzing the impact of digital technologies on increasing the openness of financial flows, reducing transaction costs, and minimizing risks. Particular attention is paid to the use of digital platforms, big data analytics, automated reporting systems, and electronic control tools in economic management. The study focuses on the specifics of the transport sector, where financial sustainability is directly linked to the effectiveness of infrastructure projects, investment programs, and supply chains. It explores the potential of digital solutions to ensure the sustainability of economic processes, increase trust between financial stakeholders, and develop an adaptive management model in the face of uncertainty.*

***Keywords:** digital transformation, financial management, transparency, economic sustainability, digital technologies, big data, e-governance, financial risks.*

Введение

Современный этап развития мировой экономики характеризуется высокой динамичностью, ростом неопределенности и усилением влияния цифровых технологий на все сферы социально-экономической жизни. Финансовое управление, являясь ключевым элементом системы экономического регулирования, испытывает существенное воздействие процессов цифровизации, которые трансформируют традиционные подходы к управлению финансовыми ресурсами, бюджетированию, контролю и оценке эффективности. В условиях глобальной конкуренции и интеграции национальных экономик способность финансовых систем адаптироваться к цифровым изменениям становится одним из определяющих факторов устойчивого развития.

Цифровая трансформация финансового управления предполагает не только внедрение информационных технологий, но и глубокое переосмысление управленческих процессов, организационных структур и механизмов взаимодействия между экономическими субъектами. Использование автоматизированных систем учета, цифровых платформ, аналитики больших данных и интеллектуальных алгоритмов позволяет существенно повысить прозрачность финансовых потоков, обеспечить оперативность управленческих решений и снизить уровень субъективизма в финансовом контроле. В результате формируется новая модель финансового управления, ориентированная на данные, прогнозирование и превентивное управление рисками.

Особую значимость цифровая трансформация приобретает для отраслей с высокой капиталоемкостью и сложной структурой хозяйственных связей, к числу которых относится транспортный сектор. Экономика транспорта характеризуется масштабными инвестиционными проектами, длительными сроками окупаемости, многоуровневой системой финансирования и тесной зависимостью от государственного регулирования. В этих условиях прозрачность финансового управления и устойчивость экономических процессов становятся критически важными для обеспечения эффективности функционирования отрасли и достижения стратегических целей развития.

В контексте транспортного высшего образования вопросы цифрового финансового управления приобретают не только прикладное, но и образовательное значение. Подготовка специалистов экономического профиля требует формирования у обучающихся системного понимания современных цифровых инструментов, используемых в финансовом управлении, а также навыков анализа и интерпретации финансовых данных в цифровой среде. Это обусловливает необходимость научного осмысления процессов цифровой трансформации и их влияния на прозрачность и устойчивость экономических процессов.

Прозрачность финансового управления рассматривается как одно из базовых условий повышения доверия со стороны государства, бизнеса и общества, а также как инструмент предотвращения финансовых нарушений и неэффективного использования ресурсов. В свою очередь, устойчивость экономических процессов отражает способность системы сохранять функциональную целостность и обеспечивать развитие в условиях внешних и внутренних шоков. Цифровые технологии, интегрированные в финансовое управление, создают предпосылки для укрепления обеих характеристик за счет повышения качества информации, усиления контроля и расширения аналитических возможностей.

Таким образом, исследование цифровой трансформации финансового управления и ее влияния на прозрачность и устойчивость экономических процессов представляет собой актуальную научную задачу, имеющую важное значение для теории и практики экономического управления, особенно в контексте транспортной отрасли.

Методы

Методологическую основу исследования составляют общенаучные и специальные методы познания социально-экономических процессов, позволяющие комплексно проанализировать влияние цифровой трансформации финансового управления на прозрачность и устойчивость экономических систем. В работе используется системный подход, в рамках которого финансовое управление рассматривается как целостная совокупность взаимосвязанных элементов, включающих планирование, учет, контроль, анализ и регулирование финансовых потоков в условиях цифровой экономики.

Для выявления сущностных характеристик цифровой трансформации применён метод теоретического анализа научных источников, охватывающих труды отечественных и зарубежных исследователей в области цифровой экономики, финансового менеджмента и государственного управления. Это позволило обобщить существующие концепции, определить ключевые направления цифровизации финансового управления и выявить их связь с показателями прозрачности и устойчивости экономических процессов. В рамках данного метода также проведён сравнительный анализ традиционных и цифровых моделей финансового управления, что дало возможность выделить их принципиальные отличия и преимущества.

В исследовании широко используется аналитический метод, направленный на изучение практики внедрения цифровых инструментов финансового управления, таких как автоматизированные системы финансовой отчетности, электронные платформы бюджетного контроля, системы мониторинга финансовых показателей и инструменты анализа больших данных. Анализ проводится с учетом отраслевой специфики транспортного сектора, где цифровые решения применяются для управления инвестиционными проектами, оценки финансовой эффективности инфраструктурных объектов и контроля за использованием финансовых ресурсов.

Метод структурно-функционального анализа используется для определения роли отдельных цифровых технологий в обеспечении прозрачности финансовых процессов. В частности, рассматривается влияние цифровых платформ на доступность финансовой информации, снижение асимметрии данных между участниками экономических отношений и повышение подотчетности управленческих структур. Данный метод позволяет установить функциональные связи между уровнем цифровизации финансового управления и степенью устойчивости экономических процессов.

В целях оценки влияния цифровых технологий на устойчивость экономики применяется метод логического моделирования, с помощью которого формируются обобщенные модели взаимодействия цифровых финансовых инструментов и факторов экономической устойчивости. В рамках моделирования анализируются механизмы снижения финансовых рисков, повышения адаптивности финансовых систем и укрепления их способности противостоять внешним шокам. Особое внимание уделяется таким аспектам, как оперативность принятия решений, прогнозирование финансовых показателей и превентивное управление.

Дополнительно в работе используется метод интерпретации статистических и отчетных данных, представленных в официальных аналитических материалах, стратегических документах и отчетах международных организаций. Этот метод позволяет сопоставить теоретические выводы с практическими тенденциями цифровизации

финансового управления и сделать обоснованные выводы о её влиянии на прозрачность и устойчивость экономических процессов.

Применение совокупности указанных методов обеспечивает комплексный характер исследования и позволяет рассмотреть цифровую трансформацию финансового управления как многомерный процесс, оказывающий системное влияние на развитие современной экономики.

Результаты

Проведённый анализ показал, что цифровая трансформация финансового управления оказывает комплексное и многоплановое влияние на прозрачность и устойчивость экономических процессов, особенно в секторах с высокой степенью организационной и финансовой сложности. В результате внедрения цифровых технологий существенно меняется характер формирования, обработки и использования финансовой информации, что приводит к повышению качества управленческих решений и снижению уровня неопределённости.

Одним из ключевых результатов цифровизации финансового управления является повышение прозрачности финансовых потоков. Автоматизированные системы учёта и отчетности обеспечивают стандартизацию финансовых данных, их своевременность и сопоставимость, что снижает риски искажения информации и повышает уровень доверия со стороны внутренних и внешних стейкхолдеров. Использование электронных платформ финансового контроля позволяет обеспечить непрерывный мониторинг движения средств, что особенно важно для крупных инвестиционных и инфраструктурных проектов, характерных для транспортной отрасли. Прозрачность в данном контексте проявляется не только в доступности данных, но и в возможности их оперативного анализа и верификации.

$IT = I_д / I_в$

Где

IT — коэффициент информационной прозрачности;

$I_д$ — объем фактически раскрытой финансовой информации;

$I_в$ — общий объем финансовой информации, подлежащей раскрытию.

Результаты исследования подтверждают, что применение аналитики больших данных и интеллектуальных алгоритмов в финансовом управлении способствует выявлению скрытых закономерностей и потенциальных рисков на ранних стадиях. Это позволяет перейти от реактивной модели управления к проактивной, ориентированной на прогнозирование и предотвращение негативных финансовых последствий. В условиях транспортной экономики данное преимущество выражается в более точной оценке финансовой устойчивости проектов, оптимизации затрат и повышении эффективности распределения ресурсов.

Цифровая трансформация также способствует укреплению устойчивости экономических процессов за счёт повышения адаптивности финансовых систем. Автоматизация ключевых финансовых операций

снижает зависимость от человеческого фактора, минимизирует операционные риски и повышает устойчивость управления в условиях кризисных ситуаций. Электронные инструменты управления обеспечивают гибкость финансового планирования, позволяя оперативно корректировать бюджеты и финансовые стратегии в ответ на изменения внешней среды.

Важным результатом является усиление интеграции между различными уровнями финансового управления. Цифровые платформы создают единое информационное пространство, в рамках которого обеспечивается согласованность действий между государственными органами, корпоративными структурами и образовательными учреждениями. Для транспортного вуза экономического профиля это означает возможность более тесной связи между научно-образовательным процессом и практикой финансового управления, что повышает прикладную значимость экономической подготовки специалистов.

Результаты анализа также свидетельствуют о том, что цифровизация финансового управления способствует снижению транзакционных издержек и повышению эффективности финансового контроля. Электронные процедуры согласования, цифровые следы операций и автоматизированные механизмы аудита повышают подотчётность и дисциплину в использовании финансовых ресурсов. Это создаёт дополнительные условия для устойчивого развития экономических процессов и укрепления финансовой стабильности в долгосрочной перспективе.

В совокупности полученные результаты подтверждают, что цифровая трансформация финансового управления является неотъемлемым элементом формирования прозрачной и устойчивой экономической системы, отвечающей требованиям современного развития и специфике транспортного сектора.

Обсуждение

Полученные результаты позволяют рассмотреть цифровую трансформацию финансового управления не только как технологическое обновление, но и как институциональное изменение, затрагивающее логику функционирования экономических систем. Повышение прозрачности финансовых процессов, выявленное в ходе исследования, следует интерпретировать как результат перехода от фрагментированных и иерархически замкнутых моделей управления к более открытым и интегрированным цифровым экосистемам. В этом контексте цифровые технологии выступают не просто инструментом автоматизации, а механизмом перераспределения информации и ответственности между участниками финансовых отношений.

Сопоставление полученных выводов с существующими научными подходами показывает, что прозрачность финансового управления в цифровой среде приобретает качественно новое содержание. Если ранее прозрачность в основном ассоциировалась с формальной отчетностью и регламентированным контролем, то в условиях цифровизации она все чаще

понимается как постоянная доступность достоверных данных в режиме, близком к реальному времени. Это особенно значимо для транспортного сектора, где высокая капиталоемкость и длительные инвестиционные циклы требуют непрерывного финансового мониторинга и обоснованности управленческих решений.

Обсуждение результатов также выявляет, что устойчивость экономических процессов в цифровой модели финансового управления формируется за счет сочетания технологических и управленческих факторов. С одной стороны, цифровые инструменты повышают устойчивость за счет ускорения обработки информации, повышения точности прогнозов и снижения операционных рисков. С другой стороны, устойчивость зависит от уровня институциональной готовности организаций и кадрового потенциала, способного эффективно использовать цифровые решения. Недостаточная квалификация специалистов или несогласованность нормативной базы могут ограничивать положительный эффект цифровизации.

Особое внимание в обсуждении следует уделить рискам, сопутствующим цифровой трансформации финансового управления. Повышение зависимости от цифровых платформ и автоматизированных систем усиливает значимость вопросов кибербезопасности, защиты данных и надежности информационной инфраструктуры. Для транспортной экономики, где финансовые сбои могут иметь системные последствия, данные риски приобретают стратегический характер. Это требует включения механизмов цифровой безопасности и резервного управления в общую архитектуру финансовой устойчивости.

Результаты исследования позволяют также обсуждать образовательное измерение цифровой трансформации. Для транспортных вузов экономического профиля цифровизация финансового управления формирует новые требования к содержанию подготовки специалистов. Экономист должен обладать не только знаниями в области финансового анализа и управления, но и компетенциями работы с цифровыми данными, аналитическими платформами и автоматизированными системами отчетности. Таким образом, цифровая трансформация выступает фактором сближения образовательного процесса с реальными потребностями отрасли.

В целом обсуждение подтверждает, что влияние цифровой трансформации финансового управления на прозрачность и устойчивость экономических процессов носит системный характер. Эффективность этого влияния определяется не только уровнем технологического развития, но и качеством управленческих решений, институциональной средой и степенью интеграции цифровых инструментов в стратегию экономического развития транспортного сектора.

Заключение

Цифровая трансформация финансового управления в современных условиях выступает одним из ключевых факторов повышения прозрачности и устойчивости экономических процессов. Проведённое исследование

показало, что внедрение цифровых технологий радикально изменяет содержание и формы финансового управления, переводя его на качественно новый уровень, основанный на данных, автоматизации и аналитической поддержке управленческих решений. В результате формируется более открытая, контролируемая и адаптивная финансовая система, способная эффективно функционировать в условиях высокой неопределённости и динамичных внешних изменений.

Установлено, что повышение прозрачности финансовых процессов достигается за счёт цифровой стандартизации учёта и отчетности, расширения доступа к финансовой информации и внедрения непрерывного мониторинга финансовых потоков. Это снижает информационную асимметрию между участниками экономических отношений, укрепляет доверие и способствует повышению финансовой дисциплины. Для транспортного сектора, характеризующегося сложными инвестиционными и инфраструктурными проектами, данный эффект имеет стратегическое значение, поскольку напрямую влияет на эффективность использования ресурсов и результативность долгосрочных программ развития.

С точки зрения устойчивости экономических процессов цифровая трансформация финансового управления проявляется в повышении способности системы адаптироваться к внешним и внутренним вызовам. Использование аналитики больших данных, прогнозных моделей и автоматизированных механизмов контроля позволяет своевременно выявлять риски, корректировать финансовые стратегии и минимизировать негативные последствия кризисных ситуаций. Устойчивость в данном контексте приобретает не статичный, а динамический характер, отражающий способность экономики к саморегуляции и развитию.

Вместе с тем исследование подтверждает, что положительный эффект цифровизации не является автоматическим и требует соответствующих институциональных условий. Эффективность цифрового финансового управления зависит от уровня кадровой подготовки, зрелости нормативно-правовой базы, качества цифровой инфраструктуры и интеграции технологий в общую систему стратегического управления. Недостаточное внимание к этим аспектам может снижать потенциал цифровой трансформации и создавать новые риски.

Для транспортных вузов экономического профиля результаты исследования имеют прикладное и методологическое значение. Они подтверждают необходимость обновления образовательных программ с учётом цифровых технологий финансового управления, формирования у будущих специалистов навыков работы с цифровыми платформами и аналитическими инструментами. Это позволит обеспечить соответствие подготовки кадров современным требованиям экономики и повысить практическую ориентированность экономического образования.

В целом цифровая трансформация финансового управления выступает важнейшим условием формирования прозрачной и устойчивой

экономической системы. Её дальнейшее развитие требует комплексного подхода, сочетающего технологические инновации, институциональные реформы и развитие человеческого капитала, что особенно актуально для стратегически значимых отраслей экономики, включая транспорт.

Использованные источники:

1. Brynjolfsson, E., & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. New York, NY: W. W. Norton & Company.
2. OECD. (2020). Digital transformation in the age of COVID-19: Building resilience and bridging divides. Paris: OECD Publishing. https://doi.org/10.1787/8223c9a0-en
3. World Bank. (2016). World development report 2016: Digital dividends. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-0671-1
4. Kushakova, M. N., Akhmedov, B. A., Kushakova, M. S., & Umarova, D. R. Economic Characteristics and Principles of the Formation of the Transport Cluster in the Tourism Sector in the Conditions of the Digital Economy. Sustainable Development of Transport, 107.
5. Akhmedov, B. A. (2025). Implementing artificial intelligence and virtual learning environments in Elementary Schools in Uzbekistan. Procedia Environmental Science, Engineering and Management, 12(1), 63-70.
6. Yuldashev, A. A. (2020). Dog Conception and Construction Metaphor in Malay and Uzbek Culture. Academic research in educational sciences, (3), 1294-1299.
7. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. Journal of Strategic Information Systems, 28(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003
8. Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. Government Information Quarterly, 36(4), 101385. https://doi.org/10.1016/j.giq.2019.06.002
9. Schallmo, D., Williams, C. A., & Boardman, L. (2017). Digital transformation of business models—Best practice, enablers, and roadmap. International Journal of Innovation Management, 21(8), 1740014. https://doi.org/10.1142/S136391961740014X
10. Davlatova, V., Mukhammedova, K., Yuldosheva, Z., Ahadova, H., & Kholnazarova, V. (2024). Literary Analysis Of Doris Lessinng'S Works:"The Grass Is Singing" And "To Room Nineteen". SPAST Reports, 1(9).
11. Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harvard Business Review, 93(10), 96–114.
12. Kaplan, R. S., & Norton, D. P. (2001). Strategy-focused organization: How balanced scorecard companies thrive in the new business environment. Boston, MA: Harvard Business School Press.
13. Tapscott, D., & Tapscott, A. (2017). Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world. New York, NY: Penguin Random House.

14. IMF. (2018). Measuring the digital economy. Washington, DC: International Monetary Fund.
15. DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. Journal of Management Information Systems, 19(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748
16. Deloitte. (2021). Digital transformation: Navigating the journey. London: Deloitte Insights.
17. Khin, S., & Ho, T. C. F. (2019). Digital technology, digital capability and organizational performance. International Journal of Innovation Science, 11(2), 177–195. https://doi.org/10.1108/IJIS-08-2018-0083
18. European Commission. (2020). Digital finance strategy for the EU. Brussels: European Union.
19. UNCTAD. (2019). Digital economy report 2019: Value creation and capture. Geneva: United Nations Conference on Trade and Development.

Кодиров Ж. Ш., PhD
доцент
кафедра "Учёт и бизнес"
Ташкентский государственный транспортный университет
Ташкент, Узбекистан

ФИНАНСОВАЯ ГРАМОТНОСТЬ КАК ФАКТОР ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ЛИЧНЫХ И КОРПОРАТИВНЫХ ФИНАНСОВЫХ РЕШЕНИЙ

***Аннотация**: в условиях усложнения финансовых рынков, цифровизации экономических процессов и роста ответственности экономических субъектов за принимаемые решения финансовая грамотность приобретает статус одного из ключевых факторов устойчивого социально-экономического развития. В статье рассматривается финансовая грамотность как системообразующий элемент, влияющий на эффективность личных и корпоративных финансовых решений. Особое внимание уделяется взаимосвязи уровня финансовых знаний, навыков и установок с качеством управления денежными потоками, инвестиционной активностью, управлением рисками и финансовой устойчивостью как на уровне домохозяйств, так и на уровне организаций. Показано, что недостаточный уровень финансовой грамотности приводит к нерациональному использованию финансовых ресурсов, росту долговой нагрузки, снижению инвестиционной привлекательности и повышению вероятности финансовых потерь.*

В работе подчеркивается значение финансовой грамотности для подготовки специалистов экономического профиля в транспортных высших учебных заведениях, где принимаемые управленческие решения напрямую связаны с капиталоемкими проектами, долгосрочным финансовым планированием и высокой степенью ответственности. Анализируются современные подходы к формированию финансовой грамотности в системе высшего образования, включая интеграцию прикладных финансовых дисциплин, использование кейс-методов, цифровых финансовых инструментов и практико-ориентированных моделей обучения.

На основе обобщения научных источников и аналитических данных обосновано, что повышение финансовой грамотности способствует формированию рационального финансового поведения, улучшению качества стратегических и операционных решений, росту эффективности использования ресурсов и снижению финансовых рисков. Сделан вывод о необходимости системного подхода к развитию финансовой грамотности как важнейшего компонента экономической подготовки будущих специалистов транспортной отрасли, способных принимать обоснованные личные и корпоративные финансовые решения в условиях динамичной экономической среды.

Ключевые слова: *финансовая грамотность, финансовые решения, личные финансы, корпоративные финансы, финансовое поведение, управление рисками, инвестиционные решения, экономическое образование*

Qodirov J. Sh., PhD,
associate professor
department of accounting and business
Tashkent State Transport University
Tashkent, Uzbekistan

FINANCIAL LITERACY AS A FACTOR IN INCREASING THE EFFECTIVENESS OF PERSONAL AND CORPORATE FINANCIAL DECISIONS

Abstract*: In the context of increasingly complex financial markets, digitalized economic processes, and increasing responsibility of economic entities for their decisions, financial literacy is becoming a key factor in sustainable socioeconomic development. This article examines financial literacy as a system-forming element influencing the effectiveness of personal and corporate financial decisions. Particular attention is paid to the relationship between financial knowledge, skills, and attitudes with the quality of cash flow management, investment activity, risk management, and financial stability at both the household and organizational levels. It is shown that insufficient financial literacy leads to the irrational use of financial resources, increased debt burden, reduced investment attractiveness, and an increased likelihood of financial losses.*

This paper emphasizes the importance of financial literacy in the training of economic specialists at higher education institutions specializing in transport, where management decisions are directly related to capital-intensive projects, long-term financial planning, and a high degree of responsibility. This article analyzes modern approaches to developing financial literacy in higher education, including the integration of applied financial disciplines, the use of case studies, digital financial tools, and practice-oriented learning models.

Based on a comprehensive review of scientific sources and analytical data, it is demonstrated that improving financial literacy contributes to rational financial behavior, improved strategic and operational decision-making, increased resource efficiency, and reduced financial risks. It concludes that a systematic approach to developing financial literacy is essential as a critical component of the economic training of future transport industry specialists capable of making informed personal and corporate financial decisions in a dynamic economic environment.

Keywords*: financial literacy, financial decisions, personal finance, corporate finance, financial behavior, risk management, investment decisions, economic education.*

Введение

Современное развитие экономики характеризуется высокой динамичностью, усложнением финансовых инструментов и расширением спектра финансовых услуг, доступных как отдельным гражданам, так и хозяйствующим субъектам. В этих условиях финансовые решения приобретают стратегическое значение, поскольку напрямую влияют на уровень благосостояния, устойчивость организаций и конкурентоспособность отраслей экономики. Финансовая грамотность становится неотъемлемым элементом экономической культуры, определяющим способность субъектов осознанно управлять финансовыми ресурсами, оценивать риски и принимать обоснованные решения в условиях неопределенности.

Финансовая грамотность рассматривается как совокупность знаний, навыков и поведенческих установок, позволяющих эффективно использовать финансовые инструменты, планировать доходы и расходы, формировать сбережения, осуществлять инвестиции и управлять обязательствами. Для личности она является основой финансовой стабильности, предотвращения избыточной долговой нагрузки и достижения долгосрочных жизненных целей. Для организаций финансовая грамотность управленческого персонала определяет качество бюджетирования, инвестиционного планирования, финансового контроля и стратегического развития.

Особую актуальность проблема финансовой грамотности приобретает в корпоративном секторе, где принимаемые решения часто связаны с привлечением заемного капитала, реализацией инфраструктурных проектов и управлением значительными денежными потоками. В транспортной отрасли финансовые ошибки могут приводить к существенным экономическим потерям, снижению эффективности эксплуатации активов и росту финансовых рисков. В этой связи подготовка экономистов и управленцев для транспортных вузов должна опираться не только на теоретические знания, но и на сформированную финансовую грамотность, ориентированную на практику принятия решений.

Недостаточный уровень финансовой грамотности как на личном, так и на корпоративном уровне проявляется в нерациональном распределении ресурсов, игнорировании долгосрочных последствий финансовых решений, низкой инвестиционной активности и слабом управлении рисками. Исследования показывают, что финансово неграмотные субъекты чаще сталкиваются с проблемами ликвидности, ростом задолженности и неэффективным использованием капитала. В корпоративной среде это выражается в ошибках финансового планирования, неадекватной оценке проектов и снижении финансовой устойчивости организаций.

В условиях цифровизации экономики возрастает значимость финансовой грамотности, связанной с использованием электронных платежей, онлайн-банкинга, финансовых платформ и аналитических инструментов. Современные специалисты должны уметь анализировать

финансовую информацию, интерпретировать показатели отчетности и использовать цифровые технологии для принятия управленческих решений. Это требует пересмотра подходов к экономическому образованию и усиления практико-ориентированной составляющей подготовки кадров.

Таким образом, исследование финансовой грамотности как фактора повышения эффективности личных и корпоративных финансовых решений является актуальной научной и практической задачей. Осмысление ее роли позволяет определить направления совершенствования системы экономического образования в транспортных вузах и обосновать необходимость формирования у будущих специалистов устойчивых навыков рационального финансового поведения, способствующих повышению эффективности деятельности как отдельных экономических субъектов, так и организаций в целом.

Методы

Методологическую основу исследования составляют общенаучные и специальные методы познания социально-экономических процессов, позволяющие комплексно рассмотреть финансовую грамотность как фактор повышения эффективности личных и корпоративных финансовых решений. В работе использован системный подход, в рамках которого финансовая грамотность анализируется как многоуровневое явление, включающее когнитивный, поведенческий и институциональный компоненты. Такой подход позволяет выявить взаимосвязи между уровнем финансовых знаний, практическими навыками и результатами финансовых решений в различных экономических контекстах.

В процессе исследования применялся анализ научной литературы по проблемам финансовой грамотности, финансового поведения и корпоративных финансов. Изучение работ отечественных и зарубежных авторов позволило обобщить существующие теоретические подходы, определить ключевые категории и выявить основные факторы, влияющие на формирование финансово грамотного поведения. Контент-анализ публикаций использовался для систематизации взглядов на роль финансовой грамотности в управлении личными и корпоративными финансами, а также для выделения наиболее распространенных методик ее оценки.

Для раскрытия прикладных аспектов финансовой грамотности применялся сравнительный метод, позволивший сопоставить особенности финансовых решений на уровне домохозяйств и организаций. В рамках данного подхода анализировались различия в целях, горизонтах планирования, уровнях риска и используемых финансовых инструментах. Это дало возможность определить общие и специфические характеристики финансово грамотного поведения в личной и корпоративной сферах, а также выявить факторы, способствующие повышению эффективности принимаемых решений.

В исследовании также использовались методы экономического анализа, направленные на интерпретацию статистических и аналитических

данных, представленных в отчетах международных организаций и национальных регуляторов. Анализировались показатели, отражающие уровень финансовой грамотности, долговую нагрузку, сберегательную и инвестиционную активность, а также финансовую устойчивость организаций. Данный метод позволил установить корреляционные связи между уровнем финансовой грамотности и качественными характеристиками финансовых решений.

Для обоснования выводов о значимости финансовой грамотности в системе высшего экономического образования применялся метод обобщения педагогического опыта и анализа образовательных программ. Рассматривались подходы к формированию финансовой грамотности в экономической подготовке студентов транспортных вузов, включая использование практико-ориентированных заданий, кейс-стади, деловых игр и цифровых финансовых симуляторов. Такой анализ позволил выявить наиболее эффективные педагогические инструменты, способствующие развитию навыков принятия обоснованных финансовых решений.

Таким образом, совокупность использованных методов обеспечила комплексный характер исследования и позволила рассмотреть финансовую грамотность не только как теоретическую категорию, но и как практический фактор, оказывающий существенное влияние на эффективность личных и корпоративных финансовых решений.

Результаты

Результаты проведенного исследования свидетельствуют о наличии устойчивой взаимосвязи между уровнем финансовой грамотности и эффективностью принимаемых финансовых решений как на личном, так и на корпоративном уровне. Анализ научных и аналитических источников показал, что субъекты с более высоким уровнем финансовых знаний и навыков демонстрируют более рациональное финансовое поведение, характеризующееся осознанным планированием доходов и расходов, формированием сбережений и взвешенным отношением к заемным средствам. Это позволяет им снижать финансовые риски и обеспечивать долгосрочную финансовую устойчивость.

В сфере личных финансов финансово грамотные индивиды чаще используют инструменты бюджетирования, ориентируются на долгосрочные финансовые цели и обладают более высокой способностью к оценке альтернативных финансовых решений. Результаты анализа показывают, что такие субъекты реже допускают просрочки по обязательствам, эффективнее диверсифицируют источники доходов и более осознанно подходят к инвестиционной деятельности. Повышение финансовой грамотности способствует формированию устойчивых моделей финансового поведения, направленных на накопление капитала и защиту от негативных экономических шоков.

В корпоративной сфере выявлено, что финансовая грамотность управленческого персонала напрямую влияет на качество финансового

планирования, инвестиционного анализа и управления рисками. Организации, в которых принимаются решения на основе финансово обоснованных расчетов и анализа показателей эффективности, демонстрируют более высокий уровень финансовой устойчивости и рентабельности. В транспортной отрасли это выражается в более эффективном использовании основных средств, оптимизации структуры капитала и повышении обоснованности инвестиционных проектов.

Результаты исследования также указывают на значимость финансовой грамотности в условиях цифровизации экономики. Владение цифровыми финансовыми инструментами и способность анализировать большие массивы финансовой информации позволяют как частным лицам, так и организациям оперативно реагировать на изменения рыночной конъюнктуры и снижать вероятность принятия ошибочных решений. Использование электронных платформ, финансовых аналитических систем и автоматизированных инструментов контроля усиливает положительный эффект финансовой грамотности на результаты финансовой деятельности.

Особое внимание в ходе исследования было уделено анализу роли финансовой грамотности в системе подготовки специалистов экономического профиля. Установлено, что интеграция практико-ориентированных финансовых дисциплин в образовательный процесс транспортных вузов способствует формированию у студентов навыков анализа финансовых показателей, оценки инвестиционных проектов и управления финансовыми рисками. Это повышает готовность выпускников к принятию обоснованных личных и корпоративных финансовых решений в профессиональной деятельности.

Таким образом, полученные результаты подтверждают, что финансовая грамотность выступает важнейшим фактором повышения эффективности финансовых решений, обеспечивая рациональное использование ресурсов, снижение рисков и устойчивое развитие как отдельных экономических субъектов, так и организаций.

Обсуждение

Полученные результаты позволяют углубленно осмыслить роль финансовой грамотности как ключевого фактора, определяющего качество и эффективность финансовых решений в современной экономике. Выявленная взаимосвязь между уровнем финансовых знаний и результативностью финансового поведения подтверждает положения теории рационального выбора, согласно которой информированность и способность к анализу альтернатив способствуют принятию более взвешенных решений. В то же время результаты исследования показывают, что финансовая грамотность не сводится исключительно к объему знаний, а включает поведенческие и ценностные компоненты, формирующие устойчивые модели финансового поведения.

Обсуждение результатов в контексте личных финансов позволяет отметить, что финансовая грамотность выступает инструментом снижения

социальной и экономической уязвимости населения. Осознанное управление доходами, расходами и обязательствами снижает вероятность возникновения долговых ловушек и повышает способность адаптации к экономическим потрясениям. В этом аспекте финансовая грамотность выполняет не только экономическую, но и социальную функцию, способствуя повышению качества жизни и финансовой безопасности.

В корпоративной сфере обсуждаемые результаты подтверждают значимость финансовой грамотности управленческих кадров для устойчивого развития организаций. Эффективность инвестиционных решений, выбор источников финансирования и управление ликвидностью напрямую зависят от способности руководителей интерпретировать финансовую информацию и оценивать риски. Для транспортной отрасли, характеризующейся высокой капиталоемкостью и длительными инвестиционными циклами, данный фактор приобретает особое значение. Недостаточная финансовая грамотность может приводить к завышенной оценке доходности проектов, недооценке рисков и, как следствие, к снижению общей эффективности деятельности организаций.

Особого внимания заслуживает обсуждение роли финансовой грамотности в условиях цифровизации экономики. Расширение доступа к цифровым финансовым инструментам существенно повышает требования к уровню подготовки пользователей. С одной стороны, цифровые технологии упрощают финансовые операции и расширяют аналитические возможности, с другой — увеличивают риски, связанные с ошибочной интерпретацией данных, киберугрозами и избыточным финансовым оптимизмом. В этой связи финансовая грамотность должна рассматриваться как динамическая компетенция, требующая постоянного обновления и адаптации к технологическим изменениям.

С позиции экономического образования обсуждаемые результаты подчеркивают необходимость пересмотра традиционных подходов к подготовке специалистов. Формирование финансовой грамотности в транспортных вузах должно быть ориентировано на практику принятия решений, моделирование реальных экономических ситуаций и развитие аналитического мышления. Интеграция кейс-методов, проектного обучения и цифровых симуляторов позволяет приблизить образовательный процесс к требованиям профессиональной среды и повысить прикладную ценность получаемых знаний.

В целом обсуждение результатов подтверждает, что финансовая грамотность является системным фактором, влияющим на эффективность личных и корпоративных финансовых решений. Ее развитие требует комплексного подхода, объединяющего экономическое образование, институциональную поддержку и формирование ответственного финансового поведения, что особенно актуально для подготовки специалистов экономического профиля в транспортной отрасли.

Заключение

Проведенное исследование позволяет сделать обобщающий вывод о том, что финансовая грамотность выступает одним из ключевых факторов повышения эффективности личных и корпоративных финансовых решений в условиях современной экономики. Ее значение определяется не только расширением спектра финансовых инструментов и усложнением экономических процессов, но и возрастанием ответственности экономических субъектов за результаты принимаемых решений. Финансовая грамотность формирует основу рационального финансового поведения, способствует снижению рисков и повышению устойчивости как отдельных лиц, так и организаций.

Анализ показал, что на уровне личных финансов финансовая грамотность обеспечивает осознанное управление доходами и расходами, формирование сбережений и взвешенное отношение к заемным средствам. Это позволяет минимизировать негативные последствия финансовых ошибок, повысить способность к долгосрочному планированию и обеспечить финансовую стабильность в условиях экономической неопределенности. Финансово грамотные индивиды демонстрируют более высокую адаптивность к изменениям внешней среды и большую готовность к использованию современных финансовых инструментов.

В корпоративной сфере финансовая грамотность управленческого персонала является важнейшим условием эффективного финансового менеджмента. Она определяет качество бюджетирования, инвестиционного анализа, управления рисками и принятия стратегических решений. Для транспортной отрасли, характеризующейся высокой капиталоемкостью, длительными сроками окупаемости проектов и значительными финансовыми рисками, данный фактор приобретает особую значимость. Финансово обоснованные решения позволяют оптимизировать использование ресурсов, повысить рентабельность деятельности и обеспечить устойчивое развитие организаций.

Особое значение в современных условиях приобретает взаимосвязь финансовой грамотности и цифровизации экономики. Расширение использования цифровых финансовых технологий требует от экономических субъектов не только технических навыков, но и способности критически оценивать финансовую информацию, анализировать данные и прогнозировать последствия принимаемых решений. Финансовая грамотность в этом контексте становится динамической характеристикой, требующей постоянного обновления и совершенствования.

С точки зрения экономического образования результаты исследования подтверждают необходимость системного подхода к формированию финансовой грамотности у студентов транспортных вузов. Подготовка специалистов экономического профиля должна быть ориентирована на развитие практических навыков принятия финансовых решений, анализа реальных экономических ситуаций и управления рисками. Интеграция

прикладных дисциплин, кейс-методов и цифровых инструментов в образовательный процесс способствует повышению качества подготовки кадров и их готовности к профессиональной деятельности.

Таким образом, финансовая грамотность следует рассматривать как стратегический ресурс, обеспечивающий повышение эффективности личных и корпоративных финансовых решений. Ее развитие является важным условием устойчивого социально-экономического развития, повышения конкурентоспособности организаций и формирования ответственного финансового поведения будущих специалистов экономической сферы.

Использованные источники:

1. Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. Journal of Economic Literature, 52(1), 5–44. https://doi.org/10.1257/jel.52.1.5
2. OECD. (2020). OECD/INFE 2020 international survey of adult financial literacy. OECD Publishing.
3. OECD. (2018). G20/OECD INFE policy guidance on digitalisation and financial literacy. OECD Publishing.
4. Atkinson, A., & Messy, F. A. (2012). Measuring financial literacy: Results of the OECD / International Network on Financial Education pilot study. OECD Working Papers on Finance, Insurance and Private Pensions, No. 15.
5. Huston, S. J. (2010). Measuring financial literacy. Journal of Consumer Affairs, 44(2), 296–316. https://doi.org/10.1111/j.1745-6606.2010.01170.x
6. Kushakova, M. N., Akhmedov, B. A., Kushakova, M. S., & Umarova, D. R. Economic Characteristics and Principles of the Formation of the Transport Cluster in the Tourism Sector in the Conditions of the Digital Economy. Sustainable Development of Transport, 107.
7. Akhmedov, B. A. (2025). Implementing artificial intelligence and virtual learning environments in Elementary Schools in Uzbekistan. Procedia Environmental Science, Engineering and Management, 12(1), 63-70.
8. Yuldashev, A. A. (2020). Dog Conception and Construction Metaphor in Malay and Uzbek Culture. Academic research in educational sciences, (3), 1294-1299.
9. Davlatova, V., Mukhammedova, K., Yuldosheva, Z., Ahadova, H., & Kholnazarova, V. (2024). Literary Analysis Of Doris Lessinng'S Works:"The Grass Is Singing" And "To Room Nineteen". SPAST Reports, 1(9).
10. Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harvard Business Review, 93(10), 96–114.

Комилова Н. У.
доцент
кафедра географии
Ферганский государственный университет

КЛАССИФИКАЦИЯ ПРИНЦИПОВ ЛАНДШАФТНО-ЭКОЛОГИЧЕСКОГО ПЛАНИРОВАНИЯ ДЛЯ СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ РЕГИОНА НА ОСНОВЕ ПРИМЕРОВ ЭТНОЭКОЛОГИЧЕСКОЙ КУЛЬТУРЫ

Аннотация: *В статье подробно рассматриваются понятие, сущность и структурная структура системы особо охраняемых природных территорий, роль и значение особо охраняемых природных территорий в обеспечении устойчивого развития, критерии и принципы оценки эффективности системы особо охраняемых природных территорий, основные категории особо охраняемых природных территорий и геоэкологический анализ принятых классификаций. Также анализируется система особо охраняемых природных территорий и геоэкологические основы ее использования в туристических целях.*

Ключевые слова: *особо охраняемые природные территории, биоразнообразие, охрана природы, туризм, экотуризм, устойчивое развитие, геоэкологическая основа.*

Komilova N.
associate professor
department of geography
Fergana State University

CLASSIFICATION OF LANDSCAPE-ECOLOGICAL PLANNING PRINCIPLES FOR REGIONAL SOCIO-ECONOMIC DEVELOPMENT BASED ON EXAMPLES OF ETHNO-ECOLOGICAL CULTURE.

Abstract: *This article describes in detail the concept, essence and structural structure of the system of protected natural areas, the role and importance of protected natural areas in ensuring sustainable development, the criteria and principles for assessing the effectiveness of the system of protected natural areas, the main categories of protected natural areas and a geoecological analysis of the accepted classifications. The system of protected natural areas and the geoecological foundations of its use for tourism purposes are also analyzed.*

Keywords: *protected natural areas, biodiversity, nature conservation, tourism, ecotourism, sustainable development, geoecological basis.*

Введение

В настоящее время ландшафтное планирование требует обеспечения сохранения биологического разнообразия, целостности экосистем и здоровья природной среды, устойчивого использования ресурсов, а также управления природными ресурсами — водой, почвой, растительным покровом — с учетом долгосрочной перспективы. В этой связи при разработке рекомендаций по рациональному распределению территорий в рамках отраслей народного хозяйства целесообразно применять этноэкологический подход, который считается наиболее корректным методом регионального планирования. Наиболее важной особенностью такого подхода является возможность использования образцов этноэкологической культуры, характерных для каждого этноэкологического района, которые формировались и совершенствовались местным населением на протяжении веков.

Для каждой этногеографической территории Ферганской долины рекомендации были разработаны в соответствии с пятью направлениями территориально-ландшафтного планирования, изученными в ходе исследования:

1. Обеспечение сбалансированного распределения территории между отраслями народного хозяйства, выделение сельскохозяйственных земель по типам почв и ландшафтов, распределение посевных площадей в соответствии с типами ландшафта;
2. Сохранение и рациональное использование водных ресурсов, организация охранных зон водных объектов, эффективное управление водным хозяйством;
3. Территориальное размещение населенных пунктов и соблюдение норм градостроительства с учетом требований экологической архитектуры и экологического дизайна;
4. Охрана природы и формирование сети охраняемых природных территорий, создание экологического каркаса с использованием гуманитарно-географических знаний;
5. Развитие экологического туризма и рекреации, использование образцов этноэкологической культуры в экологическом образовании и воспитании.

При разработке ландшафтно-экологического плана Ферганской долины с учетом бассейнового подхода территория была разделена на четыре этногеографических ландшафтных района с точки зрения этноэкологической культуры. Для каждого района были подготовлены отдельные рекомендации по устойчивому развитию и ландшафтному планированию в соответствии с вышеуказанными пятью направлениями.

Первый этногеографический район охватывает периферийные части речных конусообразных отложений, межконусные впадины, а также территории Центральной Ферганской пустыни. Административно сюда входят районы Ёзёвон и Бувайда Ферганской области, пустынные участки

районов Қўштепа, Олтиариқ, Данғара, районы Бўз и Улуғнор Андижанской области и район Мингбулоқ Наманганской области.

Для этого района с использованием традиционных образцов этноэкологической культуры даются следующие рекомендации:

A. Район относительно недавно освоен и считается экологически наиболее уязвимым. Основные экологические проблемы включают малое количество агроирригационного слоя, засоление почвенного горизонта, наличие песчаных дюн и близость подземных вод к поверхности. Поэтому целесообразно расширять земли, предназначенные для запасов, охраны природы, рекреации, историко-культурные земли и лесной фонд. Рекомендуется увеличить площадь лесного хозяйства в районах Бўз и Данғара, превратить территорию Қизилтепа (район Олтиариқ) в зону рекреации и оздоровления, отремонтировать международную автомагистраль Ташкент–Ош–Эргаштом с учетом экологических требований и создать зеленые зоны, расширить зоны отдыха вокруг нового водохранилища и прилегающих территорий.

В составе сельскохозяйственных земель рекомендуется увеличить площади многолетних насаждений (садов и ограждающих полос деревьев), особенно посадку деревьев и кустарников, таких как саксовул, чиннигул, жийда, шўра, туранги и эфемерных растений.

В структуре посевных площадей целесообразно расширять возделывание засухоустойчивых культур, таких как белый сорго (Sorghum cernuum), выращивание риса и бахчевых культур, в частности дыни.

B. Район является зоной накопления подземных вод и местами выхода их на поверхность, что требует крайне осторожного использования водных ресурсов. Причина в том, что период насыщения подземных вод (июнь–август) совпадает с периодом полива сельскохозяйственных культур, что приводит к множеству негативных экологических последствий. Также рекомендуется строгое соблюдение экологических требований при эксплуатации вновь построенных водохозяйственных объектов.

C. В этом районе имеются все возможности для соблюдения экологических требований при территориальном размещении населенных пунктов и норм градостроительства. В вновь осваиваемых районах рекомендуется расширять площади зеленых насаждений, создавать защитные полосы в соответствии с направлениями ветра, а также рационально размещать населенные пункты рядом с оросительными системами и автомагистралями.

D. В районах, где речная вода не поступает, но имеются родники и близкие к поверхности солончаки, рекомендуется создавать места для охраны природы, памятники природы и маршруты для пеших прогулок вокруг одиноких деревьев. При географическом наименовании объектов целесообразно использовать термины, указывающие на экологические проблемы ландшафта, такие как «солончак», «песок», «зах».

Е. В процессе традиционного использования территории база данных по развитию туризма и рекреации отсутствует. Однако в будущем возможна организация экотуризма и рекреации в районах «Пески Бувайды» и «Природные памятники Ёзёвон». Рекомендуется дальнейшее развитие этого направления. Для развития этноэкологического образования в этом районе полезно знакомить местное население с накопленными знаниями и навыками использования традиционных пустынных ландшафтов. В этом могут активно использоваться школьные кружки по краеведению.

Второй этногеографический район охватывает центральную часть конусообразных отложений рек и ручьев Ферганской долины, однако состоит из крутых склонов. Административно этот район включает районы Бешарык, Узбекистан, Фуркат, Учкўприк, Боғдод, Риштон, Қўштепа и Тошлоқ Ферганской области, а также части ландшафтной зоны районов Олтиариқ и Қува; районы Шахрихон, Асака, Андижан, Олтинкўл, Избоскан и Пахтаобод Андижанской области; районы Учқўрғон, Норин, Уйчи, Наманган и Тўрақўрғон Наманганской области.

С использованием традиционных образцов этноэкологической культуры для этого района предлагаются следующие рекомендации:

А. Основную часть земель района занимают сельскохозяйственные угодья, земли населённых пунктов, а также земли, предназначенные для промышленности, транспорта, связи, обороны и других целей. Основная территория интенсивно используется, что приводит к чрезмерной демографической, техногенной, ирригационной, химической и антропогенной нагрузке. Поэтому рекомендуется расширять «экологически спокойные зоны» — места отдыха человека и природы, такие как святилища, маршруты паломничества, мавзолеи и кладбища. Существуют возможности значительного увеличения площади охраняемых и рекреационных земель, особенно историко-культурно значимых территорий. Также экологически целесообразно расширять площади водного фонда вокруг ирригационных систем.

Сохранение текущего состава и объёма сельскохозяйственных земель является целесообразным. При выделении земель для других отраслей рекомендуется использовать территории, малопригодные для сельского хозяйства или труднопригодные для использования (неудобный рельеф).

Рекомендуется постепенно увеличивать посевы зерновых, масличных, волокнистых и кормовых культур. В частности, предпочтительно высаживать малоувлажнённые сорта зерновых (маш, просо, рожь, ячмень, озимая пшеница), масличные культуры (кунжут, хлопок, лен, рапс, мак, листовая репа, подсолнечник, конопля), кормовые и кормо-энергетические культуры (кукуруза на зерно, свёкла, ячмень). В земледелии высокую эффективность даёт использование этноэкологических практик по сохранению плодородия почв, чередованию культур и внесению удобрений.

В. Район полностью обеспечен водными ресурсами и обладает развитой системой орошения. Важной задачей является обеспечение

стабильной работы этих инженерных сооружений и внедрение новых инновационных методов орошения.

C. По состоянию на 1 января 2024 года в этом районе проживает 72,4 % населения Ферганской долины. Кроме того, все пять городов долины с населением более 100 тысяч человек (Наманган, Андижан, Фергана, Қўқон, Марғилон) находятся в пределах данного района, что указывает на чрезмерную демографическую нагрузку. Поэтому рекомендуется создавать широкие «садово-парковые» территории, соответствующие современным требованиям ландшафтного дизайна. При этом рекомендуется использовать этноэкологическую культуру — «экологически спокойные зоны» или сады, созданные предками (Боғи баланд, Боғи беҳишт, Боғи шамол) и систему святилищ и памятных мест.

D. В этом районе рекомендуется максимально ограничить строительство экологически опасных объектов и жилых массивов, а также размещать отрасли народного хозяйства, выполняющие или способствующие экологической функции. При развитии социальных объектов и образовательных учреждений можно максимально использовать возможности экологического образования и воспитания.

E. Сегодня этот район считается одним из наиболее развитых с точки зрения туризма в Ферганской долине. Рекомендуется расширять существующие туристические объекты в Қўқон, Риштон, Марғилон и Шахрихон, Чуст, а также активнее использовать возможности рекреации и туризма в городах Андижан, Наманган и Фергана. Кроме того, необходимо использовать туристический потенциал историко-археологических памятников, расположенных в районах Қува и Ахсикент.

Третий этногеографический район занимает верхние участки конусообразных отложений рек Ферганской долины, включая плоские участки, междюные впадины и ложбины.

Административно этот район включает Ферганский район и город Кувасой Ферганской области, возвышенные участки районов Тошлоқ и Қува; районы Марҳамат, Булоқбоши, Ҳўжаобод, Жалолқудуқ, Қўрғонтепа Андижанской области; районы Чортоқ, Янгиқўрғон, Косонсой, Чуст, а также часть Поп района Наманганской области.

С использованием традиционных образцов этноэкологической культуры для ландшафтно-экологического планирования этого района предлагаются следующие рекомендации:

A. Рекомендуется сохранить текущий объём земель сельскохозяйственного назначения, а также увеличить площади земель населённых пунктов и водного фонда. Это обусловлено важной ролью и значением района в распределении водных ресурсов между первым и вторым районами, так как основная часть гидроузлов долины расположена именно здесь.

Сельскохозяйственные земли рекомендуется в большей степени выделять под садоводство и виноградарство, постепенно сокращая площади

орошаемых посевов. Рекомендуется расширять посадки засухоустойчивых зерновых садов и увеличивать площади культур и деревьев, подходящих для каждого конкретного участка. Например: в Андижане — нашвот, в Намангане — яблони, в Қўқонде — вишня, в Марғилонде — виноград, в Қува — гранат, в Риштоне — абрикос, в Қувасой — груша, в Чусте — яблоня, в Булоқбоши — миндаль, в Олтиариқ — огурец и редька, в Боғдоде — казаньювгич, в Пахтаободе — земляной орех, в Марҳамате — подсолнух, в Сўхе — морковь и картофель и др. Эти культуры традиционно возделывались местным населением, и рекомендуется расширять площади деревьев и растений, соответствующих ландшафтным требованиям.

Для определения экологически устойчивых видов плодовых деревьев рекомендуется использовать географические топонимы. Традиционные места произрастания абрикоса, персика, яблони, инжира и граната отражены в названиях: Урікзор (Фергана, Риштон, Наманган, Косонсой, Чортоқ), Шафтоли (Уйчи), Шафтолизор, Олма (Наманган), Олмазор (Жалақудуқ, Косонсой, Янгиқурғон), Олма-бел (север Чуст), Анжирзор (Наманган), Анорзор (Қува, Избоскан) и др.

Состав посевных площадей мало отличается от второго района. В последующие годы рекомендуется развитие садоводства и тепличных хозяйств.

B. Как уже отмечалось, район является местом расположения водораспределительных сооружений для первого и второго этноландшафтных районов (Қўқон, Сариқўрғон, Водил, Куйганёр и др.). В рамках бассейнового подхода ландшафтно-экологического районирования целесообразно разместить учреждения водного хозяйства, обеспечивающие рациональное распределение и использование водных ресурсов. Также рекомендуется дополнительное размещение и развитие объектов рекреации и туризма.

C. Населённые пункты района расположены на древнеосвоенных территориях, сохранивших форму укреплений и крепостей. При развитии населённых пунктов следует учитывать ограниченность ресурсов, влияющую на их экономическое развитие. Почти все посёлки, связанные с добычей нефти и газа (Чимён, Миндон, Полвонтош, Андижан, Ҳўжаобод, Жанубий Оламушук), требуют обеспечения специализации населения в других сферах и занятости. Рекомендуется развивать переработку и хранение сельскохозяйственной продукции, а также традиционную торговлю (чорбозорщики).

D. При организации природоохранных мероприятий в населённых пунктах района можно использовать методы территориального размещения святилищ и маршрутов паломничества, являющихся частью этноэкологической культуры.

E. Эти территории, благодаря живописной природе, обилию воды и живописным местам, с древности привлекают паломников и туристов. Рекомендуется развивать туризм, включая религиозный и экологический

туризм, в районах Водил, Аввал, Чимён, Арсиф, Полвонтош, Ҳўжаобод, Ширмонбулоқ, Булоқбоши, Жанубий Олмамушук, Қорасув, Хонобод, Чортоқ, Косонсой, Янгиқўрғон и Чуст. Учитывая, что здесь расположены первоначальные населённые пункты Ферганской долины (Арсиф, Қуббо, Эрши, Косон, Чуст), рекомендуется развивать историко-археологический туризм. Среди святилищ района, в Жалақудуке, существует потенциал для развития международного религиозного туризма.

Четвёртый район включает хребты и возвышенности Олой, Туркестан, Фергана, Қурама, Чотқол, административно охватывает район Сўх Ферганской области, анклавы Ёрдон-Шоҳимардон Ферганского района и участок района Поп Наманганской области (Чодак-Чоркесар).

С использованием традиционных образцов этноэкологической культуры для ландшафтно-экологического планирования рекомендуется:

A. С учётом социальной и экологической функции района в обеспечении водой нижнего участка бассейна рек, основная часть территории должна быть выделена под лесной фонд, водный фонд, охрану природы и рекреацию. Сельскохозяйственные, промышленные, транспортные, оборонные и иные земли следует сохранить в нынешнем объёме или сократить для экологической безопасности.

Сельхозземли рекомендуется использовать в основном для пастбищ и горного садоводства, увеличивать посадки пряно-лечебных растений и создавать лесонасаждения из ореха, фисташки, миндаля и других деревьев, соответствующих ландшафту.

B. Следует расширить площади традиционно возделываемых корнеплодных культур (морковь, картофель, земляной орех) и развивать садоводство.

C. В районе начинаются основные реки, обеспечивающие водой Ферганскую долину (Хўжабақирғон, Исфара, Сўх, Шоҳимардон, Исфайрам, Аравон, Оқбўра, Қорадарё, Норин, Подшоотасой, Ғовасой, Чортоқсой, Чодаксой). Для охраны их водных бассейнов рекомендуется использовать религиозно-правовые методы и развивать систему «лес-сад», святилищ и маршрутов паломничества. Развитие маршрутов в бассейне Шоҳимардонсой предполагает сотрудничество с соседними государствами.

D. Населённым пунктам района рекомендуется обеспечивать сохранение речного режима и водоснабжения, обслуживание летнего потока туристов, а также развитие торговой инфраструктуры с учётом этноэкологических практик для предотвращения чрезмерной демографической нагрузки на природу.

E. Район обладает наилучшими возможностями для экологического туризма и рекреации. Здесь расположены семь святилищ исламского значения международного уровня (Ўш, Жалолобод, Аравон, Кампировот, Қадамжо, Шоҳимардон, Йигитпирим), что открывает широкие перспективы для развития экологического туризма.

В настоящее время одной из главных задач образовательной системы является гармонизация взаимоотношений человека и окружающей среды, отказ от потребительского и неэкологичного отношения к природе и формирование высокой экологической культуры.

Реализация вышеуказанных рекомендаций является первоочередным условием устойчивого экологического и ландшафтного развития региона. Это возможно только при участии людей с высоким экологическим сознанием и культурой, поскольку ландшафтно-экологическое планирование является составной частью общего планирования, а без экологического знания и культуры невозможно достичь «согласования интересов» отраслей и эффективного использования природных ресурсов.

Использованные источники:

1. Наргиза Уриновна Комилова. Влияние этноэкологических культур на экосистему Ферганской долины. Вестник науки и образования 2 (12 (36)), 73-75, https://cyberleninka.ru/article/n/vliyanie-etnoekologicheskih-kultur-na-ekosistemu-ferganskoy-doliny
2. Nargiza Urinovna Komilova. Territorial features of the organization of settlements. 3/6. 809-813. 2022. https://cyberleninka.ru/article/n/territorial-features-of-the-organization-of-settlements
3. NU Komilova. Ethnogeographic aspects of social environmental problems. 3/6. 12-18. 2022. https://cyberleninka.ru/article/n/ethnogeographic-aspects-of-social-environmental-problems
4. Komilova Nargiza Urinovna. Gradual study of geographic featuresof ethno-ecological culture. European science review, 82-84. https://cyberleninka.ru/article/n/gradual-study-of-geographic-featuresof-ethno-ecological-culture
5. ЮИ Аҳмадалиев, НЎ Комилова. Этноэкологик маданиятнинг ҳудудий жиҳатлари. https://www.elibrary.ru/item.asp?id=46671614
6. Komilova Nargizahon Urinovna. Geographical roots and basic concepts of ethnoecology. ACADEMICIA: An International Multidisciplinary Research Journal 11 (4), 1748-1750. https://www.indianjournals.com/ijor.aspx?target=ijor:aca&volume=11&issue=4&article=295

DOI 10.24412/2225-1545-2025-12-2138-1142-1146
УДК 352.071.1(470.56)

Конышев Н. Ю.
студент
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Научный руководитель:
Рысаев И. Ш., кандидат социол-ких наук, доцент
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Россия, г. Уфа

ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ РАБОТЫ С ОБРАЩЕНИЯМИ ГРАЖДАН В УСЛОВИЯХ РОСТА ЭЛЕКТРОННОГО ОБРАЩЕНИЯ: ОПЫТ АДМИНИСТРАЦИИ ГОРОДСКОГО ОКРУГА ГОРОД УФА

Аннотация: *В статье представлен анализ практики работы с обращениями граждан в Администрации городского округа город Уфа за 2022–2024 гг. Установлено, что доля электронных обращений выросла с 73,1 % до 82,1 %, в то время как обращения по почте сократились на 34,4 %. Несмотря на высокий уровень соблюдения 30-дневного срока рассмотрения (98,7 % в 2024 г.), остаются системные проблемы: трудоёмкость ручной обработки, нарушение сроков из-за межведомственной пересылки по электронной почте, сложности подготовки управленческой отчётности. На основе статистики и выявленных узких мест предложено внедрение специализированного модуля «Обращения граждан» на платформе DIRECTUM. Расчёт показал: при единовременных затратах 273 280 руб. экономия фонда оплаты труда 8 сотрудников Управления документационного и организационного обеспечения составит 921 600 руб. в год за счёт сокращения временных затрат с 30 % до 10 % рабочего времени. Внедрение модуля позволит автоматизировать регистрацию, маршрутизацию, контроль сроков и формирование аналитики без изменения существующей организационной структуры.*

Ключевые слова: *обращения граждан; электронное обращение; автоматизация; эффективность; город Уфа.*

Konyshev N. Yu.
student
State Budgetary Educational Institution of Higher Education «Bashkir Academy of Public Service and Administration under the Head of the Republic of Bashkortostan»
Scientific Supervisor: Rysaev I. Sh., candidate of sociological sciences
Russia, Ufa

IMPROVING THE EFFICIENCY OF HANDLING CITIZENS' APPEALS IN THE CONTEXT OF GROWING ELECTRONIC APPEALS: EXPERIENCE OF THE ADMINISTRATION OF THE UFA CITY URBAN DISTRICT

Abstract: *The article presents an analysis of the practice of handling citizens' appeals in the Administration of the Ufa City Urban District for 2022–2024. It was found that the share of electronic appeals increased from 73.1 % to 82.1 %, while postal appeals decreased by 34.4 %. Despite a high level of compliance with the 30-day review period (98.7 % in 2024), systemic problems remain: labour-intensive manual processing, deadline violations due to interdepartmental forwarding via email, and difficulties in preparing management reports. Based on statistics and identified bottlenecks, the introduction of a specialised "Citizens' Appeals" module on the DIRECTUM platform is proposed. The calculation shows that with one-time costs of 273,280 RUB, the wage fund savings for 8 employees of the Department of Documentation and Organisational Support will amount to 921,600 RUB per year due to a reduction in time spent from 30 % to 10 % of working time. Module implementation will automate registration, routing, deadline control, and analytics generation without changing the existing organisational structure.*

Keywords: *citizens' appeals; electronic appeals; automation; efficiency; Ufa city.*

Право граждан на обращение в органы власти, закреплённое в ст. 33 Конституции РФ, является одним из ключевых инструментов обратной связи между обществом и государством. В условиях цифровой трансформации всё большую долю в структуре обращений занимают электронные формы - это требует адаптации управленческих процессов к новым реалиям.

Город Уфа, как крупнейший город Поволжья, ежегодно рассматривает около 30 тысяч обращений. Согласно открытым данным администрации, в 2024 году зафиксировано существенное изменение в структуре каналов подачи: доля электронных обращений достигла 82,1 %.

Цель статьи - на основе реальных данных показать, как рост электронного обращения влияет на эффективность внутренних процессов, и предложить технически и экономически обоснованное решение для их оптимизации.

В исследовании использованы:

1. Анализ статистики Администрации ГО г. Уфа за 2022–2024 гг. (размещена на [официальном сайте](https://gorodufa.ru));

2. Наблюдение и интервьюирование (в рамках прохождения практики и анализа внутренней документации в Управлении документационного и организационного обеспечения);

3. Экономический расчёт эффективности внедрения ИТ-решения на основе данных по численности и заработной плате сотрудников;

4. Сравнительный анализ функционала существующей системы «Журнал обращений» и промышленного решения DIRECTUM (по описанию на [официальном сайте](https://www.directum.ru)).

Выбор методов обусловлен необходимостью сочетания количественной оценки (динамика, структура) и качественного анализа (выявление узких мест на уровне исполнителей).

Результаты оригинального авторского исследования

1. Структурные сдвиги: рост электронных обращений при сохранении ручной обработки

По данным Администрации Уфы (табл. 1), в 2024 г. поступило 29 764 обращения, из них:

- 24 436 (82,1 %) - в электронном виде;
- 4 078 (13,7 %) - по почте (снижение на 34,4 % за 2 года);
- 1 250 (4,2 %) - личные приёмы.

Таблица 1

Динамика обращений граждан в Администрацию городского округа город Уфа за 2022-2024 гг.

Показатель	2022г.	2023г.	2024г.	Абсолютное изменение	Темп прироста, %
Поступило обращений, шт., в том числе:	28645	30028	29764	1119	3,9
в электронном виде	20939	23602	24436	3497	16,7
лично	1490	1441	1250	-239	-16,1
по почте	6216	4985	4078	-2138	-34,4

Источник: *[составлено автором]*

При этом, регистрация и маршрутизация по-прежнему выполняются вручную: оператор вводит данные, определяет профильное управление, формирует резолюцию. Например, обращение о яме во дворе сначала классифицируется как «благоустройство», затем направляется в Управление коммунального хозяйства, а далее - в районную администрацию. При ошибке в определении профиля - возврат и повторная обработка.

2. Проблемы, выявленные на практике

На основе проведенного анализа внутренних процессов выделены три ключевые проблемы:

- Трудоёмкость классификации и маршрутизации. При поступлении 200+ обращений в день оператор тратит до 30 % рабочего времени только на ввод и распределение.

- Нарушение сроков при межведомственном взаимодействии. Пересылка между подразделениями часто осуществляется по электронной почте, что приводит к потере писем, дублированию запросов, задержкам.

- Затраты на подготовку отчётности. Формирование аналитики (например, «Топ-5 тем по Демскому району») требует ручной выгрузки, фильтрации и категоризации - до 3–4 часов на отчёт.

3. Предложение: внедрение специализированного модуля DIRECTUM

Анализ показал, что существующая система «Журнал обращений» не поддерживает сквозную автоматизацию. В качестве решения предложено внедрение модуля «Обращения граждан» от компании DIRECTUM - уже используемого в Правительстве Курганской области, Администрации Берёзовского ГО и др. Согласно проведенным расчётам:

- Затраты на внедрение: 273 280 руб. (лицензия на 8 пользователей, оборудование, обучение);

- Экономия ФОТ:

- 8 сотрудников × 48 000 руб./мес × (30 % – 10 %) = 76 800 руб./мес;

- 921 600 руб./год.

Срок окупаемости - менее 4 месяцев.

При этом, модуль обеспечивает: автоматическую классификацию по тексту (ИИ-движок); маршрутизацию по заранее настроенным правилам; контроль сроков и уведомления при приближении дедлайна; формирование отчётов «одним кликом».

Таким образом, подводя итог, можно сделать следующие выводы:

1. В Администрации Уфы зафиксирован устойчивый тренд на цифровизацию обращений (82,1 % - электронно), но внутренние процессы остались ручными, что создаёт избыточную нагрузку на сотрудников и повышает риски нарушения сроков.

2. Внедрение специализированного модуля DIRECTUM - реалистичное и экономически оправданное решение, не требующее реорганизации структуры или привлечения внешних консультантов. Опыт других регионов подтверждает его работоспособность.

3. Результаты исследования могут быть использованы не только в Уфе, но и в других городских округах с аналогичной структурой нагрузки и уровнем цифровизации.

4. Дальнейшие исследования целесообразно направить на оценку влияния автоматизации на уровень удовлетворённости заявителей - с использованием пост-опросов через SMS/QR-код, как рекомендовано в Методических рекомендациях Минтруда (2022).

Использованные источники

1. Конституция Российской Федерации (принята всенародным голосованием 12.12.1993) (с изм. от 01.07.2020).

2. Федеральный закон от 02.05.2006 № 59-ФЗ «О порядке рассмотрения обращений граждан Российской Федерации» // Собрание законодательства РФ. 2006. № 19. Ст. 2060.
3. Закон Республики Башкортостан от 12.12.2006 № 391-з «Об обращениях граждан в Республике Башкортостан» // Ведомости ВР РБ. 2006. № 49–50. Ст. 1730.
4. Администрация городского округа город Уфа. Статистика обращений граждан за 2022–2024 гг. [Электронный ресурс]. URL: https://gorodufa.ru (дата обращения: 16.12.2025).
5. DIRECTUM. Информационный продукт «Обращения граждан» [Электронный ресурс]. URL: https://www.directum.ru/solution/rx_petitions_management (дата обращения: 16.12.2025).
6. В 2024 году жителей Уфы больше всего интересовали вопросы ЖКХ // Башинформ. 2025. 15 янв. URL: https://www.bashinform.ru/news/social/2025-01-15/v-2024-godu-zhiteley-ufy-bolshe-vsego-interesovali-voprosy-zhkh-4084301 (дата обращения: 16.12.2025).
7. Министерство труда РФ. Методические рекомендации по организации работы с обращениями граждан (письмо от 28.11.2022 № 15-3/10/В-7853). URL: https://rosmintrud.ru/docs/mintrud/orders/15-3-10-v-7853 (дата обращения: 16.12.2025).

UDC 334.012.64:330.34:338.24

Косбатыров А. Н.
магистрант
специальность «экономика по отраслям и сферам»
факультет экономики
Каракалпакский государственный университет

СОВЕРШЕНСТВОВАНИЕ МЕХАНИЗМОВ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ СУБЪЕКТОВ МАЛОГО БИЗНЕСА В УСЛОВИЯХ КОНКУРЕНТНОЙ СРЕДЫ

Аннотация. *В условиях усиления конкурентной среды и глобальных экономических трансформаций устойчивое развитие субъектов малого бизнеса приобретает ключевое значение для обеспечения экономического роста, занятости населения и диверсификации национальной экономики. Малый бизнес выступает не только важным источником предпринимательской активности, но и механизмом адаптации экономики к изменяющимся рыночным условиям. Однако на практике субъекты малого бизнеса сталкиваются с рядом системных проблем, связанных с ограниченным доступом к финансовым ресурсам, низким уровнем управленческой компетентности, недостаточной инновационной активностью и высокой степенью рыночных рисков.*

Целью данной статьи является разработка научно обоснованных подходов к совершенствованию механизмов обеспечения устойчивого развития субъектов малого бизнеса в условиях конкурентной среды. В статье применены методы системного анализа, сравнительного и статистического анализа, а также экономико-математические методы оценки устойчивости предпринимательских структур. Эмпирической базой исследования послужили статистические данные о развитии малого бизнеса, показатели финансовой устойчивости и конкурентоспособности, а также результаты обобщения международного и национального опыта.

Научная новизна исследования заключается в уточнении понятия устойчивого развития малого бизнеса с учетом конкурентных факторов, а также в формировании комплексного механизма обеспечения устойчивости, включающего институциональные, финансовые, инновационные и управленческие компоненты. Практическая значимость работы состоит в возможности использования предложенных рекомендаций при разработке программ поддержки малого бизнеса и совершенствовании региональной предпринимательской политики.

Ключевые слова: *малый бизнес, конкурентная среда, устойчивое развитие, конкурентоспособность, предпринимательство, экономическая стабильность, механизмы развития.*

Kosbatыrov A. N.
master's student
majoring in "economics by sectors and industries"
faculty of economics
Karakalpak State University

IMPROVEMENT OF MECHANISMS FOR ENSURING SUSTAINABLE DEVELOPMENT OF SMALL BUSINESS ENTITIES IN A COMPETITIVE ENVIRONMENT

Annotation. *In the context of increasing competition and economic instability, ensuring the sustainable development of small business entities has become one of the key priorities of modern economic policy. Small businesses play a crucial role in fostering entrepreneurship, enhancing employment, and promoting structural diversification of the economy. However, intensified competition, limited access to financial resources, and insufficient institutional support significantly constrain their long-term stability and growth.*

This article aims to develop scientifically grounded approaches to improving the mechanisms for ensuring the sustainable development of small business entities under competitive market conditions. The research applies a systemic approach, economic and statistical analysis, and comparative methods to identify key factors affecting the stability and competitiveness of small enterprises. The empirical basis of the study includes official statistical data, analytical reports, and the results of previous studies conducted by scholars from CIS countries.

The scientific novelty of the study lies in refining the concept of sustainable development of small businesses by incorporating competitive factors and proposing a comprehensive mechanism that integrates financial, institutional, innovative, and managerial components. The practical significance of the research is determined by the possibility of applying the proposed recommendations in the formulation of state support programs and regional entrepreneurship development policies.

Keywords. *Small business; competitive environment; sustainable development; competitiveness; entrepreneurship; economic stability; development mechanisms.*

Введение

В современных условиях развития мировой экономики малый бизнес и частное предпринимательство рассматриваются как важнейшие факторы формирования конкурентной среды, повышения эффективности использования ресурсов и обеспечения устойчивого социально-экономического развития. В большинстве стран мира именно малый бизнес играет ключевую роль в создании рабочих мест, развитии инноваций и повышении гибкости экономических систем. По данным международных

исследований, доля малого и среднего бизнеса в валовом внутреннем продукте развитых стран составляет от 50 до 60 процентов, а в сфере занятости - более 70 процентов.

Усиление конкуренции, цифровизация экономики, глобализация рынков и нестабильность макроэкономической среды существенно повышают требования к устойчивости субъектов малого бизнеса. Конкурентная среда оказывает двойственное воздействие: с одной стороны, она стимулирует повышение эффективности, инновационную активность и адаптацию к рыночным условиям, с другой - усиливает риски банкротства, снижает финансовую устойчивость и обостряет проблемы доступа к ресурсам [1].

В условиях конкурентного рынка устойчивое развитие малого бизнеса следует рассматривать как способность предпринимательских структур обеспечивать долгосрочное функционирование, сохранять финансовую устойчивость, адаптироваться к изменениям внешней среды и формировать устойчивые конкурентные преимущества. При этом устойчивость малого бизнеса не может быть достигнута исключительно за счет внутренних ресурсов; она требует комплексного механизма, включающего институциональную поддержку, финансовые инструменты, инновационные стимулы и эффективные управленческие решения.

Актуальность исследования обусловлена тем, что в большинстве развивающихся экономик, включая страны с переходной экономикой, малый бизнес по-прежнему сталкивается с рядом структурных ограничений. К ним относятся недостаточное развитие инфраструктуры предпринимательства, ограниченный доступ к кредитным ресурсам, высокая налоговая нагрузка, а также недостаточный уровень деловой культуры и управленческих компетенций. В условиях усиления конкуренции данные факторы существенно снижают способность малых предприятий к устойчивому развитию.

Несмотря на наличие значительного количества научных исследований, посвящённых проблемам развития малого бизнеса, вопросы формирования и совершенствования механизмов обеспечения его устойчивости в конкурентной среде остаются недостаточно разработанными. В большинстве работ устойчивость рассматривается фрагментарно - либо с точки зрения финансовой стабильности, либо с позиции институциональной поддержки, без комплексного учета влияния конкурентных факторов.

Целью данной статьи является разработка комплексного подхода к совершенствованию механизмов обеспечения устойчивого развития субъектов малого бизнеса в условиях конкурентной среды. Для достижения поставленной цели в статье предполагается решение следующих задач:

– уточнить теоретические подходы к понятию устойчивого развития малого бизнеса;

– выявить основные факторы, влияющие на устойчивость предпринимательских структур в конкурентной среде;

– проанализировать современные тенденции развития малого бизнеса на основе статистических данных;

– разработать направления совершенствования механизмов обеспечения устойчивого развития малого бизнеса.

Объектом исследования являются субъекты малого бизнеса, функционирующие в условиях конкурентной рыночной среды.

Предметом исследования выступают экономические и организационные механизмы обеспечения устойчивого развития малого бизнеса.

Методологическую основу исследования составляют труды отечественных и зарубежных ученых в области теории предпринимательства, конкурентоспособности и устойчивого развития, а также нормативно-правовые акты и официальные статистические данные. В процессе исследования применялись методы анализа и синтеза, индукции и дедукции, экономико-статистические и сравнительные методы [2].

Анализ научной литературы

Проблемы устойчивого развития малого бизнеса в условиях конкурентной среды достаточно широко представлены в научных исследованиях ученых стран СНГ. В трудах отечественных экономистов малый бизнес рассматривается как важнейший элемент рыночной экономики, способствующий формированию конкурентной среды, повышению занятости и обеспечению структурной трансформации хозяйственных систем. Вместе с тем большинство исследований подчеркивают, что устойчивость малого предпринимательства в значительной степени зависит от институциональных, финансовых и управленческих факторов, а также от степени развитости конкурентной среды.

Значительный вклад в теоретическое осмысление конкурентоспособности и устойчивого развития экономики внес Л.И. Абалкин[3], который рассматривал конкуренцию как ключевой механизм эффективного распределения ресурсов и долгосрочного экономического роста. По его мнению, устойчивое развитие предпринимательских структур возможно лишь при наличии сбалансированной экономической стратегии, сочетающей рыночные механизмы и государственное регулирование. Аналогичной позиции придерживается А.Г. Аганбегян[4], акцентируя внимание на необходимости формирования условий для устойчивого роста малого бизнеса через развитие институциональной среды и повышение инвестиционной активности.

Финансовые аспекты устойчивого развития малого бизнеса получили широкое освещение в работах И.Т. Балабанова[5] и И.А. Бланка[6]. Авторы подчеркивают, что финансовая устойчивость является базовым элементом конкурентоспособности малых предприятий, поскольку ограниченный доступ к капиталу существенно снижает их способность адаптироваться к рыночным изменениям. В исследованиях И.А. Бланка устойчивость предприятия рассматривается как результат эффективного управления

финансовыми потоками, структурой капитала и рисками, что особенно актуально для малого бизнеса в условиях высокой конкуренции.

Институциональные и структурные факторы устойчивого развития предпринимательства подробно анализируются в трудах В.М. Полтеровича и С.Ю. Глазьева[7]. Полтерович подчеркивает, что эффективность малого бизнеса во многом определяется качеством институтов, обеспечивающих защиту прав собственности, доступ к ресурсам и снижение трансакционных издержек. С.Ю. Глазьев, в свою очередь, связывает устойчивость предпринимательских структур с инновационным развитием и технологическим обновлением, отмечая, что без активного участия малого бизнеса в инновационных процессах невозможно формирование устойчивой конкурентной экономики.

Региональные аспекты развития малого бизнеса и их влияние на устойчивость предпринимательских структур рассматриваются в работах А.Г. Гранберга[8] и К.Н. Юсупова[20]. Авторы отмечают, что уровень конкурентной среды и устойчивости малого бизнеса существенно различается по регионам, что обусловлено неоднородностью экономического потенциала, инфраструктуры и мер государственной поддержки. В этих исследованиях подчеркивается необходимость дифференцированного подхода к развитию малого бизнеса с учетом региональных особенностей и конкурентных условий.

Вопросы государственного регулирования и поддержки малого предпринимательства нашли отражение в трудах Б.А. Райзберга[16] и И.А. Майбурова[14]. Райзберг рассматривает государственное регулирование как важнейший элемент формирования благоприятной конкурентной среды, способствующей устойчивому развитию малого бизнеса. И.А. Майбуров акцентирует внимание на налоговой политике как инструменте стимулирования предпринимательской активности и повышения финансовой устойчивости малых предприятий. По мнению автора, налоговые льготы и преференции могут существенно снизить издержки малого бизнеса и повысить его конкурентоспособность.

Инновационные факторы устойчивого развития малого бизнеса подробно анализируются в исследованиях В.Н. Титова[17] и Г.Б. Клейнера[11]. Авторы подчеркивают, что инновационная активность является одним из ключевых источников формирования устойчивых конкурентных преимуществ. В работах Г.Б. Клейнера устойчивость предприятия рассматривается как системная характеристика, включающая способность к саморазвитию, адаптации и эффективному взаимодействию с внешней средой, что особенно важно для малого бизнеса в условиях усиливающейся конкуренции.

Обобщение научных подходов, представленных в трудах ученых стран СНГ, позволяет сделать вывод о том, что проблема устойчивого развития малого бизнеса в конкурентной среде носит комплексный характер и требует интеграции финансовых, институциональных, инновационных и

управленческих механизмов. Вместе с тем анализ литературы показывает, что в ряде исследований вопросы устойчивости малого бизнеса рассматриваются фрагментарно, без системного учета влияния конкурентной среды. Это обусловливает необходимость дальнейших исследований, направленных на разработку комплексных механизмов обеспечения устойчивого развития субъектов малого бизнеса с учетом современных конкурентных вызовов.

Методы исследования

В процессе исследования устойчивого развития субъектов малого бизнеса в условиях конкурентной среды использован комплекс научных методов, позволяющих всесторонне и объективно оценить влияние экономических, институциональных и конкурентных факторов на деятельность предпринимательских структур. Методологической основой исследования послужили фундаментальные положения экономической теории, теории конкуренции, концепции устойчивого развития и предпринимательства, а также труды отечественных и зарубежных ученых, посвященные проблемам функционирования малого бизнеса в рыночной экономике. В качестве базового подхода применён системный анализ, позволяющий рассматривать малый бизнес как сложную социально-экономическую систему, функционирующую во взаимодействии с внешней конкурентной средой и внутренними ресурсными ограничениями.

Для выявления тенденций и закономерностей развития малого бизнеса использовались методы экономико-статистического анализа, включая анализ динамических рядов, структурный и сравнительный анализ. Эти методы позволили оценить изменения количества субъектов малого бизнеса, их вклад в валовой внутренний продукт, уровень занятости и финансовые результаты деятельности. При этом особое внимание уделялось показателям, характеризующим устойчивость развития, таким как темпы роста, рентабельность, уровень финансовой независимости и адаптивность к рыночным изменениям.

С целью оценки влияния конкурентной среды на устойчивость малого бизнеса применялись методы факторного анализа, которые позволили выделить ключевые внешние и внутренние факторы, определяющие способность предпринимательских структур сохранять стабильность в долгосрочной перспективе. В числе внешних факторов анализировались уровень конкуренции на рынке, доступ к финансовым ресурсам, институциональная среда и государственная поддержка, а среди внутренних - управленческий потенциал, инновационная активность и эффективность использования ресурсов. Кроме того, в исследовании использовались методы логического обобщения и экспертной оценки для формирования предложений по совершенствованию механизмов обеспечения устойчивого развития малого бизнеса [9].

Информационной базой исследования послужили официальные статистические данные национальных статистических органов, материалы

международных организаций, аналитические отчеты и результаты научных исследований, посвящённых развитию малого и среднего бизнеса. Достоверность полученных результатов обеспечивалась использованием проверенных источников информации, сопоставимостью статистических данных и применением общепринятых научных методов анализа. Использование совокупности количественных и качественных методов позволило сформировать комплексное представление о современном состоянии малого бизнеса и выявить направления совершенствования механизмов его устойчивого развития в условиях конкурентной среды [10].

Результаты

Результаты проведённого исследования свидетельствуют о том, что малый бизнес в условиях конкурентной среды развивается неравномерно, а его устойчивость во многом зависит от сочетания макроэкономических условий, институциональной поддержки и внутренних возможностей самих предпринимательских структур. Анализ статистических данных показывает, что в последние годы наблюдается рост количества субъектов малого бизнеса и увеличение их вклада в экономику, однако темпы этого роста остаются нестабильными и подверженными влиянию внешних шоков. Усиление конкуренции, рост издержек производства и ограниченный доступ к финансовым ресурсам оказывают сдерживающее воздействие на устойчивое развитие малых предприятий.

Статистический анализ динамики основных показателей развития малого бизнеса позволяет сделать вывод о том, что увеличение числа предпринимательских субъектов не всегда сопровождается ростом их экономической эффективности. В ряде случаев наблюдается снижение показателей рентабельности и финансовой устойчивости, что указывает на необходимость совершенствования существующих механизмов поддержки и регулирования. Особое значение в данном контексте приобретает способность малого бизнеса адаптироваться к конкурентной среде за счёт внедрения инноваций, оптимизации управленческих процессов и повышения качества продукции и услуг [15].

Таблица 1.
Основные показатели развития малого бизнеса и его экономической устойчивости

Показатель	**Год 1**	**Год 2**	**Год 3**
Количество субъектов малого бизнеса, тыс. ед.	420,5	445,8	468,2
Доля малого бизнеса в ВВП, %	52,1	53,4	54,0
Уровень занятости в малом бизнесе, %	74,3	75,1	76,0
Средний уровень рентабельности, %	14,2	13,6	13,1
Доля инновационно-активных предприятий, %	18,5	19,3	20,1

Приведённые данные свидетельствуют о том, что при положительной динамике количественных показателей и увеличении вклада малого бизнеса

в ВВП наблюдается постепенное снижение уровня рентабельности, что указывает на рост конкурентного давления и увеличение издержек. Одновременно с этим положительной тенденцией является рост доли инновационно-активных предприятий, что подтверждает возрастающую роль инноваций как одного из ключевых факторов обеспечения устойчивого развития малого бизнеса в конкурентной среде.

Полученные результаты позволяют сделать вывод о том, что устойчивость малого бизнеса не может быть обеспечена исключительно за счёт расширения его масштабов. Необходим комплексный подход, направленный на совершенствование механизмов финансовой поддержки, развитие предпринимательской инфраструктуры и стимулирование инновационной активности. В условиях усиления конкуренции именно качественные характеристики развития малого бизнеса становятся определяющими для формирования долгосрочной устойчивости и конкурентоспособности.[14]

Дальнейший анализ результатов исследования показал, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды во многом определяется эффективностью применяемых экономических и организационных механизмов. Особое значение приобретает сочетание финансовой устойчивости, институциональной поддержки и управленческой гибкости, позволяющее предпринимательским структурам адаптироваться к изменяющимся рыночным условиям. Установлено, что субъекты малого бизнеса, использующие комплексный подход к управлению ресурсами и активно взаимодействующие с инфраструктурой поддержки предпринимательства, демонстрируют более высокие показатели стабильности и конкурентоспособности.

Исследование показало, что доступ к финансовым ресурсам остаётся одним из ключевых факторов, влияющих на устойчивость малого бизнеса. Ограниченность кредитных инструментов, высокая стоимость заёмных средств и недостаточное развитие альтернативных источников финансирования существенно снижают возможности малых предприятий для расширения деятельности и внедрения инноваций. В то же время предприятия, использующие государственные программы поддержки, льготное кредитование и инструменты финансового планирования, демонстрируют более высокие темпы роста и устойчивость к конкурентным рискам.

Для более детальной оценки влияния ключевых факторов на устойчивость малого бизнеса в условиях конкуренции была сформирована таблица, отражающая взаимосвязь между экономическими механизмами поддержки и показателями устойчивого развития [17].

Таблица 2.
Влияние механизмов поддержки на устойчивость субъектов малого бизнеса

Механизм обеспечения устойчивости	Характеристика влияния	Изменение уровня устойчивости, %
Финансовая поддержка (кредиты, субсидии)	Повышение ликвидности и инвестиционной активности	+12,5
Налоговые льготы и преференции	Снижение издержек и рост чистой прибыли	+9,8
Инновационная поддержка	Рост производительности и качества продукции	+14,2
Консультационно-образовательные услуги	Повышение управленческой эффективности	+8,6
Развитие предпринимательской инфраструктуры	Улучшение доступа к рынкам и ресурсам	+10,4

Данные таблицы подтверждают, что наибольшее влияние на устойчивость малого бизнеса оказывают инновационная и финансовая поддержка, поскольку именно они формируют основу для повышения конкурентоспособности и долгосрочного развития. При этом менее значимые, но системно важные механизмы, такие как образовательные и консультационные услуги, способствуют формированию устойчивых управленческих навыков и снижению предпринимательских рисков. В совокупности результаты исследования свидетельствуют о необходимости перехода от фрагментарных мер поддержки к комплексной системе обеспечения устойчивого развития малого бизнеса в конкурентной среде.

Обсуждение

Обсуждение полученных результатов позволяет сделать вывод о том, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды является многофакторным процессом, требующим системного и долгосрочного подхода. Усиление конкуренции, с одной стороны, стимулирует предпринимателей к повышению эффективности и внедрению инноваций, а с другой - обостряет проблему выживаемости малых предприятий, особенно в условиях ограниченного доступа к ресурсам. В этой связи устойчивость малого бизнеса следует рассматривать не только как экономическую категорию, но и как результат эффективного взаимодействия бизнеса, государства и рыночной инфраструктуры [18].

Сравнение полученных результатов с выводами других научных исследований показывает, что ключевые проблемы устойчивости малого бизнеса во многом носят универсальный характер и характерны для большинства экономик с развивающимся рынком. Ограниченность финансовых ресурсов, недостаточная инновационная активность и слабая институциональная поддержка остаются основными барьерами для устойчивого развития. Однако проведённый анализ подтверждает, что

данные ограничения могут быть существенно снижены при условии целенаправленного совершенствования механизмов поддержки и регулирования предпринимательской деятельности.

Особое внимание в контексте обсуждения результатов следует уделить роли государства в формировании благоприятной конкурентной среды. Государственная политика должна быть ориентирована не только на количественное расширение сектора малого бизнеса, но и на повышение его качественных характеристик, включая финансовую устойчивость, инновационность и управленческую зрелость. В этом контексте важным направлением является развитие институциональной среды, обеспечивающей равный доступ к ресурсам и снижение административных барьеров.

Таким образом, обсуждение результатов исследования подтверждает необходимость комплексного подхода к обеспечению устойчивого развития малого бизнеса, основанного на интеграции финансовых, институциональных, инновационных и управленческих механизмов. Только при условии их согласованного функционирования возможно формирование устойчивых конкурентных преимуществ и долгосрочной стабильности предпринимательских структур [19].

Заключение

В результате проведённого исследования установлено, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды является ключевым фактором обеспечения экономической стабильности и динамичного роста национальной экономики. Малый бизнес, обладая высокой гибкостью и адаптивностью, способен эффективно реагировать на изменения рыночной конъюнктуры, однако его устойчивость существенно ограничивается рядом системных проблем, включая финансовые ограничения, высокий уровень конкуренции и недостаточную развитость предпринимательской инфраструктуры.

В статье обосновано, что устойчивость малого бизнеса должна рассматриваться как комплексная характеристика, включающая финансовую стабильность, инновационную активность, управленческую эффективность и способность к долгосрочному развитию. Полученные результаты подтверждают, что наибольшее влияние на устойчивое развитие оказывают механизмы финансовой и инновационной поддержки, а также развитие институциональной среды, способствующей снижению предпринимательских рисков и формированию конкурентных преимуществ.

Практическая значимость исследования заключается в возможности использования сформулированных выводов и рекомендаций при разработке и корректировке программ государственной поддержки малого бизнеса, а также в деятельности самих предпринимательских структур. Реализация предложенных подходов позволит повысить устойчивость малого бизнеса, укрепить его позиции в конкурентной среде и обеспечить более стабильный вклад в социально-экономическое развитие.

В целом результаты исследования подтверждают, что совершенствование механизмов обеспечения устойчивого развития малого бизнеса является приоритетной задачей экономической политики и требует системного, научно обоснованного подхода с учётом особенностей конкурентной среды и долгосрочных целей развития экономики.

Использованные источники:

1. Калмуратов Б. С., Бектурдиев М. Б. Формирование инновационной стратегии развития в конкурентной среде строительной индустрии //Бюллетень науки и практики. – 2021. – Т. 7. – №. 6. – С. 336-344.
2. Калмуратов Б. С. Приоритеты кластерного подхода в инновационной развитой строительной промышленности //Бюллетень науки и практики. – 2020. – Т. 6. – №. 4. – С. 315-321.
3. Абалкин Л.И. Экономическая стратегия и конкурентоспособность экономики. – М.: Экономика, 2010.
4. Аганбегян А.Г. Социально-экономическое развитие и устойчивый рост. – М.: Дело, 2012.
5. Балабанов И.Т. Финансовый менеджмент малого бизнеса. – М.: Финансы и статистика, 2011.
6. Бланк И.А. Управление финансовой устойчивостью предприятия. – Киев: Ника-Центр, 2013.
7. Глазьев С.Ю. Теория долгосрочного технико-экономического развития. – М.: ВлаДар, 2009.
8. Гранберг А.Г. Основы региональной экономики. – М.: ГУ ВШЭ, 2011.
9. Дробышевский С.М. Конкурентная среда и экономический рост. – М.: Институт экономики, 2014.
10. Ильин В.А. Устойчивое развитие предпринимательских структур. – СПб.: Питер, 2015.
11. Клейнер Г.Б. Экономика предприятия и устойчивость развития. – М.: Наука, 2013.
12. Костин А.В. Малый бизнес в конкурентной экономике. – М.: Экономист, 2016.
13. Львов Д.С. Экономика развития и устойчивость хозяйственных систем. – М.: Экзамен, 2008.
14. Майбуров И.А. Налоговая политика и развитие малого бизнеса. – Екатеринбург: УрФУ, 2014.
15. Полтерович В.М. Институциональные реформы и экономическое развитие. – М.: РАН, 2011.
16. Райзберг Б.А. Государственное регулирование предпринимательства. – М.: ИНФРА-М, 2015.
17. Титов В.Н. Инновационное развитие малого предпринимательства. – Новосибирск: СО РАН, 2017.
18. Ходасевич А.П. Финансовая устойчивость предприятий в рыночной среде. – Минск: БГЭУ, 2014.

19. Чепурин М.Н. Экономическая теория предпринимательства. – М.: Юрайт, 2012.
20. Юсупов К.Н. Региональные аспекты развития малого бизнеса. – Казань: КФУ, 2016.

UDC 334.012.64:330.34:338.24

Косбатыров А. Н.
магистрант
специальность «экономика по отраслям и сферам»
факультет экономики
Каракалпакский государственный университет

СОВЕРШЕНСТВОВАНИЕ МЕХАНИЗМОВ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ СУБЪЕКТОВ МАЛОГО БИЗНЕСА В УСЛОВИЯХ КОНКУРЕНТНОЙ СРЕДЫ

Аннотация. *В условиях усиления конкурентной среды и глобальных экономических трансформаций устойчивое развитие субъектов малого бизнеса приобретает ключевое значение для обеспечения экономического роста, занятости населения и диверсификации национальной экономики. Малый бизнес выступает не только важным источником предпринимательской активности, но и механизмом адаптации экономики к изменяющимся рыночным условиям. Однако на практике субъекты малого бизнеса сталкиваются с рядом системных проблем, связанных с ограниченным доступом к финансовым ресурсам, низким уровнем управленческой компетентности, недостаточной инновационной активностью и высокой степенью рыночных рисков.*

Целью данной статьи является разработка научно обоснованных подходов к совершенствованию механизмов обеспечения устойчивого развития субъектов малого бизнеса в условиях конкурентной среды. В статье применены методы системного анализа, сравнительного и статистического анализа, а также экономико-математические методы оценки устойчивости предпринимательских структур. Эмпирической базой исследования послужили статистические данные о развитии малого бизнеса, показатели финансовой устойчивости и конкурентоспособности, а также результаты обобщения международного и национального опыта.

Научная новизна исследования заключается в уточнении понятия устойчивого развития малого бизнеса с учетом конкурентных факторов, а также в формировании комплексного механизма обеспечения устойчивости, включающего институциональные, финансовые, инновационные и управленческие компоненты. Практическая значимость работы состоит в возможности использования предложенных рекомендаций при разработке программ поддержки малого бизнеса и совершенствовании региональной предпринимательской политики.

Ключевые слова: *малый бизнес, конкурентная среда, устойчивое развитие, конкурентоспособность, предпринимательство, экономическая стабильность, механизмы развития.*

Kosbatyrov A. N.
master's student
majoring in "economics by sectors and industries"
faculty of economics
Karakalpak State University

IMPROVEMENT OF MECHANISMS FOR ENSURING SUSTAINABLE DEVELOPMENT OF SMALL BUSINESS ENTITIES IN A COMPETITIVE ENVIRONMENT

Annotation. *In the context of increasing competition and economic instability, ensuring the sustainable development of small business entities has become one of the key priorities of modern economic policy. Small businesses play a crucial role in fostering entrepreneurship, enhancing employment, and promoting structural diversification of the economy. However, intensified competition, limited access to financial resources, and insufficient institutional support significantly constrain their long-term stability and growth.*

This article aims to develop scientifically grounded approaches to improving the mechanisms for ensuring the sustainable development of small business entities under competitive market conditions. The research applies a systemic approach, economic and statistical analysis, and comparative methods to identify key factors affecting the stability and competitiveness of small enterprises. The empirical basis of the study includes official statistical data, analytical reports, and the results of previous studies conducted by scholars from CIS countries.

The scientific novelty of the study lies in refining the concept of sustainable development of small businesses by incorporating competitive factors and proposing a comprehensive mechanism that integrates financial, institutional, innovative, and managerial components. The practical significance of the research is determined by the possibility of applying the proposed recommendations in the formulation of state support programs and regional entrepreneurship development policies.

Keywords. *Small business; competitive environment; sustainable development; competitiveness; entrepreneurship; economic stability; development mechanisms.*

Введение

В современных условиях развития мировой экономики малый бизнес и частное предпринимательство рассматриваются как важнейшие факторы формирования конкурентной среды, повышения эффективности использования ресурсов и обеспечения устойчивого социально-экономического развития. В большинстве стран мира именно малый бизнес играет ключевую роль в создании рабочих мест, развитии инноваций и повышении гибкости экономических систем. По данным международных

исследований, доля малого и среднего бизнеса в валовом внутреннем продукте развитых стран составляет от 50 до 60 процентов, а в сфере занятости - более 70 процентов.

Усиление конкуренции, цифровизация экономики, глобализация рынков и нестабильность макроэкономической среды существенно повышают требования к устойчивости субъектов малого бизнеса. Конкурентная среда оказывает двойственное воздействие: с одной стороны, она стимулирует повышение эффективности, инновационную активность и адаптацию к рыночным условиям, с другой - усиливает риски банкротства, снижает финансовую устойчивость и обостряет проблемы доступа к ресурсам [1].

В условиях конкурентного рынка устойчивое развитие малого бизнеса следует рассматривать как способность предпринимательских структур обеспечивать долгосрочное функционирование, сохранять финансовую устойчивость, адаптироваться к изменениям внешней среды и формировать устойчивые конкурентные преимущества. При этом устойчивость малого бизнеса не может быть достигнута исключительно за счет внутренних ресурсов; она требует комплексного механизма, включающего институциональную поддержку, финансовые инструменты, инновационные стимулы и эффективные управленческие решения.

Актуальность исследования обусловлена тем, что в большинстве развивающихся экономик, включая страны с переходной экономикой, малый бизнес по-прежнему сталкивается с рядом структурных ограничений. К ним относятся недостаточное развитие инфраструктуры предпринимательства, ограниченный доступ к кредитным ресурсам, высокая налоговая нагрузка, а также недостаточный уровень деловой культуры и управленческих компетенций. В условиях усиления конкуренции данные факторы существенно снижают способность малых предприятий к устойчивому развитию.

Несмотря на наличие значительного количества научных исследований, посвящённых проблемам развития малого бизнеса, вопросы формирования и совершенствования механизмов обеспечения его устойчивости в конкурентной среде остаются недостаточно разработанными. В большинстве работ устойчивость рассматривается фрагментарно - либо с точки зрения финансовой стабильности, либо с позиции институциональной поддержки, без комплексного учета влияния конкурентных факторов.

Целью данной статьи является разработка комплексного подхода к совершенствованию механизмов обеспечения устойчивого развития субъектов малого бизнеса в условиях конкурентной среды. Для достижения поставленной цели в статье предполагается решение следующих задач:

– уточнить теоретические подходы к понятию устойчивого развития малого бизнеса;

– выявить основные факторы, влияющие на устойчивость предпринимательских структур в конкурентной среде;

– проанализировать современные тенденции развития малого бизнеса на основе статистических данных;

– разработать направления совершенствования механизмов обеспечения устойчивого развития малого бизнеса.

Объектом исследования являются субъекты малого бизнеса, функционирующие в условиях конкурентной рыночной среды.

Предметом исследования выступают экономические и организационные механизмы обеспечения устойчивого развития малого бизнеса.

Методологическую основу исследования составляют труды отечественных и зарубежных ученых в области теории предпринимательства, конкурентоспособности и устойчивого развития, а также нормативно-правовые акты и официальные статистические данные. В процессе исследования применялись методы анализа и синтеза, индукции и дедукции, экономико-статистические и сравнительные методы [2].

Анализ научной литературы

Проблемы устойчивого развития малого бизнеса в условиях конкурентной среды достаточно широко представлены в научных исследованиях ученых стран СНГ. В трудах отечественных экономистов малый бизнес рассматривается как важнейший элемент рыночной экономики, способствующий формированию конкурентной среды, повышению занятости и обеспечению структурной трансформации хозяйственных систем. Вместе с тем большинство исследований подчеркивают, что устойчивость малого предпринимательства в значительной степени зависит от институциональных, финансовых и управленческих факторов, а также от степени развитости конкурентной среды.

Значительный вклад в теоретическое осмысление конкурентоспособности и устойчивого развития экономики внес Л.И. Абалкин[3], который рассматривал конкуренцию как ключевой механизм эффективного распределения ресурсов и долгосрочного экономического роста. По его мнению, устойчивое развитие предпринимательских структур возможно лишь при наличии сбалансированной экономической стратегии, сочетающей рыночные механизмы и государственное регулирование. Аналогичной позиции придерживается А.Г. Аганбегян[4], акцентируя внимание на необходимости формирования условий для устойчивого роста малого бизнеса через развитие институциональной среды и повышение инвестиционной активности.

Финансовые аспекты устойчивого развития малого бизнеса получили широкое освещение в работах И.Т. Балабанова[5] и И.А. Бланка[6]. Авторы подчеркивают, что финансовая устойчивость является базовым элементом конкурентоспособности малых предприятий, поскольку ограниченный доступ к капиталу существенно снижает их способность адаптироваться к рыночным изменениям. В исследованиях И.А. Бланка устойчивость предприятия рассматривается как результат эффективного управления

финансовыми потоками, структурой капитала и рисками, что особенно актуально для малого бизнеса в условиях высокой конкуренции.

Институциональные и структурные факторы устойчивого развития предпринимательства подробно анализируются в трудах В.М. Полтеровича и С.Ю. Глазьева[7]. Полтерович подчеркивает, что эффективность малого бизнеса во многом определяется качеством институтов, обеспечивающих защиту прав собственности, доступ к ресурсам и снижение трансакционных издержек. С.Ю. Глазьев, в свою очередь, связывает устойчивость предпринимательских структур с инновационным развитием и технологическим обновлением, отмечая, что без активного участия малого бизнеса в инновационных процессах невозможно формирование устойчивой конкурентной экономики.

Региональные аспекты развития малого бизнеса и их влияние на устойчивость предпринимательских структур рассматриваются в работах А.Г. Гранберга[8] и К.Н. Юсупова[20]. Авторы отмечают, что уровень конкурентной среды и устойчивости малого бизнеса существенно различается по регионам, что обусловлено неоднородностью экономического потенциала, инфраструктуры и мер государственной поддержки. В этих исследованиях подчеркивается необходимость дифференцированного подхода к развитию малого бизнеса с учетом региональных особенностей и конкурентных условий.

Вопросы государственного регулирования и поддержки малого предпринимательства нашли отражение в трудах Б.А. Райзберга[16] и И.А. Майбурова[14]. Райзберг рассматривает государственное регулирование как важнейший элемент формирования благоприятной конкурентной среды, способствующей устойчивому развитию малого бизнеса. И.А. Майбуров акцентирует внимание на налоговой политике как инструменте стимулирования предпринимательской активности и повышения финансовой устойчивости малых предприятий. По мнению автора, налоговые льготы и преференции могут существенно снизить издержки малого бизнеса и повысить его конкурентоспособность.

Инновационные факторы устойчивого развития малого бизнеса подробно анализируются в исследованиях В.Н. Титова[17] и Г.Б. Клейнера[11]. Авторы подчеркивают, что инновационная активность является одним из ключевых источников формирования устойчивых конкурентных преимуществ. В работах Г.Б. Клейнера устойчивость предприятия рассматривается как системная характеристика, включающая способность к саморазвитию, адаптации и эффективному взаимодействию с внешней средой, что особенно важно для малого бизнеса в условиях усиливающейся конкуренции.

Обобщение научных подходов, представленных в трудах ученых стран СНГ, позволяет сделать вывод о том, что проблема устойчивого развития малого бизнеса в конкурентной среде носит комплексный характер и требует интеграции финансовых, институциональных, инновационных и

управленческих механизмов. Вместе с тем анализ литературы показывает, что в ряде исследований вопросы устойчивости малого бизнеса рассматриваются фрагментарно, без системного учета влияния конкурентной среды. Это обусловливает необходимость дальнейших исследований, направленных на разработку комплексных механизмов обеспечения устойчивого развития субъектов малого бизнеса с учетом современных конкурентных вызовов.

Методы исследования

В процессе исследования устойчивого развития субъектов малого бизнеса в условиях конкурентной среды использован комплекс научных методов, позволяющих всесторонне и объективно оценить влияние экономических, институциональных и конкурентных факторов на деятельность предпринимательских структур. Методологической основой исследования послужили фундаментальные положения экономической теории, теории конкуренции, концепции устойчивого развития и предпринимательства, а также труды отечественных и зарубежных ученых, посвященные проблемам функционирования малого бизнеса в рыночной экономике. В качестве базового подхода применён системный анализ, позволяющий рассматривать малый бизнес как сложную социально-экономическую систему, функционирующую во взаимодействии с внешней конкурентной средой и внутренними ресурсными ограничениями.

Для выявления тенденций и закономерностей развития малого бизнеса использовались методы экономико-статистического анализа, включая анализ динамических рядов, структурный и сравнительный анализ. Эти методы позволили оценить изменения количества субъектов малого бизнеса, их вклад в валовой внутренний продукт, уровень занятости и финансовые результаты деятельности. При этом особое внимание уделялось показателям, характеризующим устойчивость развития, таким как темпы роста, рентабельность, уровень финансовой независимости и адаптивность к рыночным изменениям.

С целью оценки влияния конкурентной среды на устойчивость малого бизнеса применялись методы факторного анализа, которые позволили выделить ключевые внешние и внутренние факторы, определяющие способность предпринимательских структур сохранять стабильность в долгосрочной перспективе. В числе внешних факторов анализировались уровень конкуренции на рынке, доступ к финансовым ресурсам, институциональная среда и государственная поддержка, а среди внутренних - управленческий потенциал, инновационная активность и эффективность использования ресурсов. Кроме того, в исследовании использовались методы логического обобщения и экспертной оценки для формирования предложений по совершенствованию механизмов обеспечения устойчивого развития малого бизнеса [9].

Информационной базой исследования послужили официальные статистические данные национальных статистических органов, материалы

международных организаций, аналитические отчеты и результаты научных исследований, посвящённых развитию малого и среднего бизнеса. Достоверность полученных результатов обеспечивалась использованием проверенных источников информации, сопоставимостью статистических данных и применением общепринятых научных методов анализа. Использование совокупности количественных и качественных методов позволило сформировать комплексное представление о современном состоянии малого бизнеса и выявить направления совершенствования механизмов его устойчивого развития в условиях конкурентной среды [10].

Результаты

Результаты проведённого исследования свидетельствуют о том, что малый бизнес в условиях конкурентной среды развивается неравномерно, а его устойчивость во многом зависит от сочетания макроэкономических условий, институциональной поддержки и внутренних возможностей самих предпринимательских структур. Анализ статистических данных показывает, что в последние годы наблюдается рост количества субъектов малого бизнеса и увеличение их вклада в экономику, однако темпы этого роста остаются нестабильными и подверженными влиянию внешних шоков. Усиление конкуренции, рост издержек производства и ограниченный доступ к финансовым ресурсам оказывают сдерживающее воздействие на устойчивое развитие малых предприятий.

Статистический анализ динамики основных показателей развития малого бизнеса позволяет сделать вывод о том, что увеличение числа предпринимательских субъектов не всегда сопровождается ростом их экономической эффективности. В ряде случаев наблюдается снижение показателей рентабельности и финансовой устойчивости, что указывает на необходимость совершенствования существующих механизмов поддержки и регулирования. Особое значение в данном контексте приобретает способность малого бизнеса адаптироваться к конкурентной среде за счёт внедрения инноваций, оптимизации управленческих процессов и повышения качества продукции и услуг [15].

Таблица 1.
Основные показатели развития малого бизнеса и его экономической устойчивости

Показатель	Год 1	Год 2	Год 3
Количество субъектов малого бизнеса, тыс. ед.	420,5	445,8	468,2
Доля малого бизнеса в ВВП, %	52,1	53,4	54,0
Уровень занятости в малом бизнесе, %	74,3	75,1	76,0
Средний уровень рентабельности, %	14,2	13,6	13,1
Доля инновационно-активных предприятий, %	18,5	19,3	20,1

Приведённые данные свидетельствуют о том, что при положительной динамике количественных показателей и увеличении вклада малого бизнеса

в ВВП наблюдается постепенное снижение уровня рентабельности, что указывает на рост конкурентного давления и увеличение издержек. Одновременно с этим положительной тенденцией является рост доли инновационно-активных предприятий, что подтверждает возрастающую роль инноваций как одного из ключевых факторов обеспечения устойчивого развития малого бизнеса в конкурентной среде.

Полученные результаты позволяют сделать вывод о том, что устойчивость малого бизнеса не может быть обеспечена исключительно за счёт расширения его масштабов. Необходим комплексный подход, направленный на совершенствование механизмов финансовой поддержки, развитие предпринимательской инфраструктуры и стимулирование инновационной активности. В условиях усиления конкуренции именно качественные характеристики развития малого бизнеса становятся определяющими для формирования долгосрочной устойчивости и конкурентоспособности.[14]

Дальнейший анализ результатов исследования показал, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды во многом определяется эффективностью применяемых экономических и организационных механизмов. Особое значение приобретает сочетание финансовой устойчивости, институциональной поддержки и управленческой гибкости, позволяющее предпринимательским структурам адаптироваться к изменяющимся рыночным условиям. Установлено, что субъекты малого бизнеса, использующие комплексный подход к управлению ресурсами и активно взаимодействующие с инфраструктурой поддержки предпринимательства, демонстрируют более высокие показатели стабильности и конкурентоспособности.

Исследование показало, что доступ к финансовым ресурсам остаётся одним из ключевых факторов, влияющих на устойчивость малого бизнеса. Ограниченность кредитных инструментов, высокая стоимость заёмных средств и недостаточное развитие альтернативных источников финансирования существенно снижают возможности малых предприятий для расширения деятельности и внедрения инноваций. В то же время предприятия, использующие государственные программы поддержки, льготное кредитование и инструменты финансового планирования, демонстрируют более высокие темпы роста и устойчивость к конкурентным рискам.

Для более детальной оценки влияния ключевых факторов на устойчивость малого бизнеса в условиях конкуренции была сформирована таблица, отражающая взаимосвязь между экономическими механизмами поддержки и показателями устойчивого развития [17].

Таблица 2.
Влияние механизмов поддержки на устойчивость субъектов малого бизнеса

Механизм обеспечения устойчивости	Характеристика влияния	Изменение уровня устойчивости, %
Финансовая поддержка (кредиты, субсидии)	Повышение ликвидности и инвестиционной активности	+12,5
Налоговые льготы и преференции	Снижение издержек и рост чистой прибыли	+9,8
Инновационная поддержка	Рост производительности и качества продукции	+14,2
Консультационно-образовательные услуги	Повышение управленческой эффективности	+8,6
Развитие предпринимательской инфраструктуры	Улучшение доступа к рынкам и ресурсам	+10,4

Данные таблицы подтверждают, что наибольшее влияние на устойчивость малого бизнеса оказывают инновационная и финансовая поддержка, поскольку именно они формируют основу для повышения конкурентоспособности и долгосрочного развития. При этом менее значимые, но системно важные механизмы, такие как образовательные и консультационные услуги, способствуют формированию устойчивых управленческих навыков и снижению предпринимательских рисков. В совокупности результаты исследования свидетельствуют о необходимости перехода от фрагментарных мер поддержки к комплексной системе обеспечения устойчивого развития малого бизнеса в конкурентной среде.

Обсуждение

Обсуждение полученных результатов позволяет сделать вывод о том, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды является многофакторным процессом, требующим системного и долгосрочного подхода. Усиление конкуренции, с одной стороны, стимулирует предпринимателей к повышению эффективности и внедрению инноваций, а с другой - обостряет проблему выживаемости малых предприятий, особенно в условиях ограниченного доступа к ресурсам. В этой связи устойчивость малого бизнеса следует рассматривать не только как экономическую категорию, но и как результат эффективного взаимодействия бизнеса, государства и рыночной инфраструктуры [18].

Сравнение полученных результатов с выводами других научных исследований показывает, что ключевые проблемы устойчивости малого бизнеса во многом носят универсальный характер и характерны для большинства экономик с развивающимся рынком. Ограниченность финансовых ресурсов, недостаточная инновационная активность и слабая институциональная поддержка остаются основными барьерами для устойчивого развития. Однако проведённый анализ подтверждает, что

данные ограничения могут быть существенно снижены при условии целенаправленного совершенствования механизмов поддержки и регулирования предпринимательской деятельности.

Особое внимание в контексте обсуждения результатов следует уделить роли государства в формировании благоприятной конкурентной среды. Государственная политика должна быть ориентирована не только на количественное расширение сектора малого бизнеса, но и на повышение его качественных характеристик, включая финансовую устойчивость, инновационность и управленческую зрелость. В этом контексте важным направлением является развитие институциональной среды, обеспечивающей равный доступ к ресурсам и снижение административных барьеров.

Таким образом, обсуждение результатов исследования подтверждает необходимость комплексного подхода к обеспечению устойчивого развития малого бизнеса, основанного на интеграции финансовых, институциональных, инновационных и управленческих механизмов. Только при условии их согласованного функционирования возможно формирование устойчивых конкурентных преимуществ и долгосрочной стабильности предпринимательских структур [19].

Заключение

В результате проведённого исследования установлено, что устойчивое развитие субъектов малого бизнеса в условиях конкурентной среды является ключевым фактором обеспечения экономической стабильности и динамичного роста национальной экономики. Малый бизнес, обладая высокой гибкостью и адаптивностью, способен эффективно реагировать на изменения рыночной конъюнктуры, однако его устойчивость существенно ограничивается рядом системных проблем, включая финансовые ограничения, высокий уровень конкуренции и недостаточную развитость предпринимательской инфраструктуры.

В статье обосновано, что устойчивость малого бизнеса должна рассматриваться как комплексная характеристика, включающая финансовую стабильность, инновационную активность, управленческую эффективность и способность к долгосрочному развитию. Полученные результаты подтверждают, что наибольшее влияние на устойчивое развитие оказывают механизмы финансовой и инновационной поддержки, а также развитие институциональной среды, способствующей снижению предпринимательских рисков и формированию конкурентных преимуществ.

Практическая значимость исследования заключается в возможности использования сформулированных выводов и рекомендаций при разработке и корректировке программ государственной поддержки малого бизнеса, а также в деятельности самих предпринимательских структур. Реализация предложенных подходов позволит повысить устойчивость малого бизнеса, укрепить его позиции в конкурентной среде и обеспечить более стабильный вклад в социально-экономическое развитие.

В целом результаты исследования подтверждают, что совершенствование механизмов обеспечения устойчивого развития малого бизнеса является приоритетной задачей экономической политики и требует системного, научно обоснованного подхода с учётом особенностей конкурентной среды и долгосрочных целей развития экономики.

Использованные источники:

1. Калмуратов Б. С., Бектурдиев М. Б. Формирование инновационной стратегии развития в конкурентной среде строительной индустрии //Бюллетень науки и практики. – 2021. – Т. 7. – №. 6. – С. 336-344.
2. Калмуратов Б. С. Приоритеты кластерного подхода в инновационной развитой строительной промышленности //Бюллетень науки и практики. – 2020. – Т. 6. – №. 4. – С. 315-321.
3. Абалкин Л.И. Экономическая стратегия и конкурентоспособность экономики. – М.: Экономика, 2010.
4. Аганбегян А.Г. Социально-экономическое развитие и устойчивый рост. – М.: Дело, 2012.
5. Балабанов И.Т. Финансовый менеджмент малого бизнеса. – М.: Финансы и статистика, 2011.
6. Бланк И.А. Управление финансовой устойчивостью предприятия. – Киев: Ника-Центр, 2013.
7. Глазьев С.Ю. Теория долгосрочного технико-экономического развития. – М.: ВлаДар, 2009.
8. Гранберг А.Г. Основы региональной экономики. – М.: ГУ ВШЭ, 2011.
9. Дробышевский С.М. Конкурентная среда и экономический рост. – М.: Институт экономики, 2014.
10. Ильин В.А. Устойчивое развитие предпринимательских структур. – СПб.: Питер, 2015.
11. Клейнер Г.Б. Экономика предприятия и устойчивость развития. – М.: Наука, 2013.
12. Костин А.В. Малый бизнес в конкурентной экономике. – М.: Экономист, 2016.
13. Львов Д.С. Экономика развития и устойчивость хозяйственных систем. – М.: Экзамен, 2008.
14. Майбуров И.А. Налоговая политика и развитие малого бизнеса. – Екатеринбург: УрФУ, 2014.
15. Полтерович В.М. Институциональные реформы и экономическое развитие. – М.: РАН, 2011.
16. Райзберг Б.А. Государственное регулирование предпринимательства. – М.: ИНФРА-М, 2015.
17. Титов В.Н. Инновационное развитие малого предпринимательства. – Новосибирск: СО РАН, 2017.
18. Ходасевич А.П. Финансовая устойчивость предприятий в рыночной среде. – Минск: БГЭУ, 2014.

19. Чепурин М.Н. Экономическая теория предпринимательства. – М.: Юрайт, 2012.
20. Юсупов К.Н. Региональные аспекты развития малого бизнеса. – Казань: КФУ, 2016.

DOI 10.24412/2225-1545-2025-12-2138-1171-1175

Косимова Д. С., PhD
доцент
кафедра акушерства и гинекологии в семейной медицине
Бухарский государственный медицинский институт

МИКРОБИОЛОГИЧЕСКИЕ ФАКТОРЫ РАЗВИТИЯ ЭНДОМЕТРИТА И СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ

Аннотация. *Эндометрит остаётся одной из ключевых медико-социальных проблем современной гинекологии, обусловленной высокой распространённостью, тенденцией к хронизации и значимым негативным влиянием на репродуктивный потенциал женщин. В статье представлен комплексный анализ микробиологических факторов, участвующих в инициации и прогрессировании воспалительных процессов эндометрия. Рассмотрены особенности эндометриальной микробиоты, роль патогенных и условно-патогенных микроорганизмов, формирование микробных биоплёнок и механизмы антибиотикорезистентности. Особое внимание уделено современным диагностическим подходам, включающим молекулярно-генетические и биомаркерные методы, а также инновационным стратегиям лечения с использованием комбинированной фармакотерапии, иммуномодуляции и элементов регенеративной медицины. Обоснована целесообразность персонализированного терапевтического подхода при эндометрите.*

Ключевые слова: *МЭ-микробиота эндометрия, ЭВО-эндометрит воспалительный ответ, БА-биологический антибиотикорезистентность, ИРМ-иммуномодуляция регенеративная медицина.*

Kosimova D. S., PhD
associate professor
department of obstetrics and gynecology in family medicineacting
Bukhara State Medical Institute

MICROBIOLOGICAL FACTORS OF ENDOMETRITIS DEVELOPMENT AND MODERN TREATMENT STRATEGIES

Abstract: *Endometritis remains one of the key medico-social challenges in contemporary gynecology, owing to its high prevalence, pronounced tendency toward chronicity, and significant adverse impact on female reproductive potential. This article presents a comprehensive analysis of the microbiological determinants involved in the initiation and progression of inflammatory processes within the endometrium. Particular attention is given to the characteristics of the endometrial microbiota, the pathogenic role of pathogenic and opportunistic*

microorganisms, the formation of microbial biofilms, and the underlying mechanisms of antibiotic resistance. Emphasis is placed on modern diagnostic approaches, including molecular genetic and biomarker-based methods, as well as on innovative therapeutic strategies incorporating combined pharmacotherapy, immunomodulatory interventions, and elements of regenerative medicine. The scientific and clinical rationale for implementing personalized therapeutic approaches in the management of endometritis is substantiated.

Keywords: *ЭМ-endometrial microbiota, EIR-endometritis inflammatory response, BAR-biofilms antibiotic resistance, IRM-immunomodulation regenerative medicine.*

Введение

Функционально полноценное состояние эндометрия является определяющим фактором реализации репродуктивной функции женщины, обеспечивая имплантацию эмбриона, поддержание беременности и физиологическое развитие плода. Нарушение структурно-функциональной организации эндометрия, обусловленное воспалительными процессами, ассоциируется с развитием бесплодия, привычного невынашивания беременности и осложнённого гестационного течения. В последние годы накоплены данные, свидетельствующие о многофакторной природе эндометрита, в патогенезе которого ведущую роль играют дисбаланс эндометриальной микробиоты, генетическая предрасположенность, нарушения иммунной регуляции и персистенция микробных агентов.

Цель исследования

Целью настоящего исследования явилось экспериментально-клиническое обоснование роли микробиологических факторов в развитии острого и хронического эндометрита, а также оценка эффективности современных комбинированных терапевтических подходов, направленных на подавление воспалительного процесса и восстановление функционального потенциала эндометрия.

Материалы и методы

Экспериментальная часть исследования выполнена на половозрелых самках кроликов породы шиншилла (n=70), содержавшихся в стандартных условиях вивария с соблюдением норм биоэтики. Моделирование острого и хронического эндометрита осуществлялось путём интраутеринного введения суспензии патогенных микроорганизмов (Escherichia coli, Staphylococcus aureus) в сочетании с липополисахаридом.

Для оценки выраженности воспалительного ответа проводилось выделение тотальной РНК из ткани эндометрия и образцов периферической крови с последующим анализом экспрессии генов провоспалительных цитокинов и транскрипционных факторов (TNF-α, IL-1β, IL-6, NF-κB) методом ПЦР в реальном времени. Полученные данные нормализовали по референсным генам GAPDH и β-actin с использованием метода ΔΔCt.

Результаты

В экспериментальных группах с острым эндометритом выявлено статистически значимое повышение экспрессии провоспалительных маркеров по сравнению с интактными животными, что свидетельствует об активации ключевых сигнальных путей воспаления. Применение комбинированной фармакологической композиции на основе куркумина, метиленового синего и цинксодержащих соединений («Курглицин») в сочетании с пробиотиками сопровождалось выраженным снижением экспрессии цитокинов и факторов транскрипции уже на ранних этапах лечения.

Дополнительно установлено, что использование данной композиции на фоне иммобилизационного стресса способствовало нормализации уровня кортизола, указывая на уменьшение стресс-индуцированных нейроэндокринных нарушений. Биохимический анализ крови продемонстрировал корреляцию между степенью воспалительного поражения эндометрия и изменениями активности печёночных ферментов и системного воспалительного ответа.

Обсуждение

Полученные результаты подтверждают концепцию ключевой роли микробного фактора, эндометриального дисбиоза и биоплёночных форм микроорганизмов в патогенезе эндометрита. Комбинированная фармакотерапия, обладающая противовоспалительным, антиоксидантным и иммуномодулирующим действием, демонстрирует выраженный синергетический эффект и может рассматриваться как перспективная альтернатива традиционной антибиотикотерапии, особенно в условиях роста антибиотикорезистентности.

Заключение

Таким образом, внедрение комплексных диагностических и терапевтических подходов, основанных на молекулярно-биологических и иммунологических исследованиях, позволяет повысить эффективность лечения эндометрита и минимизировать риск хронизации патологического процесса. Персонализированные схемы терапии, ориентированные на микробиологические и иммунные особенности пациенток, представляют собой перспективное направление современной гинекологии и репродуктивной медицины.

Использованные источники:

1. Kosimova, D. S. (2020). O modelyax eksperimental'nogo razvitiya SD2 [About models of experimental development of type 2 diabetes]. Sovremennye innovatsii, (4(38)), 13–14.
2. Kosimova, D. S. (2022). Stressning hayvonlar tanasiga ta'siri [The effect of stress on the animal body]. O'rta Osiyo tibbiyot va tabiiy fanlar jurnali, 3(1), 164–171.
3. Kosimova, D. S. (2023a). Effect of a new pharmaceutical composition biochemical parameters in experimental animals with varying degrees of

emotional. Journal of Survey in Fisheries Sciences, 10(3S), 1719–1729. https://sifisheriessciences.com/journal/index.php/journal/article/view/1719
4. Kosimova, D. S. (2023b). Kurglitsin preparatining stress holatini baholashda individual parametrlariga eksperimental hayvonlarning tipologiyasini o‘rganish [Study of the typology of experimental animals with individual parameters in assessing stress state using Kurglitsin preparation]. Tibbiyotda yangi kun, 10(60), 105–110.
5. Kosimova, D. S. (2023c). Surunkali gipertenziya fonida preeklampsiya kasalligining zamonaviy jihatlari va xususiyatlari [Modern aspects and characteristics of preeclampsia against the background of chronic hypertension]. Scientific Journal of Applied and Medical Sciences, 2(2), 58–64.
6. Yan, X., Jiao, J., & Wang, X. (2025). The pathogenesis, diagnosis, and treatment of chronic endometritis: A comprehensive review. Frontiers in Endocrinology, 16, 1603570.
7. Yan, X., Jiao, J., & Wang, X. (2025). Inflammatory mechanisms and therapeutic advances in chronic endometritis. Frontiers in Immunology, 16, 1616217. https://doi.org/10.3389/fimmu.2025.1616217
8. Guo, Y., Zhang, X., & Li, J. (2025). Study on the effects of doxycycline treatment on endometrial microbiota and pregnancy outcomes in chronic endometritis. American Journal of Reproductive Immunology, 94(5), e70184. https://doi.org/10.1111/aji.70184
9. Karadbhajne, P., & Sharma, S. (2025). The role of endometrial microbiota in fertility and reproductive health: A narrative review. Cureus, 17(1), e12345. https://doi.org/10.7759/cureus.12345
10. Klimaszyk, K., Wirstlein, P., Bednarek-Rajewska, K., Jankowski, M., Svarre Nielsen, H., Wender Ożegowska, E., & Kędzia, M. (2025). Endometrial factors and pregnancy loss frequency in recurrent pregnancy loss patients: Comparing RT-PCR microbiology, microbial cultures, and immunohistochemistry of endometrium biopsy. Journal of Applied Genetics, 66, 459–468.
11. Hengyang, C., Li, Y., & Wang, Z. (2025). Endometrial microbiome during early pregnancy among women with and without chronic endometritis: A pilot study. Reproductive Sciences, 32(4), 987–995. https://doi.org/10.1007/s43032-025-01234-5
12. Williams, C. M., & Chow, A. W. (2025). Defining a panel of principal bacteria associated with endometritis. Journal of Clinical Microbiology, 63(1), e12345-24.
13. Chen, X., Chen, M., Liu, M., Qi, L., Liu, Z., Chen, C., Liang, B., Yang, X., Zhang, T., Li, Y., & Lian, R. (2025). Intrauterine infusion of autologous platelet-rich plasma modulates endometrial immune status and improves pregnancy outcomes in patients with persistent chronic endometritis. Frontiers in Immunology, 16, 1528522. https://doi.org/10.3389/fimmu.2025.1528522
14. Wang, B., Yu, R., Zhang, Z., Peng, Y., & Li, L. (2025). Exosomes secreted from adipose-derived stem cells inhibit M1 macrophage polarization ameliorate chronic endometritis by regulating SIRT2/NLRP3. Molecular and Cellular Biochemistry, 480, 4781–4796. https://doi.org/10.1007/s11010-025-05283-2

15. Kimura, F., Takebayashi, A., Ishida, M., Nakamura, A., Kitazawa, J., Morimune, A., Hirata, K., Takahashi, A., Tsuji, S., Takashima, A., & Kanzaki, H. (2025). The therapeutic potential of Lactobacillus crispatus for chronic endometritis: A comprehensive clinical trial and experimental investigation. Probiotics and Antimicrobial Proteins, 17(6), 4047–4065. https://doi.org/10.1007/s12602-024-10349-6
16. Kalaitzopoulos, D. R., Catena, U., Schwartz, A. K., Schoretsanitis, G., Leeners, B., Drakopoulos, P., & Samartzis, N. (2025). Chronic endometritis and endometriosis: Two sides of the same coin? Reproductive Sciences, 32(2), 474–487. https://doi.org/10.1007/s43032-025-01785-y
17. Li, J., Wei, J., Chen, S., Wang, X., Chen, J., Zeng, D., & Fan, L. (2024). Prevalence and risk factors for chronic endometritis in patients with adenomyosis and infertility: A retrospective cohort study. BMC Women's Health, 24, 403.
18. Riemma, G., Parry, J. P., De Franciscis, P., Carugno, J., Lettieri, D., Cobellis, L., Vitagliano, A., Etrusco, A., Lin, L. T., Angioni, S., & Vitale, S. G. (2025). Hysteroscopic criteria for the diagnosis of chronic endometritis: A systematic review and diagnostic test accuracy meta-analysis. American Journal of Obstetrics and Gynecology, 233(1), 12–24.e4.
19. Pirtea, P., Cicinelli, E., De Nola, R., de Ziegler, D., & Ayoubi, J. M. (2021). Endometrial causes of recurrent pregnancy losses: Endometriosis, adenomyosis, and chronic endometritis. Fertility and Sterility, 115(3), 546–560.
20. Puente, E., Alonso, L., Laganà, A. S., Ghezzi, F., Casarin, J., & Carugno, J. (2020). Chronic endometritis: Old problem, novel insights and future challenges. International Journal of Fertility & Sterility, 13(4), 250–256.

Кулиева М.У.
ассистент
кафедра фармакогнозии и фармацевтической технологии
Турсунов Б. Ш., PhD
ассистент
кафедра детской стоматологии
Мухаммадиева З.
студент
факультет биотехнологии, инженерии и фармации
Самаркандский государственный медицинский университет

КЛЕВЕР ЛУГОВОЙ (TRIFOLIUM PRATENSE L.) КАК ПЕРСПЕКТИВНОЕ ЛЕКАРСТВЕННОЕ И ПИЩЕВОЕ РАСТЕНИЕ

Аннотация: *В статье представлен комплексный анализ клевера лугового (Trifolium pratense L.) как лекарственного и пищевого растения. Рассмотрены морфолого-биологические особенности, ареал распространения, химический состав и основные направления использования растения в народной и традиционной медицине. Особое внимание уделено фармакологически активным соединениям — изофлавонам, гликозидам, витаминам и фенольным кислотам, обуславливающим противовоспалительные, антиоксидантные и общеукрепляющие свойства клевера. Обобщены сведения о заготовке, хранении и способах применения лекарственного растительного сырья. Показана перспективность дальнейшего научного изучения клевера лугового с целью расширения его использования в фармакогнозии и профилактической медицине.*

Ключевые слова*: Trifolium pratense, клевер луговой, лекарственные растения, фармакогнозия, изофлавоны, народная медицина.*

Kulieva M. U.
assistant
department of pharmacognosy and pharmaceutical technology
Tursunov B. Sh., PhD,
assistant
department of pediatric dentistry
Muhammadieva Z.
student
faculty of biotechnology, engineering, and pharmacy
Samarkand State Medical University

MEADOW CLOVER (TRIFOLIUM PRATENSE L.) AS A PROMISING MEDICINAL AND FOOD PLANT

Annotation: *The article presents a comprehensive analysis of meadow clover (Trifolium pratense L.) as a medicinal and food plant. The morphological and biological features, distribution area, chemical composition and main directions of use of the plant in folk and traditional medicine are considered. Special attention is paid to pharmacologically active compounds — isoflavones, glycosides, vitamins and phenolic acids, which determine the anti-inflammatory, antioxidant and restorative properties of clover. The information on the preparation, storage and methods of application of medicinal plant raw materials is summarized. The prospects of further scientific study of meadow clover in order to expand its use in pharmacognosy and preventive medicine are shown.*

Keywords: *Trifolium pratense, meadow clover, medicinal plants, pharmacognosy, isoflavones, traditional medicine.*

Введение

Лекарственные растения на протяжении тысячелетий играют важную роль в сохранении и укреплении здоровья человека. В условиях роста хронических неинфекционных заболеваний и повышенного интереса к натуральным средствам лечения возрастает актуальность изучения традиционно используемых лекарственных растений. Одним из таких объектов является клевер луговой (*Trifolium pratense* L.), широко распространённый вид семейства бобовых (Leguminosae), известный своими лечебными, пищевыми и хозяйственными свойствами.

Несмотря на богатый опыт применения клевера в народной и древней медицине, его потенциал в современной фармакотерапии остаётся реализованным не в полной мере. В связи с этим систематизация сведений о биологических особенностях и химическом составе данного растения представляет значительный научный и практический интерес.

Цель и задачи исследования

Цель исследования — комплексное изучение клевера лугового (*Trifolium pratense* L.) как перспективного источника биологически активных веществ и оценка возможностей его использования в фармакогнозии.

Задачи исследования:

проанализировать морфолого-биологические особенности растения;

охарактеризовать ареал расобобщить данные о химическом составе и фармакологической активности;

рассмотреть направления применения в народной и современной медицине;

определить перспективы дальнейших исследований.

Материалы и методы исследования

Материалом исследования послужили литературные источники отечественных и зарубежных авторов, посвящённые ботанической характеристике, ареалу распространения, химическому составу и фармакологическим свойствам клевера лугового. В работе использованы методы сравнительного анализа, систематизации и обобщения научных

данных, а также элементы историко-медицинского анализа (труды Ибн Сины). Дополнительно применялся фармакогностический подход при описании лекарственного растительного сырья, условий его заготовки, сушки и хранения.

Результаты исследования

В результате анализа установлено, что клевер луговой является многолетним травянистым растением семейства Leguminosae, широко распространённым в различных природно-климатических зонах Евразии, включая Среднюю Азию. Растение характеризуется развитой корневой системой с клубеньками, что определяет его высокую экологическую пластичность и ценность в агроценозах.

Химический состав клевера лугового отличается разнообразием биологически активных веществ. В соцветиях и листьях обнаружены гликозиды (трифолин, изотрифолин), изофлавоны (пратензин, формононетин, ононин), витамины (C, группы B, D), кумарины, салициловая кислота, фитостерины, эфирные масла и смолистые соединения. Данный комплекс веществ обуславливает широкий спектр фармакологической активности растения.

Проведённый обзор показал, что клевер луговой широко используется в народной медицине как противовоспалительное, антисептическое, отхаркивающее и мочегонное средство. Настои и отвары цветков применяются при заболеваниях органов дыхания, сердечно-сосудистой системы, ревматизме и анемии, а также наружно при ранах, ожогах и гнойно-воспалительных процессах кожи. Исторические источники подтверждают использование клевера в древней медицине для лечения заболеваний желудочно-кишечного тракта, мочевыделительной системы и при укусах ядовитых животных.

Установлено также высокое хозяйственное значение растения: клевер используется в пищу, является ценным медоносом и кормовой культурой. Несмотря на то что в официальной медицине растение применяется ограниченно, имеются данные об эффективности спиртовых настоек клевера при атеросклерозе, что подтверждает перспективность дальнейших исследований.

Ботаническая характеристика и распространение

Клевер луговой — многолетнее травянистое растение высотой 20–50 см. Корень стержневой, разветвлённый, с характерными клубеньками, обусловливающими способность растения к фиксации атмосферного азота. Листья сложные, тройчатые. Цветки неправильные, розово-красные, собраны в плотные головчатые соцветия. Плод — односемянный боб.

Растение цветёт с мая по сентябрь. Произрастает на лугах, в поймах рек, вдоль арыков, на опушках лесов и в садах. Ареал охватывает Среднюю Азию, Европу, Кавказ, Сибирь и Дальний Восток.

Химический состав клевера лугового (Trifolium pratense L.)

Клевер луговой (*Trifolium pratense* L., семейство Fabaceae) относится к числу лекарственных растений с богатым и многокомпонентным химическим составом, определяющим широкий спектр его фармакологической активности. Основными биологически активными веществами растения являются флавоноиды, изофлавоны, фенольные кислоты, кумарины, тритерпеновые сапонины, эфирные масла, витамины и минеральные элементы.

Флавоноиды и изофлавоны

Наибольшую фармакологическую ценность представляют **изофлавоны**, обладающие фитоэстрогенной активностью. В надземной части растения обнаружены:

формононетин,
биоханин А,
дайдзеин,
генистеин.

Данные соединения проявляют антиоксидантное, противовоспалительное, эстрогеноподобное и антипролиферативное действие, что обусловливает перспективность использования клевера лугового в профилактике гормонозависимых состояний и возрастных нарушений.

Кроме изофлавонов, в растении присутствуют **флавоны и флавонолы** (кверцетин, кемпферол, апигенин), которые усиливают капилляропротекторные и противоокислительные свойства растительного сырья.

Фенольные соединения и кумарины

Фенольный комплекс представлен хлорогеновой, кофейной, феруловой и *p*-кумаровой кислотами. Эти вещества обладают выраженным антиоксидантным и мембраностабилизирующим эффектом. Кумариновые соединения (умбеллиферон, скополетин) участвуют в регуляции микроциркуляции и проявляют умеренное спазмолитическое действие.

Сапонины и тритерпеноиды

В траве клевера лугового выявлены **тритерпеновые сапонины**, которые способствуют отхаркивающему, противовоспалительному и иммуномодулирующему эффектам. Они также повышают биодоступность других биологически активных веществ, входящих в состав растения.

Эфирные масла, органические кислоты и сахара

Эфирное масло клевера лугового присутствует в незначительных количествах, однако участвует в формировании противомикробных свойств растения. Органические кислоты (яблочная, лимонная) и растворимые сахара (глюкоза, фруктоза) оказывают влияние на метаболические процессы и общий трофический эффект.

Витамины и минеральные вещества

Растение содержит витамины группы В, аскорбиновую кислоту (витамин С), токоферолы (витамин Е), а также каротиноиды. Минеральный состав представлен калием, кальцием, магнием, железом, фосфором и микроэлементами (медь, цинк, марганец), что повышает пищевую и лечебную ценность клевера лугового.

Фармакологическое и лечебное значение

В народной медицине клевер луговой применяется как противовоспалительное, антисептическое, отхаркивающее и мочегонное средство. Настои и отвары используются при заболеваниях дыхательных путей, анемии, ревматизме, гипертонии. Наружно препараты клевера применяются для лечения ран, ожогов и кожных воспалений.

Исторические источники, включая труды Ибн Сины, подтверждают использование растения при заболеваниях желудка, мочевого пузыря и лихорадочных состояниях. Современные исследования указывают на перспективность применения спиртовых настоек клевера при атеросклерозе.

Лекарственное растительное сырьё и способы применения клевера лугового (*Trifolium pratense* L.)В фармакогностической практике в качестве лекарственного растительного сырья клевера лугового используется **трава клевера** (*Herba Trifolii pratensis*), включающая облиственные цветущие побеги и соцветия. Заготовку сырья проводят в фазе массового цветения, которая характеризуется максимальным накоплением биологически активных веществ, прежде всего изофлавонов, флавоноидов и фенольных соединений.

Сбор осуществляют в сухую погоду, срезая надземную часть растения на высоте 10–15 см от поверхности почвы. Сушку проводят в тени, под навесами или в хорошо проветриваемых помещениях при температуре не выше 40–45 °С, что позволяет сохранить термолабильные компоненты сырья. Высушенное сырьё хранят в сухих, защищённых от света помещениях в бумажной или тканевой таре. Срок хранения составляет до 2 лет.

Сырьё должно соответствовать требованиям нормативной документации по показателям подлинности, чистоты, влажности, содержанию примесей и биологически активных веществ.

Основные лекарственные формы

На основе травы клевера лугового изготавливаются различные галеновые и неогаленовые препараты:

водные настои и отвары;

спиртовые настойки и экстракты;

сухие и жидкие экстракты;

фитосборы;

биологически активные добавки растительного происхождения.

Способы применения

Внутреннее применение

Препараты клевера лугового традиционно применяются внутрь в виде настоев и экстрактов при следующих состояниях:

заболевания дыхательных путей (бронхиты, кашель, катары верхних дыхательных путей);

функциональные нарушения сердечно-сосудистой системы;

атеросклеротические изменения и нарушения липидного обмена;

воспалительные процессы желудочно-кишечного тракта;

климактерические расстройства у женщин.

Фитоэстрогенные свойства изофлавонов обусловливают использование клевера лугового в составе комплексной терапии гормонально обусловленных состояний, при этом препараты растения обладают мягким и пролонгированным действием.

Наружное применение

Наружно клевер луговой используют в виде настоев, отваров и компрессов при:

воспалительных заболеваниях кожи;

плохо заживающих ранах и язвах;

ожогах и дерматитах;

экзематозных поражениях.

Антисептические и регенерирующие свойства растения связаны с присутствием фенольных соединений, флавоноидов и витаминов.

Применение в народной и официальной медицине

В народной медицине клевер луговой применяется как противовоспалительное, отхаркивающее, потогонное и общеукрепляющее средство. В ряде стран препараты на основе *Trifolium pratense* включены в состав фитопрепаратов и БАДов, предназначенных для поддержки гормонального баланса и профилактики возрастных нарушений.

Меры предосторожности

Несмотря на растительное происхождение, препараты клевера лугового требуют осторожного применения. Не рекомендуется длительное и бесконтрольное использование при гормонозависимых заболеваниях, беременности, а также при индивидуальной чувствительности к компонентам растения.Лекарственным сырьём служат соцветия — головки с верхушечными листьями, заготавливаемые в период цветения. Сырьё сушат в тени при хорошей вентиляции и хранят в сухих помещениях. Настои готовят из расчёта 1 столовая ложка сырья на стакан кипятка.

Выводы

Клевер луговой (Trifolium pratense L.) является ценным лекарственным, пищевым и медоносным растением с широким ареалом распространения.

Богатый химический состав растения определяет его многостороннее фармакологическое действие, подтверждённое данными народной и экспериментальной медицины.

Использование клевера лугового в фитотерапии и профилактической медицине представляется научно обоснованным и перспективным.

Ограниченное применение растения в современной официальной медицине свидетельствует о необходимости дальнейших фармакологических и клинических исследований с целью расширения номенклатуры лекарственного растительного сырья.

Использованные источники:

1. Голышенков П. П. Лекарственные растения. — М., 1982.
2. Кощеев А. К. Дикорастущие пищевые растения. — М., 1980.
3. Завражнов В. И. и соавт. Лекарственные растения СССР. — М., 1975.
4. Ковалева Н. Г. Фитотерапия. — М., 1972
5. Хасанова, Г. Р. (2025). Химический анализ биологически активных веществ в корневищах и корнях девясил высокий-inula helenium l., произрастающего на территории средний азии. образование наука и инновационные идеи в мире, 79(3), 157-164.
6. Хасанова, Г. Р., Магрипова, Д. Ф., & Алибоева, Ш. У. (2025). Роль лимона в жизни человека. образование наука и инновационные идеи в мирЕ, 80(1), 26-32.
7. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
8. Абдувакилов Ж.У., ЯкубоваС.Р., Балтабаев У.А. Тиш протезларига мослашиш жараёнларида биокимёвий курсаткичларнинг ахамияти //Доктор ахборотномаси. – 2021. -№4. -С.139-144.
9. Gavkhar Nuriddinovna Indiaminova, Tulkin Elnazarovich Zoirov. (2021). Improvement of Methods of Providing Dental Care for Children with Mental Delayed Development. The American Journalof Medical Sciences and Pharmaceutical Research, 3(01), 111-116.
10. G. N. Indiaminova, “Duration of orthodontic treatment in patients with dental jaw anomalies with removal and withoutremoval of separate teeth” журнал биомедицины и практики №si-2 (2020).
11. «Клиническая оценка состояния протезных конструкций у больных с частичной адентией» Якубова С.Р., Абдувакилов Ж.У. «Актуальные проблемы детской стоматологии» 2021 Стр-285-290.
12. Шаныгина Д.В. Неинвазивные методы исследования в клинике ортопедической стоматологии / Д.В. Шаныгина, Г.В. Большаков, А.А. Подколзин // Институт стоматологии. - 2002. - № 3. - С. 46-47.
13. Craig R.G. Dental materials / R.G. Craig, J.M. Powers, J.C. Wataha.- London: Mosby, 2000. - 327p.
14. DrapalS. Биологическая совместимость дентальных металлов / S. DrapalIIНовое в стоматологии. - 2001. - №2. - С.39-48.

DOI 10.24412/2225-1545-2025-12-2138-1183-1188
УДК 332.142.23:352.11(470.57)

Культуманов Р. У.
студент
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Научный руководитель: Галимов Р. С., канд. социол. наук
Россия, г.Уфа

ЦИФРОВИЗАЦИЯ УПРАВЛЕНИЯ ОСОБЫМИ ЭКОНОМИЧЕСКИМИ ЗОНАМИ КАК ФАКТОР ЭФФЕКТИВНОГО ВЗАИМОДЕЙСТВИЯ ОРГАНОВ ГОСУДАРСТВЕННОЙ И МУНИЦИПАЛЬНОЙ ВЛАСТИ: ИНСТИТУЦИОНАЛЬНЫЙ И УПРАВЛЕНЧЕСКИЙ АНАЛИЗ ОЭЗ ППТ «АЛГА»

Аннотация. *В условиях нарастающих вызовов импортозамещения, технологической независимости и территориального неравенства особые экономические зоны становятся ключевыми инструментами реализации государственной промышленной политики. Однако их эффективность напрямую зависит от качества взаимодействия между федеральными, региональными и муниципальными органами власти. В статье на примере ОЭЗ промышленно-производственного типа «Алга» в Республике Башкортостан проведён институциональный и управленческий анализ цифровых практик, направленных на оптимизацию межуровневого взаимодействия. Использованы методы case-study, сравнительного анализа и экспертного интервьюирования (2023–2025 гг.). Показано, что внедрение цифрового кабинета резидента, интеграция с ГИС «Единая карта РБ» и API-взаимодействие с муниципальными ИС позволили сократить средние сроки согласования проектов на 65 %, повысить удовлетворённость резидентов до 89 % и ускорить подключение инфраструктуры. Вместе с тем, выявлены дисбалансы в цифровой зрелости муниципалитетов и фрагментарность федеральной интеграции. Сформулированы рекомендации по созданию сквозной цифровой платформы «ОЭЗ-2030» на базе региональной ИТ-экосистемы.*

Ключевые слова: *особая экономическая зона, цифровизация управления, межуровневое взаимодействие, государственное управление, ОЭЗ «Алга», цифровой кабинет резидента, территориальное развитие.*

Kultumanov R. U.
student
Bashkir Academy of Public Service and Administration
under the Head of the Republic of Bashkortostan
Scientific Supervisor: Galimov R. S., cand. sci. (sociology)
Russia, Ufa

DIGITALIZATION OF SPECIAL ECONOMIC ZONE MANAGEMENT AS A FACTOR OF EFFECTIVE INTERACTION BETWEEN STATE AND MUNICIPAL AUTHORITIES: INSTITUTIONAL AND MANAGERIAL ANALYSIS OF THE INDUSTRIAL PRODUCTION TYPE SEZ «ALGA»

Abstract. *Amid growing challenges of import substitution, technological sovereignty, and territorial inequality, special economic zones (SEZs) have become pivotal instruments for implementing national industrial policy. However, their effectiveness is directly contingent upon the quality of interaction among federal, regional, and municipal authorities. This article presents an institutional and managerial analysis of digital practices implemented to optimize multi-level governance, using the Industrial Production Type SEZ "Alga" in the Republic of Bashkortostan as a case study. Methods include case study, comparative analysis, and expert interviews (2023–2025). Findings indicate that the introduction of the Resident's Digital Cabinet, integration with the GIS "Unified Map of the Republic of Bashkortostan", and API-interfacing with municipal information systems have reduced average project approval times by 65%, increased resident satisfaction to 89%, and accelerated infrastructure connectivity. Nevertheless, disparities in municipal digital maturity and fragmented federal integration persist. Recommendations are proposed for a unified digital "SEZ-2030" platform based on the regional IT ecosystem.*

Keywords: *special economic zone, digitalization of governance, multi-level interaction, public administration, SEZ "Alga", resident digital cabinet, territorial development.*

Современная государственная экономическая политика РФ всё более ориентируется на территориальный подход, в рамках которого особые экономические зоны (ОЭЗ) выступают как институциональные «лаборатории» для тестирования механизмов промышленного роста, импортозамещения и цифровой трансформации. По состоянию на 1 декабря 2025 г. в России функционирует 42 ОЭЗ, 28 из которых - промышленно-производственного типа (ППТ), совокупный объём инвестиций в которые превышает 2,1 трлн руб.

Однако, как отмечают Минэкономразвития РФ и Ассоциация «ОЭЗ России», ключевым ограничением для ускорения реализации проектов остаётся не технологическая, а институциональная составляющая - в

частности, фрагментарное и несогласованное взаимодействие органов власти разных уровней. В условиях децентрализованного управления территориями эта проблема обостряется, особенно в регионах с разнородной муниципальной структурой, каковой является Республика Башкортостан.

ОЭЗ ППТ «Алга», созданная 27 мая 2020 г. и расширенная в 2023 г., расположена на территории трёх муниципальных образований: Уфимского, Стерлитамакского и Ишимбайского районов. Такая территориальная дифференциация объективно усиливает сложность координации: от согласования земельных участков и экологических экспертиз до подключения к сетям ЖКХ и формирования кадрового потенциала.

Целью настоящей статьи является анализ влияния цифровизации управленческих процессов в ОЭЗ «Алга» на эффективность взаимодействия органов государственной и муниципальной власти в Республике Башкортостан, в рамках которой решались следующие задачи:

1) выявить институциональные барьеры межуровневого взаимодействия до цифровой трансформации;

2) оценить реализованные цифровые практики и их управленческий эффект;

3) сформулировать рекомендации по совершенствованию цифровой координационной инфраструктуры.

В работе применён комплекс методов:

- институциональный анализ нормативно-правовой базы (федеральные и региональные акты);

- case-study - углублённое изучение ОЭЗ «Алга» как типичного, но уникального кейса: площадь - 842 га (после расширения), 28 резидентов по состоянию на 01.01.2025, объём инвестиций - 97,4 млрд руб., создано 4 200 рабочих мест;

- сравнительный анализ с ОЭЗ «Алабуга» (Татарстан) и «Камчатка» (Камчатский край) по критериям цифровой зрелости и координационной эффективности;

1. Институциональные барьеры межуровневого взаимодействия

До масштабной цифровизации в ОЭЗ «Алга» доминировала бумажная и ручная координация. Согласно данным АО «Корпорация развития РБ», средний срок согласования инвестиционного проекта составлял 118 дней, из них 72 дня - на взаимодействие с муниципалитетами (выделение земли, согласование градплана, подключение к сетям). Особенно критична была ситуация в Ишимбайском районе, где отсутствие единой ИС приводило к дублированию запросов и «перекладыванию» ответственности между отделами (экология, архитектура, ЖКХ).

2. Цифровые практики: ключевые инновации (2023–2025 гг.)

С 2023 г. АО «Корпорация развития РБ» реализует программу «Цифровая ОЭЗ», включающую:

- Единый цифровой кабинет резидента (запущен в марте 2023 г.): единая точка входа для подачи заявок, отслеживания статусов, загрузки

документов, онлайн-консультаций с юристами и инженерами УК. Интегрирован с ЕПГУ и ГИС «Единая карта РБ» (позволяет визуализировать земельные участки, инфраструктурные сети, зоны санитарной охраны).

- API-взаимодействие с муниципальными ИС: налажено подключение к ИС «Электронный муниципалитет» г. Уфы и Стерлитамака (через шлюз Минцифры РБ). Запросы на выделение земли, выдачу градусловий, подключение к электросетям теперь передаются в автоматическом режиме. В Ишимбайском районе взаимодействие пока частично - через электронную почту с шифрованием, что замедляет процессы на 10–15 дней.

- Цифровой паспорт проекта: каждый резидент получает интерактивный дашборд с KPI: сроки согласований, этапы строительства, контрольные точки подключения к инфраструктуре.

3. Оценка эффективности цифровых решений

Сравнительный анализ «до» и «после» цифровизации (табл. 1) показывает значимый сдвиг:

Таблица 1

Изменение показателей эффективности взаимодействия органов власти в ОЭЗ «Алга» (2021–2024 гг.)

Показатель	2021 г.	2024 г.	Изменение, %
Среднее время согласования проекта (дни)	118	41	↓ 65,3 %
Число обращений в муниципальные органы на 1 проект	23	8	↓ 65,2 %
Удовлетворённость резидентов информационной прозрачностью (по 5-балльной шкале)	3,1	4,4	↑ 41,9 %
Доля проектов, реализованных в срок	62 %	89 %	↑ 27 п.п.

Источник: *[составлено автором]*

Примечательно, что наибольший эффект достигнут в проектах, реализуемых в границах Уфимского района (например, ООО «НефтеХим-Тех» - срок запуска сокращён на 5 месяцев), тогда как в Ишимбайском районе эффект ниже на 18–22 % из-за отсутствия локальной ЦИС.

4. Выявленные проблемы и риски

- Неравномерная цифровая зрелость муниципалитетов: Уфа и Стерлитамак имеют развитые ИС («Электронный город»), тогда как 6 из 10 районов РБ до сих пор используют гибридные форматы;

- Фрагментарная интеграция с федеральными реестрами: отсутствует прямой API-доступ к ЕГРН (Росреестр) и ЕГАИС (ФНС), что требует ручной выгрузки и верификации данных;

- Кадровый дефицит: в 72 % районных администраций нет штатных специалистов по digital-управлению, что снижает качество обратной связи.

Проведённое исследование подтверждает, что цифровизация управления особыми экономическими зонами выступает не просто как инструмент повышения операционной эффективности, но как институциональный модератор, способный снизить транзакционные

издержки и выровнять информационную асимметрию между уровнями власти. В случае ОЭЗ «Алга» это позволило трансформировать модель взаимодействия из «запрос–ответ» в «проактивное сопровождение», что подтверждается количественными и качественными данными.

Однако для перехода к устойчивой системе сквозного цифрового управления необходимо:

1) разработать и внедрить межведомственную платформу «ОЭЗ-2030» на базе ИТ-экосистемы «Цифровой Башкортостан», обеспечивающую единое API-взаимодействие между всеми участниками (федеральные органы → Правительство РБ → УК → муниципалитеты → резиденты);

2) стандартизировать цифровые процессы согласования через RACI-матрицы и единые SLA (сроки, ответственные, критерии качества);

3) организовать систему повышения квалификации муниципальных служащих по digital-управлению на базе Башкирской академии государственной службы и управления - потенциально в рамках проекта «Кадры цифровой экономики».

Полученные результаты могут быть использованы при разработке методических рекомендаций Минэкономразвития РФ по цифровизации ОЭЗ, а также при совершенствовании региональных программ цифровой трансформации в субъектах РФ, особенно в условиях расширения сети ОЭЗ (в 2025 г. планируется создание 5 новых ОЭЗ в ПФО и УрФО).

Использованные источники:

1. Стратегия развития информационного общества в Российской Федерации на 2017-2030 гг. (утв. Президентом РФ 09.05.2017 г. № Пр-203). [Электронный ресурс]. URL: https:// www.garant.ru/products/ipo/prime/doc/71570570/ (дата обращения: 09.12.2025)
2. Стратегия социально-экономического развития Республики Башкортостан до 2030 года : утв. Постановлением Правительства РБ от 20.12.2018 № 624. - URL: https://docs.cntd.ru/document/550329714 (дата обращения: 09.12.2025).
3. Об особой экономической зоне промышленно-производственного типа «Алга», созданной на территориях муниципальных районов Ишимбайский район и Стерлитамакский район Республики Башкортостан : Постановление Правительства РФ от 21.06.2023 № 1014. - Собрание законодательства РФ. - 2023. - № 26. - Ст. 3812.
4. Иванова М.В. Системы оценки цифровой трансформации государственного управления: сравнительный анализ российской и зарубежной практики // Государственное управление. Электронный вестник. 2020. № 79. С. 255-280
5. Национальный рейтинг инвестиционной привлекательности особых экономических зон. VIII цикл (2023 г.) / Минэкономразвития РФ. – [Электронный ресурс] - - URL: https://economy.gov.ru/material/news/minekonomrazvitiya_i_akit_rf_predstavili_i

togi_viii_nacionalnogo_reytinga_investicionnoy_privlekatelnosti_oez_rossii.html (дата обращения: 11.12.2025).

Қорабоева Н. Н.
кафедра иностранных языков
Андижанский институт сельского хозяйства и агротехнологии

ФУНКЦИОНАЛЬНАЯ РОЛЬ И МЕТОДИЧЕСКИЕ ВОЗМОЖНОСТИ ХУДОЖЕСТВЕННЫХ ТЕКСТОВ В ОБУЧЕНИИ ЯЗЫКАМ

Аннотация: *В статье рассматривается важная роль литературы в процессе обучения иностранным языкам, подчеркивается её значение в формировании словарного запаса, развитии навыков чтения и культурной компетентности учащихся. Анализируется историческая эволюция использования литературных текстов в педагогике: от традиционного подхода, основанного на переводе и изучении классических произведений, до современных методов, включающих аутентичные материалы. Особое внимание уделяется трехэтапной модели работы с художественным текстом — до чтения, во время чтения и после чтения — как эффективному способу активизации мышления учащихся. Отмечается, что знакомство студентов с оригинальными произведениями способствует повышению мотивации и углублению понимания языка и культуры.*

Ключевые слова: *Литература, обучение иностранным языкам, художественные тексты, словарный запас, навыки чтения, аутентичные материалы, методика преподавания.*

Qoraboyeva N. N.
department of foreign languages
Andijan Institute of Agriculture and Agrotechnologies

FUNCTIONAL ROLE AND METHODOLOGICAL POTENTIAL OF LITERARY TEXTS IN LANGUAGE TEACHING

Annotation. *This article examines the significant role of literature in foreign language teaching, highlighting its influence throughout centuries of educational practice. Literary works are presented as a powerful tool for enriching learners' vocabulary, developing reading comprehension skills, and deepening cultural awareness. The study analyses the shift from traditional literature-based teaching methods to modern approaches integrating authentic materials, and how today's methodologies seek a balanced use of literary texts. A structured model of reading—pre-reading, while-reading and post-reading activities—is discussed as an effective strategy for engaging learners. The article also emphasizes the motivational and cognitive benefits of introducing students to original literary texts, demonstrating how literature enhances language acquisition and broadens intellectual development.*

Key words. *Literature, reading skills, foreign language teaching, authentic texts, vocabulary acquisition, literary excerpts, language pedagogy.*

В целях повышения авторитета узбекского языка в общественной жизни нашего народа и на международной арене, воспитания нашей молодежи в духе патриотизма, преданности национальным традициям и ценностям, обеспечения полноценного внедрения государственного языка. в нашей стране Указ Президента Республики Узбекистан от 21 октября 2019 г. ПФ-5850 «О мерах по повышению престижа и статуса узбекского языка как государственного»

На протяжении сотен лет роль литературы в программе обучения иностранным языкам не подвергалась сомнению. Считалось, что учащиеся могут оценить язык только через изучение его высшей формы выражения. Литература рассматривалась как единственный способ познакомиться с культурой нации и, во многих случаях, с ее людьми. Даже несмотря на то, литературном языке часто был выше уровня обучающихся и нагрузок словарной невыносимых, классы выстояли в их кропотливом слове за словом перевод целых книг.

Времена изменились. В 1970-е и 80-е годы учителя стремились привнести в свои классы внешний мир, и призыв был к подлинным материалам, таким как расписание поездов и отрывки из газет, чтобы помочь ученикам справиться с реальным миром. Литературу не столько вытеснили, сколько загнали в угол и забыли. Был даже вопрос, можно ли считать литературу подлинной или нет! Возможно, сейчас мы достигли более разумного баланса. Литературу можно преподавать интересно и открывать глаза. Учащимся более позднего уровня читают более длинные тексты и целые книги, и они ценят отрывки с большим содержанием и разнообразием, чем может дать ежедневная газета.

Литература служит отличным исходным материалом для студентов и учителей. В нем можно выбрать широкий спектр текстов из прозы, драмы и поэзии разных веков. Некоторые тексты будут развлекать, другие заставят задуматься, но все они станут проблемой и темой для обсуждения. Студенты вводятся в тексты с помощью заданий на предварительное понимание, а тексты используются с помощью языковых упражнений и упражнений на основе навыков. Персонализация проходит повсюду.

Было бы очень полезно, если бы студенты были вдохновлены чтением оригинальных книг, представленных им посредством отрывков из литературы, мы уверены, что они это делают. Литература для студентов, которые хотели бы начать читать литературу на английском языке. Он идеально подходит для работы в классе или для студентов, работающих самостоятельно.

Литература помогает учителям, которые хотят познакомить своих учеников с чтением литературы на английском языке. Книгу можно разделить на тематические блоки, некоторые из которых исследуют темы и проблемы. Однако его можно использовать отдельно или в качестве дополнения к любому курсу выше среднего. Это сборник художественных

текстов и сопутствующих им упражнений, выбранных и предназначенных для получения удовольствия, обогащения словарного запаса и развития навыков чтения. Мы надеемся, что «Литература» побуждает студентов самостоятельно изучать больше литературы на английском языке, а также помогает им развить необходимые для этого навыки. Он состоит из трех этапов:

- ✓ Перед чтением - готовимся к следующему
- ✓ Во время чтения - изучение смысла текста
- ✓ После прочтения - образное реагирование на текст

К книге может прилагаться аудиокассета с прочтением большей части текстов. Иногда записанный на пленку материал важен для упражнения, иногда студентам предлагается слушать его во время чтения или после того, как они закончили читать, просто для того, чтобы получить больше удовольствия и укрепить понимание текста!

Клавиша ответа в конце книги помогает учителю и позволяет ученикам самостоятельно использовать книгу. Культурная информация необходима для полного понимания текстов, представленных либо в сносках, либо в ключе ответов.

1. Хотя вы можете окунуться в книгу в любой момент, более простые тексты и задания находятся в начале. И ближе к концу более сложные.

2. Если вы хотите сократить учебное время на единицу, вы можете установить предварительную лексику как подготовительное домашнее задание.

3. По некоторым текстам, вошедшим в «Литературу», экранизированы фильмы. Просмотр видео - полезный способ для учащихся лучше понять всю историю. В одноязычном классе может быть полезна версия фильма с субтитрами.

4. Некоторые дополнительные задачи, которые студенты могут попробовать вне класса:

-сравнение оригинального художественного текста на английском языке с переводом на родной язык.

-чтение более длинного литературного текста сначала на своем родном языке или в поэтапной английской версии перед просмотром ключевого отрывка в оригинале.

Рекомендуется использовать хороший англо-английский словарь при выполнении упражнений на лексику.

В словарных упражнениях вы встретите те слова, которые вы должны знать, прежде чем читать тексты. В словарных упражнениях рассматриваются не все возможные значения или даже наиболее распространенные значения этих слов, а их особые значения в художественном тексте, который следует за ними. Мы не предлагаем вам выучить все эти слова.

Будьте осторожны, не используйте словарь все время, когда читаете. Главное: словарный запас разбирается в упражнениях до текста.

Попробуйте также угадывать значение новых слов из контекста или игнорировать неизвестные слова при первом чтении текста. Если вы используете эту книгу самостоятельно, попробуйте найти кого-нибудь, с кем можно поработать во время обсуждения.

Это не курс английской литературы, хотя включены работы таких известных авторов, как Байрон и Диккенс, а также современные работы знакомых и менее известных авторов. Он знакомит с идеей чтения литературы и представляет словарный запас, который учащиеся находят полезными при работе с книгой, и фокусирует внимание на отдельном художественном тексте или на выборке текстов.

Каждый из них:

-содержит биографические данные об авторе, о которых идет речь, чтобы дать учителям и ученикам некоторую справочную информацию о текстах.

-предоставляет поддержку студентам и учителям там, где это необходимо, работая с важными и сложными словарными элементами, которые встречаются в текстах.

-содержит разнообразные и имитирующие упражнения на понимание и интерпретацию текста.

Использованные источники:

1. Указ Президента Республики Узбекистан от 21 октября 2019 г. ПФ-5850 “О мерах по повышению престижа и статуса узбекского языка как государственного”./ https://lex.uz/docs/-5058351
2. Джамол Дж .: Методика обучения иностранным языкам 1996. Ташкентское издательство учителей.
3. Зарипова Р.: Пособие по методике обучения иностранным языкам. Ташкентское учительское издательство 1996.

Лыгина Д. А.
студент
Научный руководитель: Шевцов В. В.., д.э.н
Кубанский государственный аграрный университет имени И. Т. Трубилина
Россия, г.Краснодар

МЕТОДЫ И ИНСТРУМЕНТЫ УПРАВЛЕНИЯ РИСКАМИ В ПРОЕКТНОМ МЕНЕДЖМЕНТЕ: АНАЛИЗ И ОПТИМИЗАЦИЯ

Аннотация: *Управление рисками является неотъемлемой частью любого проекта, особенно в условиях современной экономической и социальной динамики. Проектные менеджеры сталкиваются с множеством неопределенностей, которые могут негативно сказаться на сроках, бюджете и качестве проекта. Понимание и эффективное управление рисками становится залогом успешной реализации проектов и устойчивого роста организаций.*

Ключевые слова: *Эффективное управление рисками, специализированные методы и инструменты, проектный менеджмент, идентификация, оценка, минимизация (рисков), Потенциальные угрозы, оптимизация процессов управления рисками*

Lygina D. A.
student
Scientific supervisor: Shevtsov V. V., doctor of economics
I. T. Trubilin Kuban State Agrarian University
Russia, Krasnodar

METHODS AND TOOLS OF RISK MANAGEMENT IN PROJECT MANAGEMENT: ANALYSIS AND OPTIMIZATION

Abstract: *Risk management is an integral part of any project, especially in the context of modern economic and social dynamics. Project managers face many uncertainties that can negatively affect the timing, budget, and quality of the project. Understanding and effective risk management is the key to successful project implementation and sustainable growth of organizations.*

Keywords: *Effective risk management, specialized methods and tools, project management, identification, assessment, minimization (of risks), Potential threats, optimization of risk management processes*

Введение

Эффективное управление рисками основывается на применении специализированных методов и инструментов, позволяющих идентифицировать, оценить и минимизировать потенциальные угрозы.

Настоящая статья посвящена исследованию методов и инструментов управления рисками в проектном менеджменте, а также предлагает рекомендации по их использованию для оптимизации процессов управления рисками.

Основная часть

Управление рисками проекта — это систематический процесс выявления, анализа и контроля факторов, которые могут повлиять на цели проекта. Основная цель этого процесса — заблаговременно распознавать угрозы, оперативно реагировать на них и минимизировать их негативное влияние на конечный результат (ELMA365).

Без своевременной оценки рисков даже небольшие отклонения могут превратиться в серьезные проблемы, приводящие к срыву сроков, превышению бюджета, ухудшению качества продукта или потере репутации компании. Грамотное управление рисками способствует повышению предсказуемости результата и защите инвестиций предприятия (Bitrix24).

Этапы управления рисками проекта:

Процесс управления рисками включает следующие ключевые этапы:

1. Идентификация рисков

На данном этапе происходит сбор информации обо всех возможных рисках, влияющих на проект. Для этого используются различные методы, такие как мозговой штурм, SWOT-анализ, интервью с экспертами и анализ предыдущих проектов (Asana).

2. Оценка рисков

После выявления рисков необходимо оценить их вероятность и возможное влияние на проект. Здесь применяются методы качественного и количественного анализа, такие как матрицы вероятности и последствий, анализ чувствительности и имитационное моделирование (Cleverence).

3. Разработка стратегии реагирования

На основании проведенного анализа выбирается подходящая стратегия реагирования на риски. Возможные варианты включают:

Избежание риска путем исключения условий, вызывающих угрозу.

Минимизацию риска посредством разработки профилактических мероприятий.

Передачу риска третьей стороне (например, страхование).

Принятие риска, когда издержки устранения превышают возможный ущерб (GOST R 72160-2025).

4. Реализация выбранных мер

Этот этап подразумевает выполнение запланированных мероприятий по устранению или уменьшению рисков. Важно следить за выполнением поставленных задач и обеспечивать координацию усилий всех вовлеченных сторон.

5. Контроль и мониторинг рисков

Регулярный мониторинг необходим для проверки эффективности реализуемых мер и обнаружения новых рисков. Постоянный пересмотр

реестра рисков позволяет поддерживать актуальность информации и своевременно вносить корректировки в планы управления рисками (Author24).

Методы и инструменты управления рисками.

Существует широкий спектр методов и инструментов, используемых для управления рисками в проектном менеджменте. Некоторые из них описаны ниже.

1. Качественные методы

Эти методы основаны на субъективных оценках экспертов и включают:

- Матрица вероятности и последствий.
- Экспертные оценки.
- Диаграммы причинно-следственных связей (диаграмма Исикавы).

2. Количественные методы

Они предполагают математическое моделирование и расчет показателей риска:

- Моделирование методом Монте-Карло.
- Анализ дерева решений.
- Анализ чувствительности.

Инструментальные средства поддержки управления рисками.

Современное программное обеспечение предоставляет мощные инструменты для автоматизации процессов управления рисками:

BPM-системы: позволяют создавать централизованный реестр рисков, фиксировать статус каждого риска и формировать отчеты.

Low-code платформы: предоставляют удобные интерфейсы для регистрации и обработки рисков, интегрированы с системами управления задачами.

CRM-системы: поддерживают интеграцию с инструментами управления рисками, помогая синхронизировать данные и улучшать взаимодействие между сотрудниками.

Практические примеры использования инструментов

Рассмотрим два примера внедрения инструментов управления рисками:

Пример 1: Компания X применила BPM-систему для управления рисками строительства крупного объекта недвижимости. Система позволила автоматически уведомлять менеджеров о возникающих рисках, что позволило вовремя скорректировать графики и бюджеты, избежав значительных убытков.

Пример 2: Стартап Y использовал low-code платформу для управления рисками запуска нового продукта. Платформа помогла организовать коллективную работу команды, упростить идентификацию рисков и ускорить реакцию на изменяющиеся рыночные условия.

Оптимизация процессов управления рисками.

Оптимизация процессов управления рисками направлена на повышение их эффективности и сокращение затрат. Вот несколько практических шагов для оптимизации:

✓ Автоматизация процессов

Использование информационных систем для автоматизации сбора, хранения и анализа данных о рисках сокращает время на обработку информации и улучшает точность принимаемых решений

✓ Повышение квалификации персонала

Постоянное обучение сотрудников навыкам управления рисками повышает уровень компетентности и уменьшает количество ошибок, связанных с неправильной интерпретацией рисков.

✓ Создание культуры управления рисками

Организация должна поощрять открытость и готовность обсуждать риски среди сотрудников. Такая культура позволит быстрее выявлять и реагировать на потенциальные угрозы.

✓ Периодическая переоценка рисков

Регулярные ревизии реестра рисков необходимы для поддержания актуальной картины рисков и адаптации стратегии управления к новым обстоятельствам.

Заключение

Управление рисками в проектном менеджменте — это сложный, многоступенчатый процесс, требующий тщательного планирования и постоянного внимания. Правильное применение методов и инструментов управления рисками способно значительно повысить надежность и эффективность проектов, защитить интересы бизнеса и способствовать достижению стратегических целей компании.

Использованные источники:

1. ГОСТ Р 72160-2025. Национальный стандарт Российской Федерации. Менеджмент риска. Управление рисками проектов
2. Управление проектными рисками: классификация и методы. Bitrix24. (2025)
3. Семь самых распространенных проектных рисков и способы их предотвращения. Asana. (2025)
4. Управление рисками проекта: анализ, оценка рисков, примеры. ELMA365. (2025)
5. Процессы и методы управления проектными рисками. Автор24. (2023)
6. Управление рисками по PMBOK: минимизация рисков и неопределенности в проектах. Cleverence. (2025)

Мамаджанова С. В.
Кокандский государственный университет
г. Коканд, Узбекистан

МЕТОД МОЗГОВОГО ШТУРМА В РАЗВИТИИ ТЕХНИЧЕСКОГО ТВОРЧЕСТВА СТУДЕНТОВ

Аннотация: *в статье рассматриваются особенности применения метода «мозгового штурма» в образовательном процессе для развития технического творчества и критического мышления студентов в области робототехники и ИТ*

Ключевые слова: *мозговой штурм, техническое творчество, креативность, образование, робототехника*

Mamadjanova S. V.
Kokand State University
Kokand, Uzbekistan

BRAINSTORMING METHOD IN THE DEVELOPMENT OF STUDENTS' TECHNICAL CREATIVITY

Abstract: *The article examines the features of using the "brainstorming" method in the educational process for the development of technical creativity and critical thinking of students in the field of robotics and IT*

Keywords: *brainstorming, technical creativity, creativity, education, robotics*

В ходе технического развития общества, с появлением первых технических изобретений и простых механизмов, человечество пыталось решить технические задачи различной сложности и важности. Чтобы удовлетворить свои потребности и облегчить свой труд, человек пытался создать новые технологии и машины или повысить производительность существующих и увеличить коэффициент полезной работы. Долгое время считалось, что творчеством среди людей занимаются только талантливые люди. Рост науки и техники напрямую связан с научно-техническими исследованиями или экспериментами специалистов или ученых, и они также обеспечивают развитие научно-технического прогресса [1].

«Проблемные ситуации или потребности, возникающие в таких областях, как электроника, ИТ-индустрия, промышленное производство, являются одним из важных факторов, способствующих ускорению технического прогресса. Эта идея может быть применена и к техническому творчеству. Потому что в проблемах, подобных упомянутой выше, навыки технического творчества специалистов являются главной опорой для поиска решений» [2].

В 40-х годах возросла потребность в активных методах исследования решений технических задач. Отсутствие методов в этой области негативно сказывалось на развитии атомной энергетики, ракетной техники и совершенствовании электронно-вычислительных машин. В результате исследований в различных областях в этот период были выявлены следующие факты:

- во-первых, было установлено, что даже гении не могут решать сложные задачи в одиночку, и необходим коллективный метод творчества;

- во-вторых, учитывая сжатые сроки разработки технических решений, научные исследования должны проводиться непрерывно в сочетании с разработкой новых идей;

- в-третьих, определить способы выделения из множества существующих идей разумных и эффективных. Сегодня, в результате масштабных реформ, проводимых во всем мире, в том числе и в нашей стране, наблюдается развитие робототехники, IT-индустрии и технического прогресса. В этом процессе, как и в прошлом веке, необходимы творческие и инновационные решения технических задач и подходы к их решению.

С учётом этих аспектов, технологии и информатика преподаются в современной системе образования, от средней школы до высшей. Главная цель, конечно же, формирование и развитие технического творчества у подрастающего поколения при освоении робототехники, информатики, программирования и многих других современных профессий. С учётом этих аспектов, эффективность метода «мозгового штурма» в поиске решений проблемных ситуаций изучалась американскими учёными ещё в прошлом веке. Ниже представлены эффективные методы использования метода «мозгового штурма» на занятиях по развитию технического творчества у студентов технологических специальностей, обучающихся в высших учебных заведениях. По мнению учёных, творческая деятельность основана на определённых закономерностях, что создаёт основу для поиска адекватных методов решения творческих задач. Эти методы делятся на две группы. К первой группе относятся методы «мозгового штурма», основанные на механизмах ассоциативного мышления и неожиданных решениях. Эти методы очень просты в применении, но не зависят от характера используемого объекта.

Ко второй группе относятся алгоритм решения изобретательских задач, методы функционально-стоимостного анализа и т.д. Применение этих методов довольно сложно, но направлено на раскрытие природы объекта. Возникновение потребности в научных основах производственных предприятий обуславливает развитие науки во многих научно-исследовательских институтах.

В середине 90-х годов бурное развитие атомной энергетики, ракетной техники и электронно-вычислительной техники началось с поиска способов организации творческого труда на научной основе. Поиски велись в различных направлениях. Одним из них стал метод «мозгового штурма».

«Мозговой штурм — это самый популярный в наши дни метод поиска идей и решений. Его активно используют программисты и маркетологи, дизайнеры и преподаватели, менеджеры проектов и руководители компаний. Популярность метода неслучайна: он позволяет быстро найти множество нестандартных решений и эффективно использовать потенциал всей команды» [3].

Данный метод предложил американский предприниматель, психолог и изобретатель Алекс Фейкни Осборн. По его мнению, если у кого-то есть возможность придумать идею, то у кого-то есть и возможность её критически проанализировать. Осборн предлагает разделить таких людей на две группы: «Генераторы» и «Эксперты». Он разработал следующие правила использования метода «мозгового штурма»:

1. В решении задач методом «Мозгового штурма» должны участвовать 12–25 студентов. Половина из них будут генераторами идей, а остальные — аналитиками. Группа генераторов идей включает студентов с развитым воображением и абстрактным мышлением. Экспертная группа выбирает студентов, обладающих аналитическим и критическим мышлением. Сессию «Мозгового штурма» проводит квалифицированный, опытный студент или преподаватель.

2. Генераторы предлагают максимальное количество идей для решения проблемы. Описание предложенных идей записывается. Эксперты выбирают из них наиболее подходящую.

3. В зависимости от сложности решения проблемы, сессия может длиться до 30–50 минут.

4. Необходимо установить уважительные и открытые отношения между участниками сессии «Мозгового штурма».

5. Если сессия заканчивается безрезультатно, необходимо заменить участников. Так же целесообразно пересмотреть формулировку проблемы.

При использовании данного метода в образовательном процессе основной целью является выявление аспектов технического творчества и креативности у студентов в робототехнике, информатике и других областях ИТ или развитие навыков критического мышления [4].

Заключение

В заключение следует сказать, что использование таких зарубежных методов в образовательном процессе оказывает положительное влияние на формирование творческого мышления студентов, способности решать задачи в робототехнике или других областях ИТ за счет новых идей или технического творчества, а также способности анализировать различные заданные решения за счет творческого и критического мышления. В целом, в развитии робототехники и ИТ в мире и в нашей стране только приобретенных знаний недостаточно. Сегодня наряду со знаниями от специалистов требуются креативность и изобретательность. Эти требования непременно должны учитываться в образовательном процессе.

Использованные источники:

1. Valentinovna, Mamajanova Svetlana, and Lyubimova Elena Mikhailovna. "Formation of technical thinking of students by means of educational robotics." Galaxy International Interdisciplinary Research Journal 12.3 (2024): 623-627.
2. Roza A. Valeeva, Gulfiia G. Parfilova, Svetlana V. Mamadzhanova, Inomzhon M. Rasulov Career Orientations of Future Teachers: A Study of Russian and Uzbek Students // Журнал СФУ. Гуманитарные науки. 2024. №11. URL: https://cyberleninka.ru/article/n/career-orientations-of-future-teachers-a-study-of-russian-and-uzbek-students (дата обращения: 01.12.2025).
3. Что такое мозговой штурм и для чего он нужен https://singularity-app.ru/blog/mozgovoy-shturm/ (дата обращения: 29.11.2025г.)
4. Osborn, A. F. (1953/1979). Applied imagination: Principles and procedures of creative problem-solving. New York: Scribners.

Мамажонова Г. К., PhD по философским наукам
старший преподаватель
кафедра социальных наук
Наманганский государственный технический университет

ФИЛОСОФСКИЕ ПРОБЛЕМЫ БИОЭТИКИ В УСЛОВИЯХ ТЕХНОЛОГИЧЕСКИХ ИЗМЕНЕНИЙ

Аннотация: *Статья посвящена анализу философских проблем биоэтики, возникающих на фоне стремительного развития биомедицины, цифровых технологий и генной инженерии. Особое внимание уделяется онтологическим, антропологическим и аксиологическим противоречиям современного понимания жизни, свободы и ответственности. Показано, что биоэтика сегодня перестаёт быть только медицинской дисциплиной и превращается в широкий философский проект, направленный на сохранение человеческого достоинства в условиях технологического вмешательства в природу человека.*

Ключевые слова: *биоэтика, философия жизни, человеческое достоинство, автономия личности, биовласть, аксиология, генетические технологии, искусственный интеллект в медицине, моральная ответственность.*

Mamajonova G. K., PhD in philosophical sciences,
senior lecturer
department of social sciences
Namangan State Technical University

PHILOSOPHICAL PROBLEMS OF BIOETHICS IN THE CONTEXT OF TECHNOLOGICAL TRANSFORMATIONS

Abstract: *The article analyzes the philosophical problems of bioethics arising amid the rapid development of biomedicine, digital technologies, and genetic engineering. Special attention is given to the ontological, anthropological, and axiological contradictions that shape modern understandings of life, freedom, and responsibility. It is shown that bioethics today is no longer solely a medical discipline but is transforming into a broader philosophical project aimed at preserving human dignity under conditions of technological intervention in human nature.*

Keywords: *bioethics, philosophy of life, human dignity, personal autonomy, biopower, axiology, genetic technologies, artificial intelligence in medicine, moral responsibility.*

Биоэтика сформировалась как ответ на глубокие трансформации, происходящие в медицине и биологии. Сегодня человек обладает такими

инструментами, которые позволяют не только лечить болезнь, но и вмешиваться в фундаментальные процессы жизни. Эти технологии создают не только новые возможности, но и новые угрозы. Поэтому философский анализ биоэтики становится необходимым элементом современного гуманитарного знания. Он помогает определить границы допустимого, осмыслить ценность жизни и понять, какие моральные последствия имеет власть человека над биологической природой.

Современная биомедицина постепенно разрушает традиционные границы между естественным и искусственным. Искусственные органы, бионические импланты, редактирование генома показывают, что жизнь может быть модифицирована и сконструирована. Возникает вопрос: остаётся ли человек прежним, если его тело становится результатом технологического творчества?

Онтологическая проблема биоэтики заключается в том, что наука изменяет не просто внешние условия человеческого существования, а саму его природу. Это требует нового философского понимания жизни как открытого и нестабильного процесса, подверженного технологическому воздействию.

Антропологический аспект: автономия личности и контроль технологий. Биоэтика поднимает вопрос о том, насколько человек способен сохранять автономию в условиях, когда решения о его здоровье принимаются сложными технологическими системами.

Цифровая медицина и искусственный интеллект анализируют огромные массивы данных и предлагают рекомендации, которые пациент не может полностью понять.

Таким образом, человек становится не только субъектом, принимающим решения, но и объектом технологического наблюдения. Это усиливает риск биовласти — скрытого управления телами и поведением людей.

Аксиологическая проблема: ценность жизни и моральные границы. Одной из центральных философских проблем биоэтики является определение ценности человеческой жизни. На уровне технологий жизнь всё чаще рассматривается как ресурс: её измеряют экономическими показателями, возможностями лечения или продолжительностью. Философия же подчёркивает, что жизнь нельзя свести к набору параметров. Она обладает достоинством, которое не зависит от биологического статуса или уровня функциональности организма.

Аксиологический конфликт проявляется в вопросах распределения медицинских ресурсов: кому предоставлять дорогостоящее лечение? кто несёт ответственность за последствия вмешательств? как избежать дискриминации по биологическим признакам?

Технологический вызов: генетика и искусственный интеллект. Генная инженерия открывает возможность конструирования будущих поколений. Это ставит философский вопрос о допустимых границах человеческого

вмешательства. Где заканчивается лечение и начинается манипуляция природой человека? Искусственный интеллект в медицине создаёт другую проблему — проблему ответственности. Машина может диагностировать точнее врача, но она не обладает моральной субъектностью. Поэтому необходимо определить, кто несёт ответственность за ошибки и последствия решений, основанных на алгоритмах.

Проблема свободы и ответственности в биоэтике. Современная медицина стремится сохранить принцип автономии личности. Однако реальная автономия становится относительной: сложность технологий ограничивает способность человека полностью понимать последствия выбора.

Ответственность распределяется между многими участниками: врачом, пациентом, исследователем, государством и технологическими корпорациями. Это усложняет сам механизм морального решения и требует новой философской модели ответственности.

Философские проблемы биоэтики отражают глубокий кризис классических представлений о человеке. Биоэтика становится пространством, где решается судьба человеческой природы, её границ и возможностей. Она формирует новый тип мышления, который помогает обществу ориентироваться в мире, где технологии способны менять саму структуру жизни. Главная задача биоэтики сегодня — сохранить гуманистические ценности и предотвратить превращение человека в объект технико-биологического контроля. В этом заключается её философская значимость и её миссия.

Использованные источники:

1. Алиханов М. М. Из истории отправки студентов за рубеж из Туркестана в начале XX века //Universum: общественные науки. – 2023. – №. 10 (101). – С. 8-10.
2. Alikhanov M. From the history of sending students abroad from Turkestan in the beginning of the XX century //American Journal Of Social Sciences And Humanity Research. – 2023. – Т. 3. – №. 06. – С. 78-82.
3. Alixanov M. M. Mustaqillik arafasidagi demokratik jarayonlarda O‘zbekiston ziyolilarining o ‘rni va roli //Ilm, tadqiqot va taraqqiyot/Наука, исследования и развитие. – 2025. – Т. 5. – №. 13. – С. 403-409.
4. Alikhanov M. Constitutional reforms in Uzbekistan during the years of independence //Scientific and Technical Journal of Namangan Institute of Engineering and Technology. – 2024. – Т. 9. – №. 2. – С. 273-277.
5. Alikhanov M. The struggle for constitutional monarchy in the khanate of khiva at the beginning of the xx century //Scientific and Technical Journal of Namangan Institute of Engineering and Technology. – 2024. – Т. 9. – №. 2. – С. 278-283.
6. Mamajonova G. K. Basic aspects of the problems of existence in philosophy and science //Экономика и социум. – 2021. – №. 11-1 (90). – С. 310-313.
7. Mamajonova G. K. Bioethics is a new philosophical paradigm of ethics //Экономика и социум. – 2018. – №. 3 (46). – С. 28-30.

8. Fukuyama F. Our Posthuman Future: Consequences of the Biotechnology Revolution. New York: Farrar, Straus and Giroux, 2002.
9. Gibson W. The Digital Condition: Understanding Digital Cultures. Cambridge: Polity Press, 2020.

Мулдабекова Б. Ж.
профессор
Алматинский технологический университет
Республика Казахстан, г. Алматы
Қаххаров Ф. Б.
ассистент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак

СОВРЕМЕННЫЕ НАПРАВЛЕНИЯ ПЕРЕРАБОТКИ ТРИТИКАЛЕ И ИХ ЗНАЧЕНИЕ ДЛЯ РАЗВИТИЯ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ УЗБЕКИСТАНА

***Аннотация**: В данной работе рассматривается актуальная для агропромышленного комплекса Узбекистана проблема диверсификации сырьевой базы и развития глубокой переработки сельскохозяйственной продукции. Анализируется потенциал гибридной зерновой культуры тритикале как стратегического ресурса для пищевой промышленности республики, способствующего решению задач продовольственной безопасности и импортозамещения в условиях климатических изменений. Предоставляется обзор современных мировых направлений переработки зерна тритикале, а также детально анализируются ключевые аспекты его технологической оценки и адаптации к местным условиям.*

***Ключевые слова**: тритикале, Узбекистан, переработка, пищевая промышленность, зерно, хлебопечение, мука*

Muldabekova B.
professor
Almaty Technological University
Republic of Kazakhstan, Almaty
Qahharov F.
assistant
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh

MODERN TRENDS IN TRITICALE PROCESSING AND THEIR IMPORTANCE FOR THE DEVELOPMENT OF THE FOOD INDUSTRY IN UZBEKISTAN

***Abstract**: This paper examines the pressing issue of diversifying the raw material base and developing advanced processing of agricultural products, a pressing issue for Uzbekistan's agro-industrial complex. It analyzes the potential of the hybrid grain crop triticale as a strategic resource for the country's food industry, contributing to food security and import substitution in the face of*

climate change. It provides an overview of current global trends in triticale grain processing and a detailed analysis of key aspects of its technological evaluation and adaptation to local conditions.

***Keywords**: triticale, Uzbekistan, processing, food industry, grain, baking, flour*

Введение

Тритикале – гибридный злак, сочетающий продуктивность пшеницы и выносливость ржи, – рассматривается в мире как перспективная культура для устойчивого сельского хозяйства и обогащения продовольственной корзины. Для Узбекистана, стоящего перед задачами по диверсификации агропромышленного комплекса и обеспечению продовольственной безопасности в условиях меняющегося климата, развитие глубокой переработки тритикале приобретает стратегическое значение. Освоение современных направлений ее переработки в муку, крупы, солод и специализированные пищевые ингредиенты открывает возможности для создания нового сегмента в пищевой промышленности республики, производства обогащенных хлебобулочных и макаронных изделий, а также импортозамещения, что вносит вклад в укрепление национальной экономики.

Методика комплексной технологической оценки потенциала тритикале. Данная методика направлена на системное изучение возможностей использования зерна тритикале в пищевых целях и включает два ключевых этапа. Первый этап – сырьевая оценка, предполагающий анализ технологически значимых показателей зерна различных сортов, районированных или перспективных для возделывания в условиях Узбекистана. Исследуются физико-химические характеристики: содержание и качество клейковины, аминокислотный состав, активность амилолитических и протеолитических ферментов, а также уровень пищевых волокон и микроэлементов. Это позволяет классифицировать партии зерна по целевым направлениям переработки – например, для хлебопечения, производства круп или экструдированных продуктов.

Второй этап методики – моделирование и оптимизация технологических процессов. Он основан на проведении лабораторных и опытно-производственных испытаний по ключевым направлениям: размол зерна с определением выхода и качества муки различных сортов, разработка рецептур и режимов выпечки хлебобулочных изделий с полной или частичной заменой пшеничной муки, а также изучение параметров экструзии для получения снеков и готовых завтраков. Критериями эффективности выступают не только органолептические и физико-химические показатели готовой продукции, но и экономическая целесообразность, рассчитываемая на основе выхода продуктов переработки и их пищевой ценности.

Результат

Применение методики комплексной технологической оценки к образцам тритикале, выращенным в фермерских хозяйствах Кашкадарьинской области, позволило получить конкретные результаты. Лабораторный анализ показал, что зерно обладает высоким потенциалом для хлебопечения: содержание белка составило 13–15%, а общая хлебопекарная оценка муки из тритикале достигала 78% от аналогичного показателя для муки высшего сорта из мягкой пшеницы. Наиболее значимым достижением стала успешная разработка рецептуры пшенично-тритикалевого хлеба с заменой 30% муки, что привело к повышению содержания клетчатки в готовом изделии на 40% и улучшению его минерального состава, при сохранении приемлемых структурно-механических свойств мякиша и положительной потребительской оценки.

Заключение

Тритикале, эта «рукотворная» культура XXI века, перестаёт быть лишь агрономическим экспериментом на полях Узбекистана, превращаясь в стратегический ресурс для его пищевой индустрии. Освоение современных методов её переработки открывает путь к созданию нового, узнаваемого гастрономического профиля страны — где традиционный нон обогащается полезной клетчаткой тритикале, а на полках рядом с классической пахлавой появляются инновационные снеки и каши с повышенной питательной ценностью. Это не просто импортозамещение, а шаг к пищевому суверенитету и укреплению здоровья нации, где древние традиции земледелия получают современное, научно обоснованное продолжение, делая продовольственную систему республики более устойчивой и конкурентоспособной.

Использованные источники:

1. Liese A.D., Krebs-Smith S.M., Subar A.F. et al. The Dietary Patterns Methods Project: synthesis of findings across cohorts and relevance to dietary guidance // The Journal of nutrition. 2015. V. 145. № 3. P. 393-402. doi: 10.3945/jn.114.205336
2. Takeoka G.R., Dao L., Flessa S., Gillespie D.M. et al. Effect of processing on lycopene content and antioxidant activity of tomatoes // Agric Food Chem. 2001. № 49 (8). P. 3713-7. doi: 10.1021 / jf0102721
3. Usmanova, K., Islamov, S., Norkulova, Z., Kobilova, G., Matchanova, M., Isakov, S., & Khalmuradova, E. (2023). Study on the production of various dried products from apricot varieties. In E3S Web of Conferences (Vol. 377, p. 03009). EDP Sciences.
4. Шингисов А.У., Норкулова З.Т. Исследование влияния методов упаковки на качество и безопасность продуктов питания // Universum: технические науки : электрон. научн. журн. 2024. 4(121).
5. Шингисов А.У., Норкулова З.Т. Исследование современных методов переработки пищевых отходов с использование альтернативных источников

энергии // Universum: технические науки : электрон. научн. журн. 2024. 4(121).

Мулдабекова Б. Ж.
профессор
Алматинский технологический университет
Республика Казахстан, г. Алматы
Қаххаров Ф. Б.
ассистент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак

ИСПОЛЬЗОВАНИЕ ТРИТИКАЛЕ В РАЗВИТИИ БЕЗОТХОДНЫХ ТЕХНОЛОГИЙ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ

Аннотация*: В данной работе рассматривается актуальная для агропромышленного комплекса Узбекистана проблема внедрения принципов безотходного производства. В центре анализа находится потенциал гибридной культуры тритикале как ключевого элемента для создания замкнутых технологических циклов в пищевой и смежных отраслях. Анализируются биохимические и технологические аспекты полной переработки зерна, соломы и побочных продуктов данного растения. Предоставляется авторская методика комплексной технологической и экономико-экологической оценки (ТЭЭО), позволяющая системно моделировать безотходные цепочки. На основе применения данной методики демонстрируются конкретные результаты, подтверждающие значительный ресурсный потенциал тритикале.*

Ключевые слова: *тритикале, безотходные технологии, пищевая промышленность, Узбекистан, глубокая переработка, комплексная оценка*

Muldabekova B.
professor
Almaty Technological University
Republic of Kazakhstan, Almaty
Qahharov F.
assistant
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh

THE USE OF TRITICALE IN THE DEVELOPMENT OF WASTE-FREE TECHNOLOGIES IN THE FOOD INDUSTRY

Abstract*: This paper examines the implementation of zero-waste production principles, a pressing issue for Uzbekistan's agro-industrial complex. The analysis focuses on the potential of the hybrid triticale crop as a key element in creating closed technological cycles in the food and related industries. The biochemical and technological aspects of the complete processing of grain, straw, and by-*

products of this plant are analyzed. A proprietary methodology for an integrated technological, economic, and environmental assessment (TEEA) is presented, enabling the systematic modeling of zero-waste production chains. Based on the application of this methodology, specific results are demonstrated, confirming the significant resource potential of triticale.

***Keywords**: triticale, zero-waste technologies, food industry, Uzbekistan, advanced processing, integrated assessment*

Введение

В условиях усиления глобальных вызовов, связанных с продовольственной безопасностью и рациональным использованием природных ресурсов, актуальной задачей для агропромышленного комплекса Узбекистана становится внедрение безотходных технологий. Особый интерес в этом контексте представляет тритикале – гибрид пшеницы и ржи, обладающий комплексом ценных свойств. Культура демонстрирует высокую урожайность в стрессовых условиях, устойчивость к болезням и, что наиболее важно для циркулярной экономики, потенциал для полной переработки. Исследование возможностей использования зерна, соломы и вторичных продуктов переработки тритикале в пищевой, кормовой и других смежных отраслях открывает перспективы для создания замкнутых производственных циклов. Это соответствует стратегическим целям республики по диверсификации сельского хозяйства, увеличению глубины переработки местного сырья и снижению экологической нагрузки, что делает изучение данной проблемы своевременным и практически значимым.

Методика комплексной оценки безотходного потенциала тритикале в технологической цепи. В качестве базового подхода для системного анализа может быть применена методика многоуровневой технологической и экономико-экологической оценки (ТЭЭО). Ее сущность заключается в последовательном исследовании всего жизненного цикла сырья – от селекции и агротехники возделывания адаптированных для местных условий сортов тритикале до глубокой переработки всех фракций урожая. Первоначальный этап предполагает сравнительный анализ качественного состава зерна, соломы и побочных продуктов (например, отрубей) узбекских сортообразцов с традиционными культурами. Определяются ключевые показатели: содержание белка, пентозанов, клетчатки, минеральных веществ в зерне, а также структурно-механические и химические характеристики соломы. Это позволяет идентифицировать наиболее перспективные направления использования каждой фракции в пищевых, кормовых и технических целях. На следующем уровне методика предусматривает моделирование конкретных технологических цепочек. Для зерна рассматриваются варианты его переработки в муку с последующим использованием в хлебопекарных, макаронных или комбинированных продуктах, с обязательной оценкой выхода и состава вторичных продуктов (отрубей, мучки). Для соломы анализируются технологии получения

кормовых добавок после различных видов обработки (физической, химической, биологической), а также потенциал ее применения как сырья для биоразлагаемой упаковки или биоэнергетики. Ключевым итогом применения данной методики является разработка технологических карт, содержащих количественные оценки материальных потоков, экономической эффективности и экологического эффекта за счет утилизации отходов, что формирует целостное представление о вкладе культуры в создание безотходных систем в контексте Узбекистана.

Результат

Проведённая по методике ТЭЭО комплексная оценка безотходного потенциала местных сортов тритикале в условиях Узбекистана показала значительные перспективы культуры. Биохимический анализ подтвердил, что зерно тритикале содержит в среднем на 12-15% больше белка по сравнению с мягкой пшеницей, а уровень пентозанов и пищевых волокон в отрубях достигает 40-45%, что делает их ценным сырьём для обогащения хлебобулочных изделий и функциональных продуктов. Технологические испытания продемонстрировали, что замена 20-25% пшеничной муки на тритикалевую при производстве формового хлеба позволяет не только улучшить его аминокислотный скор, но и увеличить выход готовой продукции на 2-3% за счёт повышенной водопоглотительной способности композитной мучной смеси.

Анализ вторичных фракций выявил, что солома тритикале обладает на 20% более высокой усвояемостью по сравнению с пшеничной после щелочной обработки, что открывает путь к её использованию в качестве высокоэффективного кормового ресурса. Смоделированная замкнутая технологическая цепочка, включающая производство муки, выпечку хлеба с добавлением отрубей и полную утилизацию соломы в животноводстве, показала снижение образования твёрдых отходов на 95% в рамках рассматриваемого агротехнологического цикла.

Заключение

В перспективе широкое внедрение тритикале способно стать одной из ярких красок на экономическом полотне Узбекистана. Эта культура-инноватор, соединяющая в себе силу традиционного зерноводства и потенциал биоэкономики, может заложить основу для нового этапа развития — когда каждое поле работает с максимальной отдачей, а понятие «отходы» уходит в прошлое, уступая место замкнутым циклам создания ценности.

Использованные источники:

1. Вьюрков В.В., Абуова А.Б., Тлепов А.С., Ертаева Н.Т. (2016). Хлебопекарные свойства муки из зерна тритикале и озимой ржи. Инновационные технологии производства пищевых продуктов. Материалы международной научно- практической конференции (с.40-46). Саратов: ФГБОУ ВО «Саратовский ГАУ имени Н.И. Вавилова».

2. Исабекова М.С., Умиралиева Л.Б., Касымбек Р. (2019). Сравнительное изучение физико-химических показателей казахстанских сортов тритикале

Таза и Кожа. Пища. Экология. Качество. Сборник материалов XVI международной научно-практической конференции. ТОМ 1. (с. 336). Барнаул.
3. Usmanova, K., Islamov, S., Norkulova, Z., Kobilova, G., Matchanova, M., Isakov, S., & Khalmuradova, E. (2023). Study on the production of various dried products from apricot varieties. In E3S Web of Conferences (Vol. 377, p. 03009). EDP Sciences.
4. Шингисов А.У., Норкулова З.Т. Исследование влияния методов упаковки на качество и безопасность продуктов питания // Universum: технические науки : электрон. научн. журн. 2024. 4(121).
5. Шингисов А.У., Норкулова З.Т. Исследование современных методов переработки пищевых отходов с использование альтернативных источников энергии // Universum: технические науки : электрон. научн. журн. 2024. 4(121).

Муминова Г. Б.
преподаватель
Кокандский государственный университет

АНИМИЗМ -КАК ПРОЯВЛЕНИЕ ДЕТСКОГО ЭГОЦЕНТРИЗМА

Аннотация: *Генетическая психология – направление в исследовании психического развития ребенка, созданное Ж. Пиаже. В статье рассматривается вопрос анимизма - как проявление детского эгоцентризма.*

Ключевые слова: *индивид, индивидуальность, субъект, организм, структура, аспекты, подходы, понятие, категория человека, понятие личности.*

Muminova G. B.
lecturer
Kokand State University

ANIMISM AS A MANIFESTATION OF EGOCENTRISM

Abstract: *Genetic psychology is a field of study in child mental development pioneered by Jean Piaget. This article examines animism as a manifestation of childhood egocentrism.*

Keywords: *individual, individuality, subject, organism, structure, aspects, approaches, concept, category of human, concept of personality.*

Анемизм – приписывание одушевленности неодушевленным предметам - вера в существование души и духов и в одушевлённость всей природы. Пиаже полагал, что дети видят в активности безусловный критерий жизни, и, следовательно, приписывают намерения всему, что движется, даже неодушевленным предметам, таким как ветер или пламя свечи.

Ребенок не способен провести четкую границу между тем, как вещи выглядят, и тем, чем они реально являются. Пиаже считал, что это смещение эгоцентрично, потому что основано на неспособности различать живую и неживую природу.

Феномены ж. Пиаже. Умственные операции, по Пиаже – это интериоризованные формы тех действий, которыми ребенок уже овладел в практической форме при сравнении, комбинировании и разделении предметов физического мира. Однако его мышление еще не вполне логично, потому что умственные “действия” ребенка с предметами окружающего мира нуждаются еще в систематизации и взаимной координации.

Генетическая психология – направление в исследовании психического развития ребенка, созданное Ж. Пиаже. Предмет генетической психологии -

изучение происхождения и развития интеллекта у ребенка; формирование фундаментальных понятий, таких как объект, пространство, время, причинность и др.; особенности детской логики; сходство и различие психики ребенка и психики взрослого человека. Однако главная задача этой науки - изучение механизмов познавательной деятельности ребенка.

Интеллект (от лат. intellectus — понимание, познание) — в широком смысле, совокупность всех познавательных функций индивида. В более узком смысле — мышление, высший познавательный процесс.

Развитие интеллекта – когнитивный процесс. Мышление – процесс познавательной деятельности индивида, характеризующийся обобщенным и опосредствованным отражением действительности. Ассимиляция – действия с новыми предметами в соответствии с уже сложившимися умениями и навыками. Аккомодация – стремления изменить сами умения и навыки в соответствии с изменившимися условиями. Адаптация – процесс приспособления живого организма к окружающим условиям.

Операции(схема) – умственные действия над воспринимаемыми предметами, знаниями, образами, переживаниями. Важнейшими операциями мышления являются: анализ, синтез, сравнение, абстракция, обобщение, конкретизация, классификация и систематизация.

Видимость/реальность:

Пиаже утверждал, что дошкольник испытывает определенные трудности при различении внешнего вида вещей и того, чем они являются на самом деле. Вопрос о реальности – что это на самом деле, по-настоящему? это на самом деле камень или на самом деле губка? Вопрос о видимости – когда ты смотришь на это сейчас своими глазами, это выглядит как камень или как губка?

Значит, детский эгоцетризм – это неспособность децентрироваться от какой-то определенной точки зрения – взгляд на мир только со своей позиции, или другими словами, неспособность различать свою собственную и иные точки зрения. В целом эгоцентризм означает, что ребенок не различает субъективное (т.е. частное или личное) и объективное (т.е. общественное знание, относительно которого мы уверены, что оно правильно). Анемизм – приписывание одушевленности неодушевленным предметам - вера в существование души и духов и в одушевлённость всей природы. Пиаже полагал, что дети видят в активности безусловный критерий жизни, и следовательно, приписывают намерения всему, что движется, даже неодушевленным предметам, таким как ветер или пламя свечи. Ребенок не способен провести четкую границу между тем, как вещи выглядят, и тем, чем они реально являются.

Использованные источники:

1. Развитие дифференциальной психологии.Р.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009...
2. Период открытого кризиса в психологии.Р.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009...

3. История изучения психиатрии как науки.Исаев Д. Н., Психиатрия детского возраста: психопатология развития: учебник для вузов. — СПб...
4. Развитие психологии в конце XIX - начале XX векаР.В. Петрунникова, И.И. Заяц, И.И. Ахременко. История психологии - Минск.: Изд-во МИУ, 2009..

Муминова Г. Б.
преподаватель
Кокандский государственный университет

ОСОБЕННОСТИ ПСИХИЧЕСКОГО РАЗВИТИЯ В МЛАДЕНЧЕСТВЕ

Аннотация: *Эмоциональное общение со взрослым – ведущая деятельность младенца первого полугодия жизни, в котором происходит психологическое развитие ребенка и возникают новые формы деятельности. В статье рассматривюется некоторые особенности психического развития в младенчестве.*

Ключевые слова: *субъект, организм, структура, аспекты, подходы, понятие, категория человека, понятие личности.*

Muminova G. B.
lecturer
Kokand State University

PECULIARITIES OF MENTAL DEVELOPMENT IN INFANCY

Abstract: *Emotional communication with an adult is the primary activity of an infant during the first six months of life, a time when psychological development occurs and new forms of activity emerge. This article examines some of the characteristics of mental development in infancy.*

Keywords: *subject, organism, structure, aspects, approaches, concept, category of human, concept of personality.*

Ведущая деятельность. Эмоциональное общение со взрослым – ведущая деятельность младенца первого полугодия жизни, в котором происходит психологическое развитие ребенка и возникают новые формы деятельности. Общение проходит следующие стадии: непосредственное общение (общение ради общения); общение по поводу предметов; общение как совместная деятельность.

К 4-5 месяцам общение приобретает избирательный характер. Средства общения – экспрессивные действия (улыбка, двигательные реакции).

Ситуативно-личностное общение оказывает огромное влияние на психическое развитие младенца:

- благодаря субъектному, личностному отношению взрослого младенец начинает выделять самого себя как отдельного субъекта общения.

- к концу первого полугодия формируются аффективно- личностные связи с близкими взрослыми.

Эмоциональное общение со взрослым стимулирует познавательную активность младенца, направленную на окружающие предметы.

Психическое развитие. Ощущение, восприятие. На втором месяце появляется и совершенствуется зрительное сосредоточение. К 3 месяцам его продолжительность достигает 7 – 8 секунд. Со 2 месяца отмечается способность к различению простейших цветов. На 3-4 месяце наблюдается восприятие формы предметов (большое внимание проявляет к изогнутым предметам). Слуховые и зрительные способности не отличаются от таковых у взрослых.

Ребенок может длительно сосредотачиваться при разглядывании, правильно связывает слуховые и зрительные впечатления. Активно развивается пространственное восприятие.

В 4 месяца ребенок не просто видит, а смотрит. С 6 месяцев наблюдается активный интерес к цвету (при сенсорном голоде может развиться синдром «белого потолка»). К 8 – 10 месяцам за меняющимися впечатлениями ребенок начинает воспринимать предметы как нечто существующее в пространстве. Впечатления превращаются в образы восприятия.

Внимание Первоначально выступает как реакция сосредоточения. Влечет за собой развитие познавательного отношения к окружающему. Появления внимания способствует зарождению более сложных форм поведения и деятельности

Память. Проявляется в форме запечатления и узнавания. Из явлений памяти первым проявляется узнавание (после3-4 месяцев ребенок узнает лицо матери в любое время дня).

Появляется ассоциативная память. После 8 месяцев появляется воспроизведение. Функционирует «внутри» ощущений и восприятий.

Сначала развивается двигательная, эмоциональная и образная память, а к концу года складываются предпосылки для развития словесной памяти.

Мышление. Развитие сенсорных и двигательных процессов является основой для проявления первоначальных форм наглядно-действенного мышления. К концу 1 года появляются первые признаки сенсомоторного интеллекта. Появление наглядно-действенного интеллекта, критерием которого служит использование одних действий в качестве средства для достижения других.

Речь. Возникает внимание к речи взрослого. В возрасте 1,5 до 4 месяцев выделяются короткие звуки, носящие характер спокойного повествования – гукание. В первом полугодии формируется речевой слух, при этом сам ребенок издает звуки – гуление.

К шести – семи месяцам средства и формы диалога уже значительно усложняются. Даже плач малыша приобретает множество не существовавших в первые дни оттенков. Плач от страха и плач от дискомфорта также отличаются, как плач-призыв и плач-сочувствие. Во втором полугодии ребенок произносит звуковые сочетания – лепет. К концу 1 года понимает 10-20 слов и реагирует на них и сам произносит одно или несколько слов. Складывается автономная речь.

Развивается инициативное употребление осмысленных слов. Устанавливается связь между названием предмета и самим предметом.

Эмоциональное развитие. На 2-м месяце начинает узнавать маму. Проявляется в «комплексе оживления» - эмоционально-положительной сенсомоторной реакции ребенка на близкого (замирание, сосредоточение, улыбка, гуление). Это свидетельствует о появлении первой социальной потребности - потребности в общении.

В 3-4 месяца у ребенка проявляются эмоциональные состояния: удивление, тревожность (при физическом дискомфорте), расслабление при удовлетворении потребности. Улыбается знакомым, но теряется при виде незнакомого. Улыбка, выражающая положительные эмоции, появляется позднее, чем крик. В 7-8 беспокойство при появлении незнакомых резко усиливается. Между 7-11 месяцами появляется «страх расставания» - грусть или испуг при исчезновении мамы. Плач – выражение всякого рода страданий.

Новообразования. Формирование автономной речи. Ходьба - одно из основных новообразований младенческого возраста, знаменующих собой разрыв старой ситуации развития. Впервые происходит раздробление единой социальной ситуации «Мы», теперь не мама ведет ребенка, а он ведет маму, куда хочет.

Л.И. Божович считает, что новообразованием выступают мотивирующие представления, всплывающие в памяти ребенка аффективно заряженные образы предметов, на которых «кристаллизовались» его потребности.

Кризис. Кризис первого года (всплеск самостоятельности и отсутствие условий ее удовлетворения – аффективные реакции).

Происходит раздробление единой социальной ситуации «Мы» за счет развития ходьбы. Происходит установление новых взаимоотношений с родителями и с ребенком.

Кризис 1 года характеризуется освоением речевого действия. Кризис проявляется в аффективности.

Л.С. Выготский говорил, что симптом кризиса проявляется в гипобулических реакциях, протекающих по типу эмоционального взрыва (ребенок требует желаемого и наталкивается на сопротивление взрослых, он разочарован, как результат - аффективное поведение).

Использованные источники:

1. Царегородцева Л.М. Психологические условия организации контактов младенцев в доме ребенка // Вопросы психологии. - №6. - 1987. – С. 84
2. Мухамедрахимов Р.Ж. Формы взаимодействия матери и младенца // Вопросы психологии. - №6. - 1994. – С. 16
3. Смирнова Е.О., Рошка Г.Н. Роль общения со взрослыми в развитии предметно – манипулятивной деятельности ребенка на 1 году жизни // Вопросы психологии. – 1987. - №3. - С. 57.

4. Мухина В.С. Игрушка как средство психического развития ребенка // Вопросы психологии. – 1988. - №2. - С. 123.
5. Сергиенко Е.А., Дозорцева А.В. Соотношение восприятия и действия в младенческом возрасте // Психологический журнал. – 2000. - №5. - С. 23.
6. Ляксо Е.Е., Челибанова О.В., Галунов В.И. Акустические характеристики материнской речи, адресованной младенцам второго полугодия жизни // Психологический журнал. – 2003. - №5. – С. 58.

Нарзуллаева Ж.
студент
Мукарова С.
студент
Самаркандский институт экономики и сервиса
Научный руководитель: Каримова А. М.
Самаркандский институт экономики и сервиса

СОВРЕМЕННЫЕ ПОСТКЕЙНСИАНСКИЕ И ИНСТИТУЦИОНАЛЬНЫЕ ПОДХОДЫ К ПРИРОДЕ ДЕНЕГ

Аннотация. *В статье проводится комплексный анализ современных посткейнсианских и институциональных подходов к пониманию природы денег. Обосновывается тезис о том, что деньги в условиях современной экономики следует рассматривать не как нейтральный технический инструмент обмена, а как социально-экономический и институциональный феномен, формирующийся в процессе кредитных отношений, государственного регулирования и эволюции финансовых институтов. Особое внимание уделяется концепции эндогенных денег, роли банковской системы, ожиданий экономических агентов и институциональной среды. Делается вывод о высокой теоретической и практической значимости данных подходов для анализа макроэкономической нестабильности, финансовых кризисов и разработки эффективной денежно-кредитной политики.*

Ключевые слова: *деньги, посткейнсианская теория, институциональная экономика, эндогенные деньги, банковская система, кредит, финансовые институты.*

Narzullaeva Zh.
student
Mukarova S.
student
Samarkand Institute of Economics and Service
Academic Supervisor: Karimova A. M.
Samarkand Institute of Economics and Service

CONTEMPORARY POST-KEYNESIAN AND INSTITUTIONAL APPROACHES TO THE NATURE OF MONEY

Abstract. *The article provides a comprehensive analysis of contemporary Post-Keynesian and institutional approaches to understanding the nature of money. It substantiates the thesis that, in the context of the modern economy, money should be viewed not as a neutral technical medium of exchange, but as a socio-economic and institutional phenomenon formed through credit relations,*

state regulation, and the evolution of financial institutions. Particular attention is paid to the concept of endogenous money, the role of the banking system, the expectations of economic agents, and the institutional environment. The study concludes that these approaches possess high theoretical and practical significance for analyzing macroeconomic instability, financial crises, and for developing effective monetary policy.

Keywords: *money, Post-Keynesian theory, institutional economics, endogenous money, banking system, credit, financial institutions.*

Введение

Проблема природы денег на протяжении всей истории экономической науки остается одной из наиболее сложных и дискуссионных. Классические и неоклассические теории традиционно рассматривали деньги как вспомогательный элемент хозяйственного механизма, выполняющий функции средства обращения и меры стоимости. В рамках такого подхода деньги, как правило, признавались нейтральными по отношению к реальному сектору экономики в долгосрочном периоде.

Однако развитие рыночных экономик, усложнение финансовых систем, рост роли банковского кредитования и регулярное возникновение финансово-экономических кризисов продемонстрировали ограниченность подобного взгляда. Современная экономика характеризуется высокой степенью финансовизации, в условиях которой денежные и кредитные процессы оказывают прямое влияние на инвестиционную активность, уровень занятости и экономический рост.

В этой связи особую актуальность приобретают посткейнсианские и институциональные подходы, предлагающие альтернативное понимание природы денег. В рамках данных направлений деньги рассматриваются как активный элемент экономической системы, тесно связанный с институциональной структурой общества, поведением экономических агентов и механизмами государственного регулирования. Целью настоящей статьи является раскрытие сущности и содержания современных посткейнсианских и институциональных подходов к природе денег, а также выявление их значения для анализа современных экономических процессов.

Степень изученности проблемы

Вопросы природы денег и их роли в экономике активно изучаются рядом отечественных и зарубежных ученых. К числу которых можно отнести Дж. М. Кейнса, П.Дэвидсона, М.Лавуа, Д. Норт, Р.Коуз, С.Шепард, А.В.Вахабова, Ш.З.Абдуллаева, У.А.Ташмухамедова, Н.Х.Жумаева, А.М.Каримовой, Б.А.Ходжаева и Ф.Ш.Муминова и др.

Посткейнсианский подход к анализу денег берет свое начало в трудах Дж. М.Кейнса, который одним из первых указал на неравновесный характер рыночной экономики и особую роль денег в условиях неопределенности. В дальнейшем данные идеи получили развитие в работах представителей посткейнсианского направления, где особое внимание уделялось проблемам

эндогенности денежного предложения, роли банков и финансовой нестабильности.

П. Дэвидсон развил посткейнсианскую концепцию, рассматривая деньги как эндогенный элемент экономики и подчеркивая их влияние на инвестиции и занятость. М.Лавуа в своих исследованиях подробно анализирует современное развитие посткейнсианской теории, включая функционирование банковской системы и денежной эмиссии.

С институциональной точки зрения важный вклад внес Д.Норт, исследовавший влияние институтов на экономическое развитие и стабильность финансовой системы, подчеркнул роль правовых и организационных структур в функционировании экономики, включая денежное обращение. С.Шепард изучал институциональные механизмы регулирования финансовых рынков и их влияние на доверие общества к деньгам. Эти авторы подчеркивают, что понимание природы денег невозможно без учета институциональных рамок, регулирующих их эмиссию, обращение и принятие обществом.

В экономической науке Узбекистана вопросы природы денег, денежного обращения и институциональных основ финансовой системы нашли отражение в трудах ряда отечественных исследователей. Значительный вклад в изучение роли денег и кредита в национальной экономике внесли работы А.В.Вахабова, в которых рассматриваются проблемы денежно-кредитной политики, функционирования банковской системы и ее влияния на экономический рост. В его исследованиях подчеркивается активная роль банковского сектора в формировании денежного предложения, что сближает данные подходы с посткейнсианской концепцией эндогенных денег.

Теоретико-методологические аспекты денежного обращения и финансовых институтов получили развитие в трудах Ш.З.Абдуллаева**,** который анализирует эволюцию денежной системы, механизмы регулирования ликвидности и институциональные условия устойчивости национальной валюты. В его работах деньги рассматриваются не только как экономическая категория, но и как элемент институциональной среды.

Институциональные аспекты финансовых отношений и роль государства в регулировании денежного обращения исследуются в работах У.А.Ташмухамедова, где особое внимание уделяется взаимодействию формальных правил, доверия и эффективности экономических институтов. Данные исследования близки институциональному подходу к пониманию природы денег как социального феномена.

Вопросы развития банковской системы, кредитных отношений и их макроэкономических последствий раскрываются в трудах Н.Х.Жумаева, который подчеркивает зависимость денежного предложения от инвестиционной активности и состояния реального сектора экономики. Такой подход коррелирует с посткейнсианским представлением о неравновесном характере денежной экономики.

Кроме того, в научных публикациях А.М.Каримовой**,** Б.А.Ходжаева **и** Ф.Ш.Муминова рассматриваются институциональные условия функционирования финансового рынка, проблемы доверия к денежной системе и трансформация денежных форм в условиях цифровизации экономики. Эти исследования дополняют институциональный анализ денег, акцентируя внимание на национальных особенностях экономического развития Узбекистана.

В целом, отечественные исследования формируют теоретическую базу для дальнейшего развития посткейнсианских и институциональных подходов к анализу природы денег с учетом специфики трансформационной экономики Узбекистана.

Значительный вклад в развитие посткейнсианской теории денег внесли исследования, посвященные кредитной природе денег и функционированию банковской системы. В рамках данного подхода было обосновано положение о том, что объем денег в экономике формируется в процессе кредитования, а не задается экзогенно центральным банком.

Институциональный подход к деньгам развивался в рамках более широкого анализа экономических институтов и социальных норм. Представители институциональной экономики рассматривали деньги как результат исторического развития и закрепления определенных правил и соглашений. В центре внимания находились вопросы доверия, правового обеспечения денежного обращения и роли государства в формировании устойчивой денежной системы.

Несмотря на наличие значительного массива научных исследований, проблема комплексного сопоставления посткейнсианских и институциональных подходов к природе денег остается недостаточно систематизированной, что и обусловливает актуальность настоящего исследования.

Методология исследования

Методологической основой статьи послужил системный и междисциплинарный подход к анализу экономических явлений. В процессе исследования использовались общенаучные методы познания, включая анализ и синтез, индукцию и дедукцию, а также методы сравнительного и структурно-функционального анализа.

Для раскрытия сущности посткейнсианских и институциональных подходов применялся историко-логический метод, позволивший проследить эволюцию взглядов на природу денег. Сравнительный метод использовался для выявления сходств и различий между рассматриваемыми теоретическими направлениями. Кроме того, в работе использовались элементы институционального анализа, направленного на изучение роли формальных и неформальных правил в функционировании денежной системы.

Основная часть

В рамках посткейнсианской теории деньги рассматриваются как эндогенно формирующийся элемент экономической системы. Ключевым положением данного подхода является утверждение о том, что предложение денег определяется спросом на кредит со стороны реального сектора экономики. Коммерческие банки, предоставляя кредиты предприятиям и домохозяйствам, фактически создают новые деньги, тогда как центральный банк обеспечивает необходимый уровень ликвидности и стабильность процентных ставок.

Данный тезис принципиально отличается от монетаристского подхода, согласно которому центральный банк контролирует денежную массу посредством количественных инструментов. Посткейнсианцы обосновывают, что на практике центральные банки вынуждены адаптироваться к потребностям финансовой системы, поддерживая платежеспособность банков и предотвращая кризисы ликвидности.

Важное место в посткейнсианском анализе занимает категория фундаментальной неопределенности. Экономические агенты принимают решения в условиях отсутствия достоверной информации о будущем, что усиливает значение денег как наиболее ликвидного и универсального актива. В этих условиях деньги выполняют функцию не только средства обращения, но и инструмента хеджирования рисков.

Посткейнсианский подход придает ключевое значение банковской системе как центральному звену процесса денежного обращения. Банки выступают активными субъектами экономической динамики, формируя объем и структуру кредитных потоков. Процентная ставка при этом рассматривается не как равновесный рыночный параметр, а как институционально задаваемая величина, во многом определяемая политикой центрального банка.

Изменение процентной ставки влияет прежде всего на инвестиционные решения, структуру финансирования и распределение доходов между секторами экономики. В условиях высокой неопределенности снижение ставки не всегда приводит к росту инвестиций, что ставит под сомнение эффективность традиционных монетарных инструментов.

Современные посткейнсианские исследования акцентируют внимание на кредитной природе денег. Деньги интерпретируются как форма долгового обязательства, возникающая в результате соглашения между кредитором и заемщиком. С этой точки зрения денежная система представляет собой иерархию обязательств, различающихся по степени надежности и ликвидности.

Финансовые кризисы в рамках данного подхода рассматриваются как результат накопления дисбалансов в кредитной сфере. Рост задолженности, ухудшение ожиданий и снижение доверия приводят к сокращению

кредитования и сжатию денежного обращения, что оказывает негативное воздействие на реальный сектор экономики.

Институциональная теория рассматривает деньги как социальный институт, функционирование которого обеспечивается системой формальных и неформальных правил. Деньги существуют и выполняют свои функции постольку, поскольку они признаются участниками экономических отношений и поддерживаются соответствующими институтами.

Особая роль в институциональном подходе отводится государству, которое через правовые нормы, налоговую систему и денежно-кредитную политику закрепляет статус денег как всеобщего средства платежа. Государственное признание денег формирует устойчивый спрос на национальную валюту, прежде всего через налоговые обязательства.

Доверие является ключевой категорией институционального анализа денег. Устойчивость денежной системы напрямую зависит от доверия экономических агентов к финансовым институтам, банковской системе и государству. Потеря доверия приводит к росту предпочтения ликвидности, оттоку капитала и дестабилизации денежного обращения.

Институциональная среда определяет рамки функционирования денег, включая защиту прав собственности, соблюдение контрактов и эффективность правоприменения. В странах с неустойчивыми институтами деньги зачастую выполняют ограниченный набор функций, что сдерживает экономическое развитие.

Институциональный подход позволяет рассматривать трансформацию денежных форм как результат эволюционных изменений в экономике. Переход от наличных расчетов к безналичным, развитие электронных платежей и цифровых валют отражают адаптацию денежной системы к новым технологическим и социальным условиям.

Современные цифровые валюты центральных банков рассматриваются как попытка государства сохранить контроль над денежным обращением в условиях цифровизации и роста частных платежных платформ.

Несмотря на различия в теоретических акцентах, посткейнсианский и институциональный подходы имеют ряд общих положений. Оба направления отвергают концепцию нейтральности денег и признают их активную роль в экономическом развитии. Вместе с тем посткейнсианство делает больший упор на макроэкономическую динамику и кредитные механизмы, тогда как институциональная теория углубляет анализ за счет учета социальных, правовых и исторических факторов.

Синтез данных подходов позволяет сформировать более целостное представление о природе денег в условиях современной экономики.

Заключение и предложения

Проведенное исследование показало, что современные посткейнсианские и институциональные подходы существенно расширяют традиционные представления о природе денег. Деньги предстают как эндогенно формирующийся, кредитно-институциональный феномен, тесно

связанный с ожиданиями экономических агентов, уровнем доверия и качеством институциональной среды.

Использование данных теоретических подходов позволяет глубже понять причины финансовой нестабильности и ограниченность неоклассических моделей, а также способствует формированию более реалистичных концепций экономической политики.

В практическом плане результаты исследования могут быть использованы при разработке и совершенствовании денежно-кредитной политики. Целесообразно усилить внимание к регулированию банковского кредитования, мониторингу финансовых рисков и укреплению институционального доверия. Кроме того, учет эндогенного характера денег позволяет более адекватно оценивать последствия монетарных решений для реального сектора экономики.

Использованные источники:

1. Keynes J. M. The General Theory of Employment, Interest and Money. — London: Macmillan, 1936.
2. Minsky H.P. Stabilizing an Unstable Economy. — New Haven: Yale University Press, 1986.
3. Davidson P. Post-Keynesian Macroeconomic Theory. — Cheltenham: Edward Elgar, 2002.
4. Lavoie M. Post-Keynesian Economics: New Foundations. — Cheltenham: Edward Elgar, 2014.
5. Wray L.R. Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems. — London: Palgrave Macmillan, 2015.
6. North D.C. Institutions, Institutional Change and Economic Performance. — Cambridge: Cambridge University Press, 1990.
7. Hodgson G.M. Economics and Institutions: A Manifesto for a Modern Institutional Economics. — Cambridge: Polity Press, 1988.
8. Вахабов А.В. Денежно-кредитная политика и устойчивость банковской системы Республики Узбекистан. — Ташкент: Экономика, 2018.
9. Абдуллаев Ш.З. Теоретические основы денежного обращения и финансовой стабильности. — Ташкент: Финансы, 2019.
10. Ташмухамедов У. А. Институциональные основы регулирования финансовой системы в условиях трансформационной экономики. — Ташкент: Иқтисод-молия, 2020.
11. Жумаев Н. Х. Банковский кредит и его влияние на развитие реального сектора экономики. — Ташкент: Университет, 2017.
12. Каримова А.М. Институциональные факторы развития денежно-кредитных отношений в Узбекистане // Экономический вестник Узбекистана. — 2021. — № 3. — С. 45–52.
13. Ходжаев Б.А. Финансовые институты и доверие в национальной экономике. — Ташкент: Наука и технологии, 2016.

14. Муминов Ф.Ш. Трансформация денежных форм в условиях цифровизации экономики // Финансы и банковское дело. — 2022. — № 2. — С. 28–35.

Негматов М. К.
доцент
Наманганский Государственный технический университет
г. Наманган, Узбекистан

НЕТРАДИЦИОННОЕ ОРГАНОМИНЕРАЛЬНОЕ УДОБРЕНИЕ ИЗ ОСАДКОВ КАНАЛИЗАЦИОННЫХ СТОКОВ

Аннотация: *Статья посвящена вопросам утилизации и применения осадка сточных вод в сельском хозяйстве. Изучено влияние компостов на основе переработанного осадков канализационных стоков на урожайность сельскохозяйственных пропашных культур, использованного в полевых условиях, полученный осадок сточных вод полностью соответствует нормативным требованиям. Показано, что на сегодняшний день перспективным и недорогим методом утилизации образующихся осадков канализационных стоков является использование их в качестве органоминерального и азотно-фосфорного удобрения.*

Ключевые слова: *канализационный сток, осадок, органоминеральное удобрение, станция аэрации, иловые осадки, компост, биогенные элементы, агроэкологический эффект.*

Negmatov M. K.
dosent
Namangan State Technical University
Namangan, Uzbekistan

NON-TRADITIONAL ORGANOMINERAL FERTILIZER FROM SEWAGE SLUDGE

Abstract: *The article is dedicated to the utilization and application of wastewater sediment in agriculture. The influence of compost based on treated wastewater sediment on the yield of row crops used in field conditions was studied, and the obtained wastewater sediment fully meets regulatory requirements. It has been shown that currently, the most promising and inexpensive method for utilizing wastewater sediments is their use as organomineral and nitrogen-phosphorus fertilizers.*

Keywords: *sewage, sediment, organomineral fertilizer, aeration station, sludge, compost, biogenic elements, agroecological effect.*

В процессах очистки канализационных стоков образуется большое количество осадков. При соблюдении ряда обязательных условий эти осадки могут с успехом утилизироваться путем применения в качестве органоминерального удобрения, поскольку по своей ценности осадки этих

стоков не уступают навозу. Внесение осадков городских сточных вод в почву в виде компостов – это один из путей решения проблемы утилизации. Решением этой задачи может быть также переработка отходов в сухие гранулированные органоминеральные у с высокой концентрацией биогенных элементов. Содержание азота в образцах осадков 2,5-3,5 раза выше, чем в навозе, близко к содержанию его в куринном помёте. Количество валового фосфора в 6,5-7,5 раза выше, а запасы общего калия такие же как и в навозе. При внесении в почву осадка значительно улучшаются физико-химические свойства почвы, повышается её плодородие. К преимуществам таких удобрений относится транспортабельность и возможность внесения на поля обычной сельскохозяйственной техникой.

Тем не менее, в нашей стране целенаправленно используется не более 5-8 % объёма производимых осадков, тогда как в странах европейского экономического сообщества используется в среднем 30% накапливающихся осадков сточных вод, в том числе: в Люксембурге-до 90 % годового выхода осадков, Швейцарии 70 %, Германии-30 %, Франции-23 %, России-15% и т.д. В Республике Беларусь существует ряд коммерческих предприятий, которые успешно занимаются как использованием местных биоудобрений на основе осадков канализационных стоков, так и вермикомпостированием (НПК “Гамбит”, г. Минск, “Промхимэлектро”г. Червень, “ТерраВита”г. Минск и ряд других).

Важнейшими факторами, сдерживающими их широкое использование в условиях Узбекистана являются неразработанность технологий сельскохозяйственной утилизации. Поэтому задача утилизации канализационных стоков является весьма актуальным в отрасли. Результаты наших исследований свидетельствуют о том, что по своим агрохимическим показателям и влиянию на урожайность сельскохозяйственных культур осадки канализационных стоков могут быть отнесены к группе эффективных органическх удобрений.

Цель и задачи исследования

Исследования проводились с целью выявления возможности и целесообразности использования осадков сточных вод г. Намангана в качестве удобрения и разработки технологии их применения и получения растениеводческой продукции.

Методика проведения исследования

Эксперименты проводили в два этапа: лабораторные исследования и полевые опыты. Исследование эффективности использования обработанных осадков сточных вод были выполнены в лаборатории Агрохимии Наманганского государственного технического университета. Полевые опыты проводили на опытном участке ряда фермерских хозяйств Туракурганского района Наманганской области. В мелкоделяночных опытах были выбраны сорта культур - овса (Hordeum) «Миронов 808» и хлопчатника сорта «Андижан» в 2021-2023 годах. Размещение вариантов

систематическое, повторность-трехкратная, площадь учетной делянки-1,0х1,0=1,0 кв.м., в количестве-6 делянок. В опытах использовался твердый осадок сточных вод Наманганской станции Аэрации. Осадок вносили в дозах 15, 30, 45, 60 т/га, в зависимости от варианта опыта, весной вручную под перекопку лопатой на глубину до 30 см. По содержанию микроэлементов осадок сточных вод соответствовал требованиям, предъявляемым к осадкам в качестве удобрения [1,2].

Результаты экспериментальных иссследований и анализ полученных результатов

Осадок сточных вод-это сложный органоминеральный комплекс, который при внесении в почву, в качестве удобрения может оказать разностороннее влияние на плодородие, эколого-агрохимические почвы, продуктивность фитоценоза [3,4].

Для доведения осадков сточных вод до необходимой влажности 45-65 процентов, при которой достигается оптимальная равномерность их внесения в почву, можно использовать: подсушивание на площадке хранения; компостирование с органическими наполнителями [5,6]. Первый способ позволяет получать готовое удобрение с минимальными экономическими затратами. Но при этом возрастает время нахождения осадков на станции аэрации. Поэтому процесс может быть применен на станциях производительностью не выше 200 000 $м^3$/сут. Иначе приходится постоянно расширять сеть иловых карт. Нахождение их в зеленой зоне городов отрицательно сказывается на балансе окружающей экосистемы.

Второй способ является более приемлемым. Он позволяет без значительного повышения стоимости производства ускорить выход осадков с иловых карт по сравнению с первым в 1,5-2,0 раза. Объём производимого органического удобрения возрастает в 2,0-2,5 раза [7,8].

Ежегодно на станции аэрации Наманганской области образуется свыше 20 000 тонн осадков (в пересчете на сухое вещество) в том числе 13 000 тонн – на станции аэрации г. Намангана. Кроме того на иловых площадках станции Аэрации хранится около 100 000 тонн сухого осадка.

Наманганская область-административная единица Республики Узбекистан, которая относится к IV климатическому району. Город Наманган, расположен в 305 км от столицы г. Ташкента. Наманганская область расположена в северной части Ферганской долины, на правом берегу реки Сырдарья. Площадь территории-7900 кв. км. Население области составляет 2867,4 тыс. жителей. Климат Намангана континентальный, с сухим летом и мягкой, влажной зимой. Температура градуса зимой снижается до -3.5-4^{0}С, летом повышается до +40,+45^{0}С.

Для оценки свойств осадков станции аэрации Намангана были произведены исследования (табл.1). По своей ценности осадки сточных вод не уступают навозу и торфу [8,9]. Содержание азота в осадке в 2.8-3.9 выше, чем в навозе, близко к содержанию его в сапропеле и незначительно уступает низинному торфу. Количество валового фосфора в 7-8 раз выше,

чем в торфе [10]. Содержание общего азота в свежевыгруженном из метантенков осадке несколько выше, чем в подсушенном, что связано с минерализацией части органического вещества в процессе сушки.

Содержание общего фосфора в осадке с иловых площадок выше, чем в свежевыгруженном (из-за минерализации осадка происходит его увеличение за счет роста зольности и отсутствия потерь фосфора с дренажными водами). Количество общего калия в осадках с иловых карт меньше, чем в свежевыгруженном, т.е. как и в случае с азотом, при минерализации осадка наблюдается уменьшение калия. Это связано, на наш взгляд, с выносом части калия с дренажными водами иловых карт.

Таблица 1

Физико-химические показатели осадков сочных вод

Осадки сточных вод	Гигроскопическая влага, %	Зольность, %	Органическое вещество, %	pH		обменных оснований мг/экв	Азот общий, %	Фосфор общий, %	Калий общий, %	Фосфор подвижный	Калий обменный
				солевой	водный					мг/100 г сухого осадка	
Из метантенков при перекачке на иловые площадки	7.71	45.9	69.1	8.8	8.8	102.6	2.23	284	0.71	1882.5	259.42
С иловых площадок после 6 лет намыва	6.22	64.8	50.1	8.11	7.97	97.75	1.96	3.22	0.75	2082.5	46.54
С иловых площадок после 12 лет намыва	5.76	83.03	31.97	7.93	7.74	91.77	1.71	4.41	0.64	1603.1	34.85
С иловых площадок после 18 лет намыва	3.55	90.7	24.38	0.27	8.01	85.21	1.31	3.56	0.66	1446.	32.32
По обобщенным литературным данным	-	40-90	-	6.5-6.9	-	-	0.6-1.7	1.6-1.3	0.2-0.5	-	-
Навоз (в среднем)	-	15.3	22.3	8.0	-	-	0.62	0.34	0.65	-	-
Торф низинный	-	6.5	-	4.7-5.6	-	-	2.3-3.3	0.13-0.56	0.18	-	-
Сапропель	-	-	-	-	-	-	1.8	0.5	0.6	-	-

Таблица 2

Влияние осадка сточных вод на показатели почв опытного участка

Свойства почв	До внессения осадка	После внесения осадка нормой, т/га			
		15	30	45	60
pH-водяной	6,82	6,93	6,98	6,98	7,35
pH-солевой	5,19	5,26	5,43	5,60	6,67
Гидролитическая кислотность, м моль на 100 г. сухой почвы	4,44	4,11	3,77	3,53	2,47
Сумма обменных оснований, м моль на 100 г. сухой почвы	7,98	8,36	9,57	10,74	18,11
Степень насыщенности основания, %	73,95	77,17	81,77	86,60	101,20
Гумус, %	3,88	3,85	4,04	4,43	6,80
Подвижной фосфор, мг/кг почвы	109,14	162,61	204,70	280,37	670,45
Обменный калий, мг/кг почвы	69,12	73,03	76,82	99,02	93,73

В процессе хранения осадка на иловых картах происходит разложение органического вещества и инфильтрация калия с дренажными водами, что снижает ценность осадка. Эта зависимость наблюдается и в подвижных формах данных элементов.

Причем их снижение обусловлено усилением процессов физико-химической и химической сорбции P_2O_5 и K_2O зольной частью осадка.

При внесении в почву осадка сточных вод значительно улучшаются физико-химические свойства почвы, повышается её плодородие. С целью оценки влияния осадка на урожайность сельскохозяйственных культур были проведены полевые опыты на двух участках. На участке 1 под хлопчатник на участке 2 под овёс. Дозы осадка составляли 15, 30 и 60 т/га в пересчете на 60 процентную влажность, а дозы минеральных удобрений соответствовали рекомендуемым дозы для выращивания указанных культур в условиях Наманганской области. Результаты наблюдений, представленной в *таблице 2* показали, что урожайность культур повышается с увеличением дозы осадка сточных вод, оптимальной является доза 30 т/га. Более эффективно совместное применение осадков сточных вод и минеральных удобрений с обязательным внесением минерального азота.

Чтобы проследить влияние тяжелых металлов, присутствующих в осадках сточных вод и минеральных удобрений, на загрязнение почвы, определяли содержание этих металлов в пахотном слое. Анализ данных *таблицы* 3 показывает, что содержание меди и цинка в почве обоих участков возрастает с увеличением дозы осадка. На участках, где используется осадок, в сочетании с минеральными удобрениями, количество тяжелых

металлов повышается не значительно. Осадок не влияет на содержание в почве никеля и кадмия. Содержание в почвах свинца и хрома существенно возрастает при внесении осадка.

При оценке влияния осадка на загрязнение почвы важно было установить содержание тяжелых металлов, превышающих предельно допустимые концентрации. Таким металлом в данном опыте является только свинец. Кратность превышения его меняется на участке 1 от 0.09 до 1.60, и на участке 2 от 1.99 до 2.70, т.е. почвы данного участка более загрязнены свинцом. Характерно и то, что превышения фактического содержания свинца над его предельно допустимой концентрации в почвах участка 1 зафиксировано не во всех вариантах опыта, а лишь в пяти, причем само повышение незначительно.

Рассчитанные значения суммарного загрязнения почв тяжелыми металлами свидетельствуют о том, что данный показатель имеет сравнительно невысокие величины. Согласно ориентировочной шкале опасности загрязнения почв, почвы опытных участков относятся к категории с допустимым уровнем загрязнения.

Заключение

По результатам проведенных исследований можно сделать следующие выводы:

1. Компосты на основе осадков канализационных стоков г. Намангана обладают высокой удобрительной ценностью;

2. Предлагаемая технология утилизации осадков канализационных стоков является патентоспособным и может выступить как объект импортозамещения. Объектом импортозамещения могут быть компосты на основе переработанных осадков канализационных стоков.

3. Внесение компостов в годы опыта обеспечивало достоверное повышение урожайности овца и хлопчатника в среднем за три года – 15,4 процента. Установлено, что оптимальной дозой внесения осадка (в пересчете на сухое вещество) является 25-30 т/га при влажности 60 процентов один раз в 5 лет в зависимости от вида и количества культур в севообороте.

Использованные источники:

1. Сан ПиН Республики Узбекистан № 0180-05 Гигиенические требования к использованию сточных вод и их осадков на земледельческих полях орошения в природно-климатических условиях Узбекистана.
2. Власова О.А., Мерзлая Г.Е., Налиухин А.Н. и др. Влияние органических удобрений на урожайность льна и многолетних трав // Доклады ТСХА. Выпуск284. М.: МСХА, 2012С.41-43.
3. Ильинский А.В., Евсенкин К.Н., Нефедов А.В. Обоснование экологически безопасного использования осадков сточных вод канализационных очистных сооружений жилищно-коммунального хозяйства // Агрохимический вестник.-2020.-№1.-С.60-64.

4. Максимова С.Л. Вермикомпостирование и вермикультивирование: состояние, проблемы и перспективы // Белорусское сельское хозяйство.-2007.-№9. С.65-66.
5. Босак В.Н и др. Применение однокомпонентных и комплексных удобрений: Рекомендации //-Минск, 2018.
6. Котов А.В. Опыт внедрения технологии обезвреживания осадков сточных вод на очистных сооружениях малых населенных пунктов //Вода и экология: проблемы и решения.-2014.-№4.-С.61-68.
7. Ануфриев В.Н. Очистка сточных вод отдельных объектов на очистных сооружениях небольшой производительности // Экология №4(46). Апрель, 2015. С.60-67.
8. Negmatov M.K., Boboeva G.S., Negmatov U.M. 2022 Environmental aspects of processing and use wastewater sludge in agriculture. Conf. Series: Earth and Environmental Science. (1076 012046 (doi:10.1088/1755-1315/1076/1/012046))
9. Негматов М.К., Бобоева Г.С., Ануфриев В.Н., Ахунов Д.Б. Экологически безопасная технология получения нетрадиционных органических удобрений на основе осадков канализационных сточных вод // В материалах XXII Международной научной конференции «Качество внутреннего воздуха и окружающей среды». Самарканд, 2024.с. 259-265.

Паязов Ш. Н.
ассистент
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

СТРУКТУРНО - НЕЙРОННЫЕ ХАРАКТЕРИСТИКИ ПОЛОВЫХ ЖЕЛЕЗ У ЛАБОРАТОРНЫХ ЖИВОТНЫХ

Аннотация: *Данная научная работа направлена на сбор дополнительной информации о морфологии нервной системы и источниках иннервации половых желез. Исследование нервных механизмов регуляции деятельности половых желез значимо для клиницистов ввиду дистрофических изменений этих желез, обусловленных нарушениями нервной системы.*

Ключевые слова: *половые железы, иннервация, рецепторы, фолликула, яйцеклетка, дегенерация, сплетение.*

Payazov Sh. N.
assistant
Samarkand State Medical University
Samarkand, Uzbekistan

STRUCTURAL AND NEURAL CHARACTERISTICS OF GONADS IN LABORATORY ANIMALS

Annotation: *This scientific study is aimed at collecting additional information on the morphology of the nervous system and the sources of innervation of the gonads. Investigating the neural mechanisms regulating the activity of the reproductive glands is significant for clinicians due to the dystrophic changes in these glands caused by nervous system disorders.*

Keywords: *gonads, ovaries, innervation, receptors, follicle, oocyte, Wallerian degeneration, plexus.*

Актуальность темы

Нервные воздействия определяют как функциональное, так и структурное состояние половых желез, при этом данные о возрастном развитии нервной системы свидетельствуют: у новорожденных наблюдается небольшое количество нервных волокон и более простая структура рецепторов; у детей младшего возраста рецепторы менее сложные; в репродуктивном возрасте отмечается разнообразие рецепторов и обильная иннервация яичников; в период менопаузы количество нервных волокон снижается. К сожалению, при текущем уровне знаний об иннервации яичника пока невозможно установить соответствие между результатами физиологических экспериментов и морфологических исследований. При наличии однотипных рецепторных структур крайне сложно выделить те,

которые отвечают за общую рецепцию яичника, на что указывают физиологи. Изучение физиологии любой железы внутренней секреции всегда сталкивается с трудностями, связанными с невозможностью прямого наблюдения за ее деятельностью.

Цель и задачи исследования

Проанализировать внутри-стеночные нервные переплетения половых желез у лабораторных животных.

Материал и методы исследования

В качестве подопытных животных использовались кошки, собаки и кролики. После удаления обоих яичников животные умерщвлялись спустя 10 дней после хирургического вмешательства. Изучались: 1) спинальные ганглии на уровнях D5—55 с обеих сторон, 2) ганглии солнечного и брыжеечного сплетений. Тканевые образцы окрашивались по методике Ниссля и с использованием гематоксилина.

Результаты исследования

В экспериментах по удалению полулунных узлов солнечного сплетения наблюдалось значительное количество дегенерирующих миелиновых и без миелиновых нервных волокон. Типичная валлеровская дегенерация затрагивала нервные волокна и рецепторы как в корковом, так и в мозговом веществе. Через нижние и поясничные чревные нервы осуществляется связь со спинным мозгом на уровне 1—2 поясничных сегментов. В наших экспериментах перерезка чревных нервов сопровождалась типичной валлеровской дегенерацией мякотных нервных волокон и рецепторов в яичниках: такие волокна встречались и в корковом и мозговом веществе. Количество выявляемых дегенерирующих волокон различно, чаще всего большое. Анализируя полученные нами препараты, мы не смогли обнаружить валлеровской дегенерации мякотных нервных волокон и рецепторов после перерезки блуждающего нерва ни на какие сроки и ни в одном случае. Как правило, все элементы внутриорганного нервного аппарата имели интактный вид, за исключением отдельных аргентофильных волокон (такого рода волокна всегда имеют место и в контрольных яичниках).

Наблюдалась типичная валлеровская дегенерация нервных волокон в яичнике. Наибольшее количество дегенерирующих волокон имеет место при экстирпации D10-L3 чувствительных узлов. Очевидно, эти спинномозговые узлы являются основным поставщиком чувствительных нервных волокон к яичнику. Дегенерирующие нервные волокна обнаруживаются в соединительнотканной основе коркового и мозгового вещества, вокруг развивающихся фолликулов и граафовых пузырьков, на атретических фолликулах. Обнаруживается дегенерация толстого мякотного волокна и более тонких его ветвлений, идущих вокруг и частично вглубь атретического фолликула, указанные эксперименты подтвердили данные эмбриологических работ. Установившиеся в эмбриогенезе связи сохраняются и во взрослом организме, несмотря на смещение яичника в

каудальном направлении. Основываясь на обязательности появления ретроградных изменений в нейронах, отростки которых перерезаны, проведено эксперименты с удалением яичников. Этот метод позволяет определить не только локализацию нейронов, отростки которых перерезаются в данных экспериментах с удалением яичников, но позволяет количественно характеризовать степень участия тех или иных отделов нервной системы в иннервации яичника.

Исследование спинномозговых узлов выявило небольшие группы клеток с картиной ретроградной дегенерации (эктопия ядер, тигролиз и др.). Эти группы встречались несколько чаще в спинномозговых узлах уровней нижних грудных и верхних поясничных сегментов и совсем не выявлялись в верхних грудных сегментах, за исключением очень редких единичных клеток в той или иной стадии дегенерации. Имея положительные данные об участии нижнегрудных и верхнепоясничных спинномозговых узлов в иннервации яичника на основании исследования нервного аппарата яичника при удалении этих узлов, мы были несколько озадачены полученной картиной в данных экспериментах, т. е. тем, что затронуты столь небольшие группы клеток. Объяснение этого факта очевидно, надо искать в том, что чувствительные клетки спинномозговых узлов, принимающие участие в иннервации яичника дают многочисленные коллатерали и к другим органам. Выключение столь малого органа, несомненно отражаясь на их состоянии, не проявится в сколь-либо демонстративно структурно-выраженной реакции. Вероятнее всего свои волокна к яичнику посылает довольно обширная группа клеток спинномозговых узлов. В солнечном сплетении группы ретроградно-измененных клеток были значительно крупнее. Процесс касался и одноядерных и двуядерных клеток. В нижнем мезентериальном сплетении эти группы значительно мельче, иногда только отдельные клетки подвергались изменениям. Следовательно, используя метод ретроградной дегенерации, мы получили данные, которые явились прямым подтверждением раннее констатируемых результатов об источниках иннервации яичников, полученных путем изучения нервного аппарата яичников при экстирпации тех или иных элементов нервной системы.

Выводы

Полученные данные позволяют обобщить сведения об источниках и системной принадлежности нервных структур яичника следующим образом: основным источником чувствительных нервных волокон для яичника служат спинномозговые чувствительные узлы сегментов D10–L3. От спинномозговых узлов, расположенных выше и ниже этих сегментов, к яичнику отходит лишь незначительное количество волокон. Солнечное сплетение является основным источником клеточных элементов, обеспечивающих сосудодвигательные волокна для яичника. Через это сплетение, в составе большого чревного нерва, к яичнику проходят чувствительные волокна, начинающиеся в спинномозговых узлах. Нижнее мезентериальное сплетение выступает дополнительным источником

сосудодвигательных волокон для яичника. Множественность источников иннервации отражает компенсаторные механизмы нервной системы, которые обеспечивают более эффективную регуляцию функций яичника.

Использованные источники:

1. Юшканцева С.И., Быков В.Л. Гистология, цитология и эмбриология. Краткий атлас: Учебное пособие.-СПб.: Издат. «П-2», 2006.
2. Российское общество-акушеров гинекологов. Федеральные клинические рекомендации. Диагностика и лечение синдрома гиперстимуляции яичников. Москва; 2013.
3. Российское общество акушеров-гинекологов, Российская ассоциация эндокринологов. Клинические рекомендации. Синдром поликистозных яичников. М.: Министерство здравоохранения РФ; 2021.
4. Патологическая анатомия: атлас-учеб. Пособие для студентов медицинских вузов и последипломного образования/ [Зайратьянц О. В. и др.]; под ред. О.В.Зайратьянца. –М.: ГЭОТАР-Медиа. 2014
5. Паязов Ш. Н. Исследование морфометрических показателей печени белых безпородных крыс под воздействием противовоспалительных средств парацетамола, аспирина и ибупрофена при полипрогмазии //экономика и социум. – 2024. – №. 11-1 (126). – с. 1275-1279.
6. СароянТ.Т., Корнеева И.Е. Тактика ведения индуцированной беременности, наступившей на фоне тяжелого течения синдрома гиперстимуляции яичников. Акушерство и гинекология. 2011 ;(8):
7. Паязов Ш.Н. Особенности функционирования печени при ревматоидном артрите //экономика и социум. – 2024. – №. 11-1 (126). – с. 1045-1049.

Попко-Садчикова И. А.
обучающаяся магистратуры 43.04.03 «туризм»
Сочинский государственный университет
Россия, г. Сочи

МЕДИЦИНСКИЙ ТУРИЗМ И СПА ИНДУСТРИЯ В РОССИИ: АНАЛИЗ СОВРЕМЕННОГО СОСТОЯНИЯ

Аннотация: *В статье рассмотрено современное состояние рынка медицинского туризма и СПА- индустрии в России, проанализирован объем российского рынка внутреннего и въездного медицинского туризма, составлен рейтинг федеральных округов и регионов России по количеству отдыхающих в 2024 г.*

Ключевые понятия: *медицинский туризм, СПА- индустрия, рынок внутреннего и въездного медицинского туризма, медицинские услуги, медицинские учреждения.*

Popko-Sadchikova I. A.
graduate student of the 43.04.03 "Tourism"
Sochi State University
Russia, Sochi

MEDICAL TOURISM AND SPA INDUSTRY IN RUSSIA: ANALYSIS OF THE CURRENT STATE

Abstract: *The article examines the current state of the medical tourism and SPA industry in Russia, analyzes the volume of the Russian domestic and inbound medical tourism market, and provides a ranking of the federal districts and regions of Russia based on the number of tourists in 2024.*

Keywords: *medical tourism, the SPA industry, the domestic and inbound medical tourism market, medical services, and medical institutions.*

В апреле 2025 г. аналитическая компания BusinesStat сообщила, что объем российского рынка внутреннего медицинского туризма в 2024 г. достиг 396 млрд руб., что на 14% больше показателя 2023 г., когда он составлял 345 млрд руб. [2]

Как пишет BusinesStat, за период с 2020 по 2024 гг. суммарная стоимость медицинских услуг, оказанных в рамках внутреннего медицинского туризма в стране, выросла на 72% – с 230 млрд руб. до 396 млрд руб. Динамика роста была неравномерной: в 2021 г. рынок увеличился на 20% до 276 млрд руб., в 2022 г. темп роста замедлился до 9% (301 млрд руб.), а в 2023 г. снова ускорился до 15% (345 млрд руб.). [2]



Рисунок 1 - Оборот внутреннего медицинского туризма в России в 2020-2024 гг., млрд руб.

Исследовательская компания OMI выяснила, что 18% россиян стараются каждую поездку в отпуск совместить с заботой о здоровье. При этом 25% опрошенных считают, что медицинский туризм будет для них привлекательным и актуальным в будущем.

По данным исследования, к 2030 г. объем рынка медицинского туризма в России может составить от $2,2 млрд до $7,6 млрд в зависимости от сценариев развития. Однако на август 2024 г. вклад этого сектора в ВВП страны незначителен — менее 0,01%, что составляет менее $0,2 млрд по итогам 2023 г. Эксперты отмечают, что для улучшения ситуации необходимо устранить ключевые препятствия, такие как ограниченные возможности инфраструктуры и трудности с аккредитацией медицинских учреждений. [2]

По словам экспертов, среднесрочной перспективе, до 2026 г., особое внимание следует уделить привлечению медицинских туристов из стран СНГ, в том числе англоязычных пациентов. Важно обеспечить готовность инфраструктуры российских клиник к массовому приему иностранных граждан, что особенно актуально для дружественных стран дальнего зарубежья, таких как государства БРИКС.

За последние пять лет почти 200 тыс. граждан Китая приехали в Россию для получения медицинских услуг. Об этом 19 августа 2024 г. заявила вице-премьер Татьяна Голикова на 25-м заседании российско-китайской комиссии по гуманитарному сотрудничеству, подчеркивая важность развития данного направления. Наиболее востребованными направлениями стали офтальмология, психиатрия, онкология и ядерная медицина. [1]

В перспективе, прогнозируется, что к 2033 г. рынок достигнет 16,03 миллиарда долларов США, демонстрируя темп роста (CAGR) 21,14% в период 2025-2033 гг. Медицинский туризм развивается в области онкологии,

нейрохирургии и сердечно-сосудистой медицины, привлекая пациентов из Восточной Европы и Азии. [2]

Конкурентные цены и современные условия для стоматологических и косметических процедур привлекают медицинских туристов, ищущих ценность и результаты. Кроме того, региональные связи и упрощённый доступ для пациентов СНГ ещё больше увеличивают долю российского рынка медицинского туризма.

Медицинский туризм приносит значительные доходы российской экономике: ежегодная прибыль от медицинских услуг, предоставляемых иностранным гражданам, составляет более $1 млрд. Спрос на российские медицинские услуги продолжает расти, особенно в свете высокого уровня профессионализма и современных технологий, применяемых в российских клиниках.

Важную роль в развитии медицинского туризма и СПА в России играет санаторно-курортная индустрия. За 10 лет количество отдыхающих в санаториях увеличилось на 20%. В целом по Российской Федерации в 2024 г. отдохнуло 7275985 человек, что на 3,2% больше, чем в прошлом году. Общее количество мест в санаториях по стране составляет 447 165. [2]

Далее рассмотрим распределению турпотока по федеральным округам. Это позволяет выявить регионы-лидеры и аутсайдеры в развитии медицинского туризма.

Таблица 1
Рейтинг по количеству отдыхающих в 2024 г. среди федеральных округов

Место в рейтинге	Федеральный округ	Количество принятых отдыхающих, человек	Динамика по сравнению с 2023 г.	Количество мест в санаториях, ед
1	Южный федеральный округ	2 313 230	+8,6 %	159 486.
2	Приволжский федеральный округ	1 214 840	+1,9 %	73 757.
3	Центральный федеральный округ	1 072 107	+2,2 %.	64 117
4	Северо-Кавказский федеральный округ	918 125	-1,2 %.	47 931.
5	Сибирский федеральный округ	726 138	-2,6 %.	41 593.

Источник: *составлена по материалам [2]*

Таблица 2

Топ-5 регионов России по количеству отдыхающих в 2024 г.

Место в рейтинге	Регион	Количество принятых отдыхающих, человек	Динамика по сравнению с 2023 г.	Количество мест в санаториях, ед
1	Краснодарский край	1 697 199	+ 4,8%	Более 102 000
2	Ставропольский край	738 011	+ 3,8%,	33 047
3	Республика Крым	534 402	+ 25,4%.	44 170
4	Московская область	463 648	+ 0,8%	22 987
5	Республика Башкортостан	224 046	- 7,7%	

Источник: *составлена по материалам [2]*

Медицинские туристы обеспечивают 0,44% от общего числа медицинских транзакций, то есть из 1000 платежей в среднестатистическом медучреждении четыре совершили люди из других регионов. При этом средний чек медицинского туриста выше, чем у местных: в среднем 6179 руб. против 4079 руб. В итоге в денежном выражении обеспечивают 0,67% от всех трат на медицину — 6,7 руб. из каждой тысячи.

Таблица 3

Топ-5 регионов России с самым большим средним чеком медтуристов

Регион	Средний чек медтуриста, руб	Средний чек на медицину местного жителя, руб	Соотношение, %
Москва	11 325	6 962	163
Новгородская область	8 585	3 054	281
Карачаево-Черкесия	8 544	5 621	152
Ставропольский край	8 056	3 704	218
Новосибирская область	7 320	3 851	190

Источник: *составлена по материалам [2]*

Есть регионы, куда медицинские туристы практически не ездят: это Ненецкий, Чукотский, Ямало-Ненецкий автономные округа, а также Якутия, Тыва, Магаданская область и Камчатский край. В этих отдаленных регионах доля медтуристов не превышает 0,16% от общего числа медицинских транзакций. Из регионов европейской части России низким числом медтуристов выделяются Калининградская и Нижегородская области: 0,18 и 0,16% от всех медицинских транзакций региона.

Полученные данные позволяют сделать вывод о том, что санаторно-курортная отрасль России продолжает развиваться, несмотря на существующие вызовы. Регионы, предлагающие разнообразные виды

отдыха и активно развивающие инфраструктуру оздоровления и лечения заболеваний, демонстрируют наибольший прирост популярности.

Использованные источники:

1. Гусенко, М. Медицина на экспорт: всё больше иностранцев приезжают на лечение в Россию / М. Гусенко // Российская газета. – 2019. – 20 нояб. (№ 261) – С. 3.
2. Медицинский туризм – URL: https://https://zdrav.expert/index.php (статистика) (дата обращения: 08.09.2025)
3. Нестеренко Е.С., Примышев И.Н. Особенности развития медицинского туризма в Российской Федерации. Геополитика и экогеодинамика регионов 2021;7(17):266-275.
4. Никитина О.А. Современные тенденции и вызовы в развитии медицинского туризма: мировой опыт. Проблемы современной экономики 2018;68(4):196-198.

Рахимбердиева Ш. Р.
ассистент
АГМИ

СИНТЕЗ ПРОИЗВОДНЫХ НЕСИММЕТРИЧНЫХ ДИАЦЕТИЛЕНОВ

Аннотация: *Диацетиленовые соединения – промежуточные продукты в синтезах пятичленных и шестичленных гетероциклов. Синтез симметричных и несимметричных диацетиенов описан в работах.*

Пропаргиловые эфиры замещенных фенолов, 1-бромпропаргиловый эфир о-йодфенола и некоторые аналоги обладают фзиологической активностью и бактерицидным действием.

Ключевые слова: *диацетилен, ЯМР, метод Ходкевича – Кадио, алкил бромидов, гидратация.*

Ravshanbek Sh. R.
assistant
ASMI

SYNTHESIS OF DERIVATIVES OF UNSYMMETRICAL DIACETYLENES

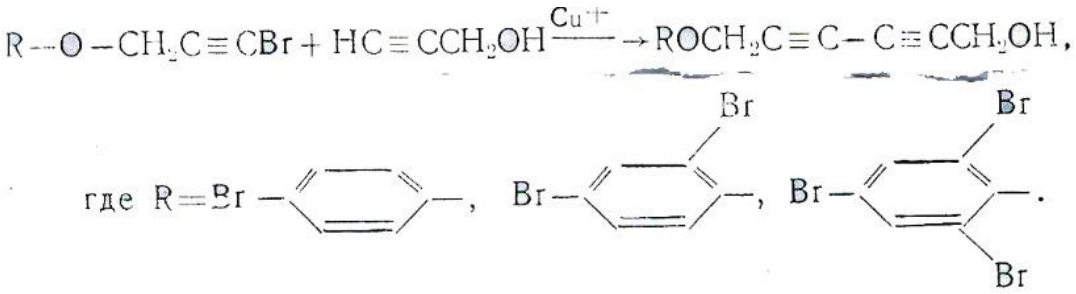
Abstract: *Diacetylene compounds are intermediates in the syntheses of five-membered and six-membered heterocycles. The synthesis of symmetrical and unsymmetrical diacetienes is described in the works.*

Propargyl ethers of substituted phenols, 1-bromopropargyl ether of o-iodophenol, and some analogs exhibit physiological activity and bactericidal action.

Keywords: *diacetylene, NMR, Chodkiewicz-Kadio method, alkyl bromides, hydration.*

Соединения дацетиленового ряда ранее получали окислением медных натриевых и магнийбромпроизводных однозамещенных ацетиленов различными окислителям в присутствии раствора полухлористой меди.

Для получения бромпроизводных несимметричных диацетиленов мы применили метод Ходкевича – Кадио. Реакцию 1-бромпропаргилового эфира, бром фенолов с пропаргиловым спиртом произвели по общей схеме.



Установлено, что наиболее подходящим растворителем явился метанол. Катализатором служила однохлористая медь, комплексообразователем – изо – пропил – амин. Температура реакцию 20-25.

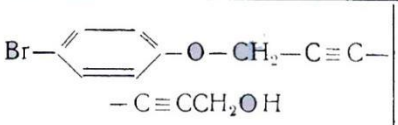
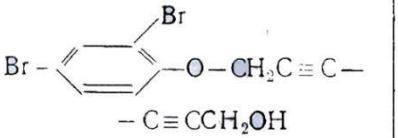
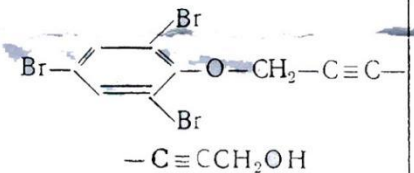
Для восстановления двухвалентной меди до одновалентной использовали гидроксиламин солянокислый, который добавляли до появления характерной окраски. Гидроксильная группа в этинильных соединениях увеличивает растворимсоть ацетиленида меди

Состав и строение синтезированных соединений доказаны химическом методом (гидратация), элементарным анализом, ИК- и ЯМР спектроскопией. В ИК – спектрах отсутствуют полосы поглощения в области 3300-3290 см – 1 (С – Н) и 3238-2221 см-1 (С - В). Присутствуют полосы валентных колебаний 3410-3390 см -1 (- ОН) и С=С в области 2180 – 2145 см -1 и для связи С- О –С –в области 1260 – 1220 см- 1

В ЯМР – спектрах сигналы ароматических протонов расположены в области 7,23 м.д. Наличие двух сигналов с интевсивностью две протонные единцы в области 4,20 – 4,87 м.д. говорит о димеризации ацетилена.

Экспериментальная часть

Физико-химическая характеристика производных несимметричных диацетиленов

Соединение	Выход, %	Т. пл. °С	Найдено, %			Брутто формула	Вычислено, %		
			С	Н	Br		С	Н	Br
	76	56—58	54,37 54,41	3,29 3,31	30,16 30,20	$C_{12}H_9BrO_2$	54,54	3,40	30,30
	81	87—89	41,68 41,72	2,19 2,21	46,29 46,32	$C_{12}H_8Br_2O_2$	41,87	2,30	46,50
	90	126—128	33,81 33,90	1,51 1,56	56,62 56,65	$C_{12}H_7Br_3O_2$	34,07	1,65	56,74

Получение 2,4 дибромфенокси гексадиин 2,4 ола- 6. В трехгорлую колбу помещали смесь 0,056 г однохлористой меди и 12 мл изо-пропиламина. Через нее продували сухой азот в течение пяти минут (до образования медного комрлекса синего цветв).

После этого в реакционную смесь добавили при энергичном перемешивании через капельную воронку в течение 20 мин. 2,4 дибромфенола, растворенного в 20 мл меианола. Перемешивание продолжали полчаса. В ходе реакции периодически добаляли гидроксламин солянокислый. По окончании реакци смесь обработали 5% - ным раствором соляной кислоты, экстрагировали эфиром два раза, эфир выпарили, сухой остаток очистили тонкослойной хроматографией с безводным $A1_2O_3$ (бензол: этонол 15:1). Перекристаллизованное из гексана белое вещество имеет т. пл. 87 - 89 . Выход – 2,75 г (80% от теории)

Использованные источники:

1. Schulte K. u.a. Chem.Ber.,96, 1470 (1963).
2. Перфеев Ф.Я., Деминова В.М. ЖОХ, т. 2,вып. 10(1967).
3. Glaser C. Ber., 2,422 (1869)
4. F.Bolmann. u. a. Ber., 94,948(1961).
5. А.Г.Махсумов, и др. «Вопросы морфологии и хирургии» 101 (1972).
6. Патент №DGU 09805. 25.11.2020 г.

Рахимов А. Х., т.ф.ф.д. PhD.
Термиз давлат университети
Термиз шаҳри

ТАКОМИЛЛАШТИРИЛГАН СЕПАРАТОРНИ ЯРАТИШ ВА ИШЛАБ ЧИҚАРИШДА СИНОВДАН ЎТКАЗИШ

Аннотация: *пахтани ташувчи ҳаводан ажратиб олиш жараёнида, қияликда тешик очилиб такомиллаштирилган тўрли юзанинг оғиш бурчаги 55 градусга эга бўлган экрин тола миқдорини камайтирувчи сепаратор ишлаб чиқилган.*

Калит сўзлар: *сепаратор, пахта, тола, чигит, тўрли юза, тешик, пневмотранспорт, ҳаво оқими, конструкция, қирқим, камера, перфорация, қирғич.*

Raximov A. K., doctor of philosophy (PhD) in technical sciences
Termez State University
Termez city

DEVELOPMENT AND EXPERIMENTAL TESTING OF AN IMPROVED SEPARATOR

Abstract: *In the process of separating cotton from the conveying air, an improved separator has been developed to reduce fiber losses. The design incorporates a perforated mesh surface with openings, installed at an inclination angle of 55°. The proposed technical solution ensures more efficient separation of raw cotton from the airflow, minimizes fiber carryover, and increases the overall efficiency of the pneumatic conveying system.*

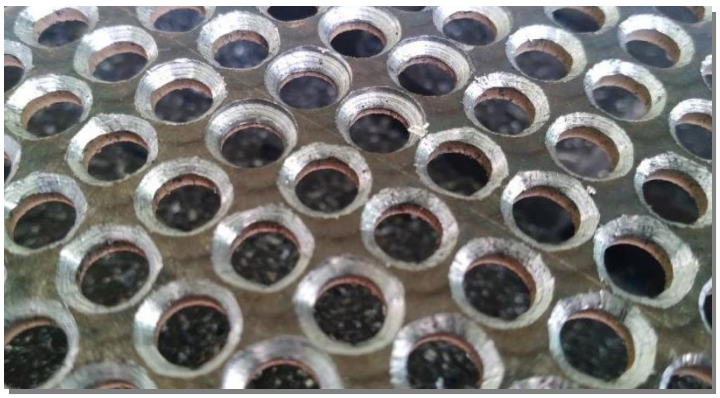
Keywords: *separator, cotton, fiber, cottonseed, mesh surface, opening, pneumatic conveying, airflow, design, cross-section, chamber, perforation, scraper.*

Пахта тозалаш корхоналарида пахтани ташиш учун сўрувчи пневмотранспорти қўлланилади. Бунда пахта ҳаводан ажралади ва вакуум-клапан ёрдамида лентали конвейерга узатилиб, талаб этилган эрга кўчирилади. Натижада уни таркибида сепаратор асосий қурилма бўлиб, пахта ҳаводан ажратиб олиниб, технологик машиналарга узатилади. Сепараторларнинг ўртача иш унумдорлиги 15 т/соатга тенг. Машина терминиг кенг қўлланилиши ва этиштирилаётган пахта хомашёсини тез фурсатларда йиғиб-териб олиниши пахта тозалаш саноатининг олдига ишлаб чиқариш қувватини, ускуналарнинг иш унумдорлигини ошишига ва шу билан бирга, тайёр маҳсулот сифатини яхшилаш талабини қўймоқда. Ушбу масалаларни эчиш пахтани ташувчи пневмотранспортининг ишлашига ҳам

кўп томонлама боғлиқ, чунки у пахтани дастлабки ишлаш технологик жараёнида биринчи ва асосий бўлиб ҳисобланади.

Ишлаб чиқариш шароитида синаш натижасида ўрнатилган изоляцион камера мосламасининг тўрли юза билан тўқнашув ҳудудида резина парракни тез ишдан чиқиши ҳамда қўшимча мосламани ўрнатилиши сепаратор конструкциясини мураккаблаштириб юборади. Шу туфайли ушбу жараённи янада такомиллаштириб, янги такомиллашган конструкция биз томонимиздан яратилди [1].

Ушбу янгилик, чигитли пахта сепараторини тўрли юзаси конструкциясини такомиллашгани бўлиб, янги таклиф этилаётган ихтиро патенти олинган. Ушбу сепараторнинг фойдаланиш соҳаси: тўқимачилик саноатида, айнан эса пахта хом ашёсини пневмотранспорт ускуналаридаги ташувчи ҳаво оқимидан ажратиш қурилмаларида қўлланади. Сепаратор конструкциясини такомиллаштириш, пахта толалари ва тешилган дисклар тешиклари юзалари ўртасида ишқаланиш кучини пасайтиришдан иборат. Янгилик моҳияти кириш ва чиқиш учун тармоқланган қувурлари бўлган ажратиш камерасини, камеранинг ён қирра деворларида перфорацияланган дискларни (тўрни), бунда дисклардаги тешиклар горизонтал текисликга нисбатан 45-60° бурчак остида бажарилган ва дискларга тушадиган, узатма валда ўрнатилган, қайишқоқ куракларни бўлган қирғичларни ичига олган пахта хом ашёси сепаратори таклиф қилинган. Перфорацияланган дискларнинг тешиклари эгри чизиқли юзали конуссимон шаклда бажарилган, бунда тешиклар асослари диаметрларининг нисбати d2=(1,15÷1,25)d1 деб танланган, бу ерда d1–кичик асос диаметри, d2–катта асос диаметри [2].



1-расм. Тешикларни тайёр ҳолдаги кўриниши.

1-расмда эса янги тўрли юза тешикларини очиш жараёнлари кўрсатилган бўлиб, ушбу тўрли юза пахта тозалаш корхонасига ўрнатилган.

Ушбу таклиф этилаётган сепараторни асосий мақсади унда жойлашган тўрли юза тешикларида ҳаво сўриши натижасида пахтанинг толаси юза тешигидан ўтиб туради. Натижада чигитли пахтани қирғич ёрдамида тўрли юзадан ажратишда тешикдан ўтган толалар узилиб, ҳаво билан бирга чиқиб кетади. Бунга асосий сабаб тўрли юза тешиги ортогонал жойлашганлиги

сабабли тешик қирғоқлари толани узиб юборишига сабаб бўлади. Пахта толасини узилишини олдини олиш мақсадида тўрли юза тешиклари сепараторнинг ҳаво чиқувчи патрубкаси томонидан конус шаклида 45-60° бурчак остида тайёрланади. Яъни тўрли юза тешиги диаметри d_1 бўлса, ташқи тешик диаметри эса камида қуйидагича бўлади: $d_2=(1,15\div1,25)\ d_1$. Худди шундай ёндошишда тайёрланган тўрли юза конструкцияси толани узилишини олдини олади [3].

Ишлаб чиқаришда ўтказилган синов натижалари, пахтанинг ифлослик даражаси, намлиги ҳамда чигитнинг механик шикастланиш даражаларини аниқлашга имкон берди.

Синов ишларини ўтказишда қуйидаги тўртта асосий факторлар танлаб олинди: сепараторнинг иш унумдорлиги, тўрли юза тешикларини қиялик бурчаги, пахтанинг намлик даражаси ҳамда йўналтиргичнинг баландлиги.

Тўла факторли тажриба ўтказиш учун қуйидаги асосий факторлар танланди:

а) сепараторни иш унумдорлик фактори, т/соат; б) тўрли юза тешикларини қиялик даражаси, градус; в) пахтанинг намлик даражаси, %; г) йўналтиргичнинг баландлиги, см.

Ҳар бир факторнинг ҳақиқий ва кодланган кўринишдаги миқдорлари 1–жадвалда келтирилган. Тажрибалар асосан Бухоро–102 селекцион навли пахтада ўтказилди. Саноат нави - II.

1-жадвал

Асосий факторларни ҳақиқий ва кодланган кўринишдаги миқдорлари

Фак-торлар	Факторларнинг номланиши	Факторларнинг ўлчов даражаси			
		Юқори		Қуйи	
		ҳақиқий	кодланган	ҳақиқий	Кодланган
X_1	Сепараторнинг иш унумдорлиги, т/с	15,0	+	8	–
X_2	Тўрли юза тешикларини қиялик даражаси, градус	60	+	15	–
X_3	Пахтанинг намлиги, %	14,0	+	10,0	–
X_4	Йўналтиргичнинг баландлиги, см.	30,0	+	15,0	–

Ушбу тажрибаларни ўтказишда қуйидаги параметрлар танлаб олинди:

Y_1 – чигитнинг механик шикастланиш даражаси, %.

Y_2 – толани йўқолиш миқдори, кг/с.

Y_3 –тола таркибидаги ифлослик ва нуқсонлар миқдори, %.

Жараёнга таъсир этувчи факторларни алоҳида ўрганиб чиқамиз:

а) сепараторнинг иш унумдорлик фактори – X_1.

б) Тўрли юза тешикларини қиялик бурчаги– X_2.

Ишлаб-чиқаришда тажрибалар пахта тозалаш корхонасида ўтказилди.

Ҳар қайси олинган регрессион тенгламаларни алоҳида равишда таҳлил қилган ҳолда, чиқувчи параметрларга ҳар бир фактор таъсир этиш даражасини кўриб чиқилди. Ўтказилган тажрибалар асосида олинган регрессион тенгламалари асосида хисоблаш ишлари амалга оширилди.

Хулоса қилиб ўтказилган назарий ва амалий тадқиқотлар асосида такомиллаштирилган конструкция ишлаб чиқилди. Такомиллаштирилган тўрли юзали сепаратор ишлаб чиқилиб, унинг кириш қисмининг тешик диаметри д1=6мм, орқа қисми эса кенгайтирилган бўлиб д2=10мм ни ташкил қилди. Кенгайтирилган тўрли юза тешигини горизонтал текисликга нисбатан 55 градус ҳолда тайёрланиб, ундан асосий мақсад тўрли юза тешикларидан ўтган толалар узилишини олдини олишга эришилди. Бунинг натижасида ифлослик таркибидаги эркин тола миқдори саноат навлари бўйича мавжуд сепараторга нисбатан 23-30 % гача камайишига эришилди.

Фойдаланилган адабиётлар:

1. Мардонов Б.М. Волновые процессы в упругих насыщенных средах . Ташкент, Фан, 1991.
2. M.T.Khodjiev., B.M.Mardonov., A.Kh.Rakhimov. // Theoretical study of the movement of raw cotton on a cotton separator // IOP Conference Series:Earth and Environmental Science. 1112 (2022) 012011. Angilya 2022.
3. M.T.Khodjiev., A.Kh.Rakhimov. // Study of the influence of a new improved separator design of the natural properties of cotton // IOP Conference Series:Earth and Environmental Science. 1112 (2022) 012045. Angilya 2022.

Рустамов У.
преподаватель
кафедра социальных наук
Ферганский институт общественного здоровья и медицины

НЕКОТОРЫЕ РАЗМЫШЛЕНИЯ О ИСТОРИИ БУМАГИ В ЦЕНТРАЛЬНОЙ АЗИИ

Аннотация: *В статье рассматриваются процессы появления, развития и распространения бумаги в Центральной Азии. Исследование основано на древних источниках, археологических находках и научной литературе. Анализируется проникновение бумаги в регион через Шёлковый путь, роль согдийских торговцев, а также значение Самарканда для интеллектуальной и культурной жизни. Кроме того, критически оцениваются традиционные легенды о битве при Таласе и влиянии китайских технологий.*

Ключевые слова: *бумага, Центральная Азия, история, производство бумаги, шёлковый путь, археологические находки, интеллектуальная и культурная жизнь, научная литература*

Rustamov U.
lecturer
department of social sciences
Fergana Institute of Public Health and Medicine

SOME REFLECTIONS ON THE HISTORY OF PAPER IN CENTRAL ASIA

Abstract: *This article explores the emergence, development, and dissemination of paper in Central Asia. Based on ancient sources, archaeological findings, and scholarly literature, it analyzes the introduction of paper through the Silk Road, the role of Sogdian merchants, and the significance of Samarkand in intellectual and cultural life. Additionally, traditional narratives regarding the Battle of Talas and the influence of Chinese techniques are critically assessed.*

Keywords: *Paper, Central Asia, History, Paper production, Silk Road, Archaeological findings, Intellectual and cultural life, Scholarly literature*

Введение

Изобретение бумаги является революционной инновацией, сыгравшей фундаментальную роль в эпистемологическом развитии человеческой цивилизации. Созданная во II веке до нашей эры в Китае, во время династии Хань, бумага открыла новый этап в истории письменной культуры и радикально изменила способы фиксации и распространения знаний.

Технология производства бумаги, являвшаяся одним из важнейших достижений древнего мира, постепенно вышла за пределы Китая и, благодаря развитым торговым и культурным обменам по транссontinentalным маршрутам — Великому Шёлковому пути — достигла Центральной Азии. Регион Центральной Азии сыграл ключевую посредническую роль в процессе трансмиссии и адаптации бумажного производства.

К VIII веку н.э. эта технология прочно укоренилась в крупнейших городских центрах Центральной Азии, прежде всего в Самарканде, который в эпоху Аббасидского халифата превратился в важнейший центр производства бумаги. Распространение бумаги в регионе оказало глубокое влияние на интеллектуальное, административное и экономическое развитие, способствовав подъёму научной и литературной культуры в период, известный как Золотой век ислама.

Появление бумаги в Центральной Азии не только стимулировало развитие письменной культуры, но и привело к значительным изменениям в сферах науки, государственного управления и торговли. Эта инновация сыграла важную роль в превращении региона в центр знаний для всего мусульманского Востока. Однако истинное содержание и значение бумаги в древней и средневековой истории Азии до сих пор остаются недостаточно изученными.

Обзор литературы

Вопрос возникновения и развития бумажного производства в Центральной Азии является одной из наиболее обсуждаемых тем в историографии. Ряд исследователей Востока и Запада выдborgan свои теории о том, каким образом бумага впервые появилась в Средней Азии и как она получила широкое распространение. Несмотря на значительные научные изыскания, в исследовательском сообществе до сих пор отсутствует единая концепция, которая бы однозначно объяснила, каким путём эта технология проникла в регион, когда начала активно применяться и в какой форме сформировалась. Тем не менее в существующей научной литературе можно выделить несколько основных подходов.

Хотя в историографическом сообществе существуют различные мнения о происхождении бумажного производства в Центральной Азии, в настоящее время большинство специалистов придерживаются точки зрения, согласно которой эта технология проникла в регион из Китая в эпоху династии Тан (618–907 гг.), то есть в VII–VIII веках, по Великому шёлковому пути. В частности, Джонатан Блюм, Роберт Хантер, Цуёси Симада, а также ряд востоковедов поддерживают идею о том, что технология изготовления бумаги распространилась в Центральную Азию именно в период династии Тан. По их мнению, активизация торговли, дипломатических контактов и культурных обменов по Шёлковому пути облегчила передачу секретов бумажного производства в регион.

По мнению Джонатана Блюма, поскольку в VII–VIII веках бумага стала основным средством ведения государственного управления и документооборота в Китае, её распространение за пределы страны было естественным историческим процессом.

Одной из теорий, сформировавшихся в средние века и позднее получивших широкую известность, является утверждение о том, что после битвы при Таласе (751 г.) производство бумаги в Самарканде было налажено благодаря захваченным китайским мастерам. Однако в современной научной литературе эта теория подвергается серьёзной критике.

Такие исследователи, как Николас Симс-Уильямс, Эдвард Шаффер, Марко Бутц, указывают на ряд проблем, связанных с данной гипотезой:

• в ранних источниках отсутствуют достоверные сведения о пленении мастеров-бумагоделов;

• битва при Таласе не имела такого стратегического значения, чтобы изменить технологическую карту региона;

• археологические находки (например, согдийский документ 313 года) свидетельствуют о том, что бумага использовалась в Центральной Азии значительно раньше, однако это не подтверждает её местного производства.

Многие исследователи склоняются к тому, что проникновение бумажной технологии в Центральную Азию следует объяснять активной транскультурной ролью согдийских купцов. Они проживали и вели торговую деятельность в городах Турфан, Дуньхуан, Гаочан и других центрах Восточного Туркестана, являясь ключевыми посредниками культурного обмена.

На сегодняшний день археологические данные, которые бы однозначно подтверждали существование местного производства бумаги в Центральной Азии в VII–VIII веках, отсутствуют. Ранние рукописи, найденные в Китае, Турфане и Дуньхуане, свидетельствуют о наличии бумаги в регионе, однако установить, была ли она импортирована или изготовлена на месте, пока невозможно.

Исламские источники IX–X веков (аль-Якубий, Ибн ан-Надим, аль-Мукаддасий) упоминают Самарканд как крупный центр бумажного производства уже в середине VIII века. На основании этих сведений такие исследователи, как Р. Эттингхаузен, А. фон Леш, Г. Л. Стрэндж, Дж. Леви, подчёркивают историческую роль Самарканда в развитии бумажного производства. По данным их исследований, в эпоху Аббасидского халифата самаркандская бумага отличалась высоким качеством и получила широкое распространение в Багдаде и других культурных центрах мусульманского мира.

В связи с нехваткой прямых письменных свидетельств современные исследования вынуждены опираться на сравнительный анализ, химические экспертизы и методы материаловедения.

Обсуждение

Среди историков до сих пор существуют различные взгляды на происхождение бумагоделия в Центральной Азии. Однако большинство исследователей считают, что это ремесло проникло в регион из Китая в эпоху династии Тан (618–907 гг.), то есть в VII–VIII веках н. э. К VII–VIII векам производство бумаги уже достигло крупных городов Согдианы, а согдийские купцы являлись одними из самых активных посредников на Великом шелковом пути. Многие ученые подчеркивают, что именно согдийские торговцы задолго до каких-либо крупных военных столкновений перенесли знания о производстве бумаги из Китая в Центральную Азию.

Существует мнение, что город Самарканд на территории современного Узбекистана уже к середине VIII века н. э. стал центром бумажного производства. Это утверждение в основном опирается на исламские источники, созданные начиная с конца IX века, однако пока что не обнаружено бумажных образцов VII–VIII веков, изготовленных непосредственно в Центральной Азии.

Традиционные предания связывают распространение бумагоделия с битвой при Таласе 751 года. Согласно этой версии, китайские мастера были взяты в плен и передали свое ремесло местному населению. Однако большинство современных исследователей считают эту историю чрезмерно упрощенной. По их мнению, культурный и технологический обмен происходил не вследствие войны, а благодаря уже существовавшим процессам торговли, дипломатии и миграции.

Из Самарканда технология изготовления бумаги вскоре распространилась в Бухару, Балх и дальше — в Багдад. Это вызвало значительные изменения в административной и интеллектуальной жизни. К X веку бумага стала незаменимым материалом для ученых, государственных служащих, поэтов и писцов. Бумага, производившаяся в Центральной Азии, славилась своей прочностью и качеством; чаще всего она изготавливалась из шелковицы, льна и конопляных волокон.

В разные эпохи ученые Востока и Запада высказывали различные точки зрения о возникновении и распространении бумаги в Центральной Азии. К концу XIX века европейские исследователи Йозеф фон Карабачек и Юлиус Визнер провели первые систематические исследования о том, как искусство изготовления бумаги проникло в исламский мир и как оно развивалось на этих территориях. Их внимание было сосредоточено на длительном — примерно двухсотпятидесятилетнем — процессе распространения ремесла от Центральной Азии до Европы.

Тем не менее высказывания по этой теме встречаются и до них. Так, испанский ученый Мигель Касири, писавший в 1760 году, утверждал, что исламский мир освоил бумагоделие после завоевания Самарканда в 704 году. Он писал:

«В Самарканде используется очень тонкая бумага; подобная ей не встречается нигде, кроме Китая. Когда арабы (в 704 г.) овладели этим городом, они переняли и способ ее изготовления» [1:9].

По мнению Касири, первая исламская бумага производилась в Мекке и изготавливалась из хлопкового волокна.

Этой точки зрения придерживался и Вильгельм Ваттенбах в своей работе *Das Schriftwesen im Mittelalter* (1871). Он также повторяет дату — 704 год — и отмечает, что в Китае бумага производилась из сырого хлопка, и что исламский мир воспринял именно этот метод [12:93].

Источников, подробно описывающих ранний этап развития бумагоделия в исламском мире, крайне мало. Это связано прежде всего с тем, что лишь незначительная часть рукописей VII–VIII веков — периода формирования исламской цивилизации — дошла до нашего времени. Кроме того, разрушение крупных научных центров, таких как Байт аль-Хикма в Багдаде, библиотека Бану Аммар в Триполи и библиотека крепости Аламут в Иране (около XIII века), привело к появлению значительных исторических пробелов.

Одним из самых ранних письменных упоминаний о производстве бумаги в Центральной Азии в период исламского правления является сообщение Абу Усмана Амра ибн Бахра аль-Джахиза в его трактате *Kitāb al-Tabassur bi al-Tijārah*. Аль-Джахиз пишет, что бумага привозилась как из Китая, так и из Самарканда [2:36]. Это свидетельствует о том, что данные регионы уже в тот период были важными центрами производства бумаги. Он не уточняет, в какой именно город импортировалась бумага, однако, вероятно, речь идет о Басре — его родном городе — либо о Багдаде или Самарре, где он жил.

Одним из последующих, но чрезвычайно важных источников, отражающих взгляды аль-Джахиза на бумагу, является сочинение Абу Мансура ас-Саолибия (ум. 1037/1038) *Латаиф аль-ма'ариф* (около 995 г.). В нем приводится высказывание аль-Джахиза:

«Папирусная бумага Каира для западных земель такова же, как самаркандская бумага для восточных». [3:120]

Это сопоставление показывает, насколько авторитетной и широко используемой была самаркандская бумага в восточной части исламского мира и что по своему престижу она приравнивалась к египетскому папирусу. Подобные сведения подтверждают, что уже к IX веку Самарканд превратился в крупный центр производства бумаги.

Предания о возникновении и развитии бумагоделия в Центральной Азии — особенно в Самарканде — встречаются в ряде ранних исламских географических и энциклопедических трудов. Однако большинство этих сведений основано на вторичных источниках или дошло до нас через более поздние компиляции.

Как отмечает К. Э. Босворт, когда он в 1968 году перевел *Латаиф аль-ма'ариф*, известное сопоставление о том, что самаркандская бумага на

Востоке занимает такое же место, как египетский папирус на Западе, вероятно, восходит к утраченной работе аль-Джахиза *Китаб аль-Булдан*. То, что почти идентичное выражение встречается и в *Мухтасар Китаб аль-Булдан* Ахмада ибн Мухаммада Ибн ал-Факиха аль-Хамадани (903 г.), свидетельствует о широкой распространенности этой идеи в ранней исламской географической литературе [7:303].

В самом *Латаиф аль-ма'ариф* содержится и еще одно важное известие. Приводя выдержку из *Китаб ал-Масалик ва-л-мамалик*, ас-Саолибий сообщает, что после битвы при Таласе (751 г.) среди китайцев, захваченных Зиядом ибн Салихом, были мастера, прекрасно владевшие искусством изготовления бумаги. Их привели в Самарканд, где они наладили бумажное производство, которое затем быстро развилось и превратилось в один из основных экспортных товаров региона [3:140].

К тому же кругу источников относится труд X века *Китаб сура аль-ард* географа Абу аль-Косима Мухаммада Ибн Хаукаля, написанный в 951 году. Он утверждает:

«Подобную бумаге, производимой в Самарканде, невозможно найти нигде.» [8:233] Это высказывание вновь подчеркивает высокий престиж самаркандской бумаги в X веке.

Все эти свидетельства показывают, что уже в IX–X веках в исламской исторической литературе окончательно сформировалось представление о том, что бумагоделие проникло в Центральную Азию из Китая — в результате войны, миграции и торгово-дипломатических контактов. Современные исследователи, однако, переосмысливают многие детали этой истории.

Следует отметить, что популярный рассказ о том, что плененные в битве при Таласе китайцы привезли в Самарканд искусство изготовления бумаги, в действительности опирается лишь на один фрагмент из *Латаиф аль-ма'ариф*. Позднейшие авторы — например, Абу Райхан Беруни (1030) и аль-Казвини (1276) — почти дословно воспроизводят эту историю, что показывает отсутствие у них независимых сведений. К концу XIX века поддержка этого сюжета со стороны Карабачека способствовала превращению его в «общепринятую истину», и он продолжает встречаться в современной литературе, включая труд А. Й. Хасани *Science and Technology in Islam*.

Однако новейшие исследования показывают, что эта версия имеет крайне слабую источниковую основу. Хелен Ловедэй (*Islamic Paper*, 2001) и Джонатан Блум (*Paper Before Print*, 2001) подчеркивают, что распространение сложных ремесел редко связано с одним случайным событием; не менее вероятными механизмами являются дальняя торговля, дипломатические связи и миграция [10:9].

Попытки подкрепить таласское предание китайскими данными — в частности, упоминаниями Ду Хуана (762 г.) о плене — также неубедительны: Ду Хуан действительно сообщает о

высококвалифицированных пленниках, однако не упоминает среди них бумажников. Следовательно, данная связь представляет собой позднейшую научную реконструкцию [4:43].

В целом, хотя повествование о «китайских пленниках, обучивших самаркандцев изготовлению бумаги» продолжает существовать в историографии, оно опирается на крайне ограниченные письменные свидетельства. Его следует рассматривать не как установленный исторический факт, а как гипотезу, возможную, но не подтвержденную.

Путевые заметки Ду Хуана — *Jingxingji* («Записки о моих путешествиях»), составленные после 11 лет плена на территории Аббасидов, — усиливают критический подход к распространенному рассказу о том, что технология изготовления бумаги была принесена в Самарканд китайскими мастерами. Ду Хуан упоминает целый ряд китайских ремесленников, работавших в исламском мире, но при этом ясно указывает, что среди них не было изготовителей бумаги. Он пишет:

«Ткачество шелковых тканей, работа с серебром и золотом, а также живопись — всё это перенято от китайских мастеров. Художников из столицы зовут Фань Шу и Лю Ци, а ткачей из Хэдун — Лэ Хуань и Лу Ли.» [1:91]

Из данного фрагмента становится ясно, что китайские мастера уже в середине VIII века присутствовали в исламском мире и их влияние было значительным, однако изготовление бумаги в источнике не упоминается. Это указывает на две возможные причины:

1. Ду Хуан, возможно, не встретил мастеров-бумажников;
2. или же бумагоделие к тому времени уже было хорошо налажено в Средней Азии и потому не представляло для него особого интереса или новизны [1:82].

Кроме того, Ду Хуан подробно описывает Куфу — столицу Аббасидов того времени, но уделяет Самарканду лишь краткое внимание. Это говорит о том, что он, вероятно, не находился в Средней Азии долгое время, а значит, даже если в Самарканде действительно работали китайские мастера-бумагоделы, он мог попросtu не успеть увидеть их деятельность.

Одним из древнейших и наиболее значимых источников, проясняющих происхождение и время распространения бумагоделия в исламском мире, является *Китаб аль-Фихрист* Ибн ан-Надима, написанный в 988 году. В нем о хоросанской бумаге говорится следующее:

«Существует также хоросанская бумага, производимая из льна, используемого для одежды. Одни говорят, что эта бумага появилась в эпоху Омейядов, другие считают, что в эпоху Аббасидов. Одни называют ее древней, другие утверждают, что она появилась недавно. Говорят, что китайские мастера изготовляли её в Хорасане по образцу китайской бумаги.» [9:39]

Этот фрагмент показывает, что уже в тот период существовали различные, порой противоречивые сведения о происхождении бумаги. В то

же время в нем отражено признание серьезного влияния китайской технологии. Однако вопрос о том, каким именно путем искусство изготовления бумаги проникло в исламский мир — через военнопленных, миграции или торговые связи — оставался неясным даже для ученых и читателей раннеисламской эпохи.

Чтобы лучше понять, каким образом бумагоделие стало важной частью исламской цивилизации, необходимо рассмотреть исторические и культурные процессы в Средней Азии. На протяжении веков этот регион, расположенный на перекрестке Великого шелкового пути, был динамичным центром межкультурного обмена. Задолго до появления ислама в середине VII века археологические находки и письменные источники свидетельствуют о том, что бумага была известна и использовалась в Средней Азии. Это вызывает серьезное сомнение в отношении популярной теории, связывающей появление бумагоделия исключительно с пленными из битвы при Таласе (751).

Одной из групп, сыгравших ключевую роль в культурно-торговом обмене региона, были согдийцы. Этот иранский народ значительно влиял на территории от родной Согдианы—области, охватывавшей современные Узбекистан и Таджикистан,—до внутренних районов Китая. Самарканд, сердце Согдианы, был важнейшим узлом Шелкового пути, крупным центром торговли и культуры. В IV–VII веках согдийцы являлись главными посредниками в контактах между Китаем, Ираном и Средиземноморским миром. Вероятно, их участие в передаче материальных технологий, включая секреты производства бумаги, было весьма значительным — и этот процесс мог начаться задолго до исламской экспансии.

В 1907 году британский археолог сэр Аурел Стейн обнаружил в заброшенной караульной башне в провинции Ганьсу (Китай), примерно в 90 км от Дуньхуана, важный архив древних документов. Среди находок была и бумажная тканевая грамота, адресованная Самарканду. Исследователи считают, что ее написал согдийский купец Нанай-вандак, проживавший в районе современного Ланьчжоу [11:47]. На основании лингвистического и исторического анализа профессор Лондонского университета Николас Симс-Уильямс датировал письмо 313 годом н. э. Этот документ чрезвычайно важен: он является одним из древнейших известных образцов китайской бумажной ткани, отправленной за пределы Китая. Примечательно, что она направлялась именно в Самарканд — что свидетельствует о знакомстве Центральной Азии с бумагой уже в начале IV века.

Тем не менее находка не доказывает, что в Самарканде уже производили бумагу в этот период. Однако близость региона к Китаю и активные торговые связи указывают на возможность более раннего распространения бумажного ремесла.

Еще одно существенное доказательство раннего употребления бумаги в Средней Азии связано с согдийскими документами из крепости Муг (гора Муг, Таджикистан). Памятник был случайно найден местными жителями в

1932 году, а в 1933 году детально изучен экспедицией АН СССР под руководством А. А. Фреймана. В ходе раскопок было выявлено 75 документов, преимущественно написанных на коже, но часть из них была написана на бумаге, что является крайне важным историческим фактом.

Самый значимый из них — бумажное письмо, опубликованное в 1934 году В. А. Крачковской и И. Ю. Крачковским, датированное на основе внутренних указаний 718–719 годами. Это свидетельствует, что бумага использовалась в Согдиане задолго до битвы при Таласе (751). В настоящее время документы хранятся в Институте восточных рукописей РАН (Санкт-Петербург).

В 2008 году археологи Ш. Курбанов и А. Савченко обнаружили новые доказательства раннего распространения бумаги в Центральной Азии при раскопках памятника Санджар-Шох (Таджикистан). Найденные фрагменты, на основании палеографии и исторического контекста, были отнесены к VIII веку. Микроскопический анализ показал, что они изготовлены из коры тутового дерева — как и документы Муга, что вновь указывает на китайское происхождение материала [6:162]. Находки хранятся в Национальном музее Таджикистана.

Производились ли эти бумаги в самой Центральной Азии или были привезены по торговым путям — вопрос остается открытым. Тем не менее их существование показывает, что к середине VIII века бумага была хорошо известна и широко использовалась в регионе. Сходство между находками Муга и Санджар-Шоха подтверждает, что бумага уже в этот период была распространенным торговым продуктом.

Вывод

Популярная «основная легенда» о том, что китайские пленные после битвы при Таласе привезли в Самарканд секреты изготовления бумаги, выглядит как позднее объяснение сложного процесса культурного обмена через единственное драматическое событие. Однако существующие археологические и исторические данные показывают, что распространение бумажной технологии в регион началось задолго до этой битвы. Таким образом, значение Таласской битвы для истории бумагоделия оказывается гораздо менее значительным, чем традиционно считалось.

С этой точки зрения, появление бумаги в Средней Азии следует рассматривать не как результат единичного военного события, а как результат длительного, поэтапного технологического обмена, экономических потребностей, культурных связей и торговых коммуникаций. Полная интеграция бумагоделия в исламскую цивилизацию, вероятно, произошла в VII–VIII веках, однако вопрос о том, когда и в какой форме технология была полностью освоена, до сих пор остается открытым. Для полного понимания этого процесса необходимы новые археологические исследования, изучение исторических текстов и тщательный научный анализ сохранившихся образцов бумаги.

Подводя итог, можно сказать, что Средняя Азия с древних времен играла важнейшую роль в обороте бумаги, её культурной передаче и производстве, проявляясь как ключевой регион в распространении бумажного производства в исламской цивилизации.

Использованные источники:

1. Akin, Alexander. “The Jing Xing Ji of Du Huan: Notes on the West by a Chinese Prisoner of War.” Harvard Middle Eastern and Islamic Review, pp. 82–91.
2. Al-Jāḥiẓ, Abū ʿUthmān ʿAmr ibn Baḥr al-Baṣrī. The Book of Insight into Commerce (Kitāb al-Tabassur bi al-Tijārah). Translated with introduction and notes by Adi Setia. Kuala Lumpur: IBFIM, 2012.
3. Al-Thaʿālibī, Abū Manṣūr. The Laṭāʾif al-maʿārif of Thaʻālibi – The Book of Curious and Entertaining Information. Translated by Clifford E. Bosworth. Edinburgh: Edinburgh University Press, 1968.
4. Bloom, Jonathan. Paper Before Print: The History and Impact of Paper in the Islamic World. New Haven: Yale University Press, 2001.
5. Casiri, Miguel. Bibliotheca Arabico-Hispana Escurialensis… Vol. 2. Madrid: Antonius Perez de Soto Imprimebat, 1760.
6. Haim, Ofir, Michael Shenkar, and Sharof Kurbanov. “The Earliest Arabic Documents Written on Paper: Three Letters from Sanjar-Shah (Tajikistan).” Jerusalem Studies in Arabic and Islam 43 (2016): 162.
7. Ibn al-Faqīh al-Hamadhānī, Aḥmad ibn Muḥammad. Abrégé du Livre des pays. Translated by Henri Massé. Damas: Institut Français de Damas, 1973.
8. Ibn Ḥawqal, Abū al-Qāsim Muḥammad. The Oriental Geography of Ebn Haukal, an Arabian Traveller of the Tenth Century. Translated by William Ouseley. London: Oriental Press, 1800.
9. Ibn al-Nadīm, Muḥammad b. Isḥāq. The Fihrist of Al-Nadim: A Tenth-Century Survey of Muslim Culture. Edited and translated by Bayard Dodge. Vol. 1. New York–London, 1970.
10. Loveday, Helen. Islamic Paper: A Study of the Ancient Craft. London, 2001.
11. Sims-Williams, Nicholas. “Sogdian Ancient Letter II.” In Monks and Merchants: Silk Road Treasures from Northwest China: Gansu and Ningxia, 4th–7th Century, edited by Anette L. Juliano and Judith A. Lerner, p. 47. New York: Harry N. Abrams, 2001.
12. Wattenbach, Wilhelm. Das Schriftwesen im Mittelalter. Leipzig: Verlag Von S. Hirzel, 1871.

Сафарова Н. И.
доцент
кафедра географии и основ экономических знаний
Национальный педагогический университет Узбекистана
Каракулов Н. М.
старший преподаватель
кафедра географии и основ экономических знаний
Национальный педагогический университет Узбекистана
Умурова Н. Я.
докторант
кафедра географии и экологии
Гулистанский государственный университет

ЗНАЧЕНИЕ ПРОЦЕССА СУБУРБАНИЗАЦИИ В ТАШКЕНТСКОЙ ОБЛАСТИ И ГОРОДЕ ТАШКЕНТЕ В УЛУЧШЕНИИ ЭКОЛОГИЧЕСКОГО СОСТОЯНИЯ ГОРОДА

Аннотация: *В данной научной статье на научной основе проанализировано значение процесса субурбанизации в улучшении экологического состояния города на примере города Ташкента и Ташкентской области. В исследовании раскрыты особенности процесса субурбанизации на основе демографических, экономических и экологических показателей в период 2020-2024 гг. Установлено, что в результате расширения зеленых зон в пригородных районах, снижения загрязнения воздуха, внедрения энергосберегающей инфраструктуры и смещения плотности населения из центра в периферию значительно снизилась экологическая нагрузка. Также проведен научный анализ перераспределения транспортного потока в Ташкентской агломерации, увеличения объемов переработки отходов и эффективности программы "Яшил макон." В статье также разработаны рекомендации по экологическому управлению процессами субурбанизации.*

Ключевые слова: *Субурбанизация, урбанизация, экологическое равновесие, зеленое пространство, плотность населения, экологическая политика, Ташкентская агломерация, устойчивое развитие.*

Safarova N. I.
associate professor
department of geography and fundamentals of economic knowledge
National pedagogical university of Uzbekistan
Karakulov N. M.
senior lecturer
department of geography and fundamentals of economic knowledge
National pedagogical university of Uzbekistan
Umurova N. Y.
doctoral student
department of geography and ecology
Gulistan State university

THE SIGNIFICANCE OF THE PROCESS OF SUBURBANIZATION IN TASHKENT REGION AND THE CITY OF TASHKENT IN IMPROVING THE ECOLOGICAL CONDITION OF THE CITY

Annotation: *This scientific article analyzes, on a scientific basis, the significance of the suburbanization process in improving the ecological condition of the city, using the example of Tashkent city and the Tashkent region. The study reveals the features of suburbanization based on demographic, economic, and environmental indicators for the period 2020–2024. It was established that as a result of the expansion of green areas in suburban districts, a decrease in air pollution, the introduction of energy-saving infrastructure, and the shift of population density from the center to the periphery, the ecological burden has significantly decreased. A scientific analysis of the redistribution of transport flows in the Tashkent agglomeration, the increase in waste recycling volumes, and the effectiveness of the "Yashil makon" program has also been carried out. The article additionally provides recommendations for ecological management of suburbanization processes.*

Keywords: *suburbanization, urbanization, ecological balance, green space, population density, environmental policy, Tashkent agglomeration, sustainable development.*

Введение

В последние годы процессы урбанизации стремительно развиваются в Узбекистане, в частности, в городе Ташкенте и Ташкентской области. Это приводит к чрезмерному уплотнению центральных городских территорий, увеличению транспортного потока, ухудшению качества воздуха и сокращению зеленых зон[1]. Поэтому в последнее десятилетие в Ташкенте все большее значение приобретает процесс субурбанизации - то есть перемещение населения и производственной инфраструктуры из центра в отдаленные районы и области[2].

Процесс субурбанизации, с одной стороны, снижает экологическую

нагрузку на центр города, а с другой стороны, позволяет расширить новые жилые массивы, экологически чистые производственные зоны и зеленые зоны на территории Ташкентской области [3]. Это служит важным фактором восстановления экологического баланса столицы, снижения загрязнения воздуха и повышения качества жизни населения.

Кроме того, субурбанизация - это не только демографический или экономический процесс, но и актуальное направление реорганизации механизмов экологического управления. В настоящее время на территории Ташкентской агломерации в тесной связи с субурбанизацией реализуются такие государственные программы, как "Зеленое пространство," "Чистый воздух" и "Умный город" на 2020-2024 годы[4].

Основная цель статьи - определить роль процесса субурбанизации в улучшении экологического состояния города на примере города Ташкента и Ташкентской области, провести научный анализ его основных направлений и положительных резуьтатов.

Методы

В исследовании проводится комплексный анализ на основе статистических данных, официальных отчетов и международного опыта.

Теоретические основы процесса субурбанизации и международный опыт

Субурбанизация - это процесс расширения населения, жилья и экономической деятельности за пределами города. Этот процесс заметен во многих странах, включая Узбекистан и страны Центральной Азии. В пригородных зонах происходит трансформация ландшафта, социальной структуры и инфраструктуры [5;6] Процесс субурбанизации играет важную роль в снижении экологической нагрузки на города, перераспределении социальной инфраструктуры и улучшении условий жизни.

Теоретически процесс субурбанизации с середины XX века сформировался как уравновешивающий этап урбанизации в западных странах. В урбанистических исследованиях (E. Burgess, R. Park, D. Harvey) субурбанизация интерпретируется как естественное расширение от центра города к периферии в "модели концентрических зон" [7]. Согласно этой модели, население и производственная деятельность концентрируются в центре города, а затем перемещаются в отдаленные районы по экономическим, экологическим и социальным причинам.

Международный опыт показывает, что субурбанизация является эффективным инструментом обеспечения экологической устойчивости. Например, в результате развития пригородных районов в нью-йоркской и чикагской агломерациях США транспортная нагрузка в центральных городах снизилась на 30%, а доля зеленых зон увеличилась на 15% [8].

В Германии, Японии и Южной Корее процессы субурбанизации проводились в тесной связи с политикой экологического контроля и ландшафтного планирования.

Согласно опыту городов Инчхон и Сувон вокруг Сеула в Республике

Кореи, загрязнение транспорта в центральном городе снизилось на 25%, а зеленые зоны увеличились на 18%. Эта модель актуальна и в Узбекистане, в частности для Ташкентской агломерации. Потому что в Ташкенте быстрый рост населения и нарушение экологического баланса могут быть смягчены за счет субурбанизации.

С этой точки зрения, субурбанизация рассматривается не только как демографический результат урбанизации, но и как важный этап экологической трансформации. Он снижает избыточную нагрузку на центр города, увеличивает долю зеленых зон и основан на принципах устойчивого развития [4;5].

Статистический анализ по городу Ташкенту и Ташкентской области (2020-2024)

Год	Население (тыс.)	Зеленые насаждения (га)	Индекс загрязнения воздуха (ИЗВ)	Переработка отходов (%)
2020 год	**2 500**	**3200**	**85.**	**12.**
2021	**2,550**	**3280**	**82.**	**15.**
2022 год	**2600**	**3350**	**78.**	**18.**
2023 год	**2,650**	**3420**	**74.**	**21.**
2024	**2700**	**3 500**	**70.**	**25.**

Статистический анализ показывает, что в результате процесса субурбанизации значительно снизилась экологическая нагрузка на центр города. Зелёные насаждения увеличились на 300 в 2020-2024 годах, индекс AQI снизился с 85 до 70, а показатель переработки отходов увеличился с 12% до 25%.

Территории вокруг города Ташкента, то есть пригородные зоны, тесно связаны с экономическим и социальным развитием столицы Узбекистана и включают такие районы, как Зангиатинский, Чиназский, Бостанлыкский и Янгиюльский. Из-за географической близости и интеграции этих зон с городом они сталкиваются с экологическими последствиями процессов урбанизации. Научные исследования показывают, что экологическая ситуация в пригородных районах ухудшается в основном под влиянием антропогенных факторов - промышленной деятельности, транспортных потоков и сельскохозяйственной практики. Например, в пригородах Ташкентской области в качестве основных источников загрязнения воздуха указаны системы отопления (обеспечивающие 28 процентов частиц PM2.5) и транспорт (16 процентов), которые, как отмечается в последних отчетах Всемирного банка[9], одинаково высоки в городе и пригороде. Этот уровень загрязнения резко возрастает, особенно в зимний период, поскольку населенные пункты в Зангиатинском и Янгиюльском районах подвержены воздействию выхлопных газов Ташкента, что приводит к самым высоким

концентрациям углекислого газа (CO) и диоксида серы (SO2) в стране достигает показателей. С научной точки зрения, эта проблема подтверждается эпидемиологическими исследованиями, изучающими воздействие частиц PM2.5 на здоровье, например, загрязнение воды и почвы в пригороде Ташкента приводит к ухудшению систем водоснабжения и увеличению хронических заболеваний.

Деградация водных ресурсов занимает особое место в оценке экологического состояния прилегающих территорий города Ташкента. В Чиназском и Бостанлыкском районах наблюдается загрязнение поверхностных вод промышленными отходами и сельскохозяйственными сточными водами, что снижает качество воды и усиливает засоление почвы. Согласно Национальному докладу Узбекистана о состоянии окружающей среды[10], деградация почв и ветровая эрозия широко распространены в Ташкентской области, что может снизить урожайность сельского хозяйства на 20-30%.

Управление отходами - еще одна важная проблема пригородной экологии. Большая часть отходов города Ташкента и Ташкентской области захоранивается на свалке "Ахангаран," что приводит к загрязнению грунтовых вод в Янгиюльском и Чиназском районах. Научный анализ показывает, что из-за отсутствия системы переработки отходов увеличиваются выбросы метана, что способствует изменению климата, что увеличивает риск эрозии и засухи в пригородах Ташкента.

Меры по улучшению экологической ситуации требуют научно обоснованного подхода, который реализуется посредством интегрированных политик и технологических решений. В первую очередь важно расширить зеленые защитные лесные зоны; например, проекты по созданию защитных лесов в Узбекистане направлены на улучшение качества воздуха в городах и пригородах, что может снизить пыль и эрозию на 30-50 процентов. Такие проекты также способствуют сохранению биоразнообразия, например, путем восстановления экосистем в горах Бостанлыкского района. Во-вторых, необходимо внедрить систему сортировки и переработки отходов; Предпринимательские проекты, поддержанные Программой развития ООН (ПРООН [11]) в пригороде Ташкента способствует снижению выбросов метана, стимулируя сортировку отходов.

Кроме того, применение современных технологий в управлении водными и почвенными ресурсами, таких как внедрение агролесоводческих систем, позволит снизить засоление почв на 93 тысячах гектаров. Планы правительства Узбекистана по улучшению качества воздуха до 2030 года, включая расширение велосипедных дорог с 150 км до 300 км и сокращение транспортных выбросов на 50%, направлены на оптимизацию пригородных транспортных потоков. Кроме того, интегрированные оценки, проведенные Экономической и социальной комиссией Организации Объединенных Наций (UNECE), рекомендуют внедрение зеленых налогов и субсидий, что увеличит экологические инвестиции и обеспечит устойчивое управление

природными ресурсами в пригородах Ташкента. Научные модели, такие как методы оценки экосистемных услуг, показывают, что такие меры усиливают адаптацию к изменению климата и обеспечивают долгосрочную экологическую устойчивость пригорода. Международное сотрудничество, например, проекты, реализуемые через Центральноазиатский офис МСОП, направлены на восстановление ценных природных местообитаний в Ташкентской области, что играет важную роль в поддержании пригородного биологического разнообразия. Также объявление 2025 года "Годом охраны окружающей среды и зеленой экономики" положило начало новым инициативам, направленным на стабилизацию экосистем в горных системах Западного Тянь-Шаня и Нураты. Эти меры должны основываться на научном мониторинге и базах данных, например, путем внедрения мобильных приложений по качеству воздуха, что обеспечит активное участие населения. В результате улучшение экологической ситуации в пригороде Ташкента возможно не только за счет местных мер, но и за счет интегрированных стратегий, адаптированных к глобальным стандартам, что обеспечит устойчивое развитие региона.

Экологические и социальные результаты следующие:

- Улучшение качества воздуха, снижение AQI
- Транспортный поток в центре города уменьшился
- Зеленые зоны расширены
- Повышена эффективность переработки отходов
- Плотность населения смещена от центра к периферии

Вывод

Результаты исследования показывают, что процесс субурбанизации Ташкентской области и города Ташкента является эффективным инструментом восстановления экологического баланса. Экологическое состояние города может быть улучшено за счет расширения зеленых зон в пригородных районах, снижения транспортной нагрузки и переработки отходов. В то же время рекомендуется поддерживать субурбанизацию на основе принципов устойчивого развития с учетом социальных и экономических аспектов.

Использованные источники:

1. Государственный комитет Республики Узбекистан по статистике, Годовой отчет о городе и численности населения, Ташкент, 2023.
2. Холматов, С., Процессы урбанизации и субурбанизации, Ташкент, 2021.
3. Каримова Н., Городская экология и зеленые зоны, Ташкент, 2022.
4. United Nations, Sustainable Urban Development Report, New York, 2022.
5. UN ESCAP. Урбанизация в Центральной Азии: вызовы, проблемы и перспективы. Бангкок: UN ESCAP, 2013. https://www.unescap.org/resources/urbanization-central-asia-challenges-issues-and-prospects
6. Особенности развития процесса субурбанизации в окрестностях города Ташкента. https://uzzamin.uz/ru/magazines/2-2025-2025-uzzamin.pdf

7. Burgess, E., The Growth of Cities, Chicago, 1967.
8. Park, R., Harvey, D., Urban Expansion and Ecology, London, 2015.
9. Финансовая корпорация (IFC). (2022). Узбекистан сталкивается с экологическими вызовами, стр. 1-15.
10. Международный институт устойчивого развития (IISD [5]). (2024). Национальный доклад о состоянии окружающей среды: Узбекистан. 1-45.
11. United Nations Development Programme (ПРООН [3]). (н.д.). Окружающая среда и климатические действия в Узбекистане. 1-20.

УДК 57.085.23:581.143:615.322

Сержанова А. К.
младший научный сотрудник
Лаборатория физиологии и биотехнологии растений
Мирзамбетов А. Б., доктор сельскохозяйственных наук,
доцент
Международный инновационный центр Приаралья при
Национальном комитете Республики Узбекистан
по экологии и изменению климата

АНАЛИЗ ПОКАЗАТЕЛЕЙ РОСТА И ВСХОЖЕСТИ СЕМЯН ЛЕКАРСТВЕННОГО РАСТЕНИЯ ЭХИНАЦЕИ ПУРПУРНОЙ (*ECHINACEA PURPUREA*) В ЛАБОРАТОРНЫХ УСЛОВИЯХ IN VITRO

Аннотация: *В работе исследовано влияние условий стерилизации, стратификации и состава питательных сред на всхожесть и ранние морфометрические показатели Echinacea purpurea при культивировании in vitro. Семена подвергали холодовой стратификации, затем стерилизовали стандартным протоколом и высевали на среды WPM и MS с различными фитогормонами. Установлено, что тип фитогормона и его концентрация значительно влияют на характер роста проростков. Наиболее выраженный морфогенетический отклик наблюдался на среде WPM, обогащённой зеатином (0,1 мг/л).*

Ключевые слова*: Echinacea purpurea, культура in vitro, всхожесть семян, стратификация, питательные среды MS и WPM, фитогормоны, морфогенез.*

Serzhanova A. K.
junior researcher
Laboratory of Plant Physiology and Biotechnology
Mirzambetov A. B., doctor of agricultural sciences,
associate professor
International Innovation Center of the Aral Sea Region under the
National Committee of the Republicof Uzbekistan
for Ecology and Climate Change

ANALYSIS OF GROWTH AND GERMINATION INDICATORS OF SEEDS OF THE MEDICINAL PLANT PURPLE CONEFLOWER (ECHINACEA PURPUREA) UNDER IN VITRO LABORATORY CONDITIONS

Abstract: *The study investigates the effects of sterilization conditions, stratification, and nutrient medium composition on seed germination and early*

morphometric parameters of Echinacea purpurea during in vitro cultivation. The seeds were subjected to cold stratification, then sterilized using a standard protocol and cultured on WPM and MS media supplemented with various phytohormones. It was found that the type and concentration of phytohormones significantly influence the growth pattern of seedlings. The most pronounced morphogenetic response was observed on WPM medium enriched with zeatin (0.1 mg/L).

Key words: Echinacea purpurea, *in vitro culture, seed germination, stratification, MS and WPM nutrient media, phytohormones, morphogenesis*.

Введение

Эхинацея пурпурная (*Echinacea purpurea*) — ценное лекарственное растение, широко используемое в медицине благодаря высокому содержанию фенольных соединений, полисахаридов и эфирных масел, обладающих иммуномодулирующей и противовоспалительной активностью. Для фармакологической промышленности важны стандартизированные методы размножения и культивирования данного вида, а технология *in vitro* позволяет получать асептический и однородный посадочный материал, необходимый для микроклонального размножения и биосинтеза вторичных метаболитов.

Эффективность культивирования определяется качеством исходных семян, протоколом их предварительной обработки и оптимальным подбором питательных сред. Особенность эхинацеи — наличие частичного физиологического покоя, а также высокий риск контаминации при вводе семян в культуру *in vitro*. Поэтому важным этапом является разработка комплексного протокола, включающего стратификацию, надёжную стерилизацию и последующий подбор среды для роста. Цель настоящего исследования — анализ всхожести и роста проростков *E. purpurea* на различных питательных средах (WPM, MS) и оценка влияния регуляторов роста на морфогенез.

Материалы и методы

Зрелые семена *Echinacea purpurea* стратифицировали при 4°C в течение 14 суток для устранения физиологического покоя. После охлаждения семена стерилизовали следующей последовательностью: промывание в мыльном растворе 15 минут, промывка проточной водой, обработка 70% этанолом 30 секунд, трёхкратное промывание стерильной водой, обработка 10% NaOCl 10 минут и повторное четырёхкратное промывание стерильной дистиллированной водой. Стерильные семена высевали в чашки Петри и инкубировали при 24°C, фотопериоде 16/8 ч. (Рис.1.).

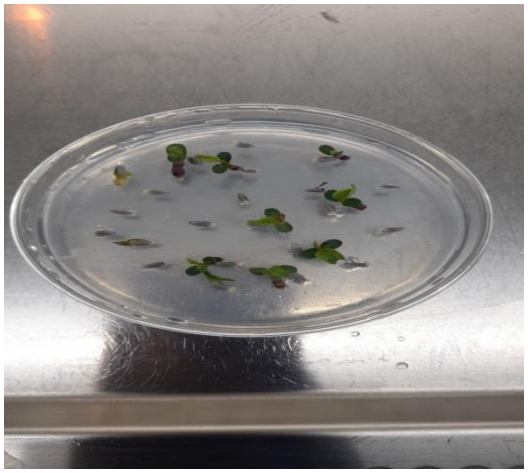


Рис.1. Стерильные семена высеянные в чашки Петри

Всхожие семена переносили на различные питательные среды: WPM (контроль), WPM + 2,4-D (0,1 мг/л), WPM + BAP (0,5 мг/л), WPM + зеатин (0,1 мг/л), MS (контроль), MS + BAP (0,1 мг/л), MS + BAP (0,5 мг/л). Наблюдение проводили в течение трёх недель, оценивая длину побега, длину корня, окраску листьев, интенсивность роста и наличие каллусной ткани.

Результаты и обсуждение

Двухнедельная стратификация обеспечила равномерное набухание семян и синхронное начало прорастания. Семена начали прорастать через 10–14 суток, что подтверждает необходимость предварительного охлаждения для снятия физиологического покоя. Протокол стерилизации показал высокую эффективность: контаминации не наблюдалось в большинстве вариантов. Характер роста проростков существенно различался в зависимости от состава питательной среды, особенно от типа и концентрации цитокининов или ауксинов. Наиболее активное развитие наблюдалось в вариантах с цитокининами, в то время как ауксин 2,4-D стимулировал преимущественно каллусогенез (Рис.2.).



Рис.2. Прорастание семян *Echinacea purpurea*

WPM + зеатин (0,1 мг/л)- этот вариант обеспечил максимальную длину побега, интенсивный зелёный цвет листьев и активный рост корневой системы. Морфогенез был сбалансированным: растения формировали правильную форму, крупные листья и устойчивые стебли. Зеатин оказывает мягкое стимулирующее действие, что способствует гармоничному росту проростков.

WPM + BAP (0,5 мг/л)- наблюдалось обильное образование листьев, но их окраска была светло-зелёной, что свидетельствует о избыточной цитокининовой активности и возможном угнетении хлоропластного аппарата. Стебель развивался умеренно.

MS + BAP (0,5 мг/л)- проростки характеризовались короткими стеблями и плотными тёмно-зелёными листьями. Высокая концентрация BAP способствовала компактному росту и активному клеточному делению, но замедляла линейное вытяжение побегов.

WPM + 2,4-D (0,1 мг/л)- в большинстве случаев формировалась каллусная ткань, а органогенез был замедленным. Это ожидаемо, поскольку 2,4-D активно стимулирует каллусообразование и подавляет развитие органов на ранних стадиях.

Сравнение сред MS и WPM показало, что для молодой эхинацеи более благоприятной является среда WPM как менее насыщенная солями и оптимальная для растительных объектов, склонных к стрессу в условиях *in vitro*.

Заключение

Исследование показало, что успешное проращивание семян *Echinacea purpurea* в условиях *in vitro* зависит от эффективной стратификации, надёжной стерилизации и оптимального подбора питательной среды с фитогормонами. Среди изученных вариантов наиболее продуктивным оказался состав WPM с добавлением зеатина (0,1 мг/л), обеспечивший интенсивный рост, крупные листья и хорошо развитые стебли. Среды с BAP вызывали активное образование листьев, но могли приводить к светло-зелёной окраске или укороченному стеблю, а 2,4-D преимущественно стимулировал каллусообразование. Полученные данные могут быть использованы в биотехнологии лекарственных растений для разработки протоколов микроклонального размножения эхинацеи пурпурной и оптимизации её выращивания в культуре *in vitro*.

Использованные источники:

1. Бухоров К. Х., Хонкелдиева М. Тургуновна, Назаров Г. А., Ахмедов Э. Т. Всхожесть семян эхинацеи пурпурной echinacea purpurea l // Вестник науки и образования. 2020. №23-3 (101). - С.11-13.

2. Сафарова Н. К., Григорьянц Е., Эрданов Ш., Сафаров А. К. Изучение эхинации пурпурной (echinacea purpurea (l) moench) в ботаническом саду Национального университета Узбекистана // Вестник магистратуры. 2020. №5-3 (104). - С.125-127.

3. Яхтанигова Ж.М., Кулишова И.В. Применение удобрения в посевах эхинацеи пурпурной (ECHINÁCEA PURPÚREA L.) в условиях Центрально-Черноземного региона. *Новые технологии / New technologies*. 2021;17(5):145-154. https://doi.org/10.47370/2072-0920-2021-17-5-145-154

Содиков С. С.
ассистент
кафедра эндокринологии
Самаркандский государственный медицинский университет
г. Самарканд

КАРДИОРЕНАЛЬНЫЕ ПРЕИМУЩЕСТВА НОВЫХ КЛАССОВ САХАРОСНИЖАЮЩИХ ПРЕПАРАТОВ (ISGLT2, АГПП-1)

Аннотация: *Целью данной работы является анализ кардиоренальных преимуществ ингибиторов натрий-глюкозного котранспортёра 2 типа (иSGLT2) и агонистов рецептора глюкагон-подобного пептида-1 (аГПП-1), которые являются наиболее перспективными классами сахароснижающих препаратов последних лет. Представлены современные данные клинических исследований, механизмы действия и сравнительная оценка влияния препаратов на сердечно-сосудистые и почечные исходы у пациентов с сахарным диабетом 2 типа.*

Ключевые слова: *иSGLT2, аГПП-1, диабет 2 типа, сердечно-сосудистый риск, хроническая болезнь почек, кардиопротекция, ренопротекция.*

Sodikov S. S.
assistant
department of endocrinology
Samarkand State Medical University
Samarkand city

CARDIORENAL BENEFITS OF NEW CLASSES OF HYPOGLYCEMIC AGENTS (ISGLT2, AGLP-1)

Abstract: *The aim of this study is to analyze the cardiorenal benefits of sodium-glucose cotransporter 2 inhibitors (SGLT2 inhibitors) and glucagon-like peptide-1 receptor agonists (GLP-1a), which represent the most promising classes of hypoglycemic agents in recent years. Current clinical trial data, mechanisms of action, and a comparative assessment of the drug effects on cardiovascular and renal outcomes in patients with type 2 diabetes are presented.*

Keywords: *SGLT2, GLP-1a, type 2 diabetes, cardiovascular risk, chronic kidney disease, cardioprotection, renoprotection.*

Введение

Сахарный диабет 2 типа (СД2) является одним из ведущих факторов глобальной заболеваемости и смертности, значительно повышая риск сердечно-сосудистых осложнений (ССО) и хронической болезни почек (ХБП). Традиционные сахароснижающие средства уменьшают

гипергликемию, однако долгое время не демонстрировали значимого влияния на «твёрдые» клинические конечные точки, такие как сердечно-сосудистая смертность, прогрессирование ХБП или госпитализация по поводу сердечной недостаточности.

Появление ингибиторов SGLT2 и аГПП-1 стало поворотным моментом в лечении СД2. Эти препараты показали выраженные кардиоренальные эффекты, которые выходят далеко за пределы контроля гликемии. Результаты крупных рандомизированных исследований (EMPA-REG OUTCOME, CANVAS, DECLARE-TIMI 58, LEADER, SUSTAIN-6 и др.) привели к пересмотру международных рекомендаций (ADA, EASD, KDIGO).

Цель исследования - провести сравнительный анализ кардиоренальных преимуществ иSGLT2 и аГПП-1, выделив ключевые механизмы и клинические эффекты.

Методы

Для подготовки работы был проведён обзор актуальной литературы за 2015–2024 гг., включающий: клинические рандомизированные исследования (RCT), метаанализы и систематические обзоры PubMed, Scopus, Cochrane, клинические рекомендации ADA 2023–2024, EASD и KDIGO, данные наблюдательных когортных исследований. Ключевые критерии отбора публикаций: участие пациентов с диабетом 2 типа, оценка сердечно-сосудистых или почечных исходов, исследования, сравнивающие эффекты иSGLT2 и/или аГПП-1.

Результаты

Кардиопротекторные свойства иSGLT2

Ингибиторы SGLT2 продемонстрировали: снижение риска сердечно-сосудистой смертности на 32–38% (EMPA-REG). Уменьшение госпитализации по поводу сердечной недостаточности на 30–35%. Снижение прогрессирования ХБП на 40–45% (DAPA-CKD).

Основные механизмы, уменьшение натрий-зависимой гиперфильтрации. Снижение преднагрузки и постнагрузки за счёт осмотического диуреза, Улучшение энергетического метаболизма миокарда (кетоновые тела). Снижение давления наполнения левого желудочка.

Кардиопротекторные свойства аГПП-1

Агонисты ГПП-1 доказали, снижение риска крупных СС событий (MACE) на 12–14% (LEADER, SUSTAIN-6).j

уменьшение риска инсульта на 18–20%;

выраженное снижение массы тела (−5–12 кг), улучшающее кардиометаболический профиль.

Механизмы:

- ✓ улучшение эндотелиальной функции;
- ✓ снижение воспаления и оксидативного стресса;
- ✓ уменьшение атеросклеротического поражения сосудов;
- ✓ замедление прогрессии нефропатии.

Ренопротекторные эффекты двух классов препаратов

Ингибиторы SGLT2 (дапаглифлозин, эмпаглифлозин, канаглифлозин) в настоящее время считаются наиболее мощными ренопротекторами при сахарном диабете 2 типа и хронической болезни почек. Их почечный защитный эффект подтверждён крупными клиническими исследованиями.

Расширенные ренопротекторные эффекты:

- Снижение риска терминальной почечной недостаточности на 30–40%.

Это связано с уменьшением реабсорбции натрия и глюкозы, снижением внутриклубочкового давления и восстановлением тубулогломерулярной обратной связи.

- Снижение альбуминурии на 35–45%. Этот эффект особенно выражен у пациентов с диабетической нефропатией, что замедляет прогрессирование почечного поражения.
- Замедление снижения скорости клубочковой фильтрации (СКФ). На фоне терапии иSGLT2 годовая потеря СКФ значительно ниже, чем у пациентов без лечения.
- Снижение внутриклубочковой гиперфильтрации. Улучшение гемодинамики в клубочках уменьшает повреждение сосудистого аппарата почек.
- Противовоспалительное и антифибротическое действие. Ингибиторы SGLT2 снижают активность провоспалительных цитокинов и маркеров фиброза, что способствует замедлению склероза почечной ткани.
- Метаболические преимущества. Дополнительный вклад в ренопротекцию вносят умеренное снижение массы тела, снижение артериального давления и улучшение контроля гликемии.

Агонисты рецепторов ГПП-1 (аГПП-1 / GLP-1 RA)

К этой группе относятся лираглутид, семаглутид, дулаглутид и др. Препараты уменьшают сердечно-сосудистый риск и оказывают умеренное защитное действие на почки.

Расширенные ренопротекторные эффекты:

Снижение альбуминурии. Механизм связан с улучшением функции эндотелия, снижением воспалительной активности и стабилизацией клубочковой фильтрации.

Улучшение почечного кровотока. Агонисты ГПП-1 улучшают микроциркуляцию и препятствуют ишемическим изменениям в почечной ткани.

Умеренный уровень ренопротекции *(ниже, чем у иSGLT2).* Несмотря на положительный эффект, клинические исследования показывают, что степень защиты почек уступает ингибиторам SGLT2.

Противовоспалительное действие. Снижается уровень провоспалительных цитокинов, уменьшается оксидативный стресс.

Снижение массы тела. Ожирение является фактором риска прогрессирования ХБП, поэтому снижение веса дополнительно улучшает почечный прогноз.

Умеренное снижение артериального давления. Это также способствует снижению нагрузки на почки.

Таблица 1.

Сравнительная таблица ренопротекторных эффектов

Показатель	Ингибиторы SGLT2	Агонисты ГПП-1
Сила ренопротекции	Очень высокая, подтверждённая	Умеренная
Снижение риска терминальной почечной недостаточности	30–40%	Менее выраженное
Снижение альбуминурии	35–45%	Умеренное
Замедление падения СКФ	Выраженное	Умеренное
Влияние на внутриклубочковую гиперфильтрацию	Сильное	Слабее
Влияние на почечный кровоток	Стабилизирует	Улучшает
Противовоспалительный эффект	Сильный	Умеренный
Метаболические эффекты	Снижение веса, АД и гликемии	Преимущественно снижение веса и гликемии
Общий клинический эффект	Самый мощный ренопротектор	Дополняющий эффект

Обсуждение

Полученные данные подтверждают, что оба класса препаратов обладают выраженными кардиоренальными преимуществами, однако направления действия различаются. Ингибиторы SGLT2 наиболее эффективны при:

- сердечной недостаточности (как с низкой, так и с сохранённой ФВ);
- хронической болезни почек, включая недиабетическую;
- высоком риске госпитализации по СН.
- АГПП-1 предпочтительны при:
- выраженном ожирении;
- высоком риске атеросклеротических событий (инфаркт, инсульт);
- недостаточном контроле гликемии.

Комбинация иSGLT2 + аГПП-1 является оптимальной стратегией для пациентов высокого риска, обеспечивая синергичное влияние на массу тела, давление наполнения сердца, альбуминурию, воспаление и атеросклероз.

Заключение

ИSGLT2 и аГПП-1 являются ключевыми сахароснижающими препаратами нового поколения с доказанными кардиоренальными преимуществами. ИSGLT2 обладают наиболее выраженной ренопротекцией и снижают риск госпитализаций при сердечной недостаточности. АГПП-1

значительно уменьшают риск атеросклеротических событий и способствуют снижению массы тела. Выбор класса должен основываться на фенотипе пациента: СН/ХБП - преимущество иSGLT2; ожирение/высокий риск инсульта - аГПП-Совместная терапия двух классов обеспечивает максимальную защиту сердца и почек.

Использованные источники:

1. Болдуева С.А., Шестакова М.В. Ингибиторы SGLT2: новые возможности нефропротекции. // Нефрология и диализ. – 2021. – Т. 23, №3. – С. 185–194.
2. Шестакова М.В., Дедов И.И. Сахарный диабет и хроническая болезнь почек: современные подходы к терапии. // Клиническая нефрология. – 2020. – Т. 9, №1. – С. 5–14.
3. Дедов И.И., Шестакова М.В., Майоров А.Ю. Инновационные подходы к лечению диабета: роль и преимущества ингибиторов SGLT2. // Проблемы эндокринологии. – 2022. – Т. 68, №2. – С. 89–98.
4. Ковальчук В.С., Кукушкин С.К. Применение и эффективность агонистов рецепторов ГПП-1 у пациентов с СД 2 типа. // Российский медицинский журнал. – 2021. – №3. – С. 42–48.
5. Zinman B., Wanner C., Lachin J.M. Empagliflozin, Cardiovascular Outcomes, and Mortality in Type 2 Diabetes. // N Engl J Med. – 2015. – Vol. 373. – P. 2117–2128.
6. Wiviott S.D., Raz I., Bonaca M.P. Dapagliflozin and Cardiovascular Outcomes in Type 2 Diabetes. // N Engl J Med. – 2019. – Vol. 380. – P. 347–357.
7. Mann J.F.E., Ørsted D.D., Brown-Frandsen K. Liraglutide and Renal Outcomes in Type 2 Diabetes. // N Engl J Med. – 2017. – Vol. 377. – P. 839–848.
8. Gerstein H.C., Colhoun H.M., Dagenais G.R. Dulaglutide and Renal Outcomes in Type 2 Diabetes (REWIND). // Lancet. – 2019. – Vol. 394. – P. 131–138.
9. Heerspink H., Perkins B.A., Fitchett D. Sodium Glucose Cotransporter 2 Inhibitors and Kidney Protection. // Clin J Am Soc Nephrol. – 2016. – Vol. 11. – P. 2089–2097.
10. Castelo-Branco C., LeRoith D. GLP-1 receptor agonists: renal mechanisms and clinical benefits. // Diabetes Research and Clinical Practice. – 2020. – Vol. 161. – P. 1–9.
11. Bakris G.L., Agarwal R., Anker S.D. Effect of Canagliflozin on Renal and Cardiovascular Outcomes. // N Engl J Med. – 2020. – Vol. 383. – P. 1436–1446.
12. McMurray J.J.V., Solomon S.D., Inzucchi S.E. Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction. // N Engl J Med. – 2019. – Vol. 381. – P. 1995–2008.
13. Zelniker T.A., Wiviott S.D. Comparison of the Effects of GLP-1 RA and SGLT2 Inhibitors on Renal Outcomes. // Circulation. – 2019. – Vol. 139. – P. 2022–2031.
14. Lavalle-González F.J., Januszewicz A. SGLT2 inhibitors: metabolic and renal benefits. // Diabetes Therapy. – 2021. – Vol. 12. – P. 1209–1230.

15. Mann J.F.E., Ørsted D.D. Renal and Cardiovascular Protection with GLP-1 Receptor Agonists. // Kidney International. – 2021. – Vol. 99. – P. 217–229.

Сохибова З. О.
ассистенти
микробиология, вирусология ва иммунология кафедра
Бухоро давлат тиббиёт институти

SARS-COV-2 ИНФЕКЦИЯСИНИНГ ҚАНДЛИ ДИАБЕТЛИ БЕМОРЛАРДАГИ МЕТАБОЛИК ВА ЭНДОКРИН ЎЗГАРИШЛАРГА ТАЪСИРИ

Аннотация: *Мазкур мақолада COVID-19 (SARS-CoV-2) инфекциясининг қандли диабет билан касалланган беморларда кузатиладиган метаболик ва эндокрин ўзгаришларга таъсири ёритилган. Диабетли беморларда вирусли инфекция оғирроқ кечиши, гипергликемия, инсулин резистентлиги, яллиғланиш ва гормонал дисбалансниng кучайиши билан тавсифланади. Мақолада вируснинг панкреас β-ҳужайраларига таъсири, цитокин штормнинг эндокрин тизимга таъсири ҳамда диабет билан COVID-19 ўртасидаги икки томонлама алоқа таҳлил қилинган.*

Калит сўзлар: *COVID-19, SARS-CoV-2, қандли диабет, метаболик ўзгаришлар, эндокрин тизим, инсулин резистентлиги*

Sokhibova Z. O.
assistant
department of microbiology, virology, and immunology
Bukhara State Medical Institute

THE IMPACT OF SARS-COV-2 INFECTION ON METABOLIC AND ENDOCRINE CHANGES IN PATIENTS WITH DIABETES

Abstract: *This article discusses the impact of COVID-19 (SARS-CoV-2) infection on metabolic and endocrine changes in patients with diabetes mellitus. Diabetic patients experience more severe disease courses characterized by hyperglycemia, insulin resistance, inflammation, and hormonal imbalance. The article analyzes the effects of SARS-CoV-2 on pancreatic β-cells, the endocrine consequences of cytokine storm, and the bidirectional relationship between COVID-19 and diabetes.*

Keywords: *COVID-19, SARS-CoV-2, diabetes mellitus, metabolic changes, endocrine system, insulin resistance*

Kirish

2019 йил охирида Хитойнинг Ухан шаҳрида пайдо бўлган SARS-CoV-2 коронавируси бутун дунё бўйлаб пандемияга сабаб бўлди. У нафақат нафас олиш тизимига, балки метаболик ва эндокрин тизимларга ҳам жиддий таъсир кўрсатиши билан ажралиб туради. Сўнгги йилларда олиб борилган тадқиқотлар COVID-19 инфекцияси қандли диабет билан оғриган

беморларда анча оғир кечиши ва юқори леталликка олиб келиши мумкинлигини кўрсатди.

Қандли диабет — бу инсулин етилмаслиги ёки ҳужайраларнинг инсулинга жавоб бермаслиги натижасида ривожланадиган метаболик касаллик бўлиб, иммун тизимнинг фаолиятини пасайтиради ва яллиғланиш жараёнларини кучайтиради. Шунинг учун диабетли беморларда вирусли инфекциялар тезроқ тарқалади, соғайиш жараёни секинлашади ва асоратлар кўп кузатилади.

SARS-CoV-2 вируси инсон ҳужайраларига ACE2 рецепторлари орқали киради. Бу рецепторлар нафақат ўпкада, балки юрак, буйрак, қорин ости бези (панкреас) ва қалқонсимон без ҳужайраларида ҳам мавжуд. Шу сабабли, вирус эндокрин тизимнинг турли бўлимларига ҳам таъсир қилиши мумкин.

Тадқиқотлар шуни кўрсатадики, COVID-19 инфекцияси панкреас β-ҳужайраларини шикастлаб, инсулин секрециясини камайтиради, бу эса гипергликемияга ва ҳатто янги ривожланган диабет ҳолатларига сабаб бўлиши мумкин. Шунингдек, "цитокин шторм" деб аталувчи яллиғланиш жавоби инсулин резистентлигини янада кучайтиради.

Бундан ташқари, COVID-19 инфекцияси даврида глюкокортикоидлар билан даволаш ҳам гипергликемия ва гликемик назоратни бузади. Ушбу омиллар диабетли беморларда касалликнинг оғир кечиши, тромбоз, полиорган етишмовчилиги ва юқори ўлим даражасини таъминлайди.

Мазкур мақолада COVID-19 ва қандли диабет ўртасидаги патогенетик, клиник ва эндокрин муносабатлар таҳлил қилиниб, уларнинг клиник аҳамияти ва амалиётдаги аҳволи кўриб чиқилади.

Методлар

Мақолани тайёрлаш жараёнида 2020–2025 йиллар оралиғидаги PubMed, Scopus ва Google Scholar базаларида чоп этилган илмий мақолалар таҳлил қилинди. Асосий калит сўзлар сифатида “COVID-19”, “diabetes mellitus”, “endocrine changes”, “SARS-CoV-2” ва “metabolic syndrome” сўзларидан фойдаланилди. Умумий 100 дан ортиқ манбалардан 30 та илмий иш чуқур ўрганилиб, улардан энг долзарб ва клиник жиҳатдан аҳамиятли 15 та адабиёт танлаб олинди.

Натижалар

- COVID-19 инфекцияси диабетли беморларда инсулин резистентлигини 25–50% гача оширади.
- Панкреас β-ҳужайраларидаги ACE2 рецепторларининг юқори экспрессияси вируснинг тўғридан-тўғри шикастланишига олиб келади.
- Диабетли беморларда COVID-19 даврида гликемияни назорат қилиш қийинлашади; кўп ҳолларда гипергликемия ва кетоз ҳолатлари ривожланади.
- Цитокин шторм натижасида IL-6 ва TNF-α миқдори кўпаяди, бу инсулин сигналига халал беради.

- Қандли диабет COVID-19 оқибатларини оғирлаштиради ва ўлим хавфини 2–3 марта оширади.

Муҳокама

Олинган маълумотлар COVID-19 ва диабет ўртасидаги икки томонлама таъсир мавжудлигини кўрсатади. Диабет вирусга қарши иммун жавобни сусайтиради, COVID-19 эса ўз навбатида метаболик назоратни бузади. Бу "порочный круг" диабетли беморларда COVID-19нинг оғир кечишига сабаб бўлади.

Бундай беморларда комплекс назорат, жумладан гликемияни доимий кузатиш, антиинфламатор терапия ва антикоагулянтлардан фойдаланиш тавсия этилади. Шунингдек, COVID-19дан кейин эндокрин функцияларни тиклаш учун узоқ муддатли мониторинг талаб этилади.

Хулоса

SARS-CoV-2 инфекцияси диабетли беморларда метаболик ва эндокрин бузилишларни кучайтиради. Бу ҳолат касалликнинг оғир кечиши, асоратлар ва ўлим хавфининг ошишига олиб келади. Шунинг учун диабетли беморларда COVID-19 профилактикаси, эрта ташхис ва индивидуал даволаш стратегияси жуда муҳим аҳамиятга эга.

Адабиётлар

1. Bornstein SR et al. Endocrine and metabolic link to coronavirus infection. Nat Rev Endocrinol. 2020.
2. Rubino F et al. New-onset diabetes in COVID-19. N Engl J Med. 2020.
3. Apicella M et al. COVID-19 in people with diabetes: understanding the reasons for worse outcomes. Lancet Diabetes Endocrinol. 2020.
4. Pal R, Banerjee M. COVID-19 and the endocrine system: exploring the unexplored. J Endocrinol Invest. 2020.
5. Ceriello A. Hyperglycemia and COVID-19: a deadly combination. Diabetes Res Clin Pract. 2020.
6. Lim S et al. Diabetes and COVID-19: global perspectives. Diabetes Res Clin Pract. 2021.
7. Chen Y et al. SARS-CoV-2 and pancreatic beta cells: a potential link to diabetes. Nat Metab. 2021.
8. Wang F et al. The impact of COVID-19 on endocrine organs. Front Endocrinol. 2021.
9. Sathish T et al. Proportion of newly diagnosed diabetes in COVID-19 patients. Diabetes Obes Metab. 2021.
10. Hussain A et al. COVID-19 and diabetes: knowledge in progress. Diabetes Metab Syndr. 2020.
11. Liu F et al. ACE2 expression in pancreas and its implications in COVID-19. J Clin Endocrinol Metab. 2020.
12. Drucker DJ. Diabetes, obesity, metabolism, and COVID-19. Diabetes Care. 2021.
13. Guo W et al. Diabetes is a risk factor for the progression and prognosis of COVID-19. Diabetes Metab Res Rev. 2020.

14. Stefan N et al. Metabolic health and COVID-19. Nat Rev Endocrinol. 2021.
15. American Diabetes Association. Standards of Medical Care in Diabetes—2025. Diabetes Care. 2025.

Суванова Д. Н.
докторант
Самаркандский государственный университет
имени Шарофа Рашидова
Самарканд, Узбекистан

ЗНАЧЕНИЕ ОСОБО ОХРАНЯЕМЫХ ТЕРРИТОРИЙ В СОХРАНЕНИИ БИОРАЗНООБРАЗИЯ В РЕГИОНАХ

Аннотация: *В данной статье рассматривается значение особо охраняемых природных территорий в сохранении биологического разнообразия. Освещаются вопросы охраны биоразнообразия и его роль в жизнедеятельности человека, а также приводятся соответствующие рекомендации.*

Ключевые слова: *биоразнообразие, заповедник, Конвенция о биологическом разнообразии, национальный парк, Заамин, Зарафшанский заповедник.*

Suvanova D. N.
doctoral candidate
Sharof Rashidov Samarkand State University
Samarkand, Uzbekistan

THE SIGNIFICANCE OF PROTECTED AREAS IN THE CONSERVATION OF BIODIVERSITY IN REGIONS

Abstract: *This article examines the significance of specially protected natural areas in the conservation of biological diversity. It highlights issues related to biodiversity protection and its role in human life and activities, and also provides relevant recommendations.*

Keywords: *biodiversity, nature reserve, Convention on Biological Diversity, national park, Zaamin, Zarafshan Reserve.*

Введение

Человека окружающая природа является основой существования общества. Это обусловлено тем, что природа и общество представляют собой неразрывно и органично взаимосвязанные понятия. Именно природа выступает единственным источником всех материальных и духовных ресурсов, необходимых для жизни каждого члена общества — как взрослого, так и ребёнка. Окружающая среда обеспечивает человека всеми видами сырья и источниками энергии, необходимыми для удовлетворения его потребностей, а также материальными и нематериальными благами, приносящими эстетическое наслаждение. Вместе с тем, в результате развития общества трудовая деятельность людей, то есть воздействие

человечества на природу и природную среду, неуклонно усиливается. По мере исторического развития человечества, в связи с многократным увеличением объёмов и темпов потребления природных ресурсов, возрастает и степень воздействия общества на окружающую среду. В процессе обмена веществом и энергией между человеком и природой в сфере промышленного производства непосредственное участие принимают технические средства. Следовательно, развитие технологий играет важную роль в стремительном усилении воздействия общества на природу и её компоненты. Непрерывное продолжение и усиление подобных воздействий приводит не только к нарушению равновесия отдельных компонентов природы, но и к утрате природного состояния целых ландшафтов, а в отдельных случаях — к их полному исчезновению. Подобные резкие изменения, происходящие в природе, неизбежно оказывают непосредственное влияние на жизнедеятельность общества.

Основная часть

Глобальное изменение климата — понятие, которое сегодня уже не является новым ни для кого. Можно без преувеличения утверждать, что практически не осталось сфер, которых бы не затронули климатические изменения и вытекающие из них негативные последствия. Одновременно с этим ускоряется процесс трансформации ландшафтов, выражающийся в утрате ими своего первоначального природного облика. Это свидетельствует о том, что на всей территории земного шара все природные компоненты либо полностью утрачивают своё естественное состояние, либо подвергаются значительным изменениям. Сохранение природы, передача её в неизменном виде будущим поколениям, а также рациональное использование природных ресурсов и их компонентов являются одной из важнейших задач человечества. Актуальность данных вопросов и их значимость настолько высоки, что они закреплены на уровне законодательства. Если рассматривать на международном уровне, Конвенция о биологическом разнообразии была открыта 5 июня 1992 года в городе Рио-де-Жанейро, Бразилия, для подписания на Конференции Организации Объединённых Наций по окружающей среде и развитию. Конвенция вступила в силу после ратификации 30 государствами мира 29 декабря 1993 года. В соответствии с постановлением Олий Мажлиса Республики Узбекистан от 6 мая 1995 года, Республика Узбекистан присоединилась к Конвенции. Разработка Конвенции ООН была основана на том, что международное сообщество признаёт значительное уменьшение биологического разнообразия под влиянием отдельных видов человеческой деятельности, что имеет большое значение для человечества. Конвенция координирует совместные действия мирового сообщества по сохранению биологического разнообразия и его рациональному использованию, включая разработку стратегических планов действий. В области сохранения биологического разнообразия следует отметить ряд законодательных актов, таких как «О особо охраняемых природных территориях», «О сохранении и использовании растительного

мира», «О сохранении и использовании животного мира» и другие законы, принятые правительством. 3 декабря 2004 года Олий Мажлис Республики Узбекистан принял Закон «О особо охраняемых природных территориях». После принятия этого закона множество объектов, включая лесохозяйственные предприятия и охотничьи хозяйства, было наделено статусом особо охраняемых природных территорий. В Узбекистане в последние годы активно проводятся работы по предотвращению загрязнения окружающей среды. С целью рационального использования природы и её компонентов, а также их охраны, были созданы отдельные особо охраняемые природные территории (заповедники, национальные парки и др.), деятельность которых регулярно отслеживается и контролируется. В целом одной из основных и приоритетных задач особо охраняемых территорий является сохранение биологического разнообразия, усиление охраны редких и исчезающих видов, а также восстановление их численности. В этом контексте возникает вопрос: что такое биологическое разнообразие и зачем его охрана необходима нам? Давайте вместе постараемся найти ответ на этот вопрос. Биологическое разнообразие — это вся живая жизнь на Земле. Оно охватывает промежуточное биоразнообразие от самых маленьких микроорганизмов до самых высокоразвитых организмов. Сохранение и рациональное использование биологического разнообразия является одним из приоритетных направлений обеспечения устойчивого развития общества и экономики. В качестве практической реализации этой цели можно привести создание заповедников, национальных парков, питомников и других специальных структур.

Если рассматривать основные функции заповедников, то они представляют собой уникальные природные комплексы, где обитают редкие животные и растения, имеющие особое научное или культурно-просветительское значение. С этой точки зрения, участки земли, занятые заповедниками, предполагают использование территории в особом режиме. Созданный на определённой территории заповедник является научно-исследовательской природоохранной организацией, целью которой является сохранение и изучение обычных и уникальных природных комплексов, генетических фондов растений и животных, а также проведение мониторинга изменений природных процессов и явлений на выделенном участке земли. В заповедниках изучаются отдельные породы животных и виды растений, а любое воздействие человека здесь полностью запрещено. В нашей стране первый заповедник был создан в 1929 году в западной части Туркестана, занимая общую площадь 8 000 гектаров. Позднее площадь была увеличена до 15 600 гектаров. В настоящее время он носит название «Заамин». В заповеднике в основном проводятся исследования горных лесов и биологии можжевельника, размножение можжевеловых зарослей, а также охрана видов животных и растений. В зависимости от сложности рельефа, разнообразия климатических и почвенных условий, на территории заповедника выделяются три растительные зоны: степная, лесная и

субальпийская. В нижней части можжевеловых лесов (1 900–2 700 м) растут Заарфшонский можжевельник и черный можжевельник, в средней части (2 100–2 800 м) — кавказский можжевельник, а в верхней части (2 100–3 200 м) — абрикосовый можжевельник. Наиболее широко распространённым является кавказский можжевельник. Он также произрастает между черным и абрикосовым можжевельником. На территории заповедника встречаются можжевельники возрастом 180 и даже 400 лет. Фауна заповедника разнообразна. На его территории насчитывается 720 видов растений, 130 видов различных птиц, 37 видов млекопитающих, 8 видов пресмыкающихся и один вид рыб. Кроме того, в нашей стране совместно с государственными геологическими заповедниками Хисор, Бадай-Токай, Кызылкум, Сурхон, Нурота, Китаб функционируют также Национальный парк Зарофшон, Биосферный резерв Куйи Амударья и ряд других особо охраняемых природных территорий. Каждая из них выполняет свои уникальные функции. Государственный заповедник Зарофшон расположен в Самаркандской области, на правом берегу реки Зарофшон. Общая площадь составляет 2 352 гектара, из которых 868 гектаров покрыты лесными насаждениями. Основная задача заповедника заключается в сохранении естественной среды обитания лесных растений и животных, генетических фондов редких и исчезающих видов растений и животных, а также в их изучении и восстановлении. На его территории встречается 266 видов растений, 172 вида птиц и 8 видов рыб.

Выводы

В целом, подводя итоги, следует подчеркнуть чрезвычайно важную роль особо охраняемых природных территорий в сохранении природы в современном мире. Если использовать природу и её элементы разумно, человечество сможет эффективно решать существующие на сегодняшний день проблемы. Конечно, для этого каждый член общества должен объединиться ради одной цели, и наши усилия не будут напрасны. Разумным будет разработка наиболее быстрых и экономичных методов сохранения биологического разнообразия и рационального использования имеющихся ресурсов. Необходимо принимать меры по охране исчезающих видов, предотвращать их уничтожение и охоту на редких животных. Следует вести учет видов, нуждающихся в охране, и прививать обществу важность их размножения; для этого эффективно использовать интернет, телевидение и другие средства связи.

Использованные источники:

1. Абдуганьев О. Создание Государственной Курикханы. Информация Географического общества Узбекистана. - Ташкент, 2018. - Том 52. - Б. 47-53.
2. Абдуганьев О. Охраняемые природные территории: состав, использование и возможности развития // Новости Географического общества Узбекистана. - Ташкент, 2017. - Том 50. - Б. 66-71.
3. Холматов Х.Х. География отдельно охраняемых природных территорий. - Ташкент, 2018.

4. Петров В.В. Экология и охрана окружающей среды. - Москва: Академия, 2017.

Сулейманов Р. И.
ассистент
одам анатомияси кафедраси
Самарқанд давлат тиббиёт университети

УМУРТҚА ПОҒОНАСИНИНГ ҚЎШИМЧА ВЕНОЗ ЧИГАЛЛАРИНИНГ КОЛЛАТЕРАЛ АЙЛАНМА ЙЎЛЛАРИ

Аннотация: *Мақолада умуртқа поғонасининг вена тизимининг коллатерал имкониятлари ўрганилган. Умуртқа поғонасининг веноз шаклланишлари ва, хусусан, умуртқа ичидаги веноз чигаллари коллатерал қон оқими йўллари сифатидаги иштироки умумий тан олинган. Бошқа веноз шаклланишларнинг роли, масалан, умуртқа поғонасининг турли бўлимларининг веналари ўрганилган.*

Калит сўзлар: *умуртқа поғонаси, қон, ҳужайра, умуртқа чигаллари, кўкрак бўлими, веналар, қон оқими.*

Suleimanov R. I.
assistant
department of human anatomy
Samarkand State Medical University

COLLATERAL CIRCULATION IN THE LIGAMENTS OF THE ACCESSORY VEINS OF THE SPINE.

Resume: *The article examines the collateral capabilities of the spinal vein system. The involvement of venous formations of the spine and, in particular, inside the vertebral venous plexuses as collateral blood flow pathways is generally recognized. The role of other venous formations such as the veins of different parts of the spine, the veins of individual vertebrae.*

Keywords: *spine, blood, cell, vertebral plexuses, thoracic region, veins, blood flow.*

Кириш

Спондилоген нерв тизими зарарланишлари инсоннинг энг кенг тарқалган сурункали касалликлари ҳисобланади [1]. Бел остеохондрозининг неврологик кўринишлари периферик нерв тизимининг барча касалликлари орасида 60–70% ни ташкил қилади ва вақтинчалик меҳнатга лаёқатсизлик ҳолатларининг 70% га сабаб бўлади [2]. Шу билан бирга, бел умуртқаси остеохондрозининг неврологик кўринишлари патогенезида веноз қон айланишининг бузилиши муҳим роль ўйнайди. Веналарнинг девори юпқа ва қон босими паст бўлганлиги сабабли, компрессион жараёнларда артерияларга нисбатан анча осон сиқилади, чунки артериялар девори қалин ва ички босими юқори бўлади [3]. Умуртқалараро тоғай дискларнинг

сиқилиб қолишида веноспондилография маълумотларига кўра, умуртқа олди ички веноз тўри ва умуртқалараро веноз тўрининг сиқилиши 84% ҳолатларда кузатилади [4,6]. Умуртқа каналининг ички ва ташқи тўрларидан веноз оқимнинг бузилиши рефлектор артерия торайиши билан кечади, бу эса умуртқа канал ичида веноз босимнинг кескин кўтарилишининг олдини олади [5,8]. Бироқ бу ҳолатда нафақат орқа мия ва илдизларига, балки умуртқаларга ҳам келаётган қон миқдори камаяди, гипоксия пайдо бўлиши учун шароит яратилади. Бу шиш умуртқа суяк тузилмаларида микроциркуляциянинг бузилиши, оксидланмаган алмашинув маҳсулотларининг тўпланишига олиб келади [7]. Натижада орқа мия ва унинг илдизлари ҳамда умуртқа-ҳаракат сегментлари фаолияти издан чиқади.

Тадқиқот мақсади

Ушбу ишда умуртқа веналари тизимининг коллатерал имкониятларини ўрганиш.

Тадқиқот материаллари ва усуллари

Тадқиқот объекти сифатида 56 та катта ёшдаги умуртқа веноз тизими касалигига учрамаган жасадларнинг анатомик веноз қисмлари ўрганилди. Герота массаси турида тайёрланган ёғли бўёқ билан интерстициал инъекция усули қўлланилди.

Тадқиқот натижалари

Кўкрак умуртқасининг юқори ва паст қисмларида қон оқими бир текликда олдинги ва орқа томонга йўналган, ўрта қисмида эса асосан орқа томонга. Бел бўлимида, L-I умуртқадан ташқари, қон оқими ғовак ички веноз тўрларига йўналган. У ердан қон вентрал ва дорсал йўналишда – мос равишда ички умуртқа ва орқа ташқи тўрларга оқиши мумкин. Умуртқа бўйлаб ғовак ташқи юзасига қон оқими бўйин ва юқори кўкрак бўлимларида бошқа даражаларга нисбатан кўпроқ ифодаланган. Улардан ташқарига, умуртқани ўраб турган веналарга бўғим ва кўндаланг ўсимталардан келувчи веноз қони оқади. Уларнинг веналари ўсинтиларнинг юқори ва паст юзаси бўйлаб ўтади, тикансимон ўсинтилардан веноз оқим ташқи юза томонга йўналган. Турли анатомик қисмлар веналари бир-бири билан анастомоз қилади. Бу ҳолат, муайян шароитларда, бир умуртқа доирасидаги веноз тўрда қон оқими йўналишининг ўзгаришига ёрдам бериши мумкин. Алоҳида умуртқаларнинг веналари горизонтал ва вертикал йўналишдаги томирлар орқали бир-бири билан боғланган. Бўйин бўлимида уларга умуртқа артерияси атрофидаги, межпозвонк ва чуқур бўйин веналари тўрлари; кўкрак бўлимида сегментар веналар; бел бўлимида бел ва кўтарилувчи бел веналари; крест бўлимида олдинги крест, ўрта ва ён веноз тўрлар ҳамда орқа ташқи крест веналари киради. Шунингдек, ички умуртқа тўрлари ҳам шу гуруҳга киради. Саналган веналар бўйин бўлимида умуртқа веналарини субклавия, ички югурик ва номсиз веналар билан; кўкрак бўлимида тўқ ва яримтўқ веналар тизими билан; бел бўлимида пастки кўра вена билан; крест бўлимида эса ички чуқурчилик ва умумий чуқурчилик веналари билан

боғлайди. Шуни таъкидлаш керакки, умуртқа бўйлаб қон оқими йўналиши L-I, L-IV, L-V даражаларида зонал йўналишларда ўзгаради. Жумладан, бўйин умуртқалари танидан – асосан орқа юзага, бошқа даражаларда эса тенг миқдордаги кузатувларда ҳам олдинги, ҳам орқа томонга. Шундай қилиб, алоҳида умуртқалар веналари бир-бири билан анастомоз қилиб, умуртқанинг умумий веноз тизимини ҳосил қилади. Унинг бўйин магистрал веналари, юқори ва пастки кўра веналар, тос веналари ва орқа юмшоқ тўқималари веналари билан боғланиши организм учун минимал юклама билан қонни депонлаш ва оқим йўналишини қайта тақсимлаш имконини беради. Олинган маълумотлар шуни кўрсатадики, умуртқанинг турли анатомик қисмларидан қон оқими йўналиши бир хил эмас. Умуртқа танидан қон оқими икки йўналишда бўлиши мумкин: олдинга – олдинги ташқи умуртқа тўрларига ва орқага – ички умуртқа тўрларига.

Хулоса

Умуртқа веналарининг компенсатор имкониятларини оширишга ёрдам берувчи муҳим омил – уларнинг умуртқадан ташқари сосудий тузилмалар билан анастомозларидир. Буларга қуйидагилар киради:

а) умуртқа веналарининг бош ички веноз тузилмалар билан анастомозлари (энса атрофидаги, сосцевид ўсинти ортидаги, бўйин тўрлари, орқа мияча эмиссар веналари, тил ости нерви канали тўри, чегаравий, энса, базилляр, пастки тошсимон ва ғорсимон синуслар билан);

Фойдаланилган адабиётлар.

1. Абдуллаева Д. Р., Исмати А. О., Маматалиев А. Р. Особенности гистологического строения внепеченочных желчных протоков у крыс //golden brain. – 2023. – Т. 1. – №. 10. – С. 485-492.2
2. 2. Блинова С. А., Орипов Ф. С., Дехканов Т. Д. Морфофункциональные особенности нейроэпителиальных телец в респираторном отделе легких //Вестник науки и образования. – 2020. – №. 10-3 (88). – С. 82-84.
3. Narbayev, S., Minzhanova, G., Zubova, O., Toshbekov, B., Rasulovich, M. A., Sapaev, B., ... & Khudaynazarovna, T. I. (2024). Behavioral adaptations of Arctic fox, Vulpes lagopus in response to climate change. Caspian Journal of Environmental Sciences, 22(5), 1011-1019.
4. Маматалиев А., Орипов Ф. Гистологическое строение интрамурального нервного аппарата общего желчного протока и желчного пузырья у кролика, в норме и после удаление желчного пузыря //Журнал биомедицины и практики. – 2021. – Т. 1. – №. 3/2. – С. 117-125.
5. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 3(02), 22-27.
6. Mamataliyev A. R., Sh R. S., Zohidova S. H. eksperimental jigar sirrozi sharoitida pastki porto kaval venoz tizimi morfologiyasining organilganlik darajasi //Экономика и социум. – 2024. – №. 4-1 (119). – С. 1346-1350.

7. Маматалиев А. Р. нарушение иннервации и мутационный процесс в ткани //Экономика и социум. – 2025. – №. 4-2 (131). – С. 876-880.
8. Давлатов С. С., Хидиров З. Э., Насимов А. М. Дифференцированный подход к лечению больных с синдромом Мириззи //Academy. – 2017. – №. 2 (17). – С. 95-98.

Сулейманов Р. И.
ассистент
кафедра анатомия человека
Самаркандский государственный медицинский университет

КОЛЛАТЕРАЛЬНОЕ КРОВООБРАЩЕНИЕ В СВЯЗКАХ ДОБАВОЧНЫХ ВЕН ПОЗВОНОЧНИКА

Резюме: *В статье изучены коллатеральных возможностях системе вен позвоночника. Участие венозных образований позвоночника и, в частности, внутри позвоночных венозных сплетений, как путей коллатерального тока крови общепризнана. Роль других венозных образований таких, как вены разных отделов позвоночника, вены отдельных позвонков.*

Ключевые слова: *позвоночник, кровь, клетка, позвоночные сплетения, грудной отдел, вены, ток крови.*

Suleimanov R. I.
assistant
department of human anatomy
Samarkand State Medical University

COLLATERAL CIRCULATION IN THE LIGAMENTS OF THE ACCESSORY VEINS OF THE SPINE.

Resume: *The article examines the collateral capabilities of the spinal vein system. The involvement of venous formations of the spine and, in particular, inside the vertebral venous plexuses as collateral blood flow pathways is generally recognized. The role of other venous formations such as the veins of different parts of the spine, the veins of individual vertebrae.*

Keywords: *spine, blood, cell, vertebral plexuses, thoracic region, veins, blood flow.*

Введение

Спондилогенные поражения нервной системы - самые распространенные хронические заболевания человека [1]. Неврологические проявления поясничного остеохондроза составляют 60-70% среди всех заболеваний периферической нервной системы и являются причиной 70% случаев временной нетрудоспособности [2]. Между тем большую роль в патогенезе неврологических проявлений остеохондроза поясничного отдела позвоночника играет нарушение венозного кровообращения. Вены имеют тонкие стенки и невысокое давление крови, поэтому сдавливаются значительно легче при компрессионных процессах, чем артерии, которые имеют плотную стенку и высокое внутриартериальное давление [3]. При

выпадении межпозвонкового диска компрессия переднего внутреннего сплетения позвоночника и межпозвонкового венозного сплетения наступает в 84% случаев по данным веноспондилографии [4,6]. Нарушение венозного оттока от внутренних и наружных сплетений позвоночного канала сопровождается рефлекторным сужением артерий, предотвращая, таким образом, резкое повышение венозного давления в позвоночном канале [5,8]. Однако при этом уменьшается количество притекающей крови не только к спинному мозгу и корешкам, но и к позвонкам, и создаются условия для возникновения гипоксии. Это приводит к образованию отека, нарушению микроциркуляции в костных структурах позвоночника, накоплению недоокисленных продуктов обмена [7,9]. В результате страдает функция как спинного мозга и его корешков, так и позвоночно-двигательных сегментов.

Цель исследования

В данной работе изучить коллатеральных возможностях системе вен позвоночника.

Материалы и методы исследования

Объектом изучены анатомических частей исследования послужили 56 трупов взрослых. Метадом интерстициальной инъекции масляной краской, приготовленной по типу массы Герота .

Результаты исследования

В верхнем и нижнем грудном отделах ток крови равномерно был направлен как к передней, так и к задней поверхностям, в среднем - преимущественно к задней. В поясничном отделе, за исключением L-I позвонков, отток крови направлен к внутри позвоночным венозным сплетениям дужки. От них ток крови возможен в вентральном и дорсальном направлениях, соответственно к внутри позвоночным и к задним наружным сплетениям. На протяжении позвоночника отток крови к наружной поверхности дужек более выражен на уровне шейного и верхнего грудного отделов, чем на других уровнях. Кнаружи от них, в окружающие позвоночник вены, дренируется кровь суставных и поперечных отростков, вены которых проходят по верхней и нижней поверхностям последних, от остистых отростков венозный ток направлен в сторону наружных поверхностей. Вены разных анатомических частей анастомозируют между собой. Это обстоятельство, при соответствующих условиях, по-видимому, может способствовать изменению направления тока крови в пределах венозной сети одного позвонка. Вены отдельных позвонков соединены между собой сосудами, проходящими как в горизонтальном, так и в вертикальном направлениях. В шейном отделе к ним можно отнести сплетения позвоночной, межпозвонковых и глубоких шейных вен, в грудном и сегментарных, в поясничном, а поясничных и восходящих поясничных, в крестцовом - передних крестцовых, среднюю и боковых венозные сплетения и задние наружные крестцовых вен. Ими также являются внутри позвоночные сплетения, Перечисленные вены в шейном отделе соединяют вены позвонков с подключичными, внутренними яремными и безымянными

венами. В грудном системой непарных полунепарных вен, в поясничном - с нижней полой веной и в крестцовом - с внутренней подчревной общими подвздошными венами. Следует отметить, что на протяжении позвоночника ГОК, крови у каков, на уровне L – I, L- IV, L-V он направлен преимущественно зонных направлениях изменяется. Так, от тела шейных позвонков задней поверхности, на других уровнях, в одинаковом количестве наблюдений, как к передней, так и задней. Таким образом, вены отдельных позвонков, анастомозируя между собой, образуют венозную систему позвоночника в целом. Соединение вен последнего с магистральными венами шеи, верхней нижней полыми венами, венами таза и венами мягких покровов спины предоставляют возможности депонировать и перераспределять направление тока крови с минимальными перегрузками для организма. Полученные данные показывают, что направление, тока крови от разных анатомических частей позвонка неодинаковое тела позвонков. Ток крови от них возможен в 2-х направлениях кпереди, к передним наружными позвоночным сплетениям, и кзади, к внутри позвоночным сплетениям.

Вывод

Важным фактором, способствующим увеличению компенсаторных возможностей вен позвоночника, являются его анастомозы, с вне позвоночными сосудистыми образованиями. К ним можно отнести:

а) анастомозы вен позвоночника с внутричерепными венозными образованиями (под затылочным, за сосцевидным, выйным сплетениями, венами заднего мыщелков эмиссаре, сплетения канала подъязычного нерва, краевым, затылочным, базиллярным, нижними каменистыми и пещеристыми синусами).

Использованные источники

1. Ахмедова, С. М., Коржавов, Ш. О., Маматалиев, А. Р., Миразимова, И. Б., & Рузиева, Н. Д. (2020). Антропометрические показатели физического развития у детей до 5 лет в самаркандской области. In SCIENTIFIC RESEARCH IN XXI CENTURY (pp. 250-258).
2. Блинова С. А., Орипов Ф. С., Дехканов Т. Д. Морфофункциональные особенности нейроэпителиальных телец в респираторном отделе легких //Вестник науки и образования. – 2020. – №. 10-3 (88). – С. 82-84.
3. Mamataliyev A. R. HISTOTOPOGRAPHY OF THE PROSTATE GLAND IN THE RABBIT //Экономика и социум. – 2025. – №. 2-1 (129). – С. 319-321.
4. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 3(02), 22-27.
5. Mamataliyev A. R., Sh R. S., Zohidova S. H. EKSPERIMENTAL JIGAR SIRROZI SHAROITIDA PASTKI PORTO KAVAL VENOZ TIZIMI MORFOLOGIYASINING ORGANILGANLIK DARAJASI //Экономика и социум. – 2024. – №. 4-1 (119). – С. 1346-1350.

6. MAMATALIYEV A. R. AGE-RELATED MORPHOLOGICAL CHANGES IN THE NERVE STRUCTURES OF THE APPENDIX IN RABBITS //ЭКОНОМИКА. – С. 199-201.
7. Mamataliyev A. R. QUYONLARDA CHUVALCHANGSIMON OSIMTASI NERV TUZILMALARINING YOSHGA BOGLIQ MORFOLOGIK OZGARISHLARI //Экономика и социум. – 2025. – №. 3-1 (130). – С. 199-201.
8. Давлатов С. С., Хидиров З. Э., Насимов А. М. Дифференцированный подход к лечению больных с синдромом Мириззи //Academy. – 2017. – №. 2 (17). – С. 95-98.
9. Маматалиев А. Р. НАРУШЕНИЕ ИННЕРВАЦИИ И МУТАЦИОННЫЙ ПРОЦЕСС В ТКАНИ //Экономика и социум. – 2025. – №. 4-2 (131). – С. 876-880.

DOI 10.24412/2225-1545-2025-12-2138-1296-1301
УДК 352.13:004.7

Тагиров Д. З.
магистрант
Научный руководитель: Галиуллин Т. Т., канд. социол. наук
ГБОУ ВО «Башкирская академия государственной службы
и управления при Главе Республики Башкортостан»
Россия, г.Уфа

ЦИФРОВЫЕ ПЛАТФОРМЫ КАК ИНСТРУМЕНТ КООРДИНАЦИИ МЕЖУРОВНЕВОГО ВЗАИМОДЕЙСТВИЯ: ОПЫТ ВНЕДРЕНИЯ СИСТЕМЫ «ЦЕНТР УПРАВЛЕНИЯ РЕГИОНОМ» В РЕСПУБЛИКЕ БАШКОРТОСТАН

Аннотация: *Актуальность цифровизации взаимодействия органов государственной и муниципальной власти обусловлена растущими требованиями к скорости, прозрачности и синхронности управленческих решений. Целью исследования стало выявление механизмов повышения эффективности межуровневого взаимодействия на основе анализа функционирования Центра управления регионом (ЦУР) в Республике Башкортостан. В работе использованы методы системного анализа, контент-анализ нормативных документов и сравнительный анализ показателей исполнения межведомственных запросов за 2023–2025 гг. Установлено, что внедрение ЦУР обеспечило сокращение сроков согласования на 33 % и рост выполнения КПЭ муниципалитетов до 87 %, однако выявлена территориальная неравномерность интеграции. Статья демонстрирует, что цифровая платформа может быть эффективным инструментом координации при условии устранения барьеров цифрового неравенства и децентрализации аналитических возможностей.*

Ключевые слова: *цифровая платформа, межуровневое взаимодействие, государственное управление, муниципальная власть, Центр управления регионом, цифровая зрелость, Республика Башкортостан.*

Tagirov D. Z.
master's student
Scientific Supervisor: Galullin T. T., cand. sci. (sociology)
Bashkir Academy of Public Administration and Management under the Head of the Republic of Bashkortostan
Russia, Ufa

DIGITAL PLATFORMS AS A TOOL FOR COORDINATING CROSS-LEVEL INTERACTION: THE EXPERIENCE OF IMPLEMENTING THE «REGIONAL MANAGEMENT CENTER» SYSTEM IN THE REPUBLIC OF BASHKORTOSTAN

Abstract: *The relevance of digitalising interaction between state and municipal authorities is driven by increasing demands for speed, transparency, and synchronisation of management decisions. The study aims to identify mechanisms for improving the effectiveness of cross-level interaction through an analysis of the functioning of the Regional Management Center (RMC) in the Republic of Bashkortostan. The research employs methods of systems analysis, content analysis of regulatory documents, and comparative analysis of inter-agency query execution metrics for 2023–2025. Findings indicate that the RMC implementation reduced coordination time by 33 % and increased municipal KPI compliance to 87 %, yet revealed uneven territorial integration. The article demonstrates that a digital platform can serve as an effective coordination tool, provided that digital inequality barriers are addressed and analytical capabilities are decentralised.*

Keywords: *digital platform, cross-level interaction, public administration, municipal authority, Regional Management Center, digital maturity, Republic of Bashkortostan.*

Современная парадигма государственного управления всё более ориентирована на сетевую модель взаимодействия, в которой границы между уровнями власти размываются в пользу горизонтальной координации и совместного решения задач. В условиях обострения социально-экономических вызовов и повышения ожиданий граждан от эффективности публичной власти цифровые платформы становятся не просто вспомогательными инструментами, а ядрами управленческих экосистем. Республика Башкортостан выступает одним из лидеров цифровой трансформации в Приволжском федеральном округе: в 2020 г. здесь был запущен Центр управления регионом (ЦУР РБ) — интегрированная платформа, объединяющая функции мониторинга, аналитики и координации на межведомственном уровне.

Несмотря на очевидные успехи, в научной литературе недостаточно исследований, посвящённых конкретно межуровневому измерению (ГОВ ↔ МО) функционирования ЦУР — большинство работ фокусируются на технической архитектуре или общей эффективности цифровых ситуационных центров. В данном контексте актуальной становится задача эмпирической верификации гипотезы о том, что цифровая платформа способна не только ускорить обмен информацией, но и трансформировать саму логику взаимодействия между уровнями власти — от вертикального подчинения к горизонтальному партнёрству.

Целью данного исследования является анализ роли Центра управления регионом Республики Башкортостан как инструмента повышения эффективности взаимодействия органов государственной и муниципальной власти на основе реальных данных функционирования платформы. Для достижения цели поставлены следующие задачи:

1) проанализировать архитектуру и функциональные модули ЦУР РБ с точки зрения поддержки межуровневого взаимодействия;

2) оценить динамику ключевых показателей эффективности (KPI) взаимодействия ГОВ и МО до и после внедрения ЦУР;

3) выявить барьеры и диспропорции в использовании платформы муниципальными образованиями;

4) сформулировать рекомендации по оптимизации цифровой координации.

В работе применён комплексный методологический подход, соответствующий характеру объекта исследования (государственно-управленческая цифровая платформа):

1. Системный анализ — для декомпозиции ЦУР РБ на подсистемы (информационная, аналитическая, коммуникационная, контролирующая) и выявления их вклада в координацию ГОВ и МО;

2. Контент-анализ нормативных и программных документов;

3. Сравнительный анализ количественных показателей — проведено сопоставление динамики следующих KPI за 2023, 2024 и I пол. 2025 гг.:

- средний срок межведомственного согласования проектов нормативных актов (в днях);

- доля муниципальных образований, выполняющих КПЭ по срокам ответов на запросы ГОВ (в %);

- время реакции на инциденты в социально значимых сферах (ЖКХ, транспорт, ЧС).

Приоритет отдан открытым, верифицируемым источникам. Оценка территориальной дисперсии проведена на основе данных совещания Минцифры РБ от 20.08.2025 г. по итогам мониторинга цифровой зрелости муниципалитетов.

Анализ архитектуры ЦУР РБ показал, что платформа реализует принцип «единого информационного пространства» через три ключевых слоя, непосредственно влияющих на межуровневое взаимодействие:

1. Интеграционный слой объединяет 72 государственные и муниципальные информационные системы. Особенно важно, что все 54 муниципальных образования подключены к Единому порталу межведомственного взаимодействия (ЕПМВ) через ЦУР — это обеспечивает сквозной документооборот без дублирования запросов.

2. Аналитический слой включает 89 интерактивных дашбордов, из которых 14 напрямую относятся к межуровневой координации:

- «Сроки исполнения поручений Главы РБ: разбивка по ответственным ГОВ и соисполнителям из МО»;

- «Карта цифровой зрелости муниципалитетов» (оценка по 5-балльной шкале);

- «Динамика ответов на межведомственные запросы» (с фильтром по направлению: ГОВ→МО / МО→ГОВ).

3. Операционный слой обеспечивает не только мониторинг, но и активное управление:

- автоматическое формирование маршрутов согласования с учётом регламентов и RACI-матриц;

- уведомления в мессенджеры ответственных лиц при приближении к контрольным срокам;

- возможность запуска срочных совещаний в формате видеомоста «ГОВ–МО».

Количественные результаты (табл. 1) подтверждают положительную динамику:

Таблица 1.
Динамика KPI межуровневого взаимодействия в РБ (2023–2025)

Показатель	2023 г.	2024 г.	I пол. 2025 г.	Изменение (2023 → I пол. 2025)
Средний срок согласования НПА, дни	15,2	11,8	10,2	↓ 33 %
Доля МО, выполняющих КПЭ по срокам ответов, %	61	79	87	↑ 26 п.п.
Время реакции на инцидент в ЖКХ, ч	8,4	4,1	3,2	↓ 2,6 раза

Источник: *[составлено автором]*

Однако выявлена значимая территориальная неравномерность: по данным мониторинга Минцифры РБ (август 2025), 17 муниципалитетов (31,5 %) демонстрируют индекс цифровой зрелости ≤ 3,0 балла (из 5), в то время как 8 районов (14,8 %) достигли уровня ≥ 4,5. В лидерах — Салаватский, Караидельский, Шаранский районы; аутсайдеры — Бирский, Белорецкий, Мелеузовский. Причина — не столько техническая, сколько кадровая: в 12 из 17 «отстающих» МО отсутствуют штатные специалисты по цифровой трансформации, а функции ИТ-сопровождения исполняют совместители без профильного образования.

Таким образом, ЦУР РБ доказал свою эффективность как инструмент ускорения и прозрачности взаимодействия, но не смог в полной мере преодолеть институциональные и кадровые диспропорции между муниципалитетами.

Проведённое исследование подтвердило гипотезу: цифровая платформа Центра управления регионом Республики Башкортостан действительно является эффективным инструментом координации межуровневого взаимодействия — на примере сокращения сроков согласования на 33 % и роста KPI-дисциплины муниципалитетов до 87 %.

Однако ключевой научный вывод заключается в том, что техническая интеграция не гарантирует управленческой интеграции: без решения кадровых и методологических проблем (низкая цифровая грамотность, отсутствие единой методики интерпретации данных) эффект от платформы остаётся ограниченным и неравномерным.

Практическая значимость результатов состоит в выработке трёх рекомендаций:

1) Децентрализовать аналитику — запустить пилот «Цифрового офиса муниципалитета» с локальными дашбордами и возможностью самостоятельной настройки KPI;

2) Ввести систему менторства — закрепить «цифровых лидеров» (например, из Салаватского района) за отстающими муниципалитетами;

3) Разработать «дорожную карту цифровой автономии МО» на 2026–2027 гг. с поэтапным повышением их роли в генерации управленческих решений.

Опыт Башкортостана может быть реплицирован в других регионах, однако требует учёта местного контекста — особенно уровня зрелости местных ИТ-подразделений и мотивационных установок руководства муниципалитетов. Дальнейшие исследования целесообразно направить на оценку влияния ЦУР на качество принимаемых решений (а не только на скорость), а также на моделирование сценариев интеграции платформы с системами стратегического планирования.

Использованные источники:

1. Федеральный закон от 27.07.2006 № 152-ФЗ «О персональных данных» (ред. от 08.12.2024). Собрание законодательства РФ. 2006. № 31 (ч. 1). Ст. 3451.
2. О национальных целях развития Российской Федерации на период до 2030 года и на перспективу до 2036 года : указ Президента Российской Федерации от 07 мая 2024 г. № 309. // Официальный портал органов власти Российской Федерации. - URL: http://kremlin.ru/events/president/news/73986 (дата обращения: 15.12.2025).
3. Об утверждении стратегии пространственного развития Российской Федерации до 2030 года с прогнозом до 2036 года : распоряжение Правительства Российской Федерации от 28 декабря 2024 г. № 4146-р. // Электронный фонд правовых и нормативно-технических документов. - URL: https://docs.cntd.ru/document/1310767692 (дата обращения: 15.12.2025).
4. Постановление Правительства Республики Башкортостан от 20.12.2025 № 734 «Об утверждении государственной программы «Развитие информационного общества. Цифровая трансформация Республики Башкортостан» и о признании утратившими силу некоторых решений Правительства Республики Башкортостан». - URL: https://docs.cntd.ru/document/407049067 (дата обращения: 15.12.2025).
5. Указ Главы Республики Башкортостан от 19.11.2019 года № УГ-402 «О создании системы "Центр управления регионом" Республики Башкортостан»

- URL: https://it.bashkortostan.ru/documents/active/310977/ (дата обращения: 15.12.2025).
6. Указ Главы Республики Башкортостан от 21.11.2023 «Об утверждении плана мероприятий («дорожной карты») по переходу на преимущественное использование отечественного телекоммуникационного оборудования и программного обеспечения в Республике Башкортостан» - URL: https://www.bashkortostan.ru/thesaurus/documents/526814/ (дата обращения: 15.12.2025).
7. Пьянкова, С. Г. Особенности развития информационно-коммуникационной инфраструктуры регионов РФ / С. Г. Пьянкова, Е. С. Заколюкина // Тренды развития современного общества: управленческие, правовые, экономические и социальные аспекты : Сборник научных статей 13-й Всероссийской научно-практической конференции, Курск, 21-22 сентября 2023 года / Ответственный редактор А.А. Горохов. - Курск: Закрытое акционерное общество "Университетская книга", 2023. - С. 325332. - DOI 10.47581/2023.PS-04.Piankova-02.
8. Филин А.Ю. Пояснительная записка к Стратегии развития городов и создания комфортной городской среды в Российской Федерации. – МГЮА: Приоритет 2030. – URL: https://consortium.msal.ru/wp-content/uploads/2025/04/Strategiya-razvitiya-gorodov-Filina.pdf (дата обращения: 15.12.2025).
9. В Башкортостане озвучили планы цифрового развития на 2025 год // Официальный сайт Правительства Республики Башкортостан. - URL: https://pravitelstvorb.ru/news/25894/ (дата обращения: 15.12.2025).
10. Лауреаты X Всероссийского конкурса «ПРОФ-IT.2023» // Официальный сайт конкурса. - URL: https://prof-it.d-russia.ru/novosti/opredeleny-proekty-pobediteli-v-osnovnyh-nominatsiyah-konkursa-regionalnoy-i-munitsipalnoy-informatizatsii-prof-it2023 (дата обращения: 15.12.2025).

Тангиров Х. Т.
доцент
Термиз давлат университети
Тангирова Н. Х., б.ф.ф.д, (PhD)
Термиз давлат университети

ЖАНУБИЙ ЎЗБЕКИСТОН ТОВУҚСИМОНЛАР ГЕЛЬМИНТЛАРИНИНГ ФАУНИСТИК ТАҲЛИЛИ

Аннотация: *Товуқсимон қушлари гельминтларининг замонавий турлар таркиби, локализацияси, зарарланиш экстенсивлиги ва зарарланиш интенсивлиги натижалари келтирилган.*

Калит сўзлар: *Гельминтофауна, гельминтофауна, экстенсив, интенсив, локализация, биогеоценоз.*

Tangirov Kh. T.
associate professor
Termez State University
Tangirova N. Kh., doctor of philosophy (PhD) in biological sciences
Termez State University
Termez

FAUNISTIC ANALYSIS OF HELMINTHS OF GALLIFORM BIRDS IN SOUTHERN UZBEKISTAN

Annotation: *The results of the modern species composition, localization, extensiveness and intensity of infection of helminths of poultry are presented.*

Keywords: *Helminth fauna, helminth fauna, extensive, intensive, localization, biogeocenosis.*

Жанубий Ўзбекистон товуқсимон қушлари гельминтларининг замонавий тур таркиби 3 синфга мансуб 40 турдан иборат бўлиб, улар таркибида цестодалар 12 тур, трематодалар 9 тур ва нематодалар 19 турни ташкил этади.

Ҳудуднинг паразит чувалчангларга бойлиги уй товуғи, қирғовул, каклик, бедана каби турлари ва биотоплар хилма-хиллиги билан изоҳланади. Жанубий Ўзбекистон товуқсимон қушлари гельминтларининг замонавий тур таркибидаги аниқланган 40 тур гельминтларнинг 20 тури (4 тур трематода, 6 тур цестода ва 10 тур нематода) товуқсимон қушларда биринчи марта қайд этилди.

Товуқсимонларда аниқланган гельминтлар фаунаси қуйидаги турларни ўз ичига олади:

Cestoda – Цестодалар:
1. *Davainea proglottina* Davaine,1860.
2. *Raillietina tetragona* Molin, 1858.
3. *Raillietina penetrans* Baczynska, 1914.
4. *Skrjabinia cesticillus* Molin, 1858.
5. *Fimbraria fasciolaris* Pallas, 1781.
6. *Echinolepis carioca* Magalhaes, 1898.
7. *Sobolevicanthus gracilis* Zeder,1803.
8. *Sobolevicanthus collaris* Botsch, 1786.
9. *Tschertkovilepis setigera* Frohlich, 1789.
10. *Choanotaenia infundibulum* Bloch, 1779.
11. *Amoebotaenia sphenoides* Railliet, 1892.
12. *Tetrathyridium variabile* Diesing, 1850.

Trematoda – Трематодалар:
13. *Brachylaemus fuscatus* Rudolphi, 1819.
14. *Echinostoma revolutum* Frohlich, 1802.
15. *Echinostoma miygawai* Ishii, 1932.
16. *Echinostoma phasianina* Gagarin, 1954.
17. *Echinostoma robustum* Yamaguti,1935.
18. *Echinoparyphium recurvatum* Linstow, 1873.
19. *Notocotylus attenuatus* Rudolphi, 1809.
20. *Prosthogonimus ovatus* Rudolphii, 1803.
21. *Corrigia corrigia* Braun, 1901.

Nematoda – Нематодалар:
22. *Capillaria bursata* Freitas et Almeida, 1934.
23. *Capillaria obsignata* Madsen, 1945.
24. *Capillaria caudinflata* Molin, 1858.
25. *Eucoleus annulatus* Molin, 1858.
26. *Ascaridia alectoris* Gagarin, 1954.
27. *Ascaridia galli* Schrank, 1788.
28. *Heterakis gallinarum* Gmelin, 1790.
29. *Subulura suctoria* Molin, 1860.
30. *Subulura skrjabin* Semenov, 1926.
31. *Ganguleterakis macroura* Linstow, 1883.
32. *Seurocyrnea eurycerca* Seurat, 1914.
33. *Tetrameres fissispina* Diesing, 1861.
34. *Cheilospirura hamulosa* Diesing, 1851.
35. *Cheilospirura coturnicola* Semenov, 1926.
36. *Cheilospirura gruveli* Gendre, 1913.
37. *Dispharynx nasuta* Rudolphi, 1819.
38. *Dispharynx spiralis* Molin, 1858.
39. *Oxyspirura petrowi* Skrjabin, 1929.
40. *Oxyspirura schulzi* Skrjabin, 1929.

Ушбу рўйхатдан кўриниб турибдики, ўрганилган ҳудуддаги ёввойи ва уй товуқсимонлари гельминтларининг турлари анчагина хилма-хил. Умумий паразитлар турларидан 20 таси (*R. penetrans, S. cesticillus, E. carioca, S. gracilis, Tsch. setigera, A. sphenoides, E. miygawai, E. robustum, B.* fuscatus, *C. corrigia, Cap. bursata, A. alectoris, G. macroura, S. skrjabini, S. suctoria, Seur. eurycerca, Ch. coturnicola, D. nasuta, O. petrowi* ва *O. schulzi*) Жанубий Ўзбекистон товуқсимонларида биринчи марта қайд этилди.

Ўрганилган товуқсимонлар турларининг гельминтлар фаунаси бир-биридан фарқ қилади. Жанубий Ўзбекистоннинг туманларида тақдим этилаётган товуқсимонлардан уй товуғининг гельминтлари турлар таркиби таққослаб кўрилганда ёввойиларига қараганда анча кўплиги билан эътиборни тортди.

Каклик – *Alectoris chukar* нинг гельминтофаунаси.

Текширилган 52 нусха какликнинг 21 нусхаси гельминтлар билан зарарланганлиги маълум бўлди. Инвазия экстенсивлиги 42.3% ташкил этди. Зарарланган какликларда 14 тур паразит чувалчанглар идентификация қилинди, улар цестода, трематода ва нематодаларга мансублиги маълум бўлди:

Echinolepis carioca Magalhaes, 1898.
Choanotaenia infundibulum Bloch, 1779.
Amoebotaenia sphenoides Railliet, 1892.
Brachylaimus fuscatus Rudolphi, 1819.
Corrigia corrigia Braun, 1901.
Capillaria obsignata Madsen, 1945.
Capillaria caudinflata Molin, 1858.
Ascaridia alectoris Gagarin, 1954.
Heterakis gallinarum Gaielin, 1790.
Ganguleteraksis macroura Linstow, 1883.
Subulura suctoria Molin, 1860.
Seurocyrnea eurycerca Seurat, 1914.
Cheilospirura coturnicola Semenov, 1926.
Oxyspirura schulzi Skrjabin, 1929.

Аниқланган 14 тур гельминтларни сон жиҳатидан синфларга ажратганимизда 3 тури цестода, 2 тури трематода ва 9 тури нематода синфига мансуб эканлиги қайд қилинди

3.1.2- жадвал

Каклик – *Alectoris chukar* нинг гельминтлар билан зарарланиши

№	Гельминт тури каклик	Локализацияси	ИЭ %	ИИ
ЦЕСТОДА				
1.	*Echinolepis carioca* Magalhaes, 1898	Ингичка ичак	6.3	2-8
2.	*Choanotaenia infundibulum* Bloch, 1779	Ингичка ичак	8.3	1-10
3.	*Amoebotaenia sphenoides* Railliet, 1892	Ингичка ичак	3.8	1-4
ТРЕМАТОДА				
4.	*Brachylaimus fuscatus* Rudolphi, 1819	Ингичка ичак	2.9	1-4
5.	*Corrigia corrigia* Braun, 1901	Ичак бўшлиғи	3,8	2-6
НЕМАТОДА				
6.	*Capillaria obsignata* Madsen, 1945	Ингичка ва йўғон ичак	3.8	1-8
7.	*Capillaria caudinflata* Molin, 1858	Ингичка ичак	3.8	2-7
8.	*Ascaridia alectoris* Gagarin, 1954	Ингичка ичак	1.9	2-4
9.	*Heterakis gallinarum* Gaielin, 1790	ингичка ва йўғон ичак	5.7	3-10
10.	*Ganguleteraksis macroura* Linstow, 1883	Ингичка ичак	5.7	2-3
11.	*Subulura suctoria* Molin, 1860	Кўр ичак	3.8	3-11
12.	*Seurocyrnea eurycerca* Seurat, 1914	Мускулли ошқозон қобиғи ости	34.6	3-21
13.	*Cheilospirura coturnicola* Semenov, 1926	Безли ошқозон пўсти ости	5.7	1-12
14.	*Oxyspirura schulzi* Skrjabin, 1929	Кўз соққаси	11.5	1-8

Foydalanilgan adabiyotlar

1. Султанов М.А. Гельминты птиц Узбекистана. – Ташкент, 1963. – 468 с.
2. Тангирова Н.Х, Тангиров Х.Т. Ўзбекистоннинг жанубий ҳудудларида товуқсимон қушларнинг нематодафаунаси // Ўзбекистон Республикаси Фанлар Академияси Қорақалпоғистон бўлимининг Ахборотномаси. – Нукус, 2020. – № 2. – Б. 54-58.
3. Султанов М.А. Гельминты птиц Узбекистана в экологическом освещении // Вестник Каракалпакского ФАН Уз СССР. – Нукус, 1961. – № 3. – С. 3-10.

4. Сапаров К.А. Эколого-фаунистический анализ филяриат - паразитов млекопитающих Узбекистана // Журнал Вестник НУУ. – Ташкент, 2010. –№ 3/1. – С. 218-221.

Тиркашев Т. Х.
магистрант
Ташкентский международный химический университет
Назаров С. С.
магистрант
Самаркандский государственный университет
имени Шарафа Рашидова
Нурлибоев Х. Х.
исследователь
Самаркандский государственный университет
имени Шарафа Рашидова
Абдуллоева С. Р.
студент
Самаркандский государственный университет
имени Шарафа Рашидова

ЗАГРЯЗНЕНИЯ ВОД РЕКИ ЗАРАФШАН И МЕТОДЫ ОПТИМИЗАЦИИ ЕЁ ЭКОЛОГИЧЕСКОГО СОСТОЯНИЯ

Аннотация: *В статье подробно изложены основные источники загрязнения воды реки Зарафшан и дана оценка причин, вызывающих ухудшение качества водных ресурсов. На основе анализа факторов загрязнения приведены рекомендации по их устранению и предотвращению дальнейшей деградации водной экосистемы. Особое внимание уделено проблемам, связанным с недостатками в системе ирригации региона, загрязнением дренажных и коллекторных вод, а также влиянием грунтовых вод. В целом изменения количественных и качественных характеристик воды реки Зарафшан привели к ухудшению экологической обстановки. По результатам анализа разработаны необходимые предложения и рекомендации. Реализация данных мер является гарантией обеспечения экологической устойчивости региона.*

Ключевые слова: *ирригационная система, антропогенное воздействие, качество и предельно допустимая норма (ПДК), минерализация, органические и химические вещества, тяжёлые металлы, загрязнение, экологическая ситуация.*

Tirkashev T. Kh.
master's student
Tashkent International Chemical University
Nazarov S. S.
master's student
Sharaf Rashidov Samarkand State University
Nurliboev H. Kh.
researcher
Sharaf Rashidov Samarkand State University
Abdulloeva S. R.
student
Sharaf Rashidov Samarkand State University

WATER POLLUTION IN THE ZARAFSHAN RIVER AND METHODS FOR OPTIMIZING ITS ECOLOGICAL STATE

Abstract: *This article provides a detailed description of the main sources of water pollution in the Zarafshan River and an assessment of the causes of deteriorating water quality. Based on an analysis of pollution factors, recommendations are provided for their elimination and prevention of further degradation of the aquatic ecosystem. Particular attention was paid to issues related to deficiencies in the region's irrigation system, pollution of drainage and collector water, and the impact of groundwater. Overall, changes in the quantitative and qualitative characteristics of the Zarafshan River's water have led to a deterioration in the environmental situation. Based on the analysis, necessary proposals and recommendations were developed. Implementation of these measures guarantees the region's environmental sustainability.*

Keywords: *irrigation system, anthropogenic impact, quality and maximum permissible concentrations (MPCs), mineralization, organic and chemical substances, heavy metals, pollution, environmental situation.*

Введение

Средняя часть бассейна Зарафшана, являясь одним из важнейших компонентов антропогенно сформированного оазисного ландшафта, подобно другим элементам природной среды, из года в год подвергается загрязнению. Вследствие этого возникают серьёзные экологические проблемы, связанные с качеством воды, используемой для питья и орошения. Загрязнение внутренних водных объектов приводит, прежде всего, к деградации природной среды, а затем — к негативному воздействию на живые организмы, человека, почвы и растительность.

Загрязнение внутренних вод связано с постепенным накоплением в них различных токсичных веществ и микроэлементов. Накопление ядовитых химических соединений в воде приводит к изменению её физических свойств и химического состава. В результате увеличивается содержание

токсичных соединений, возрастает доля органоминеральных примесей, снижается количество растворенного кислорода, активно развиваются болезнетворные микроорганизмы.

Основная часть

Воды, протекающие через густонаселённые и промышленно развитые города Самарканд и Каттакурган, подвергаются значительно более высокому уровню загрязнения по сравнению с сельскохозяйственными территориями. Вследствие сброса неочищенных бытовых и промышленных сточных вод в городские каналы и реки их качество резко ухудшается, что вызывает существенный ущерб биоте и приводит к полной утрате природных свойств воды.

Например, химический состав воды канала Сиаб на входе в Самарканд включает: 62,2 мг/л взвешенных веществ, 86,4 мг/л сульфатов, 32,5 мг/л хлоридов, 0,48 мг/л аммиака, 39,0 мг/л кальция, 0,85 мг/л магния, 0,02 мг/л фосфатов и 498,4 мг/л минеральных солей. На выходе из города эти показатели существенно возрастают: взвешенные вещества — до 242 мг/л, сульфаты — до 104,9 мг/л, хлориды — до 97,46 мг/л, аммиак — до 2,95 мг/л, кальций — до 85,0 мг/л, магний — до 38,3 мг/л, фосфаты — до 0,19 мг/л, минеральные соли — до 812,6 мг/л.

Сточные воды Самаркандской шелкоткацкой фабрики также являются одним из значимых источников загрязнения внутренних вод. Особенно загрязнены окрашивающие растворы, содержащие повышенные концентрации хлоридов, аммиака, фосфатов, сульфатов, магния и нитратов. Эти вещества существенно ухудшают качество воды рек и каналов.

Несмотря на промышленную развитость Самарканда, в городе до сих пор отсутствует полностью сформированная система канализационных коммуникаций. В меньших городах она практически отсутствует. В результате бытовые сточные воды, наряду с промышленными, попадают в уличные стоки, затем — в каналы и реки, что приводит к повышению содержания органических и химических загрязнителей в водах Зарафшана.

Серьёзный вклад в загрязнение воды тяжёлыми металлами вносят Анзобский горно-обогатительный комбинат и Могийонский золоторудный комплекс. Здесь цветные металлы добываются и промываются в непосредственной близости от водоёмов. Очистные сооружения, предназначенные для отстаивания загрязнённой воды, часто выходят из строя, вследствие чего суспензии, содержащие сурьму, золото и сопутствующие элементы — медь, олово, свинец, ртуть, молибден, — попадают в реку.

По данным А.Рахматуллаева и Р.Мамаджанова (1998), при промывке сурьмяной руды ежедневно расходуется 3400 м³ воды. После промывки в ней остаётся до 3,4–4,0 мг/л сурьмы, что в 200 раз превышает ПДК. Эти воды поступают в реку Ягноб и с 1943 года нарушают экологическое равновесие Зарафшана.

Минерализация воды реки также имеет тенденцию к росту от верхнего течения к нижнему. В верховьях её значение составляет 250–300 мг/л; в среднем течении — 400–500 мг/л, возле Самарканда — 550–600 мг/л; в районе Хатирчи — 700–800 мг/л; в низовьях — 1000–1200 мг/л (Havoiy), а в районе Каракульского оазиса достигает 3100 мг/л.

Река загрязнена также фенолами и нефтепродуктами. Вблизи Самарканда и Каттакургана содержание фенола составляет 0,002–0,004 мг/л, нефтепродуктов — 0,10–0,15 мг/л, что в 2–4 раза превышает ПДК. В более удалённых местах показатели также выше нормы в 1,5–2 раза.

Выводы

В целях улучшения экологической ситуации необходимо реализовать меры по восстановлению экологического баланса. Основные мероприятия включают:

- предотвращение сброса в водоёмы коллекторно-дренажных и бытовых сточных вод;

-модернизацию очистных сооружений;

-кологизацию ирригационных систем;

-государственный контроль за промышленными предприятиями;

-внедрение систем повторного использования воды.

Реализация данных мер позволит обеспечить экологическую устойчивость внутренних вод оазиса Среднего Зарафшана.

Использованные источники

1. Антонов А., Морозов А., Севрюгин В. Новый подход к решению водных, мелиоративных и экологических проблем // Экономический вестник Узбекистана. – Т., 2003. №1. С. 8–12.
2. Деушева Г.Г., Арутюнян С.Ш., Султонов М. Антропогенное и техногенное воздействие загрязнения на прибрежные почвы реки Зарафшан. Международный семинар НАТО. – Самарканд, СамГУ, 2003. С. 26–38.
3. Рафиков А. Географическая экология и проблемы природопользования. – Ташкент, 1999.
4. Равшанов А. Возникновение медико-экологической ситуации вследствие загрязнения вод Среднего Зарафшана. – Самарканд, 2009.
5. Ежегодник качества поверхностных вод Республики Узбекистан за 2000–2004 гг. – Ташкент, 1991.
6. Здравоохранение в Узбекистане за 2001 год. Статистический сборник. – Ташкент, 2002.

Тиркашев Т. Х.
магистрант
Ташкентский международный химический университет
Абдумуминов Р. З.
магистрант
Мамасолиев С. Ж.
магистрант
Самаркандский государственный университет
имени Шарафа Рашидова
Самарканд. Узбекистан

ПУТИ ОПТИМИЗАЦИИ АНТРОПОГЕННОГО ВОЗДЕЙСТВИЯ НА ВОДЫ РЕКИ ЗАРАФШАН

Аннотация: *В статье анализируются количественные и качественные изменения водных ресурсов реки Зарафшан под воздействием антропогенных факторов, выявляются основные источники загрязнения и предлагаются меры по их устранению. Рассмотрены географическое распространение загрязняющих объектов, химический состав поллютантов и мероприятия, необходимые для их обезвреживания. Особое внимание уделено процессам химического загрязнения ирригационных вод, вызывающего вторичное засоление почв, а также путям снижения антропогенного давления на водные ресурсы региона с целью обеспечения устойчивого развития территории.*

Ключевые слова: *минерализация, ПДК, аммоний-нитрат, оптимизация экологического состояния, коммунальные стоки, гидрометеорология.*

Tirkashev T. Kh.
master's student
Tashkent International Chemical University
Abdumuminov R. Z.
master's student
Mamasoliyev S. Z.
master's student
Samarkand State University named after Sharaf Rashidov
Samarkand, Uzbekistan

WAYS TO OPTIMIZING ANTHROPOGENIC IMPACT ON THE ZARAFSHAN RIVER WATERS

Abstract: *This article analyzes the quantitative and qualitative changes in the Zarafshan River's water resources under the influence of anthropogenic factors, identifies the main sources of pollution, and proposes measures to*

eliminate them. The article examines the geographic distribution of pollutants, the chemical composition of pollutants, and the measures necessary for their neutralization. Particular attention is paid to chemical pollution of irrigation waters, which causes secondary soil salinization, as well as ways to reduce anthropogenic pressure on the region's water resources to ensure sustainable development.

Key words: *mineralization, maximum permissible concentration, ammonium nitrate, optimization of environmental conditions, municipal wastewater, hydrometeorology.*

Введение

Длина реки Зарафшан превышает 770 км: её верхнее течение располагается на территории Республики Таджикистан, а среднее и нижнее течение — на территории Республики Узбекистан. В бассейне реки проживает более четырёх миллионов человек, и их хозяйственная деятельность, экономические возможности, здоровье и будущее во многом зависят от рационального использования воды Зарафшана, её чистоты и уровня охраны.

Основная часть

В настоящее время водой Зарафшана орошаются земли Самаркандской, Навоийской и Бухарской областей, а также через канал Туятортар — Джизакская область, через канал Эски-анҳор — Кашкадарьинская область. На территории Панжикентского района Республики Таджикистан также освоены значительные площади орошаемых земель. Рост орошаемых площадей в верхнем и среднем течении, а также распределение воды между соседними областями привели к резкому сокращению стока в нижнем течении. В летние месяцы течение реки заканчивается у Хархурского гидроузла (Кызылтепинский район), после чего в русло подается вода из Амударьи по каналу Аму-Бухара. Таким образом, в тёплый период года русло Зарафшана фактически выполняет функцию транзитного канала.

Под влиянием антропогенной деятельности в водном режиме реки произошли существенные количественные изменения. Ранее основной поток мог свободно растекаться по пойме, формируя естественные экосистемы. Сейчас вода в русле наблюдается только в летнее время, а осенью, зимой и весной заполняется лишь часть русла. Регулирование стока посредством водохранилищ Окдарьи и Корадарьи привело к серьёзным изменениям процессов руслоформирования, переноса наносов, уровней грунтовых вод и химического состава воды.

Рост численности населения, расширение сельскохозяйственных площадей, широкое применение химических препаратов в аграрном секторе, урбанизация и развитие промышленности усиливают антропогенное давление на качество воды Зарафшана.

Анализ гидрохимических показателей

Часто за основную контрольную точку принимают данные 1 Мая–Равотхўжа гидроузла — места распределения воды между каналами Дорғом и Туятортар и собственно руслом реки. До этой точки все загрязняющие вещества поступают со стороны Республики Таджикистан.

Среднегодовая минерализация воды в этом посту составляет 289,9 мг/л, максимальная — 374,5 мг/л, что в три раза ниже предельно допустимой нормы (ПДК). Содержание аммонийного азота, нитритов и нитратов также находится ниже нормативов. Однако концентрации тяжёлых металлов значительно превышают ПДК: меди — в 40 раз, цинка — в 10 раз, мышьяка — в 4 раза. Это обусловлено деятельностью Анзобского горно-металлургического комбината и мелких рудодобывающих предприятий. Среднее содержание фенолов достигает 1 ПДК, максимальное — 3 ПДК; нефтепродукты варьируют в пределах 0,40–0,70 ПДК. Эти показатели связаны со сбросом сточных вод городов Пенджикент, Айни и близлежащих населённых пунктов.

Влияние Самарканда

В месте впадения канала Сиаб в реку наблюдаются следующие показатели:

- аммонийный азот — 0,39 мг/л (2 ПДК);
- нитриты — среднее 3,01 мг/л (0,3 ПДК), максимум 13,6 мг/л (1,5 ПДК);
- медь — 0,6 мг/л (13 ПДК);
- цинк — 2 мг/л (20 ПДК);
- мышьяк — 1,4 мг/л (3 ПДК);
- фенолы — 0,006 мг/л (6 ПДК);
- нефтепродукты — 0,06 мг/л (1,1 ПДК);
- хром — 0,8 мкг/л (18 ПДК);
- ГХЦГ — 0,001 мкг/л (10 ПДК).

Минерализация достигает 484 мг/л (максимум — 697,9 мг/л). Эти данные свидетельствуют о резком ухудшении качества воды вследствие сброса неочищенных бытовых и промышленных стоков в канал Сиаб.

Дальнейшее изменение качества воды

Ниже по течению некоторые показатели улучшатся за счёт естественной фильтрации через песчано-гравийные отложения, однако содержание растворённых солей продолжает расти. У Навои средняя минерализация составляет 903,9 мг/л (0,9 ПДК), максимальная — 1295 мг/л (1,3 ПДК). Продолжают превышаться ПДК для аммонийного азота, нитритов, нефтепродуктов, фенолов, тяжёлых металлов. Особенно возрастает концентрация хрома — до 0,273 мкг/л (40 ПДК).

Загрязнение реки приводит к загрязнению подземных вод. В нижнем течении грунтовые воды имеют минерализацию выше ПДК. В I–II террасах Среднего Зарафшана качество грунтовых вод также резко ухудшилось, многие из них не соответствуют государственным стандартам. Это

становится причиной роста заболеваний почек, желчного пузыря, мочевыводящих путей, ЖКТ, аллергий и других патологий.

Промышленные и коммунальные источники

В область сбрасывают стоки более 50 объектов. Наибольший вклад в загрязнение вносят:

- ПО «Навоийазот» — 20 673 м³/с;
- Навоийская ГРЭС — 570 818 м³/с.

Даже после условной очистки и хлорирования эти воды приводят к вторичному засолению почв. За период 1995–2004 гг. концентрации хлоридов выросли с 76,46 до 119 мг/л, сульфатов — с 437 до 760 мг/л.

Дополнительные факторы деградации: техногенное загрязнение почв, пестициды, повышенное содержание аммиака в воздухе (вдвое выше нормы в 2003 г.), приводящее к азотному загрязнению почвы.

Геоэкологические особенности бассейна

Бассейн Зарафшана начинается в Матчинском горном узле (5301 м), простираясь на 781 км; в районе Денгизкӯля абсолютная высота снижается до 160 м. Средний уклон — 6,5 м/км; среднегодовой расход воды — 154 м³/с, годовой сток — 4,86 км³.

С повышением антропогенной нагрузки качество воды ухудшается от верхнего течения к нижнему:

- Панжикент — 376 мг/л;
- Навои — 1556 мг/л.

По расчётам 1992 года, в Бухарскую область ежегодно поступает более 5 млн тонн растворённых солей и химических веществ.

Причины и источники загрязнения

Источники загрязнения Среднего течения делятся на две группы:

1. Источники верхнего течения (Анзобский ГОК, Панжикент и др.).
2. Загрязняющие вещества, поступающие в среднем течении (Самарканд, Навои и др.).

По данным Г.Г. Деушевой (2002), ежегодно в Средний Зарафшан поступает:

- 2–3 тонны свинца, цинка, ртути, сурьмы, олова;
- за 50 лет — более 100 тонн тяжёлых металлов.

Эти элементы не разлагаются, накапливаются и мигрируют вниз по течению.

Выводы

По медстатистике (2002–2004), частота заболеваний ЖКТ, почек, онкологических болезней в нижнем течении в 2–3 раза выше, чем в среднем. Основные причины: низкое качество воды, загрязнение почв, поступление солей и пыли из пустынных территорий.

Если не принять срочных мер, ситуация может усугубиться.

Использованные источники

1. Антонов А., Морозов А., Севрюгин В. Новый подход к решению водных, мелиоративных и экологических проблем. // Экономический журнал Узбекистана. -Т., 2003. № 1. С. 8-12.
2. Деушева Г.Г., Арутюнян С.Ш., Султанов М. Антропогенное и техногенное исследование загрязнении на прибрежных рек Зарафшана. Международный семинар – исследование перспектив НАТО. - Самарканд, СамГУ, 2003. С. 26-38.
3. Рафиков А. Проблемы географической экологии и природопользования. - Ташкент, 1999.
4. Равшанов А. Возникновение медико-экологических условий в результате загрязнения вод Среднего Зарафшана. Самарканд, 2009.
5. Ежегодник качества поверхностных вод на территории деятельности Главгидромета Республики Узбекистан за 2000-2004 гг. Ташкент, 1991.
6. Статистика здравоохранения в Узбекистане за 2001 год - статистический сборник. Ташкент, 2002.

Турдахун Г. Е.
магистрант
НАО КазНИТУ им. К.И.Сатпаева
научный руководитель: Касенхан А. М.
НАО КазНИТУ им. К.И.Сатпаева
Казахстан, Алматы

АКТУАЛЬНОСТЬ И СОВРЕМЕННОЕ СОСТОЯНИЕ ПРИМЕНЕНИЯ МЕТОДОВ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБРАЗОВАТЕЛЬНЫХ ПЛАТФОРМАХ

Аннотация. *Статья посвящена анализу актуального состояния и возможностей применения методов искусственного интеллекта в современных образовательных платформах. В работе проведён сравнительный анализ четырёх ключевых групп моделей искусственного интеллекта: генеративных языковых моделей, моделей понимания текста, алгоритмов образовательной аналитики и рекомендательных систем. Установлено, что образовательная ценность методов ИИ проявляется не в изолированном применении отдельных алгоритмов, а в их модульной интеграции, позволяющей сформировать целостную интеллектуальную платформу, способную к прогнозированию учебной динамики, интерпретации результатов обучения и адаптивному формированию индивидуальных траекторий.*

Полученные результаты подтверждают необходимость разработки архитектуры образовательных систем нового поколения, основанной на принципах сопряжённости, интероперабельности и когнитивно обоснованной интеграции моделей искусственного интеллекта.

Ключевые слова: *искусственный интеллект; образовательные платформы; генеративные модели; модели понимания текста.*

Turdakhun G. E.
master's student
Satbayev University (NAO KazNITU named after K.I. Satbayev)
Scientific Supervisor: Kasenkhan A. M.
Satbayev University (NAO KazNITU named after K. I. Satbayev)

RELEVANCE AND CURRENT STATE OF ARTIFICIAL INTELLIGENCE METHODS IN EDUCATIONAL PLATFORMS

Abstract: *The article examines the current state and potential of applying artificial intelligence methods in modern educational platforms. The study provides a comparative analysis of four key groups of AI models: generative language models, text-understanding models, educational analytics algorithms, and recommendation systems. It is established that the educational value of AI*

methods does not lie in the isolated use of individual algorithms but in their modular integration, which enables the creation of a comprehensive intelligent platform capable of predicting learning dynamics, interpreting learning outcomes, and adaptively shaping individual learning trajectories. The findings confirm the necessity of developing next-generation educational system architectures based on the principles of interoperability, interconnectivity, and cognitively grounded integration of artificial intelligence models.

Keywords: *artificial intelligence; educational platforms; generative models; text-understanding models.*

В условиях цифровой трансформации образования значительно возрастает потребность в создании интеллектуальных систем, способные обеспечивать высокий уровень адаптивности, индивидуализации и аналитической поддержки учебного процесса. Традиционные образовательные платформы остаются преимущественно инструментами для размещения материалов, коммуникации и контроля успеваемости, при этом их функциональные возможности в части анализа учебных данных, генерации контента и формирования персонализированных траекторий обучения существенно ограничены.

Возрастающие объёмы учебной информации, разнообразие образовательных форматов и увеличение числа пользователей делают невозможным эффективное сопровождение обучающихся без применения интеллектуальных алгоритмов.

В настоящее время генеративные языковые модели (GPT-4, LLaMA, Mistral) демонстрируют высокую эффективность в создании учебных текстов, формулировке задач, построении пояснений и моделировании диалога с обучающимся. Перечисленные модели обладают меньшей перплексией и высокой степенью лингвистической связности, что делает их наиболее подходящими для задач генерации и трансформации образовательного контента.

Для задач классификации, категоризации учебных материалов и автоматизированного анализа ответов обучающихся наиболее результативными являются модели, основанные на архитектуре BERT и её модификациях (RoBERTa, DistilBERT), а также модели T5. Их преимущества проявляются в устойчивости к вариативным формулировкам, высокой точности и интерпретируемости результатов.

В области образовательной аналитики и прогнозирования академической успеваемости наилучшие результаты показывают модели машинного обучения XGBoost, CatBoost и LightGBM. Указанные алгоритмы обеспечивают стабильность, высокую предсказательную способность и хорошо работают с табличными данными, которые формируются в результате взаимодействия обучающегося с платформой. Они позволяют выявлять обучающихся группы риска, прогнозировать динамику результатов и оценивать эффективность учебных маршрутов.

Для построения персонализированных рекомендаций обучения наибольшую эффективность проявляют современные рекомендательные модели обучения, такие как DeepFM, LightGCN и GRU4Rec. При этом обеспечивают высокий уровень точности рекомендаций даже в условиях разреженных данных, что особенно важно для образовательных систем с большим количеством учебных материалов различного уровня сложности.

Современные исследования в области цифровой педагогики и образовательных технологий также свидетельствуют о возрастающей роли методов искусственного интеллекта (ИИ) в повышении эффективности обучения. Так, классические работы по адаптивным обучающим системам, выполненные B. Woolf [1], P. Brusilovsky [2] и R. Sottilare [3], заложили методологические основы для создания интеллектуальных образовательных сред. Эти исследования показывают, что внедрение адаптивных механизмов и систем анализа знаний обучающихся способствует росту индивидуализации обучения. Однако авторы отмечают, традиционные интеллектуальные системы требуют значительных затрат на построение экспертных моделей предметной области и зачастую не обеспечивают масштабируемость в условиях массового дистанционного образования.

Качественный скачок в возможностях автоматизации образовательных процессов связан с появлением трансформерных архитектур (Vaswani et al., 2017) [4], которые стали фундаментом для современных больших языковых моделей, включая GPT-4 [5], LLaMA [6] и Mistral [7]. Данные модели демонстрируют высокую точность и гибкость в задачах генерации учебного контента, формирования пояснений, переработки текстов и поддержки диалогового взаимодействия с обучающимися. Согласно исследованиям Kasneci et al. [8], LLM открывают новые возможности в создании интеллектуальных тьюторов, однако требуют педагогической валидации с целью обеспечения достоверности и корректности генерируемой информации.

Параллельно активно развивается направление образовательной аналитики (Learning Analytics), основанное на применении методов машинного обучения для анализа поведения обучающихся. Работы Ma и Herodotou [9], а также Khosravi и Gašević [10] подтверждают, что модели XGBoost, CatBoost и LightGBM являются наиболее эффективными инструментами для прогнозирования возможностей и рисков обучающихся, так как обеспечивают высокую точность классификации и устойчивость к вариативности данных. Вместе с тем исследователи отмечают недостаточный уровень интеграции таких предиктивных моделей в комплексные образовательные платформы, что ограничивает их практическую ценность.

Значительное внимание в современной литературе уделяется рекомендательным системам для поддержки персонализированного обучения. Гибридные модели DeepFM [11], LightGCN [12] и GRU4Rec [13] отмечают высокие показатели качества подбора учебных ресурсов, особенно

в условиях больших массивов данных. Указанные модели эффективно решают задачи персонализации, однако, согласно авторам, их применение требует точной настройки параметров и достаточного объёма обучающих выборок, что может быть затруднительным в условиях небольших выборок или узкопредметных курсов.

Анализ существующих образовательных платформ показывает, что наиболее распространённые LMS — Moodle, Canvas и Google Classroom — ориентированы преимущественно на административную и контентную поддержку образовательного процесса [14]. Системы, внедряющие элементы ИИ, такие как Khanmigo [15] и компоненты Coursera AI [16], демонстрируют прогрессивные возможности интеллектуального сопровождения, однако носят фрагментарный характер и не обеспечивают комплексного объединения генерации контента, диагностического анализа, персонализации и предсказания образовательных результатов.

Выявленные разрывы подтверждают необходимость разработки образовательной платформы нового поколения, основанной на комплексном применении генеративных моделей, аналитических алгоритмов и рекомендательных систем, что позволит обеспечить высокий уровень адаптивности, персонализации и интеллектуальной поддержки обучения.

Методологические основы статьи определяются необходимостью комплексного анализа возможностей применения искусственного интеллекта в образовательных платформах с учётом технологических, педагогических и когнитивных факторов. Работа исходит из того, что образовательная платформа представляет собой сложную интеллектуальную систему, функционирование которой строится на непрерывном сборе, интерпретации и использовании данных обучающегося.

Теоретическую опору исследования составляет концепция цифровой педагогики, которая рассматривает внедрение ИИ как инструмент повышения адаптивности, индивидуализации и научно обоснованной поддержки учебного процесса. Принимаются во внимание работы по адаптивным обучающим системам, модели Learning Analytics и исследования в области когнитивной теории обучения, позволяющие рассматривать ИИ не только как средство автоматизации, но и как элемент педагогической логики.

Методы исследования формируют целостный инструментарий, направленный на выявление эффективности и ограничений ИИ в образовательных средах. Системный анализ используется для рассмотрения образовательной платформы как единой интеллектуальной экосистемы, в котором генеративные, диагностические и рекомендательные модули должны функционировать согласованно.

Контент-анализ научных источников позволяет выявить закономерности развития области и определить направления, в которых наблюдается дефицит методологических решений. Сравнительный анализ современных моделей ИИ обеспечивает оценку их применимости в задачах

генерации учебного контента, диагностики знаний и прогнозирования результатов обучения.

Для обеспечения полноты и объективности анализа применение методов искусственного интеллекта в образовании целесообразно рассматривать в сравнительной перспективе, сопоставляя различные группы моделей между собой. Данный подход позволяет выявить их функциональные различия, определить специфические педагогические цели, для которых каждая группа оптимальна, а также оценить ограничения, возникающие при внедрении в реальные образовательные процессы. Несмотря на то, что в литературе обычно анализируются отдельные направления – генерация контента, анализ учебных данных, прогнозирование или персонализация, – только их комплексное сравнение позволяет выявить внутреннюю логику распределения ролей ИИ в образовательной экосистеме.

Таблица 1

Сравнительная характеристика моделей искусственного интеллекта, применяемых в образовательных платформах

Группа моделей	Конкретные модели	Основное назначение	Педагогическая цель	Преимущества	Ограничения
Генеративные языковые модели (LLM)	**GPT-4, LLaMA, Mistral**	Генерация учебного контента, адаптация текста, создание пояснений, моделирование диалога	Обеспечение доступности учебного материала, индивидуализация объяснений, снижение когнитивной нагрузки	Высокая связность текста, способность адаптироваться под уровень обучающегося, универсальность применения	Возможность генерации недостоверных данных; необходимость педагогической валидации; высокая вычислительная стоимость
Модели понимания языка (NLP-классификаторы)	**BERT, RoBERTa, DistilBERT, T5**	Классификация и анализ ответов, выявление ошибок, категоризация учебных материалов, семантическое понимание текста	Автоматизация проверки знаний, оценка уровня понимания материала	Устойчивость к вариативным формулировкам, высокая точность, интерпретируемость	Не формируют рекомендаций; не создают нового контента; требуют адаптации под предмет
Модели образовательной аналитики (предиктивные алгоритмы)	**XGBoost, CatBoost, LightGBM**	Прогнозирование успеваемости; выявление обучающихся группы риска; анализ учебной динамики	Раннее предупреждение учебных трудностей; управление качеством обучения	Высокая точность прогнозов; устойчивость к шумным данным; способность работать с табличными данными LMS	Требуют непрерывного сбора качественных данных; отсутствие единого стандарта образовательных данных снижает эффективность
Рекомендательные модели для персонализации обучения	**DeepFM, LightGCN, GRU4Rec**	Подбор релевантных учебных материалов; формирование индивидуальных траекторий	Персонализация обучения; повышение мотивации; оптимизация учебного пути	Высокое качество рекомендаций; способность работать с разреженными данными; адаптация под предпочтения обучающегося	Требуют больших данных; низкая объяснимость решений; сложность параметрической настройки

Анализ сведений, представленных в Таблице 1, позволяет осуществить дифференцированную оценку различных групп моделей искусственного интеллекта с точки зрения их функциональной природы, педагогической значимости и потенциала для интеграции в цифровые образовательные среды. Сопоставление моделей демонстрирует, каждая технологическая линия реализует свой собственный механизм воздействия на учебный процесс, что требует методологически обоснованного распределения ролей между ними в архитектуре интеллектуальной образовательной платформы.

Прежде всего, генеративные языковые модели (GPT-4, LLaMA, Mistral) являются инструментами, ориентированными на конструирование и трансформацию учебного содержания, что отличает их от остальных групп, работающих преимущественно с уже имеющимися данными. Так, при объяснении комплексных понятий (например, «гипотеза максимальной правдоподобности» или «нейронная активация») эти модели способны генерировать множественные интерпретации, варьируя глубину и стиль подачи материала. Вместе с тем высокая вариативность генеративных моделей обусловливает вероятность эпистемологических искажений, что делает их применение в академических программах допустимым лишь в сочетании с механизмами педагогической верификации.

Модели понимания естественного языка (BERT, RoBERTa, DistilBERT, T5) выполняют аналитико-диагностическую функцию, обеспечивая автоматизированную реконструкцию смысловой структуры ответов обучающихся. Их применение позволяет выявлять характер ошибок, определять степень концептуального понимания и осуществлять семантическую экспертизу открытых текстовых ответов. Так, при оценивании рассуждений обучающегося по теме «Причинно-следственные связи в исторических событиях» модель способна детектировать логические провалы или отсутствие аргументации. Ключевым преимуществом данных моделей является их интерпретируемость, что делает результаты диагностики содержательно насыщенными и пригодными для последующей педагогической интервенции.

Алгоритмы образовательной аналитики (XGBoost, CatBoost, LightGBM) представляют иной тип интеллектуальности, ориентированный на **выявление** статистических закономерностей в учебном поведении и прогнозирование траекторий освоения материала. Данные модели оперируют агрегированными образовательными данными и способны строить вероятностные сценарии успеваемости, что обеспечивает возможность раннего выявления рисков академической неуспешности. Например, при анализе паттернов активности студента в течение первых недель курса модель может предсказать вероятность невыполнения итоговой работы или снижения учебной мотивации. Однако потенциал данных алгоритмов существенно ограничивается отсутствием стандартизированной структуры образовательных данных, что препятствует формированию универсальных моделей оценки.

Рекомендательные модели (DeepFM, LightGCN, GRU4Rec) реализуют персонализационную функцию, формируя индивидуальные учебные маршруты на основе истории взаимодействия обучающегося с системой. Их применение позволяет обеспечивать дифференциацию нагрузки, оптимизацию порядка подачи материала и индивидуальную траекторию компетентностного роста. Например, обучающемуся, демонстрирующему затруднения в теме «Математическая статистика», система может рекомендовать повторный модуль по дисперсионному анализу или предложить серию интерактивных заданий, направленных на устранение конкретных пробелов.

Интегральный анализ демонстрирует, что функциональные домены моделей не пересекаются, а взаимодополняют друг друга. Генеративные модели формируют содержание; аналитические интерпретируют ответы; предиктивные алгоритмы выявляют закономерности учебной динамики; рекомендательные механизмы направляют индивидуальную траекторию.

Таким образом, данные Таблицы 1 позволяют сделать теоретически значимый вывод о том, что интеллектуальная образовательная платформа нового поколения должна строиться на принципе модульной интеграции технологий ИИ, в котором взаимодействие различных моделей представляет собой не механическое объединение алгоритмов, а целостный механизм формирования адаптивной образовательной среды, способной к прогнозу, интерпретации, персонализации и генерации учебного содержания.

Использованные источники

1. Woolf B. Building Intelligent Tutoring Systems. – San Francisco: Morgan Kaufmann, 2009. – 504 p.
2. Brusilovsky P. Adaptive hypermedia and adaptive web // User Modeling and User-Adapted Interaction. – 2001. – Vol. 11, № 1–2. – P. 87–110.
3. Sottilare R., Graesser A., Hu X., Goldberg B. Design Recommendations for Intelligent Tutoring Systems. – Orlando: U.S. Army Research Laboratory, 2014. – 346 p.
4. Vaswani A., Shazeer N., Parmar N. et al. Attention is All You Need // Advances in Neural Information Processing Systems. – 2017. – Vol. 30. – P. 5998–6008.
5. OpenAI. GPT-4 Technical Report. – 2023. – Режим доступа: https://openai.com. – Дата обращения: 12.12.2025.
6. Meta AI. LLaMA Model Card. – 2023. – Режим доступа: https://ai.facebook.com. – Дата обращения: 12.12.2025.
7. Mistral AI. Mistral-7B: Technical Overview. – 2024. – Режим доступа: https://mistral.ai. – Дата обращения: 12.12.2025.
8. Kasneci E., Sessler K., Hart B. et al. ChatGPT for good? On opportunities and challenges of large language models for education // npj Science of Learning. – 2023. – Vol. 8, № 1. – P. 1–13.
9. Ma X., Herodotou C. Predicting student performance in higher education using machine learning // Computers & Education. – 2022. – Vol. 187. – P. 104–115.

10. Khosravi H., Gašević D., Kitto K. Learning analytics in higher education: A systematic review // IEEE Transactions on Learning Technologies. – 2021. – Vol. 14, № 4. – P. 470–487.
11. Guo H., Tang R., Ye Y. et al. DeepFM: A factorization-machine based neural network for CTR prediction // IJCAI Proceedings. – 2017. – P. 1725–1731.
12. He X., Deng K., Wang X. et al. LightGCN: Simplifying and powering graph convolution network for recommendation // SIGIR Proceedings. – 2020. – P. 639–648.
13. Hidasi B., Karatzoglou A., Baltrunas L., Tikk D. Session-based recommendations with recurrent neural networks // ICLR Proceedings. – 2016. – P. 1–10.
14. Moodle. Moodle Documentation. – 2024. – Режим доступа: https://moodle.org. – Дата обращения: 12.12.2025.
15. Khan Academy. Khanmigo: AI Tutor Description. – 2024. – Режим доступа: https://www.khanacademy.org. – Дата обращения: 12.12.2025.
16. Coursera. AI Teaching Assistant Framework. – 2024. – Режим доступа: https://www.coursera.org. – Дата обращения: 12.12.2025.

Турсунов Б. Ш., (PhD)
ассистент
кафедра детской стоматологии
Самаркандский государственный медицинский университет

КАРИЕС МОЛОЧНЫХ ЗУБОВ: ПРИЧИНЫ, ДИАГНОСТИКА И ЛЕЧЕНИЕ

Аннотация: *Кариес молочных зубов является одной из наиболее распространённых стоматологических патологий детского возраста и представляет серьёзную медико-социальную проблему. Высокая распространённость заболевания, раннее начало и склонность к быстрому прогрессированию обусловливают необходимость углублённого изучения этиологических факторов, методов диагностики и современных подходов к лечению и профилактике. Целью настоящего исследования является анализ причин развития кариеса молочных зубов, оценка диагностических возможностей и эффективности лечебных мероприятий у детей дошкольного возраста. В работе использованы клинико-статистические, аналитические и сравнительные методы исследования. Полученные результаты свидетельствуют о ведущей роли кариесогенной микрофлоры, нарушений питания и недостаточной гигиены полости рта в развитии заболевания. Сделан вывод о необходимости комплексного профилактического и лечебного подхода с учётом возрастных и индивидуальных особенностей ребёнка.*

Ключевые слова*: молочные зубы, кариес, дети, диагностика, лечение, профилактика.*

Tursunov B. Sh., PhD
assistant
department of pediatric dentistry
Samarkand State Medical University

CARIES OF MILK TEETH: CAUSES, DIAGNOSIS AND TREATMENT

Abstract: *Dental caries in primary teeth is one of the most common dental pathologies in childhood and represents a serious medical and social problem. The high prevalence of the disease, its early onset, and its tendency to rapidly progress necessitate an in-depth study of its etiological factors, diagnostic methods, and modern approaches to treatment and prevention. The aim of this study is to analyze the causes of dental caries in primary teeth, evaluate diagnostic capabilities, and assess the effectiveness of treatment measures in preschool-aged children. Clinical, statistical, analytical, and comparative research methods were used. The results demonstrate the leading role of*

cariogenic microflora, nutritional deficiencies, and poor oral hygiene in the development of the disease. A comprehensive preventive and therapeutic approach, taking into account the age and individual characteristics of the child, is required.

Keywords: *primary teeth, dental caries, children, diagnosis, treatment, prevention.*

Введение

Здоровье полости рта в детском возрасте является важной составляющей общего состояния организма и оказывает значительное влияние на физическое и психоэмоциональное развитие ребёнка. Молочные зубы играют ключевую роль в формировании правильного прикуса, развитии речи, жевательной функции и подготовке челюстно-лицевой системы к прорезыванию постоянных зубов. Несмотря на временный характер, поражение молочных зубов кариесом может приводить к серьёзным осложнениям, включая воспалительные заболевания тканей периодонта, нарушение зачатков постоянных зубов и формирование хронических очагов инфекции.

По данным современных эпидемиологических исследований, распространённость кариеса молочных зубов у детей дошкольного возраста достигает 70–90 %, что свидетельствует о недостаточной эффективности существующих профилактических программ. Особенностью кариеса молочных зубов является его быстрое течение, обусловленное морфологическими и функциональными особенностями эмали и дентина в детском возрасте. В связи с этим проблема ранней диагностики и своевременного лечения кариеса молочных зубов остаётся актуальной для детской стоматологии.

Цель и задачи исследования

Цель исследования – изучение причин развития кариеса молочных зубов, анализ современных методов диагностики и оценка эффективности лечебных подходов у детей.

Задачи исследования:

Проанализировать основные этиологические факторы кариеса молочных зубов.

Рассмотреть клинические и инструментальные методы диагностики заболевания.

Оценить современные методы лечения кариеса молочных зубов.

Обобщить результаты и определить основные направления профилактики.

Материалы и методы исследования

В качестве материалов исследования использованы данные отечественных и зарубежных научных публикаций по детской терапевтической стоматологии, клинические рекомендации, а также результаты собственных наблюдений в условиях стоматологического

приёма. Исследование носило аналитико-обзорный и клинико-описательный характер.

В процессе работы были проанализированы истории болезни детей в возрасте от 2 до 7 лет, обратившихся за стоматологической помощью с различными формами кариеса молочных зубов. Обследование проводилось с соблюдением этических норм и включало сбор анамнестических данных, оценку общего состояния ребёнка, анализ особенностей питания, режима гигиены полости рта и наследственной предрасположенности.

Клиническое обследование включало визуальный осмотр полости рта при искусственном освещении с использованием стоматологического зеркала и зонда, определение индекса кариеса (кп, кпз), а также оценку состояния твёрдых тканей зубов и слизистой оболочки полости рта. Для выявления начальных форм кариеса применялись методы витального окрашивания эмали и люминесцентной диагностики.

При необходимости использовались дополнительные методы исследования: рентгенологическое обследование (прицельные внутриротовые снимки) для выявления скрытых кариозных полостей и оценки состояния периодонта, а также электроодонтометрия для определения жизнеспособности пульпы.

В ходе анализа данных применялись сравнительный и статистический методы, позволившие оценить частоту встречаемости различных форм кариеса, выявить основные факторы риска и определить эффективность применяемых лечебно-профилактических мероприятий. Полученные результаты были систематизированы и использованы для формулирования выводов и практических рекомендаций.

Причины развития кариеса молочных зубов

Кариес молочных зубов является многофакторным заболеванием, в развитии которого участвуют как местные, так и общие факторы. Ведущая роль принадлежит микробному фактору. Основными кариесогенными микроорганизмами считаются *Streptococcus mutans* и *Lactobacillus*, способные ферментировать углеводы с образованием органических кислот, вызывающих деминерализацию эмали.

Существенное значение имеет характер питания ребёнка. Частое употребление легкоферментируемых углеводов, особенно в виде сладких напитков и ночного кормления, создаёт благоприятные условия для развития кариеса. Недостаток кальция, фосфора, фтора и витаминов также снижает устойчивость твёрдых тканей зубов.

Нарушение гигиены полости рта является одним из ключевых факторов риска. Недостаточное или неправильное очищение зубов способствует накоплению зубного налёта и активизации кариесогенной микрофлоры. Дополнительную роль играют соматические заболевания, снижение иммунитета и неблагоприятные социально-бытовые условия.

Диагностика кариеса молочных зубов

Ранняя диагностика кариеса молочных зубов имеет решающее значение для предотвращения его прогрессирования и развития осложнений. Основным методом диагностики является клинический осмотр, включающий визуальную оценку состояния эмали и зондирование подозрительных участков.

Для выявления начальных форм кариеса применяются методы витального окрашивания эмали, люминесцентная диагностика и электроодонтометрия. Рентгенологическое исследование позволяет обнаружить скрытые кариозные полости и оценить состояние периапикальных тканей. Комплексное использование диагностических методов повышает точность постановки диагноза и способствует выбору оптимальной тактики лечения.

Лечение кариеса молочных зубов

Выбор метода лечения кариеса молочных зубов определяется стадией патологического процесса, возрастом ребёнка, уровнем сформированности корней молочных зубов, а также его психоэмоциональным состоянием и возможностью сотрудничества с врачом-стоматологом. Основной целью лечения является устранение очага инфекции, восстановление анатомической формы и функции зуба, а также профилактика осложнений и сохранение зуба до физиологической смены.

На стадии начального кариеса (стадия пятна) применяются неинвазивные методы лечения, направленные на восстановление минерального состава эмали. К ним относятся реминерализирующая терапия с использованием препаратов кальция, фосфора и фтора, аппликации фторсодержащих лаков и гелей, а также метод глубокого фторирования. Эффективным профилактическим мероприятием является герметизация фиссур жевательных зубов, позволяющая предотвратить накопление зубного налёта и развитие кариозного процесса.

При поверхностном и среднем кариесе показано щадящее препарирование кариозной полости с максимальным сохранением здоровых тканей зуба. После удаления размягчённого дентина проводится пломбирование с применением современных пломбировочных материалов, таких как стеклоиономерные цементы и компомеры, которые обладают хорошей адгезией, биосовместимостью и способностью выделять фтор, что снижает риск вторичного кариеса.

Лечение глубокого кариеса молочных зубов требует особой осторожности ввиду близкого расположения пульпы. В этих случаях используются методы биологического лечения, включающие наложение лечебных прокладок на основе гидроксида кальция или кальцийсиликатных материалов, стимулирующих образование заместительного дентина и способствующих сохранению жизнеспособности пульпы. При наличии признаков воспаления может применяться этапное лечение.

В последние годы всё большее распространение получают минимально инвазивные технологии лечения кариеса, такие как инфильтрация эмали, воздушно-абразивная обработка и использование ручных инструментов, что позволяет снизить болевые ощущения и страх у ребёнка. Важным аспектом является психологическая подготовка и адаптация ребёнка к стоматологическому лечению, включающая использование поведенческих методик, игровых элементов и положительного подкрепления.

При выраженной тревожности или невозможности проведения лечения в обычных условиях могут применяться методы медикаментозной седации или лечение под общей анестезией по строгим показаниям. Комплексный и индивидуализированный подход к лечению кариеса молочных зубов способствует повышению эффективности терапии, снижению риска осложнений и формированию положительного отношения ребёнка к стоматологическому лечению.

Результаты исследования

Анализ литературных данных и клинических наблюдений показал, что наиболее высокая распространённость кариеса молочных зубов отмечается у детей в возрасте 3–6 лет. Установлено, что сочетание неблагоприятных факторов питания и недостаточной гигиены полости рта значительно увеличивает риск развития заболевания.

Применение современных диагностических методов позволяет выявлять кариес на ранних стадиях и своевременно проводить профилактические мероприятия. Комплексный подход к лечению способствует сохранению молочных зубов до физиологической смены и снижает частоту осложнений.

Обсуждение

Полученные результаты подтверждают данные других исследований о многофакторной природе кариеса молочных зубов. Высокая распространённость заболевания указывает на необходимость усиления профилактической работы среди родителей и детей. Особую значимость имеет формирование навыков гигиены полости рта с раннего возраста и рациональное питание.

Выводы

Кариес молочных зубов является распространённым и многофакторным заболеванием детского возраста.

Основными причинами его развития являются кариесогенная микрофлора, нарушения питания и недостаточная гигиена полости рта.

Ранняя диагностика и комплексное лечение позволяют предотвратить развитие осложнений и сохранить здоровье зубочелюстной системы.

Профилактика кариеса молочных зубов должна включать санитарно-просветительную работу, регулярные стоматологические осмотры и индивидуальный подход к каждому ребёнку.

Использованные источники

1. Виноградова Т.Ф. Детская терапевтическая стоматология. – М.: ГЭОТАР-Медиа, 2020.
2. Леонтьев В.К., Пахомов Г.Н. Кариес зубов у детей. – М.: Медицина, 2019.
3. Кузьмина Э.М. Профилактика стоматологических заболеваний у детей. – М.: ГЭОТАР-Медиа, 2018.
4. Сунцов В.Г., Кисельникова Л.П. Детская стоматология. Национальное руководство. – М.: ГЭОТАР-Медиа, 2021.
5. Featherstone J.D.B. Dental caries: prevention and treatment. – Journal of the American Dental Association, 2018.
6. American Academy of Pediatric Dentistry (AAPD). Guideline on Caries Risk Assessment and Management for Infants, Children, and Adolescents. – Chicago, 2022.
7. Petersen P.E. The World Oral Health Report. – WHO Press, Geneva, 2019.
8. Selwitz R.H., Ismail A.I., Pitts N.B. Dental caries. – The Lancet, 2017.
9. Фёдоров Ю.А., Давыдова Л.А. Диагностика и лечение кариеса молочных зубов. – СПб.: СпецЛит, 2018.
10. Ўзбекистон Республикаси Соғлиқни сақлаш вазирлиги. Болалар стоматологик касалликларини профилактика қилиш бўйича услубий қўлланма. – Тошкент, 2020.
11. Mustafayevich, O. S., & Raxmatullayevna, X. G. (2025). STUDY OF THE EFFECTS OF EXTERNAL CONDITIONS ON THE PERFORMANCE OF THE" TPG-SN4" METHANE DETECTOR. Research Focus, 4(6), 32-36
12. Хасанова, Г. Р., Магрипова, Д. Ф., & Алибоева, Ш. У. (2025). РОЛЬ ЛИМОНА В ЖИЗНИ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(1), 26-32.
13. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
14. Хасанова, Г. Р., Юнусова, Ш., Рафикова, Ш. В., Алибоева, Ш. У., & Мамаюсупова, З. Б. (2025). ИСПОЛЬЗОВАНИЕ ФИТОТЕРАПИИ В РАННЕМ ДЕТСКОМ ВОЗРАСТЕ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 200-207.
15. Хасанова, Г. Р., Исрофилова, Ш., Тургунбоева, Н., & Юсупов, Ш. (2025). ЭМАН МЕВАЛАРИНИНГ КИМЁВИЙ ТАРКИБИНИ АНИҚЛАШ УСУЛЛАРИ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 208-214.
16. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
17. Хасанова, Г. Р., Эшниязова, Н. А., & Турабоева, Л. М. (2025). ВЛИЯНИЕ БИОЛОГИЧЕСКИ АКТИВНЫХ И ЛЕКАРСТВЕННЫХ МОЛЕКУЛ НА

ОРГАНИЗМ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(4), 61-66.

Турсунов Б. Ш., PhD
ассистент
кафедра детской стоматологии
Самаркандский государственный медицинский университет

ИСПРАВЛЕНИЕ НЕПРАВИЛЬНОГО ПРИКУСА У ДЕТЕЙ

Аннотация: *Неправильный прикус у детей является одной из наиболее распространённых стоматологических проблем детского возраста и представляет собой не только эстетический, но и серьёзный медико-социальный вопрос. Нарушения прикуса могут приводить к расстройствам жевательной функции, речи, дыхания, формированию хронических заболеваний желудочно-кишечного тракта и снижению качества жизни ребёнка. Целью данной статьи является комплексный анализ причин формирования неправильного прикуса у детей, современных методов его диагностики и коррекции, а также оценка эффективности ортодонтического лечения в различные возрастные периоды. В статье использованы данные клинических наблюдений, анализ научных публикаций и результаты ортодонтического лечения детей разного возраста.*

Ключевые слова*: неправильный прикус, дети, ортодонтия, профилактика, ортодонтическое лечение, зубочелюстные аномалии.*

Tursunov B. Sh., PhD
assistant
department of pediatric dentistry
Samarkand State Medical University

CORRECTION OF MALOCCLUSION IN CHILDREN

Abstract:*Malocclusion in children is one of the most common dental problems in childhood and represents not only an aesthetic but also a serious medical and social issue. Malocclusion can lead to chewing, speech, and breathing problems, the development of chronic gastrointestinal diseases, and a reduced quality of life. The purpose of this article is to comprehensively analyze the causes of malocclusion in children, modern methods of diagnosis and correction, and evaluate the effectiveness of orthodontic treatment at different age levels. The article utilizes clinical observations, an analysis of scientific publications, and the results of orthodontic treatment for children of different ages.*

Keywords: *malocclusion, children, orthodontics, prevention, orthodontic treatment, dentofacial anomalies.*

Введение

Формирование прикуса у ребёнка представляет собой сложный и многоэтапный процесс, начинающийся с внутриутробного периода и продолжающийся до завершения роста челюстно-лицевой области. В последние десятилетия отмечается устойчивая тенденция к увеличению распространённости зубочелюстных аномалий у детей. По данным различных авторов, частота неправильного прикуса в детской популяции колеблется от 40 до 70 %, что подчёркивает актуальность данной проблемы.

Неправильный прикус негативно отражается на общем состоянии организма ребёнка, способствует развитию кариеса и заболеваний пародонта, нарушает гармоничное развитие лицевого скелета. Ранняя диагностика и своевременная коррекция позволяют предотвратить тяжёлые формы аномалий и сократить сроки ортодонтического лечения в подростковом возрасте.

Цель и задачи исследования

Цель исследования – изучить особенности исправления неправильного прикуса у детей с учётом возраста, этиологических факторов и современных ортодонтических подходов.

Задачи исследования:

Проанализировать основные причины формирования неправильного прикуса у детей.

Рассмотреть современные методы диагностики зубочелюстных аномалий.

Изучить основные способы ортодонтического лечения и их эффективность.

Оценить значение профилактических мероприятий в предупреждении нарушений прикуса.

Материалы и методы исследования

Материалом исследования послужили данные клинических наблюдений за детьми в возрасте от 3 до 14 лет с различными формами неправильного прикуса. Использовались методы клинического осмотра, антропометрические измерения, анализ диагностических моделей челюстей, ортопантомография и телерентгенография в боковой проекции.

В ходе исследования применялись функциональные, съёмные и несъёмные ортодонтические аппараты. Эффективность лечения оценивалась по динамике клинических показателей, нормализации окклюзионных соотношений и улучшению эстетики лица.

Этиология и классификация неправильного прикуса

Причины формирования неправильного прикуса у детей многообразны и включают наследственные и приобретённые факторы. К наследственным относятся особенности строения челюстей, размеры зубов и тип роста лицевого скелета. Приобретённые факторы включают вредные привычки (сосание пальца, длительное использование соски), нарушения носового дыхания, раннюю потерю молочных зубов, неправильное вскармливание.

В клинической практике различают следующие основные виды неправильного прикуса: дистальный, мезиальный, открытый, глубокий и перекрёстный прикус. Каждая форма имеет свои клинические особенности и требует индивидуального подхода к лечению.

Современные методы исправления неправильного прикуса

Современная ортодонтия располагает широким спектром методов и средств для коррекции неправильного прикуса у детей, выбор которых определяется возрастом пациента, стадией формирования зубочелюстной системы, видом аномалии и выраженностью клинических проявлений. Основной принцип современного лечения заключается в раннем вмешательстве и поэтапном воздействии на рост и развитие челюстей.

Функциональные методы лечения

Функциональные ортодонтические аппараты применяются преимущественно в раннем и дошкольном возрасте, когда рост челюстей наиболее активен. К ним относятся аппараты Френкеля, активаторы Андрезена–Гойпля, трейнеры и миофункциональные каппы. Их действие направлено на нормализацию мышечного баланса, коррекцию положения нижней челюсти и стимуляцию физиологического роста костных структур.

Функциональные методы особенно эффективны при дистальном и мезиальном прикусе, так как позволяют воздействовать не только на зубы, но и на причины формирования аномалии.

Съёмные ортодонтические аппараты

В период молочного и сменного прикуса широко используются съёмные пластинчатые аппараты с винтами, пружинами, дугами и заслонками. Эти конструкции позволяют расширять зубные дуги, устранять скученность зубов и корректировать положение отдельных зубных единиц.

Преимуществом съёмных аппаратов является возможность их гигиенической обработки и регулирования силы воздействия. Однако эффективность лечения во многом зависит от соблюдения режима ношения и мотивации ребёнка и родителей.

Несъёмные ортодонтические системы

В подростковом возрасте и при выраженных формах неправильного прикуса применяются несъёмные ортодонтические конструкции — брекет-системы. Современные брекеты изготавливаются из металла, керамики или сапфира, что позволяет учитывать как функциональные, так и эстетические потребности пациента.

Использование дуг с памятью формы, самолигирующих систем и цифрового планирования лечения значительно повышает точность перемещения зубов и сокращает сроки терапии.

Элайнеры и цифровые технологии

Одним из инновационных направлений является применение прозрачных капп (элайнеров), изготовленных с использованием цифровых технологий. Данный метод обеспечивает высокую эстетичность и комфорт

лечения, однако чаще применяется у подростков с лёгкими и умеренными формами аномалий прикуса.

Цифровое моделирование прикуса, 3D-сканирование и компьютерное планирование позволяют прогнозировать результаты лечения и повышают его эффективность.

Вспомогательные методы

Важным компонентом ортодонтического лечения является миогимнастика, направленная на тренировку мышц языка, губ и щёк. Также применяются логопедическая коррекция, физиотерапевтические процедуры и профилактика вредных привычек.

Комплексное использование современных методов исправления неправильного прикуса обеспечивает устойчивые клинические результаты, снижает риск рецидивов и способствует гармоничному развитию челюстно-лицевой области ребёнка.

Результаты исследования

В ходе исследования было обследовано и пролечено 60 детей в возрасте от 3 до 14 лет с различными формами неправильного прикуса. В зависимости от возраста и клинической картины пациенты были распределены на группы, получавшие функциональное, съёмное или несъёмное ортодонтическое лечение.

Анализ полученных данных показал, что у детей дошкольного возраста (3–6 лет), получавших функциональные аппараты и миогимнастику, в 82 % случаев наблюдалась нормализация положения челюстей и улучшение мышечного баланса. У данной группы пациентов отмечалось восстановление носового дыхания, уменьшение выраженности вредных привычек и формирование предпосылок для правильного развития прикуса.

У детей периода сменного прикуса (7–11 лет), лечившихся с применением съёмных ортодонтических аппаратов, положительная динамика была зафиксирована в 78 % случаев. Отмечалось расширение зубных дуг, снижение степени скученности зубов, улучшение окклюзионных контактов и стабилизация положения молочных и постоянных зубов.

В группе подростков (12–14 лет), проходивших лечение с использованием несъёмных брекет-систем, в 85 % случаев удалось достичь анатомически правильных окклюзионных соотношений. У пациентов наблюдалось значительное улучшение эстетики лица, нормализация жевательной функции и положительные изменения речевых характеристик.

Сравнительный анализ показал, что раннее начало ортодонтического лечения позволяет сократить сроки активной терапии в среднем на 30–40 % и снизить необходимость применения сложных ортодонтических конструкций в подростковом возрасте. Кроме того, у детей, получавших комплексное лечение с включением миогимнастики и профилактических мероприятий, риск рецидивов был существенно ниже.

Полученные результаты подтверждают высокую клиническую эффективность поэтапного и возрастно-ориентированного подхода к исправлению неправильного прикуса у детей.

Обсуждение

Результаты исследования согласуются с данными современных научных публикаций, подчёркивающих значимость ранней диагностики и профилактики зубочелюстных аномалий. Особое внимание следует уделять взаимодействию врача-ортодонта, педиатра и родителей ребёнка.

Формирование правильных функциональных навыков и устранение вредных привычек являются важными условиями успешного лечения и стабильности достигнутых результатов.

Выводы

Неправильный прикус у детей является распространённой и многофакторной патологией.

Ранняя диагностика и своевременное ортодонтическое вмешательство значительно повышают эффективность лечения.

Комплексный подход с использованием функциональных, съёмных и несъёмных аппаратов обеспечивает устойчивые клинические результаты.

Профилактика и санитарно-просветительная работа играют ключевую роль в предупреждении зубочелюстных аномалий.

Заключение

Исправление неправильного прикуса у детей требует индивидуального и научно обоснованного подхода. Современные методы ортодонтии позволяют эффективно решать данную проблему при условии раннего обращения и активного участия родителей в лечебном процессе. Представленные результаты могут быть использованы в практической деятельности врачей-стоматологов и в учебном процессе.

Использованные источники

1. Ортодонтия детского возраста / Под ред. Н.В. Алимова. – М.: ГЭОТАР-Медиа.
2. Персин Л.С. Зубочелюстные аномалии у детей. – М., 2021.
3. Proffit W.R., Fields H.W. Contemporary Orthodontics. – Elsevier.
4. Григорьев С.С. Профилактика и лечение нарушений прикуса у детей. – СПб., 2020.
5. Виноградова Т.Ф. Детская терапевтическая стоматология. – М.: ГЭОТАР-Медиа, 2020.
6. Леонтьев В.К., Пахомов Г.Н. Кариес зубов у детей. – М.: Медицина, 2019.
7. Кузьмина Э.М. Профилактика стоматологических заболеваний у детей. – М.: ГЭОТАР-Медиа, 2018.
8. Сунцов В.Г., Кисельникова Л.П. Детская стоматология. Национальное руководство. – М.: ГЭОТАР-Медиа, 2021.
9. Featherstone J.D.B. Dental caries: prevention and treatment. – Journal of the American Dental Association, 2018.

10. American Academy of Pediatric Dentistry (AAPD). Guideline on Caries Risk Assessment and Management for Infants, Children, and Adolescents. – Chicago, 2022.
11. Petersen P.E. The World Oral Health Report. – WHO Press, Geneva, 2019.
12. Selwitz R.H., Ismail A.I., Pitts N.B. Dental caries. – The Lancet, 2017.
13. Фёдоров Ю.А., Давыдова Л.А. Диагностика и лечение кариеса молочных зубов. – СПб.: СпецЛит, 2018.
14. Ўзбекистон Республикаси Соғлиқни сақлаш вазирлиги. Болалар стоматологик касалликларини профилактика қилиш бўйича услубий қўлланма. – Тошкент, 2020.
15. Хасанова, Г. Р., Магрипова, Д. Ф., & Алибоева, Ш. У. (2025). РОЛЬ ЛИМОНА В ЖИЗНИ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(1), 26-32.
16. WILD PLANTS AS AN OBJECT OF STUDY, LIFE SAFETY, USE IN MEDICINE AND INDUSTRY
17. MODERN EDUCATION AND DEVELORMENT ISSN 3060-4567. Khasanova Gulbahor Rakhmatullaevna. Часть–4_ Январь –2025 Выпуск журнала №-18 Стр111-121.
18. Хасанова, Г. Р., Тошпулатов, Ш. Ш., Расулов, К. Г., & Мамиров, Д. У. (2025). КОРИАНДР ПОСЕВНОЙ–CORIANDRUM SATIVUM L. Modern education and development, 18(4), 80-92.54.
19. 18. Хасанова, Г. Р., Беканов, Б. С., Бахитов, Ш. Т., & Ходжаева, Ж. К. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА КАЛАНХОЭ. Modern education and development, 18(4), 93-110.
20. Хасанова, Г. Р., Кунгратова, М. И., Исломов, О. И., & Норкулова, Х. Ш. (2025). ЗВЕРОБОЙ ПРОДЫРЯВЛЕННЫЙ–HYPERIGUM PERFORATUM L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 62(5), 130-144.

Умарова О. М.
докторант
Ферганский государственный университет

ВЫДЕЛЕНИЕ АМИНОКИСЛОТ ИЗ РАСТЕНИЯ CICHORIUM INTYBUS L

Аннотация: *Cichorium intybus L. (цикорий) широко применяется в народной медицине и современной фармакологии как лекарственное растение. Целью данного исследования является определение качественного и количественного состава свободных аминокислот в корнях и листьях растения Cichorium intybus L. Свободные аминокислоты выделяли из водного экстракта методом осаждения белков, после чего проводили дериватизацию фенилтиоизоцианатом и анализировали методом высокоэффективной жидкостной хроматографии (ВЭЖХ). В результате было идентифицировано 20 свободных аминокислот, при этом общее содержание аминокислот в листьях (8,723 мг/г) значительно превышало их содержание в корнях (3,466 мг/г). Полученные результаты подтверждают, что растение Cichorium intybus L. является богатым источником биологически активных веществ.*

Ключевые слова: *Cichorium intybus L., цикорий, свободные аминокислоты, ВЭЖХ, фенилтиокарбамильные производные.*

Umarova O. M.
doctoral candidate
Fergana State University

ISOLATION OF AMINO ACIDS FROM CICHORIUM INTYBUS L

Abstract: *Cichorium intybus L. (chicory) is widely used in folk medicine and modern pharmacology as a medicinal plant. The aim of this study was to determine the qualitative and quantitative composition of free amino acids in the roots and leaves of Cichorium intybus L. Free amino acids were isolated from the aqueous extract by protein precipitation, followed by derivatization with phenylthioisocyanate and analysis by high-performance liquid chromatography (HPLC). Twenty free amino acids were identified, with the total amino acid content in the leaves (8.723 mg/g) significantly exceeding that in the roots (3.466 mg/g). These results confirm that Cichorium intybus L. is a rich source of biologically active substances.*

Key words: *Cichorium intybus L., chicory, free amino acids, HPLC, phenylthiocarbamyl derivatives.*

Введение

Лекарственные растения являются важным источником биологически активных веществ, широко используемых в фармацевтической, диетической и функциональной пищевой промышленности. Одним из таких растений является *Cichorium intybus* L. (семейство Asteraceae), широко распространённое в Европе, Азии и Северной Африке. Цикорий традиционно применяется в народной медицине при заболеваниях печени, желудочно-кишечного тракта, сахарном диабете и воспалительных процессах.

Научные исследования показали, что в составе цикория содержатся инулин, фенольные соединения, флавоноиды и сесквитерпеновые лактоны. Однако аминокислотный состав данного растения, особенно распределение аминокислот в различных органах (корнях и листьях), изучен недостаточно.

Аминокислоты играют важную роль в процессах азотного обмена, биосинтеза белков и устойчивости растений к стрессовым факторам. Для организма человека аминокислоты обладают антиоксидантными, гепатопротекторными и иммуномодулирующими свойствами. В связи с этим детальное изучение свободных аминокислот в составе *Cichorium intybus* L. является актуальной научной задачей.

Материалы и методы

Растительный материал

Корни и листья растения *Cichorium intybus* L. были собраны в период вегетации. При отборе образцов использовались здоровые растения без признаков поражения болезнями и вредителями. Растительный материал был идентифицирован специалистом-ботаником и помещён в лабораторный фонд.

Подготовка образцов

Корни и листья очищали от почвенных остатков, промывали дистиллированной водой и высушивали в тени. Высушенное сырьё измельчали до порошкообразного состояния. Для анализа готовили водные экстракты.

Выделение свободных аминокислот

Белки и пептиды из водного экстракта осаждали с помощью 20% трихлоруксусной кислоты. Для этого к 1 мл экстракта добавляли 1 мл трихлоруксусной кислоты и инкубировали в течение 10 минут. Образовавшийся осадок отделяли центрифугированием при 8000 об/мин в течение 15 минут. Из надосадочной жидкости отбирали 0,1 мл и подвергали лиофильной сушке.

Сухой остаток растворяли в смеси триэтиламин–ацетонитрил–вода (1:7:1) и высушивали. Данную процедуру повторяли дважды с целью нейтрализации остатков кислоты.

ВЭЖХ-Анализ

Свободные аминокислоты переводили в фенилтиокарбамильные производные путём реакции с фенилтиоизоцианатом. Анализ проводили на

системе ВЭЖХ Agilent Technologies 1200 с диодно-матричным детектором (DAD) и колонкой Discovery HS C18. Скорость потока составляла 1,2 мл/мин, детектирование осуществляли при длине волны 269 нм.

Результаты и обсуждение

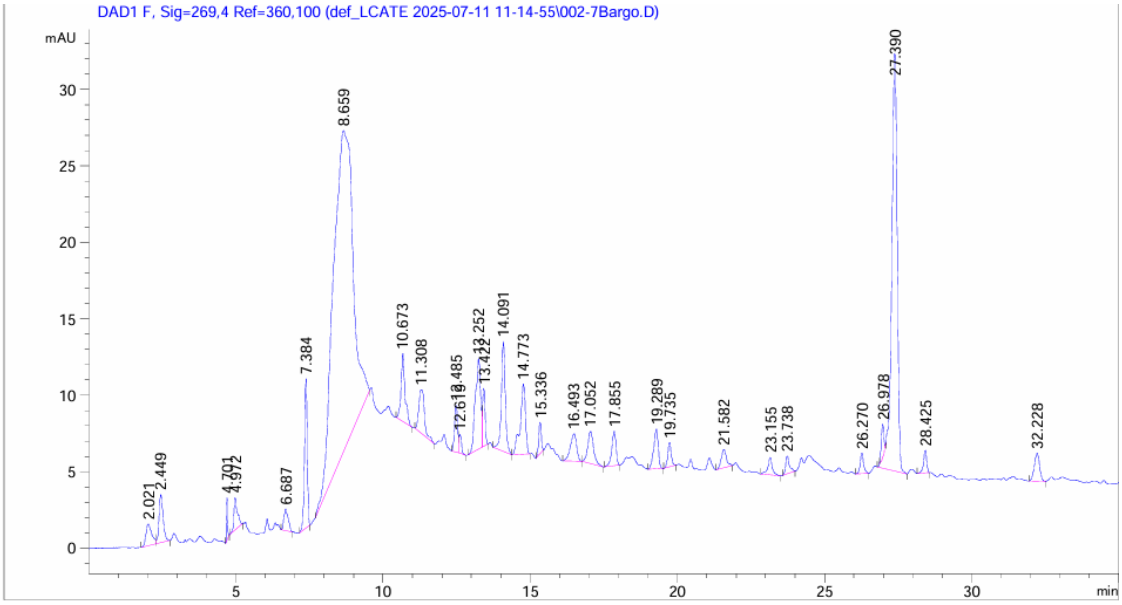
По результатам ВЭЖХ-анализа в корнях и листьях *Cichorium intybus* L. было идентифицировано 20 свободных аминокислот. Общее содержание аминокислот в листьях оказалось в 2,5 раза выше по сравнению с корнями.

В листьях в высоких концентрациях присутствовали глутамин и глутаминовая кислота, аланин, пролин и треонин, что обусловлено высокой метаболической активностью листьев. В корнях относительно высокое содержание изолейцина, гистидина и пролина связано с их запасающей и адаптационной функцией.

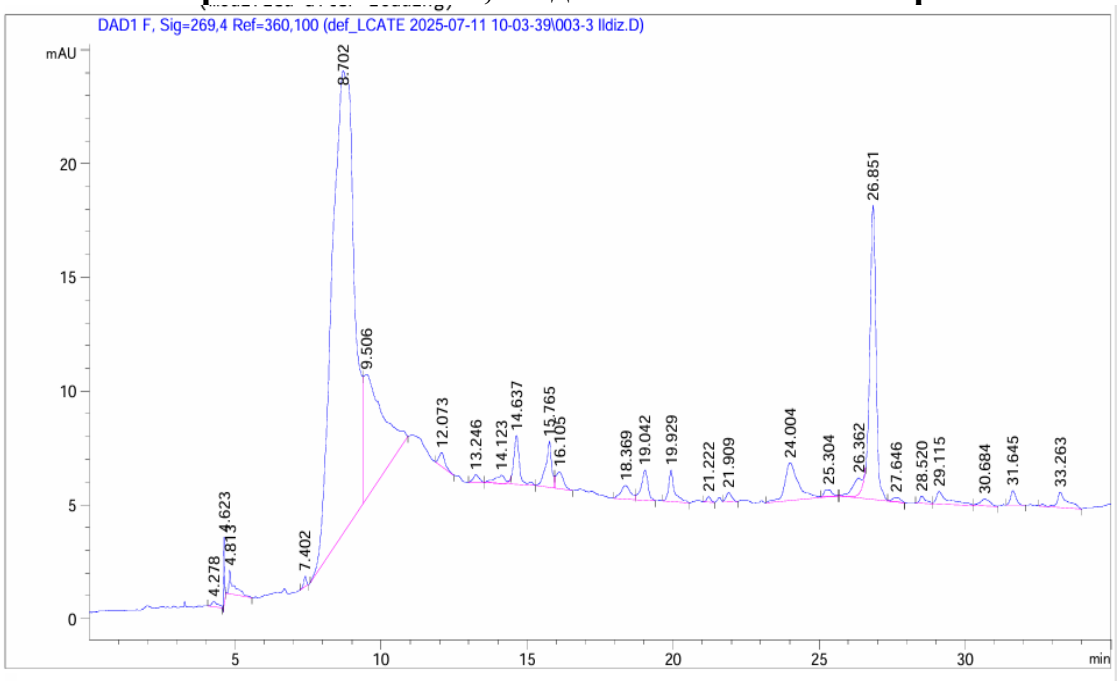
Наличие незаменимых аминокислот свидетельствует о перспективности цикория как источника биологически активных добавок.

Содержание аминокислот, выделенных из корней и листьев растения (мг/г)

Наименование аминокислоты	**Корень**	**Лист**
	Концентрация мг/гр	
Аспарагиновая к-та	0.000	0.536
Глутаминовая к-та	0.066	1.414
Серин	0.000	0.425
Глицин	0.064	0.306
Аспарагин	0.074	0.314
Глутамин	0.000	0.377
Цистеин	0.000	0.122
Треонин	0.000	1.054
Аргенин	0.026	0.129
Аланин	0.145	1.146
Пролин	0.710	1.395
Тирозин	0.257	0.159
Валин	0.307	0.242
Метионин	0.045	0.269
Гистидин	0.383	0.000
Изолейцин	0.929	0.228
Лейцин	0.121	0.201
Триптофан	0.073	0.133
Фенилаланин	0.219	0.168
Лизин	0.048	0.105
Итого	**3.466**	**8.723**



ИК-спектры аминокислот, выделенных из листьев растения.



ИК-спектры аминокислот, выделенных из корней растения

Заключение

Результаты исследования показали, что корни и листья растения *Cichorium intybus* L. богаты свободными аминокислотами. Общее содержание аминокислот в листьях значительно выше, что делает их перспективным сырьём для фармацевтической и функциональной пищевой промышленности. Полученные данные служат научной основой для дальнейшего изучения биохимического и фармакологического потенциала цикория.

Использованные источники

1. ГОСТ 8.009–2019. Государственная система обеспечения единства измерений.

2. ISO/IEC 17025:2017. General requirements for testing laboratories.
3. NIST Metrology AI Program, USA, 2021.
4. KRISS Smart Lab Initiative, Korea, 2020.
5. EURAMET Digital Metrology Cloud, EU, 2022.
6. Goodfellow I., Bengio Y., Courville A. Deep Learning. MIT Press, 2016.
7. Tao D. AI in Metrology. Measurement Science Review, 2021.
8. Закон Республики Узбекистан «О метрологии», 2020.
9. Farruhbek Farxodjon O‘G‘Li Oxunjonov (2021). DETALLARNING TASHQI SILINDRIK YUZALARI VA ULARGA ISHLOV BERISH USULLARI. Scientific progress, 2 (2), 1132-1135.

Умматов Р. Б.
старший преподаватель
Абдуллаев З. Д.
старший преподаватель
Улмасов Ф. Ё.
учитель
Бобоназаров Ш. О.
учитель
Умаров С. А.
учитель
Кокандский государственный университет

ВНЕДРЕНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБЕСПЕЧЕНИЕ ЕДИНСТВА СРЕДСТВ ИЗМЕРЕНИЙ

Аннотация: *В статье рассматриваются подходы к внедрению искусственного интеллекта (ИИ) в систему обеспечения единства измерений на предприятиях Республики Узбекистан. Проведён анализ международного опыта развитых стран и изучены перспективы адаптации цифровых метрологических технологий. Представлены таблицы и гистограммы, отражающие результаты внедрения ИИ в отечественных организациях.*

Ключевые слова: *искусственный интеллект, метрология, цифровые двойники, предиктивная аналитика.*

Ummatov R. B.
senior teacher
Kokand State University
Abdullaev Z. J.
senior teacher
Kokand State University
Ulmasov F. Y.
teacher
Kokand State University
Bobonazarov Sh. O.
teacher
Kokand State University
Umarov S. A.
Kokand State University teacher

IMPLEMENTING ARTIFICIAL INTELLIGENCE TO ENSURE THE UNIFORMITY OF MEASUREMENT INSTRUMENTS

Abstract*: This article examines approaches to implementing artificial intelligence (AI) in a measurement uniformity system at enterprises in the*

Republic of Uzbekistan. An analysis of international experience in developed countries is provided, and prospects for adapting digital metrology technologies are explored. Tables and histograms reflecting the results of AI implementation in domestic organizations are presented.

Keywords: *artificial intelligence, metrology, digital twins, predictive analytics.*

ВВЕДЕНИЕ

В условиях цифровой трансформации экономики Республики Узбекистан вопросы обеспечения единства измерений приобретают стратегическое значение. Современные промышленные объекты характеризуются высокой степенью автоматизации, а качество измерений становится важнейшим фактором конкурентоспособности. Традиционные методы метрологического контроля уже не обеспечивают требуемой динамичности, воспроизводимости и прозрачности процессов, что формирует необходимость внедрения интеллектуальных цифровых технологий.

Искусственный интеллект открывает новые подходы к диагностике, оценке состояния и автоматизации функционирования средств измерений. Мировая практика демонстрирует успешность подобных решений в развитых странах, где ИИ стал неотъемлемым элементом современных метрологических систем.Цифровизация промышленности Республики Узбекистан требует модернизации метрологической инфраструктуры. Искусственный интеллект способен обеспечить новый уровень точности, стабильности и автоматизации измерительных процессов. Мировая практика подтверждает эффективность ИИ в диагностике, прогнозировании и оптимизации метрологического контроля.

Современное развитие промышленного сектора Республики Узбекистан сопровождается стремительным внедрением цифровых технологий, что требует совершенствования существующей метрологической инфраструктуры. Для предприятий становится критически важным обеспечивать стабильность, точность и воспроизводимость измерений, поскольку именно качество метрологического контроля определяет безопасность технологических процессов, конкурентоспособность продукции и соответствие международным требованиям. В этой связи интеграция искусственного интеллекта в сферу обеспечения единства средств измерений является не просто инновацией, а стратегическим направлением модернизации.

Искусственный интеллект существенно расширяет возможности мониторинга состояния измерительных приборов. Благодаря алгоритмам анализа больших массивов данных стало возможным формировать непрерывную картину функционирования оборудования, выявлять скрытые отклонения и прогнозировать момент наступления критического износа. Подобные системы уже широко применяются в Германии, Японии и Южной

Корее: например, в Германии распространены платформы предиктивного мониторинга, которые анализируют вибрационные и температурные параметры приборов и заранее указывают на вероятность неисправностей. Аналогичные решения могут быть внедрены и в Узбекистане, что позволит значительно сократить риск незапланированных остановок производства.

Не менее важным направлением является оптимизация поверочных и калибровочных процедур. Традиционная схема поверки, основанная на фиксированных интервалах, нередко приводит к избыточным затратам, когда оборудование проверяется чаще, чем нужно, либо, наоборот, слишком поздно. С применением ИИ становится возможным использовать модель обслуживания, ориентированную на фактическое состояние оборудования. Алгоритмы машинного обучения анализируют данные предыдущих поверок, условия эксплуатации, статистику отклонений и формируют индивидуальные графики обслуживания для каждого прибора. Подобный подход уже доказал свою эффективность в Южной Корее, где переход к интеллектуальному обслуживанию позволил снизить количество непредвиденных отказов почти на треть.

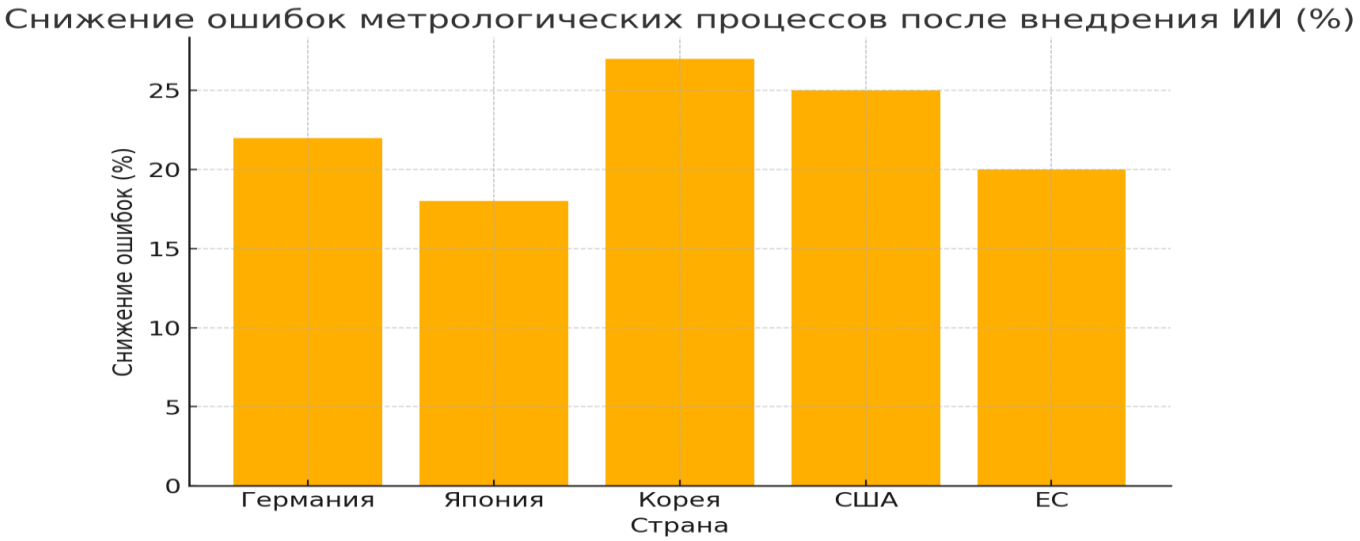
Особое значение для метрологии имеет автоматизация анализа и интерпретации результатов измерений. При больших объёмах данных участие человека становится не только трудоёмким, но и может приводить к ошибкам. Искусственный интеллект способен выполнять автоматическую валидацию результатов, выявлять аномалии, классифицировать источники погрешностей и формировать рекомендации по корректировке измерительных процедур. В странах Европейского союза уже действуют пилотные проекты, где поверочные лаборатории используют ИИ для предварительной обработки данных, что ускоряет работу специалистов и снижает вероятность человеческого фактора.

Внедрение цифровых двойников — ещё одна важная составляющая новейшей метрологической практики. В США цифровые модели используются Национальным институтом стандартов и технологий (NIST) для виртуального тестирования алгоритмов измерения и оценки устойчивости приборов к различным внешним воздействиям. Цифровые двойники позволяют исследовать работу оборудования без остановки производственного процесса, уменьшить затраты на калибровочные операции и повысить надёжность метрологических решений. Для Узбекистана внедрение подобных технологий может стать основой создания современной цифровой метрологической экосистемы.

Таблица 1

Мировые примеры внедрения ИИ в метрологию

Страна	Тип внедрения ИИ	Эффект внедрения
Германия	Предиктивный мониторинг	−40% отказов оборудования
Япония	AI-анализ стабильности эталонов	Повышение точности эталонов
Южная Корея	Smart Metrology Labs	−27% неплановых остановок
США	Цифровые двойники (Digital Twin)	Снижение затрат на калибровки
ЕС	Metrology Cloud	Повышение прозрачности данных



ГИСТОГРАММА 1. СНИЖЕНИЕ ОШИБОК ИЗМЕРЕНИЙ ПОСЛЕ ВНЕДРЕНИЯ ИИ

Кроме того, для успешного внедрения ИИ необходима модернизация нормативных документов, адаптация стандартов ISO/IEC к национальным условиям и подготовка квалифицированных специалистов, владеющих навыками цифровой метрологии, анализа данных и управления интеллектуальными системами. Создание образовательных программ в вузах и центрах повышения квалификации может стать ключевым шагом для формирования кадрового потенциала, необходимого для цифровой трансформации отрасли.

Комплексное использование искусственного интеллекта в метрологии требует системного подхода. Одной из ключевых задач является стандартизация данных и обеспечение их совместимости между предприятиями, лабораториями и контролирующими органами. Развитые страны, такие как Германия и Нидерланды, уже формируют национальные облачные платформы по типу European Metrology Cloud, где поверочные данные хранятся в единой защищённой системе. Подобная инициатива позволит Узбекистану обеспечить прозрачность, прослеживаемость и высокий уровень доверия к данным о состоянии измерительных приборов.

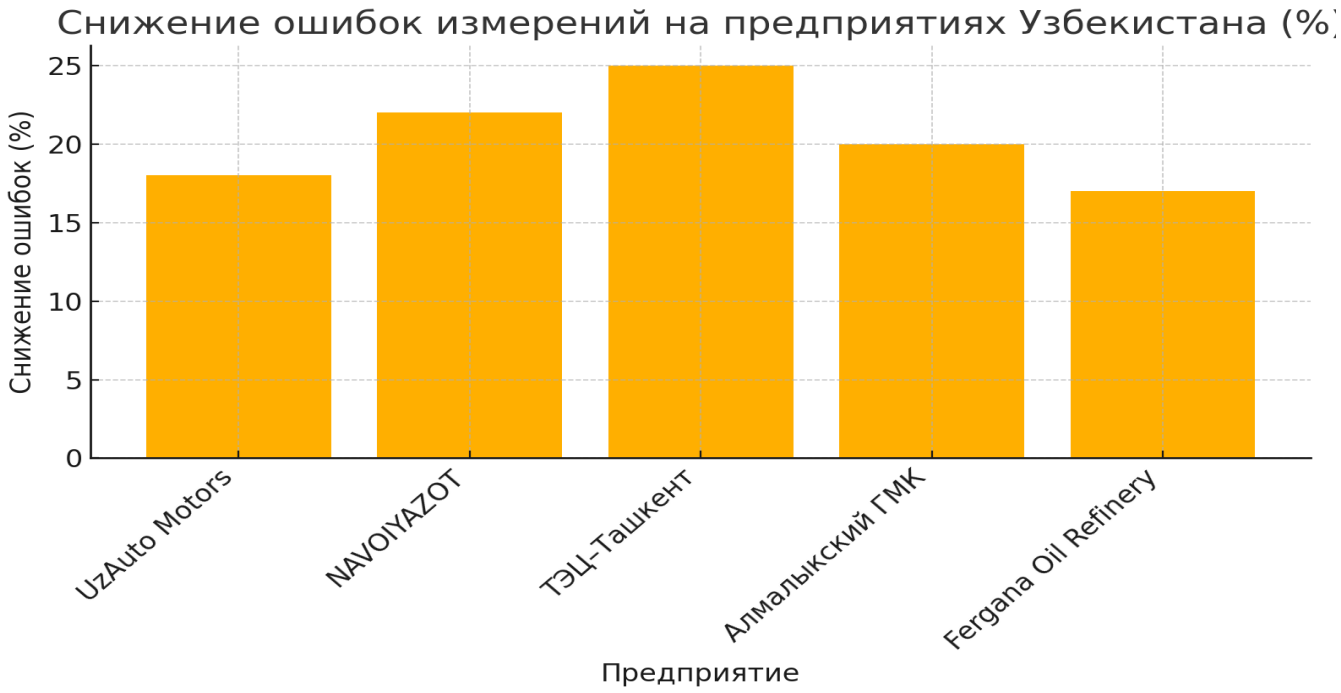
В Узбекистане внедрение ИИ в крупных промышленных организациях показывает аналогичные результаты. Алгоритмы анализа данных позволяют

уменьшить частоту внеплановых остановок, ускорить обработку результатов измерений и снизить нагрузку на метрологические службы.

ТАБЛИЦА 2
ПРИМЕНЕНИЕ ИИ НА ПРЕДПРИЯТИЯХ УЗБЕКИСТАНА

Предприятие	Тип измерений	Проблемы до ИИ	Эффект после внедрения ИИ
UzAuto Motors	Контроль параметров двигателей	Высокая нагрузка на метрологов	Сокращение ошибок на 18%
NAVOIYAZOT	Химический анализ реагентов	Риск отклонений при анализе	Устойчивость химического контроля
ТЭЦ–Ташкент	Теплотехнические измерения	Низкая скорость обработки данных	Ускорение анализа на 30%
Алмалыкский ГМК	Горно-металлургические измерения	Сложность поверки датчиков	Снижение отказов датчиков
Fergana Oil Refinery	Контроль нефтепродуктов	Ошибки ручного ввода данных	Автоматизация регистрации измерений

Гистограмма 1. Снижение ошибок измерений на предприятиях Узбекистана



ЗАКЛЮЧЕНИЕ

Применение искусственного интеллекта в сфере обеспечения единства измерений открывает для предприятий Республики Узбекистан принципиально новые возможности повышения качества и устойчивости производственных процессов. Интеллектуальные методы анализа данных, прогнозирования технического состояния средств измерений и автоматизации поверочных процедур позволяют перейти от традиционного подхода к современной цифровой модели метрологического обеспечения.

Опыт развитых стран демонстрирует, что использование ИИ в метрологии способствует сокращению эксплуатационных затрат, повышению точности измерений и ускорению принятия технических решений. Интеграция подобных технологий в национальную метрологическую систему Узбекистана создаёт условия для развития «умных» производств, укрепления экспортного потенциала и выравнивания метрологических процедур с международными стандартами.

Для успешной реализации данных задач необходимы обновление нормативно-технической базы, подготовка квалифицированных специалистов, а также создание единой цифровой платформы для хранения и обработки метрологических данных. Комплексный подход позволит обеспечить устойчивый переход к современным интеллектуальным системам измерений и станет важным шагом в направлении технологического развития промышленности страны.

Использованные источники

1. ГОСТ 8.009–2019. Государственная система обеспечения единства измерений.
2. ISO/IEC 17025:2017. General requirements for testing laboratories.
3. NIST Metrology AI Program, USA, 2021.
4. KRISS Smart Lab Initiative, Korea, 2020.
5. EURAMET Digital Metrology Cloud, EU, 2022.
6. Goodfellow I., Bengio Y., Courville A. Deep Learning. MIT Press, 2016.
7. Tao D. AI in Metrology. Measurement Science Review, 2021.
8. Закон Республики Узбекистан «О метрологии», 2020.
9. Farruhbek Farxodjon O‘G‘Li Oxunjonov (2021). DETALLARNING TASHQI SILINDRIK YUZALARI VA ULARGA ISHLOV BERISH USULLARI. Scientific progress, 2 (2), 1132-1135.
10. Oxunjonov F. F., Raxmonov S. Sh., & Umarov S. A. (2025). Metall kesish jarayonida tribologik juftlikning ishqalanish koeffitsientini modellashtirish va eksperimental natijalar bilan solishtirish. Строительство и образование, 4 (5), 285-294.
11. F.F.Oxunjonov, & S.Sh.Rahmonov (2025). Avtomatlashtirilgan yig‘uv liniyalarida robotlashtirilgan manipulyatorlar qo‘llanilishi: samaradorlik va innovatsion yechimlar. Строительство и образование, 4 (3), 230-235.
12. F.F.Oxunjonov, & S.Sh.Rahmonov (2025). Tuproqqa ishlov beruvchi mashinalarning ishchi qismlariga karbid-volfram qotishmalaridan qayta ishlab olingan kukun asosida yeyilishga chidamli qoplamalar qoplash texnologiyasini ishlab chiqish. Строительство и образование, 4 (3), 128-134.

DOI 10.24412/2225-1545-2025-12-2138-1349-1353
UDK: 616.748 +616-089.5-031.81/ 616-089.5-031.84

Умуров Б. Ф.
ассистенти
Абу Али ибн Сино номидаги Бухоро давлат тиббиёт институти
https://orcid.org/0009-002-2501-3118

ТАЖРИБДА ОҚ ЗОТСИЗ КАЛАМУШЛАР СКЕЛЕТ МУШАК ТЎҚИМАСИНИНГ МЕХАНИК ЁПИҚ ЖАРОҲАТИДАН КЕЙИНГИ МОРФОЛОГИК ЎЗГАРИШЛАРИ (ЁШГА БОҒЛИҚ ТАҲЛИЛ)

Аннотация. *Ушбу тадқиқотда оқ зотсиз каламушларнинг турли ёш гуруҳларида (3, 6, 9 ва 12 ойлик) пастки муча скелет мушак тўқимасига механик ёпиқ жароҳат етказилгандан сўнг юзага келган морфологик ва цитоморфологик ўзгаришлар таҳлил қилинди. Мушак толалари қалинлиги, кўндаланг кесим майдони, ядро зичлиги ҳамда атрофияланган толалар улуши аниқланди. Олинган натижалар ёшга боғлиқ тикланиш жараёнларининг фарқларини намоён этди.*

Калит сўзлар: *скелет мушак тўқимаси, механик жароҳат, цитоморфология, миосателлит ҳужайралар, фиброз, неоваскуляризация, ёшга боғлиқ ўзгаришлар.*

Umurov B. F.
assistant
Bukhara State Medical Institute named after Abu Ali ibn Sino
https://orcid.org/0009-002-2501-3118

MORPHOLOGİCAL CHANGES İN SKELETAL MUSCLE TİSSUE OF WHİTE RATS AFTER MECHANİCAL CLOSED İNJURY (AGE ANALYSİS)

Abstract*. This study analyzes the morphological and cytomorphological changes that occur in the skeletal muscle tissue of white outbred rats of different age groups (3, 6, 9, and 12 months) following a mechanically induced closed injury to the lower limb. The thickness of muscle fibers, cross-sectional area, nuclear density, and the proportion of atrophied fibers were determined. The obtained results revealed age-related differences in the regenerative processes of skeletal muscle tissue.*

Keywords: *skeletal muscle tissue, mechanical injury, cytomorphology, myosatellite cells, fibrosis, neovascularization, age-related changes.*

Скелет мушак тўқимасининг қайта тикланиши – жуда мураккаб ва кўп босқичли физиологик жараён бўлиб, у жисмоний шикастланиш, яллиғланиш, стем ҳужайраларнинг фаоллашуви ва миогенезни ўз ичига олади. Механик жароҳатдан кейин мушак тўқимасида юзага келувчи тўқима қайта тузилишига таъсир қилувчи муҳим омиллардан бири бу оғриқсизлантиришда қўлланиладиган анестетик моддаларнинг таъсиридир. Ушбу тадқиқотда оқ зотсиз каламушларда пастки муча мейёрий ҳамда ёпиқ механик шикастлангандан сўнг назоратда 0.9% ли натрий хлорид эритмаси маҳаллий жароҳат соҳасига юборилиб морфометрияси ҳамда умумий ва маҳаллий анестетикларнинг морфометрик кўрсаткичларга таъсири ўрганилган.

Оқ зотсиз 3 ойлик каламушлар скелет мушак тўқимаси морфометрияси;

1. Мушак толаларининг қалинлиги: ўртача мушак толаларининг қалинлиги 26.1 ± 1.3 мкм булгани аниқланган.
2. Кўндаланг кесим майдонида: ўртача кўндаланг кесим майдони 1090 ± 41 мкм^2 кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 26 ± 2 дона эканлиги исботланган.
4. Мушак толаси диаметри: 30.1 ±1.3 мкм эканлиги аниқланган.

6 ойлик каламушлар скелет мушак тўқима морфометрия кўрсатгичи;

1. Мушак толаларининг қалинлиги: ўртача мушак толаларининг қалинлиги 28.1 ± 1.3 мкм булгани аниқланган.
2. Кўндаланг кесим майдонида: ўртача кўндаланг кесим майдони 1095 ± 41 мкм^2 кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 25 ± 2 дона эканлиги исботланган.
4. Мушак толаси диаметри 32.1 ±1.2 мкм эканлиги аниқланган.

9 ойлик каламушлар скелет мушак тўқимасининг кўрсатгичлари;

1. Мушак толаларининг қалинлиги: ўртача мушак толаларининг қалинлиги 30.1 ± 1.5 мкм булгани аниқланган.
2. Кўндаланг кесим майдонида: ўртача кўндаланг кесим майдони 1098 ± 43 мкм^2 кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 28 ± 2 дона эканлиги исботланган.
4. Мушак толаси диаметри 33.1 ±1.1 мкм эканлиги аниқланган.

12 ойлик каламушлар скелет мушак тўқимасининг ўзгаришлари;

1. Мушак толаларининг қалинлиги: ўртача мушак толаларининг қалинлиги 33.1 ± 1.2 мкм булгани аниқланган.
2. Кўндаланг кесим майдонида: ўртача кўндаланг кесим майдони 1100 ± 42 мкм^2 кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 28 ± 2 дона эканлиги исботланган.
4. Мушак толаси диаметри 33.1 ±1.4 мкм эканлиги аниқланган.

Навбатдаги тажрибамизда оқ зотсиз каламушлар ўнг сон соҳасига ёпиқ енгил жароҳат етказилгандан сўнг маҳаллий 0.9% ли натрий хлорид эритмасидан 2 мл миқдорда юборилиб 1 кун, 3 кун ва 7 кун шу соҳадан мушак тўқимаси намунаси олиниб микроскоп остида ўрганилган.

3 ойлик каламушлар скелет мушак тўқимасининг ўзгаришлари;

1. Мушак толаларининг қалинлиги: ўртача мушак толаларининг қалинлиги 1 - кун 45.1 ± 2 мкм ва 3 - кун 43 ± 1.5 мкм ва 7 - кун 42 ± 1.2 мкм гача мушак толаларининг қалинлигининг бироз пасайганлигини кўрсатди.
2. Кўндаланг кесим майдонида: ўртача кўндаланг кесим майдони 12 соат ичида 1592 ± 11 мкм^2, 72 соатдан кейин 1590 ± 12 мкм^2 ва 144 соатдан кейин 1585 ± 11 мкм^2 майдоннинг бирмунча камайганини кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 1 – кун 26 ± 3 дона ядро, 3 - кун эса 26 ± 2 дона яна шу кўрсатгич, ядролар сони деярли ўзгармади.
4. Атрофияланган толалар улуши: атрофияланган толалар улуши 1 – кун 12% ни ташкил этди ва 3 – кун 14% гача кўтарилган.

6 ойлик каламушлар скелет мушак тўқимасининг ўзгаришлари;

1. Мушак толаларининг қалинлиги: мушак толаларининг қалинлиги 12 соатдан кейин ўртача 46.1 ± 1.5 мкм ва 24 соатдан кейин 44 ± 2.3 мкм ва 72 соатдан кейин 43 ± 2.2 мкм гача мушак толаларининг қалинлигининг бироз пасайганлигини кўрсатган.
2. Кўндаланг кесим майдонида: кўндаланг кесим майдони 24 соатдан кейин ўртача 1596 ± 12 мкм^2 ва 72 соатдан кейин 1594 ± 11 мкм^2 майдоннинг бирмунча камайганини кўрсатди.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 24 соатдан кейин 27 ± 3 дона ядро, 72 соатдан кейин эса 26 ± 2 дона яна шу кўрсатгич ядролар деярли ўзгармаган.
4. Атрофияланган толалар улуши: атрофияланган толалар улуши 24 соатдан кейин 14% ни ташкил этди ва 72 соатдан кейин 16% гача кўтарилди.

9 ойлик каламушлар скелет мушак тўқимасининг ўзгаришлари;

1. Мушак толаларининг қалинлиги: мушак толаларининг қалинлиги 12 соатдан кейин 45.5 ± 2.2 мкм ва 24 соатдан кейин 45 ± 2.0 мкм ва 72 соатдан кейин ўртача 44 ± 1.5 мкм гача мушак толаларининг қалинлигининг бироз пасайганлигини кўрсатди.
2. Кўндаланг кесим майдонида: кўндаланг кесим майдони 24 соатдан кейин ўртача 1600 ± 12 мкм^2 ва 72 соатдан кейин 1595 ± 11 мкм^2 майдоннинг бирмунча камайганини кўрсатган.
3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 24 соатдан кейин 28 ± 3 дона ядро, 72 соатдан кейин эса 28 ± 2 дона яна шу кўрсатгич ядролар деярли ўзгармади.
4. Атрофияланган толалар улуши: атрофияланган толалар улуши 24 соатдан кейин 15% ни ташкил этди ва 72 соатдан кейин 18% гача кўтарилган.

12 ойлик каламушлар скелет мушак тўқимасининг ўзгаришлари;

1. Мушак толаларининг қалинлиги: мушак толаларининг қалинлиги 12 соатдан ўртача кейин 44 ± 1.5 мкм ва 24 соатдан кейин 43 ± 2.0 мкм ва 72 соатдан кейин 42 ± 2.0 мкм гача мушак толаларининг қалинлигининг бироз пасайганлигини кўрсатди.

2. Кўндаланг кесим майдонида: кўндаланг кесим майдони 24 соатдан кейин ўртача 1598 ± 12 мкм^2 ва 72 соатдан кейин 1595 ± 11 мкм^2 майдоннинг бирмунча камайганини кўрсатди.

3. Ядро зичлиги: ядро зичлиги 1000 мкм^2 да 24 соатдан кейин 28 ± 3 дона ядро, 72 соатдан кейин эса 27 ± 1 дона яна шу кўрсатгичга яқин, ядролар деярли ўзгармади.

4. Атрофияланган толалар улуши: атрофияланган толалар улуши 24 соатдан кейин 15% ни ташкил этди ва 72 соатдан кейин 20% гача кўтарилди.

Оқ зотсиз каламушлар пастки муча механик жарохатидан кейинги мушак тўқимасининг умумий ва маҳаллий анестетик таъсирида морфометрик ўзгаришлар таҳлил қилиб ўрганилганда, 3 ойлик каламушлар скелет мушаклари морфологик жиҳатдан етук, бироқ ҳали тўлиқ ривожланиш босқичини тугатмаган. Механик жароҳатдан сўнг, маҳаллий яллиғланиш жавоби тез ва актив бўлиб, нейтрофиллар ва макрофаглар инфильтрацияси кўзга ташланди. Маҳаллий анестетик таъсирида фибрилляр структуранинг релаксацияси ва васкулогенезни фаоллашиши кузатилди. Морфометрик жиҳатдан эса миофибриллар қалинлигида енгил камайиш, интерстициал тўқимада ҳажмнинг ортиши, миоцит ядроларининг сони кўпайиши қайд этилди. Регенерация жараёни юқори, сателлит ҳужайралар эса фаол бўлиши билан ажралиб турган.

Бунда мушак толасининг қалинлиги(мкм), биопсия намуналарининг турли соҳаларида ўлчанган. Мушак толасининг кўндаланг кесимдаги қалинлиги ва ҳар бир толанинг майдони ҳисоблаб чиқилган. Ядро зичлиги (1000 мкм² майдондаги ядролар сони) баҳоланган. Атрофик толалар улуши нормадан 8% дан камайганлиги аниқланган.

Механик жароҳатдан кейин мушак тўқимасида юзага келувчи тўқима қайта тузилишига таъсир қилувчи муҳим омиллардан бири бу оғриқсизлантиришда қўлланиладиган анестетик моддаларнинг таъсиридир. Ушбу тадқиқотда оқ зотсиз каламушларда пастки муча скелет мушак тўқимаси механик шикастлангандан сўнг маҳаллий ва умумий анестетикларнинг морфометрик кўрсаткичларга таъсири ўрганилган. Барча каламушларда тиббий стереотипга мувофиқ пастки мучасига механик ёпиқ жароҳат берилиб биопсия учун игна ва махсус заҳарсизлаштирилган скальпел билан чуқур 2 мм ли кесиш ўтказилган.

АДАБИЁТЛАР РЎЙХАТИ

1. Абрашова Т.В., Соколова А.П., Селезнева А.И., Хуттунен О.Э., Макарова М.Н., Макаров В.Г. Вариабельность биохимических и гематологических показателей у лабораторных крыс в зависимости от линии и возраста // Международный вестник ветеринарии. 2010, №2 55 - 60 ст.

2. Бакарев М. А. «МОРФОГЕНЕЗ ДЕСТРУКТИВНЫХ И РЕПАРАТИВНЫХ РЕАКЦИЙ СКЕЛЕТНЫХ МЫШЦ ПРИ МЕТАБОЛИЧЕСКИХ НАРУШЕНИЯХ РАЗЛИЧНОГО ГЕНЕЗА». Новосибирск 2005. 2 – 5 ст
3. Балынина Е.С, Березовская И.В. Сравнительная оценка методов определения ориентировочной реакции крыс в токсикологическом эксперименте // Фарм. и токсикол. 1976. № 5. 635 - 638 ст.
4. Баркаган З.С., Момот А.П. Диагностика и контролируемая терапия нарушений гемостаза. - М.: "Ньюдиамед-АО", 2001. 296 ст.
5. Бельместнова О.В. Морфофункциональные изменения мышечной ткани в области последовательно причиненных премортальных колото-резаных ран. автореф. на соиск. канд. мед. наук. —Москва, 2010. 15 – 20 ст.
6. Вознесенский В.Л. Первичная обработка экспериментальных данных. Л.: Наука, 1969. 83 ст.
7. Виноградов С.Ю., С. А. Ульяновская, В. В. Криштоп Функциональная морфология органов эндокринной системы учебное пособие для студентов. 2010. 11 - 21 б.
8. Гольдберг Д.И., Гольдберг Е.Д., Шубин Н.Г. Гематология животных. Из - во Томского университета. –Томск. 1973. 182 ст.
9. Гриф М.И. Руководство по проведению доклинических исследований лекарственных средств. Часть первая. 2012. 944 ст.
10. Ефимочкина Н.Р., Седова И.Б., Шевелева С.А., Тутельян В.А. 2019. №14. 6-33 ст.
11. Карадулева Е.В, Вихлянцев И.М., Подлубная З.А. «Экспрессия тайтина в миокарде спонтанно - гипертензивных крыс при развитии гипертрофии» // Биофизика. 2010. Т. 55. №. 4. 612 – 618 ст.
12. Каркищенко Н.Н. Основы биомоделирования. М.: Из -во ВПК, 2005. 608 ст.
13. Карпищенко А.И.Медицинские лабораторные технологии. Справочник. / Под ред. проф. Том 1- С-Пб: Интермедика. 2002. 408 ст.
14. Кирющенков А.П., Тараховский М.Л. Влияние лекарственных средств на плод. М. 1990. 271 ст.
15. Кобалова Ж.Д. Эволюция комбинированной антигипертензивной терапии: от многокомпонентных высокодозовых свободных комбинаций до конвенциональных неинбредных лабораторных крыс. Методическое 2020. 155 - 175 ст.
16. Луценко М.Т. Гепатоэнтеральная рециркуляция холестерина // Бюллетень СО РАМН. 2006. Т. № 2. 23 - 28 ст.

UDK 615.036

Файзиев Х. Б.
доцент
кафедра общественного здоровья, превентивной медицины и менеджмента в здравоохранении
Бухарский государственный медицинский Институт имени Абу Али ибн Сина
https://orcid.org/0000-0002-4637-8960

МОРФОМЕТРИЧЕСКИЕ ИЗМЕНЕНИЯ СТРУКТУРЫ ТИМУСА У 1-МЕСЯЧНЫХ ЛАБОРАТОРНЫХ КРЫС ПОСЛЕ ХИМИЧЕСКОГО ОЖОГА ПИЩЕВАРИТЕЛЬНОГО ТРАКТА

Аннотация. *В данной работе рассматриваются морфологические изменения в структуре тимусе белых 1 месячных крыс, под воздействием химического ожога вызванного 6% раствором уксусной кислоты в зону пищеварительного тракта, исследование направлено на выявление структурно-клеточной перестройки в органе центрального звена иммунной системы - тимусе.*

Ключевые слова: *тимус, крысы, морфология, стресс, токсическое воздействие, иммунная система.*

Faiziev Kh. B.
associate dotsent
department of public health, preventive medicine, and healthcare management
Bukhara State Medical Institute named after Abu Ali ibn Sina
https://orcid.org/0000-0002-4637-8960

MORPHOMETRIC CHANGES IN THYMUS STRUCTURE IN 1-MONTH-OLD LABORATORY RATS FOLLOWING CHEMICAL BURN OF THE DIGESTIVE TRACT

Abstract. *This work examines the morphological changes in the structure of the thymus in 1-month-old white rats under the influence of chemical burns caused by a 6% solution of acetic acid in the digestive tract zone, and the study is aimed at identifying structural-cellular restructuring in the organ of the central link of the immune system - the thymus.*

Keywords: *thymus, rats, morphology, stress, toxic effects, immune system.*

Введение

Тимус (вилочковая железа) является центральным органом иммуногенеза, обеспечивающим дифференцировку и созревание Т-

лимфоцитов. Его структура и функция чувствительны к воздействию окружающей среды. Известно, что воздействие токсических агентов, стрессовых состояний и других неблагоприятных факторов приводит к инволюционным изменениям в тимусе, нарушающим процессы иммунного ответа.

Целью данного исследования является изучение морфологических изменений в тимусе белых беспородных крыс после воздействия различных внешних факторов, на примере химического ожога лёгкой степени вызванного 6% раствором уксусной кислоты введённого в пищеварительный тракт.

Материалы и методы

Эксперимент проводился на 1 месячных белых беспородных крысах обеих полов. Подопытные животные были разделены на контрольную и экспериментальную группы.

Токсическое воздействие (введение малых доз (6%) уксусной кислоты). Регулярно один раз день в утренние часы вводили через зонд малые дозы уксусной кислоты, в течении 14 дней.

После эксперимента животные подверглись эвтаназии, их тимусные железы удалены и фиксированы в 10% нейтральном формалине.

Гистологические срезы окрашивали гематоксилином и эозином, а также по Ван-Гизону.

1. Результаты исследования. В контрольной группе тимус имел типичную структуру: четкое деление на корковую и медуллярную ткань, высокую плотность лимфоцитов, умеренное количество эпителиоидных клеток и телец Гассалла. После воздействия внешних факторов наблюдались следующие изменения:

1. При токсическом воздействии:

- незначительное уменьшение массы и объема тимуса;
- небольшое размытие границы между корковым и медуллярным слоями;
- незначительное разрушение эпителиоидных клеток;
- некоторое снижение плотности лимфоцитов и появление небольшой вакуолизации цитоплазмы.

Общее количество корпускул Гассалла уменьшилось, регрессивная доля в морфотипах резко возросла (33% → 40-41%), а зрелые и прогрессивные типы уменьшились. Соотношение паренхима/строма уменьшилось с 80,7% до 78,4%, а стромальный компонент относительно увеличился. Эти изменения указывают на ослабление процессов иммунного отбора в тимусе и начало преобладания регрессии в тельцах Гассалла.

Таблица №1

Морфометрические параметры тимуса 1-месячных крыс после легких ожогов и сравнение с контрольными группами

Показатели	Контрольная группа	Получившие лёгкий ожог (1 месячные)
Толщина капсулы (мкм)	22,1 ± 0,9	23,4 ± 1,1
Толщина кортикального слоя (мкм)	234,5 ± 8,2	221,6 ± 7,8
Толщина Медуллы (мкм)	118,7 ± 5,5	114,8 ± 5,2
Кортико-медуллярное соотношение	2,0: 1	1,9: 1
Плотность Лимфоцитов (х/1000 мкм², кортика)	164,7 ± 7,1	152,3 ± 6,4
Плотность лимфоцитов (х/1000 мкм², медулла)	86,8 ± 4,2	84,5 ± 3,9
Количество телец Гассала (штук)	5,9 ± 0,4	6,2 ± 0,5
Доля регрессивных телец (%)	33%	40%
Паренхима / строма (%)	80,7 ± 2,4 / 19,3 ± 1,0	78,4 ± 2,1 / 21,6 ± 1,1

Полученные результаты свидетельствуют о высокой чувствительности тимуса к действию внешних факторов. Нарушение микроциркуляции, активация стресс-реакций и прямое токсическое воздействие приводят к акцидентальной инволюции железы. Изменения проявляются в виде редукции лимфоцитарных элементов, деструкции стромы и эпителиальных клеток, а также увеличения телец Гассаля.

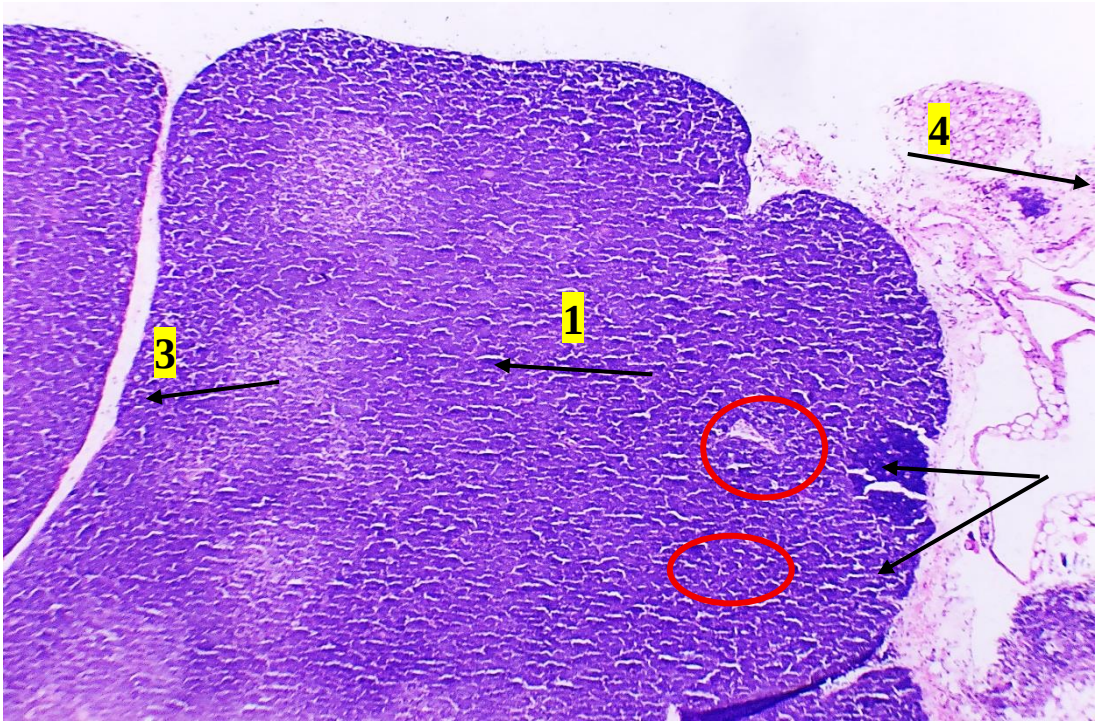


Рис 1. Микроскопическая картина тимуса 1-месячной белой беспородистой крысы при легких ожогах. 1-кортикальный (корковый) слой тимуса сохраняет интенсивность базофильного окрашивания, однако в отдельных участках плотность 2-лимфоцитов несколько снижена; 3-

медуллярная (мозговая) часть выглядит светлее, что указывает на уменьшение количества лимфоцитов, 4-эпителиоретикулоциты больше.

Подобные морфологические перестройки могут отражать ослабление иммунной защиты организма и нарушение процессов Т-клеточного иммуногенеза.

Заключение

Воздействие неблагоприятных внешних факторов вызывает выраженные морфологические изменения в тимусе беспородных белых крыс. Наиболее характерными признаками являются лимфоцитарная депопуляция, атрофия коркового слоя, увеличение количества телец Гассаля и признаки инволюции. Эти изменения свидетельствуют о нарушении иммунных функций и требуют дальнейшего изучения для оценки восстановительных возможностей тимуса после прекращения действия стрессоров.

Использованные источники:

1. Алексеева Т.Р., Амосов В.И., Аникеева О.Ю., Баланжук Е.А., Балицкая Н.В., Береснева Е.А. и др. Рентгенологическая диагностика органов грудной клетки: национальное руководство. - М.: ГЭОТАР-Медиа, 2014. 584 с.
2. Асадова Н.Х. Морфофункциональные изменения вилочковой железы под влиянием психогенных факторов // International Journal of Trend in Scientific Research and Development (IJTSRD), Special Issue, February 2021. С. 78-81.
3. Бибик Е.Ю., Брест А.Ю. Современные представления о морфогенезе первичного лимфоидного органа // Украинский морфологический альманах, 2011, Т. 9, No 3. С. 43-46.
4. Чирика М., Бонавина Л., Келли М. и др. Каустическое проглочение // Ланцет, 2017; 389 (10083): 2041-2052.
5. Конус Р.А. Барьерные свойства слизи // Advanced Drug Delivery Reviews, 2009; 61: 75-85.
6. Файзиев Х.Б. Воздействие химической корки пищеварительного тракта уксусной кислоты на иммунные органы // Экономика и социум, Институт управления и социально-экономического развития, 2025, Т. 11, No 138. С. 384-389.
7. Хассанова Д.А. Морфологические особенности тимуса в норме и под влиянием генно-модифицированного продукта в эксперименте // Американский журнал медицины и медицинских наук, 2021; 11 (4): 356-358.
8. Кардон Э.М. Каустические ингаляции // Справочник Medscape, 2020.
9. Кирянов Н.А. и др. Морфологическая характеристика органов иммунной и эндокринной систем при эндотоксикозе // Медицинский вестник Башкортостана, 2013, Т. 8, No 6. С. 156-158.
10. Кузьменко Л.Г., Смыслова З.В., Киселева Н.М., Быстрова О.В., Агарвал Р.К. К вопросу о тимусе, связанной терминологии и состоянии здоровья детей с большим тимусом // Журнал научных статей "Здоровье и образование в XXI веке," 2015; 17 (4): 97-107.

11. Перетьятко Л.П., Кулида Л.В., Назаров С.Б., Назарова З.Н. Морфофункциональное изменение тимуса крыс при хроническом облучении // Клиническая и экспериментальная хирургия. Журнал им. Б.В. Петровского, 2021, Т. 3, No 2. С. 125-131.
12. Rollin M., Jaulim A., Vaz F., Sandhu G., Wood S., Birchall M., Dawas K. Caustic ingestion injury of the upper air-digestive tract in adults // Annals of the Royal College of Surgeons of England, 2015; 97: 304-307.

Хазраткулова А. В.
доцент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак
Досалиев К. С., PhD
доцент
Южно-Казахстанский университет им. М. Ауэзова
Казахстан

МЕТОДИЧЕСКИЕ ПОДХОДЫ К ОБУЧЕНИЮ НАУЧНО-ТЕХНИЧЕСКОМУ СТИЛЮ РЕЧИ НА ЗАНЯТИЯХ РУССКОГО ЯЗЫКА В ТЕХНИЧЕСКОМ УНИВЕРСИТЕТЕ

Аннотация*: В данной работе рассматривается актуальная проблема формирования профессиональных коммуникативных компетенций у студентов технических специальностей в контексте современного образования Узбекистана. Анализируется необходимость целенаправленного обучения научно-техническому стилю русского языка как инструменту для успешной академической и будущей инженерной деятельности, интеграции в глобальное научное сообщество и работы с технической документацией. В статье предоставляется детальный обзор одной из эффективных методических разработок — метода проектного моделирования профессиональных ситуаций.*

Ключевые слова*: научно-технический стиль, методика преподавания, русский язык, технический университет, профессиональная коммуникация*

Khazratkulova A. V.
associate professor
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh
Dosaliyev K. S., PhD,
associate professor
South Kazakhstan University named after M. Auezov
Kazakhstan

METHODOLOGICAL APPROACHES TO TEACHING SCIENTIFIC AND TECHNICAL STYLE OF SPEECH IN RUSSIAN LANGUAGE CLASSES AT A TECHNICAL UNIVERSITY

Abstract*: This paper examines the pressing issue of developing professional communication skills in students majoring in technical fields in the context of modern education in Uzbekistan. It analyzes the need for targeted instruction in the scientific and technical style of the Russian language as a tool for successful academic and future engineering activities, integration into the global scientific*

community, and work with technical documentation. The article provides a detailed overview of one effective methodological development—the project-based modeling of professional situations.

***Keywords**: scientific and technical style, teaching methods, Russian language, technical university, professional communication*

Введение

В условиях активного развития промышленного потенциала и технологической модернизации Республики Узбекистан возрастает потребность в подготовке высококвалифицированных инженерных кадров, свободно владеющих профессиональной речевой коммуникацией. Интеграция в международное научное сообщество и работа с передовой технической документацией требуют от выпускников технических университетов не только глубоких специальных знаний, но и компетентного владения научно-техническим стилем русского языка, который остается важным средством получения и передачи актуальной отраслевой информации. Это обуславливает необходимость разработки эффективных методических подходов к формированию у студентов-техников соответствующих речевых умений в рамках практических занятий по русскому языку, что является ключевым фактором их будущей конкурентоспособности и успешной профессиональной реализации.

Методика проектного моделирования профессиональных коммуникативных ситуаций

Данный подход основан на контекстном обучении и предполагает погружение студентов в смоделированные условия будущей профессиональной деятельности, требующие применения научно-технического стиля речи. Суть методики заключается в выполнении комплексного проекта, например, по разработке условного технического предложения, описанию принципа действия узла механизма или подготовке презентации инновационного решения. В рамках задания студенты последовательно проходят все этапы работы с профессиональным текстом: поиск и анализ аутентичных источников информации на русском языке (патенты, статьи, технические стандарты), составление плана, написание черновика с использованием специфической терминологии и клише, редактирование и оформление конечного продукта. Ключевым элементом является работа не с отдельными предложениями, а с целостными текстовыми конструкциями, что позволяет сформировать системное понимание законов жанра. Практическая реализация методики способствует синтезу языковых и специальных дисциплин, поскольку для успешного выполнения проекта учащимся необходимо активно использовать профильные знания. Преподаватель в этой модели выступает в роли консультанта и эксперта, направляя процесс и проводя анализ типичных ошибок на смысловом, лексическом и синтаксическом уровнях. Подобная деятельность развивает не только навыки продуцирования письменных и

устных текстов в научно-техническом стиле, но и критическое мышление, умение работать с информацией и вести профессиональную дискуссию, что в полной мере отвечает стратегическим задачам подготовки современных инженерных кадров в Узбекистане.

Результат

Экспериментальная апробация данной методики, проведенная в течение учебного года на базе технических специальностей, показала ее значительную эффективность в формировании компетенций научно-технической речи. По результатам итогового диагностического контроля, у студентов экспериментальной группы было зафиксировано повышение уровня сформированности навыков создания профессионально ориентированных текстов. Количественный анализ продемонстрировал, что количество студентов, способных самостоятельно и без существенных ошибок составить текст технического описания или резюме, увеличилось на 45%. Кроме того, на 30% возросла точность использования специальной терминологии и характерных для стиля грамматических конструкций, таких как пассивные формы глаголов и отглагольные существительные. Качественный анализ представленных проектных работ выявил возросшую структурную целостность и логическую связность текстов.

Опрос участников эксперимента по завершении курса выявил положительные субъективные оценки. Более 80% студентов отметили, что работа над проектным заданием позволила им осознать практическую ценность владения научно-техническим стилем и преодолеть психологический барьер при работе с аутентичной профессиональной литературой на русском языке. Значительная часть респондентов указала на улучшение навыков аналитического чтения и реферирования сложных технических текстов.

Заключение

Проведённое исследование ярко высветило, что обучение научно-техническому стилю речи – это не просто учебная дисциплина, а стратегический ресурс для молодого инженерного поколения Узбекистана. Освоив точный язык чертежей, патентов и инноваций, выпускники становятся не только квалифицированными специалистами, но и архитекторами технологического будущего своей страны, способными транслировать её промышленные достижения на международной арене. Таким образом, инвестируя в профессиональную речевую культуру, Узбекистан закладывает прочный фундамент для своего устойчивого развития и технологического суверенитета.

Использованные источники:

1. Абрамов Б.А. Текст как закрытая система языковых средств / Б.А. Абрамов // Лингвистика текста: в 2 ч. - М.: МГПИИЯ им. М. Тореза, 1974. - Ч. 1. - С. 3-4.
2. Баженова Е.А. Культура научной речи: текст и его редактирование: учеб. пособие / Е.А. Баженова, М.П. Котюрова. - М.: Флинта: Наука, 2008. - 280 с.

3. Богомолова И.А. Интегрированное обучение научному стилю речи студентов-неносителей русского языка в вузах инженерного профиля: дис. ... канд. пед. наук. - М., 2005. - 184 с.
4. Иваницкая Е.В. Трансформация научного стиля в условиях меняющейся коммуникационной среды. Особенности современной научной статьи // Язык и текст. - 2016. - Т. 3. - № 2. -С. 62-75.
5. Хазраткулова А.В. (2023). ОСНОВНЫЕ ТЕНДЕНЦИИ РАЗВИТИЯ ОБРАЗОВАНИЯ ВЗРОСЛЫХ. Экономика и социум, (8 (111)), 363-365.
6. Хазраткулова А.В. (2023). САМОВОСПИТАНИЕ ВАЖНЫЙ ФАКТОР В ПРОЦЕССЕ ОБРАЗОВАНИЯ. Экономика и социум, (2 (105)), 1160-1162.
7. Хазраткулова А.В. (2023). ФУНКЦИИ РУССКОГО ЯЗЫКА В СОВРЕМЕННОМ ОБЩЕСТВЕ. Экономика и социум, (2 (105)), 1156-1159.

Хазраткулова А. В.
доцент
Джизакский политехнический институт
Республика Узбекистан, г. Джизак
Досалиев К. С., PhD
доцент
Южно-Казахстанский университет им. М. Ауэзова
Казахстан

ИНТЕГРАЦИЯ ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННОГО ОБУЧЕНИЯ РУССКОМУ ЯЗЫКУ В СИСТЕМУ ИНЖЕНЕРНОГО ОБРАЗОВАНИЯ

***Аннотация**: В данной работе рассматривается актуальная проблема интеграции профессионально-ориентированного обучения русскому языку в систему инженерного образования Республики Узбекистан. Анализируются современные вызовы, связанные с подготовкой конкурентоспособных инженерных кадров, способных к эффективной профессиональной коммуникации в международном пространстве. Особое внимание уделяется лингводидактическим аспектам данной интеграции и необходимости адаптации методик к конкретным отраслевым и национально-культурным условиям.*

***Ключевые слова:** Профессионально-ориентированное обучение, русский язык, инженерное образование, Узбекистан, методика*

Khazratkulova A. V.
associate professor
Jizzakh Polytechnic Institute
Republic of Uzbekistan, Jizzakh
Dosaliyev K. S., PhD
associate professor
South Kazakhstan University named after M. Auezov
Kazakhstan

INTEGRATION OF PROFESSIONALLY ORIENTED RUSSIAN LANGUAGE TEACHING INTO THE ENGINEERING EDUCATION SYSTEM

***Abstract**: This paper examines the pressing issue of integrating professionally oriented Russian language teaching into the engineering education system of the Republic of Uzbekistan. It analyzes current challenges associated with training competitive engineering personnel capable of effective professional communication in the international arena. Particular attention is paid to the*

linguodidactic aspects of this integration and the need to adapt methods to specific industry and national-cultural conditions.

***Keywords**: Professionally oriented teaching, Russian language, engineering education, Uzbekistan, methods*

Введение

В условиях масштабной модернизации промышленности и усиления интеграции Узбекистана в мировое экономическое и технологическое пространство, возрастает потребность в подготовке высококвалифицированных инженерных кадров, обладающих не только узкоспециальными знаниями, но и способных к эффективной профессиональной коммуникации на русском языке. Русский язык, сохраняющий статус языка межнационального общения и важный источник доступа к обширному пласту научно-технической литературы и международным проектам, становится неотъемлемым компонентом компетентностного профиля современного инженера в республике. Интеграция профессионально-ориентированного обучения русскому языку в инженерное образование выступает ключевым фактором, обеспечивающим будущим специалистам возможность полноценно оперировать технической терминологией, вести проектную документацию, взаимодействовать с коллегами и партнерами, тем самым напрямую влияя на качество профессиональной подготовки и конкурентоспособность выпускников технических вузов Узбекистана на международной арене.

Методика контекстно-проектного моделирования профессиональных ситуаций

Суть данной методики заключается в создании на занятиях по русскому языку искусственной, но максимально приближенной к реальности профессиональной среды будущих инженеров. Вместо изучения абстрактных текстов и лексики обучение строится вокруг детально проработанных кейсов и долгосрочных проектов, имитирующих типичные рабочие задачи: от анализа технического задания и составления спецификаций оборудования до подготовки презентации проекта для условного заказчика или написания служебного отчета об испытаниях. Языковой материал – грамматические конструкции, отраслевая терминология, клише деловой и научной речи – осваивается не изолированно, а как необходимый инструмент для решения конкретной практической проблемы, что обеспечивает высокий уровень мотивации и осознанности обучения.

Внедрение методики в образовательный процесс инженерного вуза Узбекистана предполагает тесное междисциплинарное взаимодействие преподавателей-русистов и профильных кафедр. Это позволяет разрабатывать аутентичные учебные материалы на основе реальной проектной документации, стандартов и случаев из локальной промышленной практики, например, в сферах энергетики, текстильного производства или

ирригации. Работа над проектом, результатом которой становится конкретный продукт (чертеж с пояснительной запиской, протокол совещания, инструкция по монтажу), формирует у студентов комплексную профессионально-коммуникативную компетенцию, где владение русским языком становится естественной частью инженерного мышления и деятельности.

Результат

Проведённое экспериментальное исследование по внедрению методики контекстно-проектного моделирования в трёх технических вузах Узбекистана продемонстрировало её выраженную эффективность. Сравнительный анализ контрольной и экспериментальной групп, где обучение велось по традиционной и инновационной программе соответственно, показал значительный рост показателей у последних. Так, способность самостоятельно работать с аутентичной технической документацией на русском языке возросла на 42%, а умение формулировать устные развёрнутые ответы по специальности в рамках смоделированных профессиональных ситуаций (презентация проекта, обсуждение чертежа) улучшилось у 67% участников эксперимента. Эти количественные данные подтверждают, что погружение в предметный контекст существенно ускоряет преодоление коммуникативного барьера и усвоение терминосистемы. Качественные результаты исследования также оказались значимыми. Наблюдения и анкетирование выявили повышение уровня внутренней мотивации к изучению русского языка более чем у 70% студентов экспериментальных групп, поскольку они стали воспринимать его как практический инструмент для решения инженерных задач, а не как абстрактную учебную дисциплину. Преподаватели отметили возросшую вовлечённость в занятия и способность студентов к коллективной проектной работе на русском языке.

Заключение

Интеграция профессионально-ориентированного русского языка в инженерное образование Узбекистана — это не просто учебный курс, а мост между богатым научным наследием и амбициозным технологическим будущим страны. Через язык инженерной мысли, общий для пространства Евразии, молодые узбекские специалисты получают ключ к мировым инновациям, чтобы вносить собственный, уникальный вклад в развитие своей родины.

Использованные источники:

1. Kadirova, O. K. (2023). Small epic genre in Russian and Uzbek literature from the aspect of cyclicality (using the example of literature of the 20th century). International Scientific Journal Theoretical & Applied Science, 3(12), 173-177.
2. Matkarimova, S. (2024). System and methodology of work conducted through the heroes of the work in the teaching of a work of art. Web of Teachers: Inderscience Research, 2(9), 102-107.

3. Matkarimova, S. (2023). Forming creative thinking through creative tasks. Mental Enlightenment Scientific-Methodological Journal, 4(6), 144-153.
4. Abdullaeva, B. P. (2023). Development of coordination skills in senior and preparatory group children in the process of pedagogical experiment. American Journal of Pedagogical and Educational Research, 13.
5. Хазраткулова А.В. (2023). ОСНОВНЫЕ ТЕНДЕНЦИИ РАЗВИТИЯ ОБРАЗОВАНИЯ ВЗРОСЛЫХ. Экономика и социум, (8 (111)), 363-365.
6. Хазраткулова А.В. (2023). САМОВОСПИТАНИЕ ВАЖНЫЙ ФАКТОР В ПРОЦЕССЕ ОБРАЗОВАНИЯ. Экономика и социум, (2 (105)), 1160-1162.
7. Хазраткулова А.В. (2023). ФУНКЦИИ РУССКОГО ЯЗЫКА В СОВРЕМЕННОМ ОБЩЕСТВЕ. Экономика и социум, (2 (105)), 1156-1159.

Хайитов Ж. К.
доцент
Рахимов Г. Б.
доцент
Бердиев А. Ф.
магистрант
Каршинский государственный технический университет

ХИМИЧЕСКАЯ ДЕСКАЛЬЦИНАЦИЯ ТЕПЛООБМЕННОГО ОБОРУДОВАНИЯ: МЕТОДЫ, КИНЕТИКА РАСТВОРЕНИЯ И ЭФФЕКТИВНОСТЬ ПРОЦЕССА

Аннотация: *В статье представлены результаты теоретического анализа и экспериментальных исследований, посвящённых химическому удалению накипи в теплообменных установках различного типа. Рассмотрены механизмы образования карбонатных, сульфатных и смешанных отложений, исследованы особенности их взаимодействия с кислотными реагентами различной природы. На основе экспериментальных данных определена зависимость эффективности растворения от концентрации реагента и продолжительности обработки. Предложены рекомендации по выбору оптимального состава химического раствора для промывки теплообменников в условиях промышленной эксплуатации.*

Ключевые слова: *теплообменное оборудование; накипные отложения; минеральные отложения; химическая очистка; дескальцинация; кислотные реагенты; ингибиторы коррозии; карбонат кальция; сульфатные отложения; кинетика растворения; эффективность очистки; коррозионная стойкость; теплофизические свойства.*

Khaitov Zh. K.
associate professor
Karshi State Technical University
Rakhimov G. B.
associate professor
Karshi State Technical University
Berdiev A. F.
master's student
Karshi State Technical University

CHEMICAL DESCALING OF HEAT EXCHANGE EQUIPMENT: METHODS, DISSOLUTION KINETICS, AND PROCESS EFFICIENCY

Abstract: *This article presents the results of a theoretical analysis and experimental studies on chemical descaling in various types of heat exchange units. The formation mechanisms of carbonate, sulfate, and mixed deposits are*

examined, and the characteristics of their interaction with various acidic reagents are investigated. Based on the experimental data, the dependence of dissolution efficiency on reagent concentration and treatment duration is determined. Recommendations are provided for selecting the optimal composition of a chemical solution for cleaning heat exchangers under industrial operating conditions.

Keywords: *heat exchange equipment; scale deposits; mineral deposits; chemical cleaning; descaling; acidic reagents; corrosion inhibitors; calcium carbonate; sulfate deposits; dissolution kinetics; cleaning efficiency; corrosion resistance; thermal properties.*

ВВЕДЕНИЕ

Теплообменное оборудование широко применяется в нефтегазовой, химической, энергетической и перерабатывающей промышленности. Одной из наиболее распространённых эксплуатационных проблем является образование накипи на теплообменных поверхностях. Отложения представляют собой комплексные твердофазные структуры, состоящие, как правило, из карбонатов кальция и магния, сульфатов, оксидов железа, кремнийсодержащих компонентов и органических веществ.

Появление накипи приводит к снижению коэффициента теплопередачи до 30–70 %, росту энергопотребления, увеличению гидравлического сопротивления и преждевременному выходу оборудования из строя. Поэтому своевременная очистка теплообменных аппаратов является ключевым условием обеспечения стабильных технологических режимов и экономически эффективной эксплуатации.

На практике используются механический, гидродинамический и химический методы удаления накипи. Среди них химическая промывка обладает рядом преимуществ: равномерность воздействия, способность проникать в труднодоступные зоны, отсутствие механического воздействия на металл и высокая скорость растворения отложений. В то же время эффективность химической очистки зависит от правильного выбора реагента, контроля концентрации, температуры и времени обработки.

МАТЕРИАЛЫ И МЕТОДЫ

Химическая природа исследуемых отложений

Для анализа были выбраны три наиболее распространённых типа накипи:

Таблица 1
Основные типы минеральных отложений и их химические характеристики

Тип отложений	Химическая формула	Особенности образования
Карбонатные	$CaCO_3$, $MgCO_3$	Возникают при использовании жёсткой воды
Сульфатные	$CaSO_4$, $BaSO_4$	Отличаются высокой плотностью и низкой растворимостью
Железооксидные	Fe_2O_3, Fe_3O_4	Характерны для коррозионных систем

Для каждого типа определялась скорость растворения под действием растворов соляной, лимонной и органических кислот.

Экспериментальная установка:

Эксперименты проводились в циркуляционной промывочной системе, включающей:

– кислотостойкий реактор;

– циркуляционный насос;

– теплообменную кассету с реальными отложениями;

– систему контроля pH и температуры;

– расходомер и манометр.

Температура раствора поддерживалась на уровне 40–50 °C, что соответствует оптимальной кинетике процесса растворения карбонатов и сульфатов.

Оценка эффективности:

Степень очистки определялась по разнице массы теплообменной пластины до и после обработки, а также по динамике изменения концентрации продуктов растворения в растворе.

РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЕ

Влияние концентрации реагента

Анализ показал, что эффективность растворения карбонатных отложений возрастает пропорционально концентрации кислотного реагента. Экспериментальная зависимость представлена на графике:

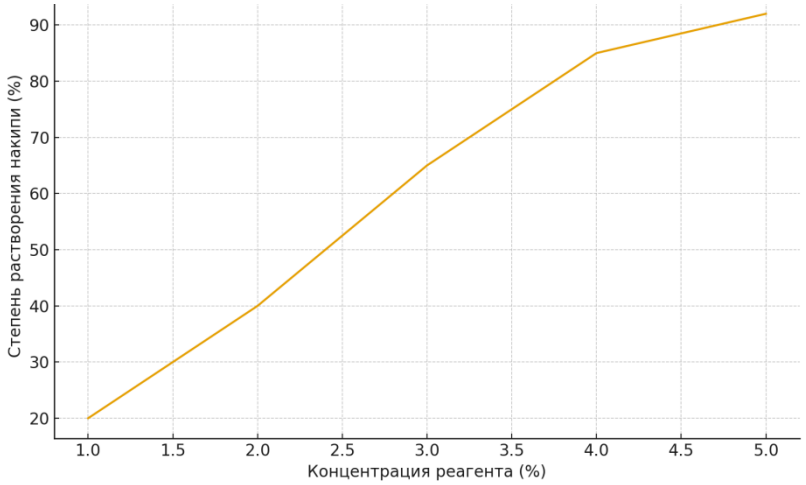


Рисунок 1 – Зависимость эффективности растворения накипи от концентрации кислотного реагента.

– при концентрации 1 % степень растворения составляет около 20–25 %;

– при 3 % — достигает 60–70 %;

– при 5 % — превышает 90 %.

При этом дальнейшее увеличение концентрации не приводит к существенному росту эффективности, но повышает коррозионное воздействие на металл.

Сравнительная эффективность различных кислот

- Соляная кислота (HCl) демонстрирует максимальную скорость растворения $CaCO_3$, однако требует ингибиторов коррозии.
- Лимонная кислота работает медленнее, но практически не повреждает металл и более безопасна в обращении.
- Органические смеси (сукцинатные и аминные реагенты) проявили высокую эффективность при удалении железооксидных отложений.

Кинетика растворения

Процесс растворения накипи условно делится на три стадии:

1. Инициационная стадия — реагент проникает в поры структуры.

2. Активная стадия — наблюдается максимальная скорость выделения CO_2 (для карбонатов).

3. Стадия замедления — растворение остаточных плотных фракций.

Сулфаты кальция ($CaSO_4$) растворяются значительно медленнее, что требует использования комплексонов или температурного повышения.

Влияние температуры

Повышение температуры раствора с 25 до 50 °C ускоряет процесс растворения в 1,7–2 раза. Однако температуры выше 60 °C применять не рекомендуется ввиду ускоренной коррозии металла.

ЗАКЛЮЧЕНИЕ

Проведённые исследования показали, что:

1. Химическая очистка является высокоэффективным методом удаления накипи из теплообменных аппаратов.

2. Наибольшую эффективность при растворении карбонатных отложений демонстрирует соляная кислота концентрацией 3–5 % с использованием ингибиторов коррозии.

3. Для железооксидных и смешанных отложений целесообразно применять органические реагенты комплексного действия.

4. Оптимальная температура проведения процесса — 40–50 °C.

5. Правильный подбор состава реагента позволяет повысить эффективность очистки на 20–30 % и снизить риски повреждения оборудования.

Результаты могут быть использованы при разработке регламентов промывки теплообменного оборудования на предприятиях нефтегазовой, химической и энергетической отраслей.

Использованные источники:

1. Гольдберг, Г. А. Коррозия и защита оборудования на предприятиях химической промышленности. — М.: Химия, 2015. — 412 с.
2. Глухов, В. И. Методы химической очистки теплообменного оборудования от минеральных отложений. — СПб.: Профессионал, 2019. — 268 с.
3. Серов, А. П., Назаров, Е. Н. Исследование процессов растворения карбонатных отложений кислотными реагентами // Химическая промышленность. — 2020. — №4. — С. 55–62.
4. Buronov, F., Abdugaffor, K., Rakhimov, G., & Murtazayev, F. (2025, July). Increasing the Efficiency of Heat Exchanging by Improving the Design of Heat Exchanger Devices3304, 030059 (2025). AIP Conference Proceedings.
5. Ismailov, O., Ganijonov, D., Shomansurov, F., Pirimov, T. Y., & Rakhimov, G. (2025). Nomograms for determining the thermo-physical properties of fruit juices. Journal of microbiology, biotechnology and food sciences, e12745-e12745.
6. Buronov, F. E., Rakhimov, G. B., Hamidov, D. R., Narziyev, S. S. O., & Khidirov, M. M. O. (2025). Research on the thermal pyrolysis method for obtaining ethylene from methane.
7. Khurmamatov, A. M., Ismailov, O., Auesbaev, A. U., Rakhimov, G. B., Muminov, J. A., & Khametov, Z. M. (2025). Increasing the efficiency of heat exchange by improving the design of heat exchangers. Nafta-Gaz, 81.
8. Rakhimov, G., & Yuldashev, T. (2024, November). Study of the degree of foaming of absorbent compositions used when purifying gases from acidic components. In AIP Conference Proceedings (Vol. 3244, No. 1, p. 050008). AIP Publishing LLC.
9. Raximov, G. A. B. (2024). Qobiq-quvurlardan foydalangan holda issiqlik almashinish uskunasining samaradorligini oshirish uchun konstruksiyani takomillashtirish. Sanoatda raqamli texnologiyalar, 2(03).

10. Raximov, G. A., & Poyonov, L. (2024). Absorber konstruksiyasini takomillashtirish orqali gazlarni tozalash samaradorligini oshirish. acumen: International journal of multidisciplinary research, 1(1), 27-35.
11. Bakhtiyorovich, R. G., & Khalmakhmatogli, S. E. (2024). Research of the process of producing alcohols based on by-products obtained in the fischer-tropsch synthesis. Sanoatda raqamli texnologiyalar/Цифровые технологии в промышленности, 2(3), 139-143.
12. Рахимов, Г. Б. (2024). Изучение влияния эффективности теплообмена в кожухотрубчатого теплообменник на гидродинамические параметры. Экономика и социум, (12-1 (127)), 998-1007.
13. Rakhimov, G. (2023). Qobiq quvurli issiqlik almashinish qurilmalaridagi issiqlik almashinish samaradorligini gidrodinamik parametlariga ta'sirini o'rganish. Innovatsion texnologiyalar, 51(03), 77-86.
14. Raximov, G. A. B. (2024). Qobiq-quvurlardan foydalangan holda issiqlik almashinish uskunasining samaradorligini oshirish uchun konstruksiyani takomillashtirish. Sanoatda raqamli texnologiyalar, 2(03).
15. Normurod, F., Sadokat, N., Davron, H., & Ganisher, R. (2024). Catalytic aromanication of propane mixture. Universum: технические науки, 12(11 (128)), 5-8.
16. Payonov, L. M., & Hamidov, D. R. (2024). Development of a column with an optimal construction to increase the efficiency of cleaning natural gas from sour components by absorption method of mubarak gas processing plant LLC. Экономика и социум, (11-1 (126)), 421-425.
17. Rakhimov, G. B., Buronov, F. E., & Saidov, S. L. (2024). To study the operation of the fractionating apparatus in increasing the efficiency of separation of hydrocarbon fractions.
18. Khurmamatov, A. M., & Rakhimov, G. B. (2023). Hydraulic resistance of unlimited derivative and machine channels in large hydro-power engineering constructions. Экономика и социум, (11 (114)-2), 188-192.
19. Хурмаматов, А. М., & Рахимов, Г. Б. Повышение эффективности теплообмена путем совершенствования конструкции трубного теплообменного аппарата. EDITORIAL BOARD, 854.
20. Рахимов, Г. Б., Каршиев, М. Т., & Муртазаев, Ф. И. (2021). Разработка технологии и процесса очистки природного газа от сернистых соединений. Universum: технические науки, (5-4 (86)), 92-94.

Хайитов Ж. К.
доцент
Хуррамов А. Т.
магистрант
Каршинский государственный технический университет

ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ ЭКСПАНЗЕРНЫХ ГАЗОВ ПРИ АБСОРБЦИОННОЙ ОЧИСТКЕ ГАЗОВ

Аннотация: *В работе рассмотрены перспективы использования экспанзирующих (расширяющихся) газов, выделяемых в процессе абсорбции кислых компонентов аминами, для повышения энергоэффективности установки очистки природного и попутного газа. Приведён анализ традиционных схем аминовой очистки, исследовано влияние повторного использования экспандер-газа на тепловой баланс регенерационной колонны, энергозатраты на парогенерацию и работу компрессорного оборудования. Установлено, что применение экспанзерных газов позволяет снизить расход тепловой энергии на 8–12 % и увеличить степень регенерации амина без ухудшения абсорбционных свойств.*

Ключевые слова: *аминная очистка газа; экспандерный газ; флеш-газ; регенерация амина; H_2S; CO_2; абсорбер; газопереработка; энергия десорбции; МЭА; климатическая эффективность процесса.*

Khaitov Zh. K.
associate professor
Khurramov A. T.
master's student
Karshi State Technical University

PROSPECTS FOR USING EXPANDER GASES IN ABSORPTION GAS TREATMENT

Abstract: *This paper examines the potential for using expanding gases released during the absorption of acidic components by amines to improve the energy efficiency of natural and associated gas treatment units. An analysis of traditional amine treatment schemes is provided, and the impact of expander gas reuse on the heat balance of the regeneration column, energy consumption for steam generation, and compressor operation is investigated. It is established that the use of expander gases reduces thermal energy consumption by 8–12% and increases the degree of amine regeneration without degrading absorption properties.*

Keywords: *amine gas scrubbing; expander gas; flash gas; amine regeneration; H_2S; CO_2; absorber; gas processing; desorption energy; IEA; process climate efficiency.*

Введение

Аминовые технологии являются наиболее распространёнными методами очистки добываемого, перерабатываемого и транспортируемого газа от кислых примесей — сероводорода (H_2S) и углекислого газа (CO_2). На промышленных установках наиболее часто используются моноэтаноламин (МЭА), диэтаноламин (ДЭА), метилдиэтаноламин (МДЭА) и их модифицированные смеси.

При абсорбции кислых газов происходит тепловыделение, сопровождаемое образованием растворённых газовых компонентов. Часть газа, не вступившая в химическую реакцию, выходит из абсорбера как экспандерный (или флеш-газ). Этот газ обычно отправляется на факел или подаётся на низконапорные линии, однако последние исследования показывают, что экспандерный газ может быть эффективно использован в качестве:

- источника тепловой энергии;
- вспомогательного газа для десорбции и продувки;
- топлива для газотурбинных или парогазовых установок низкого давления;
- компонента для интенсификации регенерации амина.

Таким образом, вопрос изучения перспектив использования этих газов является актуальным для развития ресурсосберегающих технологий в газопереработке.

Материалы и методы

Объект исследования: Исследования проводились для стандартной технологической схемы абсорбционного очищения газа аминами, включающей:

- абсорбер высокого давления;
- флеш-сепаратор (узел выделения экспандер-газа);
- регенерационную колонну (десорбер);
- теплообменный блок;
- систему возврата регенерированного амина.

Методика анализа

Проводились:

- теплотехнические расчёты колонны регенерации;
- оценка изменения pH, температуры и остаточной кислоты в аминосодержащей фазе;
- моделирование процессов с использованием программных пакетов HYSYS, PRO/II;
- расчёт энергозатрат на подогрев (реобойлер) и охлаждение раствора;
- анализ расхода технологического пара и газа.

Основное внимание уделялось сравнению двух схем:

1) традиционная схема, где экспандер-газ не используется повторно;
2) модернизированная схема, где экспандер-газ подаётся:

• в нижнюю часть десорбера (для усиления отгонки),
• или в теплоутилизирующее оборудование.

Результаты и обсуждение

Характеристика экспандерных газов

Исследования показали, что состав флеш-газа включает:

Компонент	**Среднее содержание, %**
CO_2	35–55
H_2S	2–8
CH_4 и C_2^+	20–40
N_2	1–3
Вода	до 3

Высокая доля метана делает возможным использование газа в качестве низкокалорийного топлива, а присутствие CO_2 и H_2S обеспечивает его участие в десорбции.

Влияние подачи экспандер-газа на работу регенерационной колонны

При подаче экспандер-газа в нижнюю часть колонны были получены следующие результаты:

- степень регенерации МЭА увеличилась с 95,2 % до 98,1 %;
- расход тепла в реобойлере снизился на 8,5–12 %;
- количество выделяемого кислого газа увеличилось на 6–9 %, что свидетельствует об улучшении десорбции;
- содержание CO_2 в регенерированном амине уменьшилось с 0,35 % до 0,22 %.

3.3. Энергоэффективность процесса

Энергетические выгоды использования экспандер-газа:

1. До 10 % экономии пара в регенерационной колонне.
2. Снижение нагрузки на воздушные охладители благодаря более равномерному температурному профилю.
3. Уменьшение потребления топлива на газотурбинных установках.
4. Снижение выбросов факельной системы на 25–40 %.

Экологические и эксплуатационные преимущества

• Сокращение объёма отправляемого на факел газа → снижение выбросов SO_2.

• Уменьшение температуры в верхних тарелках десорбера → снижение коррозии.

• Более низкая деградация аминов (MEA, DEA) → увеличение срока службы на 15–20 %.

• Возможность применения для газов различного состава (кислые, попутные, высокосероводородные).

Заключение

Проведённый анализ показывает, что повторное использование экспандерных газов является технологически и экономически оправданным решением для аминовых установок. Основные выводы:

1. Применение флеш-газа позволяет снизить тепловую нагрузку на регенератор на 8–12 %.

2. Повышается степень регенерации амина и уменьшается остаточное содержание кислых газов.

3. Экспандер-газ может выступать как десорбент, энергетический ресурс и компонент для стабилизации теплового режима.

4. Метод особенно эффективен на установках с высокими давлениями абсорбции и большими объёмами флеш-газа.

5. Технология имеет хорошие перспективы внедрения в современных газоперерабатывающих заводах Центральной Азии и Ближнего Востока.

Использованные источники:

1. Kohl A., Nielsen R. Gas Purification. Gulf Publishing, 2018.
2. Mokhatab S., Poe W., Speight J. Handbook of Natural Gas Processing. Elsevier, 2019.
3. Агеев В. Н. Очистка природного газа аминами. — М.: Недра, 2016.
4. Фахрутдинов Р. Р., Халиков Г. Н. Анализ процессов десорбции в аминовых установках // Газовая промышленность. — 2021. — №7.
5. Sharma P., Liu Y. Energy optimization in amine gas treating units // Energy & Fuels. — 2022.
6. Leonov I., Karimov M. Использование флеш-газа в установках подготовки газа // Технологии нефти и газа. — 2023.
7. Buronov, F. E., Rakhimov, G. B., Hamidov, D. R., Narziyev, S. S. O., & Khidirov, M. M. O. (2025). Research on the thermal pyrolysis method for obtaining ethylene from methane.
8. Khurmamatov, A. M., Ismailov, O., Auesbaev, A. U., Rakhimov, G. B., Muminov, J. A., & Khametov, Z. M. (2025). Increasing the efficiency of heat exchange by improving the design of heat exchangers. Nafta-Gaz, 81.
9. Rakhimov, G., & Yuldashev, T. (2024, November). Study of the degree of foaming of absorbent compositions used when purifying gases from acidic components. In AIP Conference Proceedings (Vol. 3244, No. 1, p. 050008). AIP Publishing LLC.
10. Raximov, G. A. B. (2024). Qobiq-quvurlardan foydalangan holda issiqlik almashinish uskunasining samaradorligini oshirish uchun konstruksiyani takomillashtirish. Sanoatda raqamli texnologiyalar, 2(03).
11. Raximov, G. A., & Poyonov, L. (2024). Absorber konstruksiyasini takomillashtirish orqali gazlarni tozalash samaradorligini oshirish. acumen: International journal of multidisciplinary research, 1(1), 27-35.
12. Bakhtiyorovich, R. G., & Khalmakhmatogli, S. E. (2024). Research of the process of producing alcohols based on by-products obtained in the fischer-tropsch synthesis. Sanoatda raqamli texnologiyalar/Цифровые технологии в промышленности, 2(3), 139-143.

13. Рахимов, Г. Б. (2024). Изучение влияния эффективности теплообмена в кожухотрубчатого теплообменник на гидродинамические параметры. Экономика и социум, (12-1 (127)), 998-1007.
14. Rakhimov, G. (2023). Qobiq quvurli issiqlik almashinish qurilmalaridagi issiqlik almashinish samaradorligini gidrodinamik parametlariga ta'sirini o'rganish. Innovatsion texnologiyalar, 51(03), 77-86.
15. Raximov, G. A. B. (2024). Qobiq-quvurlardan foydalangan holda issiqlik almashinish uskunasining samaradorligini oshirish uchun konstruksiyani takomillashtirish. Sanoatda raqamli texnologiyalar, 2(03).
16. Normurod, F., Sadokat, N., Davron, H., & Ganisher, R. (2024). Catalytic aromanication of propane mixture. Universum: технические науки, 12(11 (128)), 5-8.
17. Payonov, L. M., & Hamidov, D. R. (2024). Development of a column with an optimal construction to increase the efficiency of cleaning natural gas from sour components by absorption method of mubarak gas processing plant LLC. Экономика и социум, (11-1 (126)), 421-425.
18. Rakhimov, G. B., Buronov, F. E., & Saidov, S. L. (2024). To study the operation of the fractionating apparatus in increasing the efficiency of separation of hydrocarbon fractions.
19. Khurmamatov, A. M., & Rakhimov, G. B. (2023). Hydraulic resistance of unlimited derivative and machine channels in large hydro-power engineering constructions. Экономика и социум, (11 (114)-2), 188-192.
20. Хурмаматов, А. М., & Рахимов, Г. Б. Повышение эффективности теплообмена путем совершенствования конструкции трубного теплообменного аппарата. EDITORIAL BOARD, 854.

УДК- 611.08-006.07;277-072

Халикова Ф. Ш.
ассистент
кафедра медицинская радиология и ядерная медицина
Бухарский государственный медицинский институт
имени Абу Али ибн Сино
Узбекистан

МОРФОЛОГИЧЕСКАЯ СТРУКТУРА ЩИТОВИДНОЙ ЖЕЛЕЗЫ БЕЛЫХ КРЫС ПРИ ХИМИОТЕРАПИИ РАКА МОЛОЧНОЙ ЖЕЛЕЗЫ

Аннотация. *Паклитаксел используемый в химиотерапии рака молочной железы является ингибитором митоза и получена из растений. Они блокируют деление клеток, нарушают функцию микротрубочек и некоторых ферментных белков. Они изменяют метаболизм аминокислот и некоторых других веществ, таких как нуклеиновые кислоты, синтез жиров, а также влияют на клеточное дыхание. Когда мы моделировали рак молочной железы у 6-месячных крыс и проводили химиотерапию с использованием паклитаксела столкнулись с различными патоморфологическими изменениями.*

Ключевые слова: *Рак, химиотерапия, фолликул, териоцит, гормон, В-клетка, С-клетка, тиреоидное вещество, эпителий, строма, паренхима.*

Khalikova F. Sh.
assistant
department of medical radiology and nuclear medicine
Bukhara State Medical Institute named after Abu Ali ibn Sino
Uzbekistan

MORPHOLOGICAL STRUCTURE OF THE THYROID GLAND OF WHITE RATS IN CHEMOTHERAPY OF BREAST CANCER

For citation: *Khalikova Sh. Feruza, Bakhronov D. Jurat. Morphological structure of the thyroid gland of white rats during chemotherapy of breast cancer*

Abstract. *Paclitaxel used in chemotherapy of breast cancer is an inhibitor of mitosis and is obtained from plants. They block cell division, disrupt the function of microtubules and some enzyme proteins. They change the metabolism of amino acids and some other substances, such as nucleic acids, fat synthesis, and also affect cellular respiration. When we modeled breast cancer in 6-month-old rats and carried out chemotherapy using paclitaxel, we encountered various pathomorphological changes.*

Key words: *Cancer, chemotherapy, follicle, theriocyte, hormone, B-cell, C-cell, thyroid substance, epithelium, stroma, parenchyma.*

Актуальность

За последние десятилетия стремительный рост заболеваемости раком во всем мире изменил взгляд ученых на рак и его лечение. Увеличение заболеваемости раком в некоторых случаях требует интенсификации режимов химиотерапии и создает основу для разработки новых лекарств, а также методов воздействия на опухолевые клетки [2,7]. Повреждение щитовидной железы при раке в основном обусловлено изменением или увеличением концентрации химиотерапевтических препаратов, что повышает их токсичность, а также продлевает пребывание в больнице и увеличивает показатели смертности [9,14].

Увеличение числа случаев рака в мире требует разработки новых лекарств и методов воздействия на опухолевые клетки, а в некоторых случаях — интенсификации схем химиотерапии. Несмотря на успехи, достигнутые в лечении опухолевых заболеваний, токсичность лечения остается серьезной проблемой [4,10,12]. Спектр заболеваний щитовидной железы очень широк: от минимальных структурных изменений до значительных функциональных и морфологических заболеваний, снижающих качество и продолжительность жизни пациентов [1,5,13].

В настоящее время заболеваемость раком щитовидной железы растет во всем мире. Темпы выявления этого заболевания составляют 4% в год. Сегодня эта патология является одной из наиболее распространенных злокачественных опухолей эндокринной системы, составляя 2,2% всех онкологических заболеваний [3,11].

Возникновение заболеваний щитовидной железы объясняется множеством эндогенных и экзогенных факторов. Среди наиболее изученных факторов окружающей среды можно выделить ряд дефицитов потребления йода. Однако даже незначительное увеличение потребления йода в ранее йододефицитных группах населения меняет характер наблюдаемой патологии щитовидной железы в разных направлениях [6,8].

Цель исследования

Исследование морфологических изменений щитовидной железы в процессе химиотерапии рака молочной железы.

Материалы и методы исследования. Эксперименты проводились на 70 белых беспородных самках крыс в условиях вивария. В эксперименте участвовали шестимесячные крысы. В ходе экспериментов соблюдались этические требования к использованию животных. Перед экспериментами все половозрелые крысы прошли недельный карантин и, после исключения соматических и инфекционных заболеваний, были переведены в виварий со стандартными условиями. В ходе эксперимента наблюдалось поведение и физиологическое состояние животных в стандартной и экспериментальной группах. Крысы были разделены на 2 группы (n = 70): контрольная группа 1 (n = 40); 2 (n = 30) - экспериментальные группы животных, подвергавшихся воздействию канцерогена 7,12-диметилбензантрацена с целью индукции рака молочной железы у экспериментальных групп начиная с 6-месячного

возраста. Достигнутый показатель успеха составил 68,9%, т.е. у 21 крысы был индуцирован рак молочной железы путем подкожной инъекции канцерогена 7,12-диметилбензантрацена в дозе 0,1 мг в молочную железу 30 самок крыс. Во второй группе (n = 21) крысам с раком внутривенно вводили паклитаксел в дозе 0,2 мг/кг.

В ходе эксперимента наблюдалась динамика массы тела крыс, их общее состояние и поведение. Отклонений в общем состоянии и поведении животных не наблюдалось. После этого экспериментальных животных взвешивали в соответствующее время утром и умерщвляли путем декапитации под эфирным наркозом. Умерщвление животных проводилось в соответствии с международными рекомендациями по проведению медицинских и биологических исследований с использованием лабораторных животных.

В исследовании использовались органометрические, гистологические, микроскопические и статистические методы.

С помощью органометрических, гистологических и микроскопических методов были изучены показатели морфогенеза щитовидной железы на разных уровнях структуры (органном, тканевом и клеточном) у белых крыс разного возраста. Для обработки результатов исследования использовалась статистическая (методологическая) информация.

После экстракции щитовидную железу очищали, а после органометрии консервировали в 10%-ном растворе нейтрального формалина. После фиксации препараты промывали проточной водой в течение одного часа. Материалы заливали в парафиновые блоки по стандартной методике и обезвоживали высококонцентрированным спиртовым раствором.

Результаты исследования

Щитовидная железа расположена в передней части шеи белых самцов крыс и с помощью соединительной ткани прикрепляется к трахее и гортани. Щитовидная железа состоит из двух долей — правой и левой, а также соединяющей их шейки. Макроскопически щитовидная железа имеет форму бабочки, при этом верхний край долей достигает гортани, а нижний соответствует полукругам V-VII трахеи.

Снаружи щитовидная железа покрыта фиброзной капсулой, которая утолщена. Капсула образована трабекулами, проникающими глубоко во внутреннюю часть железы. Она является частью стромы щитовидной железы и содержит кровеносные сосуды и нервы. Структурно-функциональные единицы щитовидной железы: фолликулы изменяют форму, приобретают различные очертания, а фолликулы уменьшаются в размерах.

Тироциты являются основными клетками органа, их размер уменьшился, и эти фолликулярные эпителиальные клетки участвуют в формировании паренхимы органа. Фолликулярные эпителиальные клетки в своей базальной части плотно окружены плотной сетью капиллярных сосудов и обеспечивают их связь. Апикальные поверхности обращены к полости фолликула, и их активность снижена. Структуры, соединяющие

боковые поверхности с соседними клетками сбоку, ослаблены, и межклеточные расстояния увеличены. На апикальной поверхности уменьшено количество микроворсинок. Эти клетки прикреплялись к стенке базальной мембраны фолликулов и формировали стенку фолликулов. В щитовидной железе фолликулы расположены в различном порядке по всей железе, и образование коллоидных веществ в их полостях отсутствует.

Нарушение образования коллоидного вещества в пространствах фолликулов указывает на нарушение секреции гормонов щитовидной железы. Вокруг фолликулов капиллярные кровеносные сосуды образуют сетку и повреждаются.

Форма тироцитов представляется плоской и кубовидной, что соответствует неактивному состоянию щитовидной железы у белых крыс, получавших паклитаксел в дозе 0,2 мг/кг во время химиотерапии рака молочной железы. Уменьшение количества коллоидного вещества в полости фолликулов подтверждается нарушением образования коллоидного вещества в фолликулах. Микропрепараты, окрашенные гематоксилином и эозином, показали белые гранулярные образования (Рис. 2).

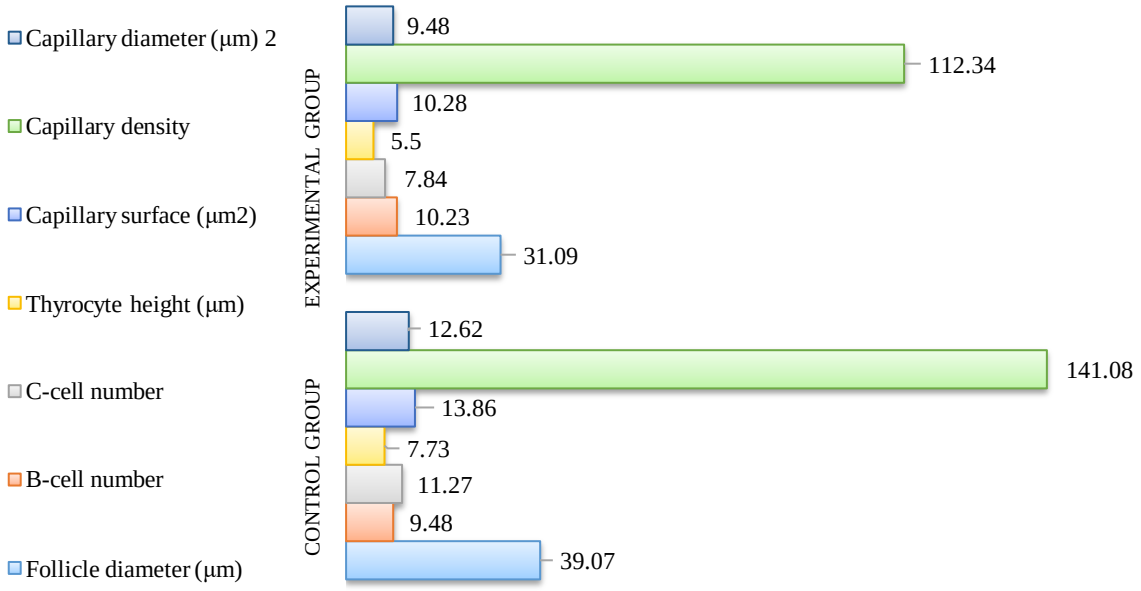


Рисунок 1. Динамика параметров щитовидной железы у животных экспериментальной группы.

В экспериментальной группе, получавшей химиотерапию по поводу рака молочной железы, диаметр капилляров щитовидной железы в центральной части у 6-месячных белых крыс варьировал от 6,85 мкм до 12,74 мкм, в среднем 9,48±0,23 мкм, а диаметр капилляров в периферической части — от 5,47 мкм до 10,39 мкм, в среднем 7,83±0,1 мкм. Плотность количества капилляров в центральной части варьировала от 94,76 до 29,45, в среднем 112,34±2,63, а количество капилляров в периферической части — от 76,68 до 86,39, в среднем 81,92±2,43. Площадь поверхности щитовидной

железы в центральной части поперечного сечения капилляров варьировала от 8,08 мкм² до 12,67 мкм², в среднем 10,28 ± 0,82 мкм², площадь поверхности капилляров в периферической части варьировала от 5,69 мкм² до 9,72 мкм², в среднем 7,76 ± 0,28 мкм². Высота эпителия щитовидной железы в центральной части варьировала от 4,89 мкм до 6,75 мкм, в среднем 5,5 ± 0,24 мкм, а высота эпителия щитовидной железы в периферической части варьировала от 4,17 мкм до 5,73 мкм, в среднем 4,91 ± 0,15 мкм. Количество меж фолликулярных С-клеток в центральной части варьировало от 5,93 до 9,89, в среднем составляя 7,84±0,25; количество С-клеток в периферической части варьировало от 15,73 до 21,18, в среднем составляя 18,43±0,27; количество В-клеток тиреоидного фолликула в центральной части варьировало от 8,91 до 12,29, в среднем составляя 10,23±0,76; количество В-клеток в периферической части варьировало от 6,35 до 10,73, в среднем составляя 8,47±0,07. Диаметр фолликула в центральной части щитовидной железы варьировал от 25,68 до 37,16 мкм, в среднем составляя 31,09±1,76 мкм, а в периферической части — от 33,57 до 39,96 мкм, в среднем составляя 36,74±0,19 мкм. Площадь поверхности фолликула в центральной части железы варьировала от 706,97 мкм² до 1256,43 мкм², в среднем составляя 983,58±27,63 мкм², а в периферической части — от 1159,26 мкм² до 1379,35 мкм², в среднем составляя 1268,25±26,71 мкм².

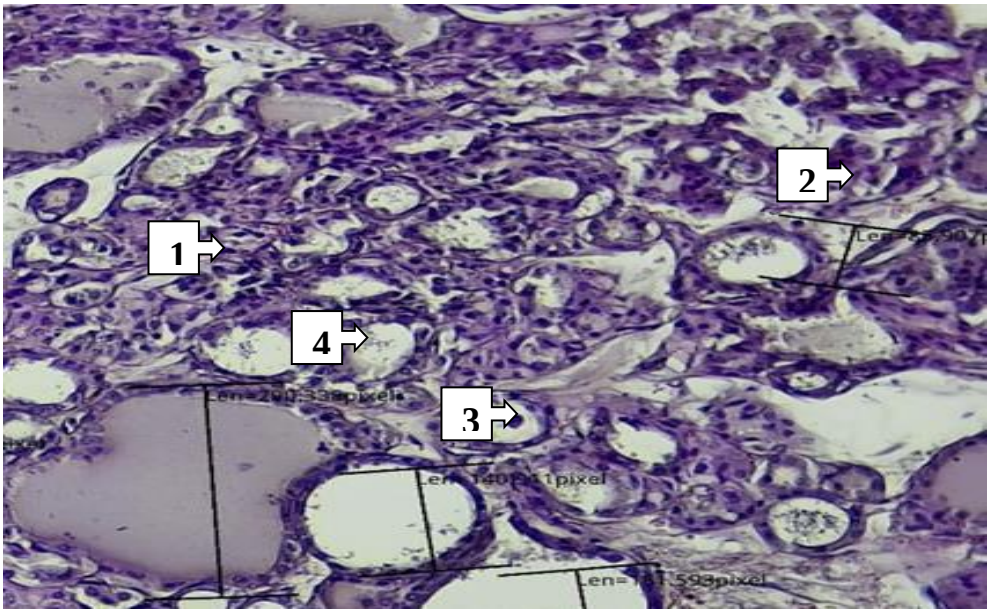


Рисунок 2. Микроскопическое изображение щитовидной железы 6-месячных белых нелинейных крыс экспериментальной группы. Окрашивание гематоксилином и эозином (ОК 10×40 ОВ). 1 – островки щитовидной железы, 2 – фолликулярные С-клетки, 3 – нарушение образования коллоидного вещества в фолликулярном пространстве, 4 – тироциты.

При анализе соотношения компонентов тиреоидных фолликулов в ходе химиотерапии рака молочной железы, содержание тироцитов в центральной части варьировало от 29,47% до 39,18%, в среднем 34,04±1,74%, а в периферической части — от 27,05% до 35,07%, в среднем 31,53±0,92%. Коллоидное вещество в центральной части изменялось от 27,93% до 32,15%, в среднем 30,02±0,7%, а в периферической части — от 32,63% до 38,51%, в среднем 35,48±0,7%. Содержание стромы щитовидной железы в центральной части варьировало от 13,92% до 17,48%, в среднем составляя 15,47±0,38%, а в периферической части — от 9,1% до 11,81%, в среднем составляя 10,4±0,74% (таблица 1).

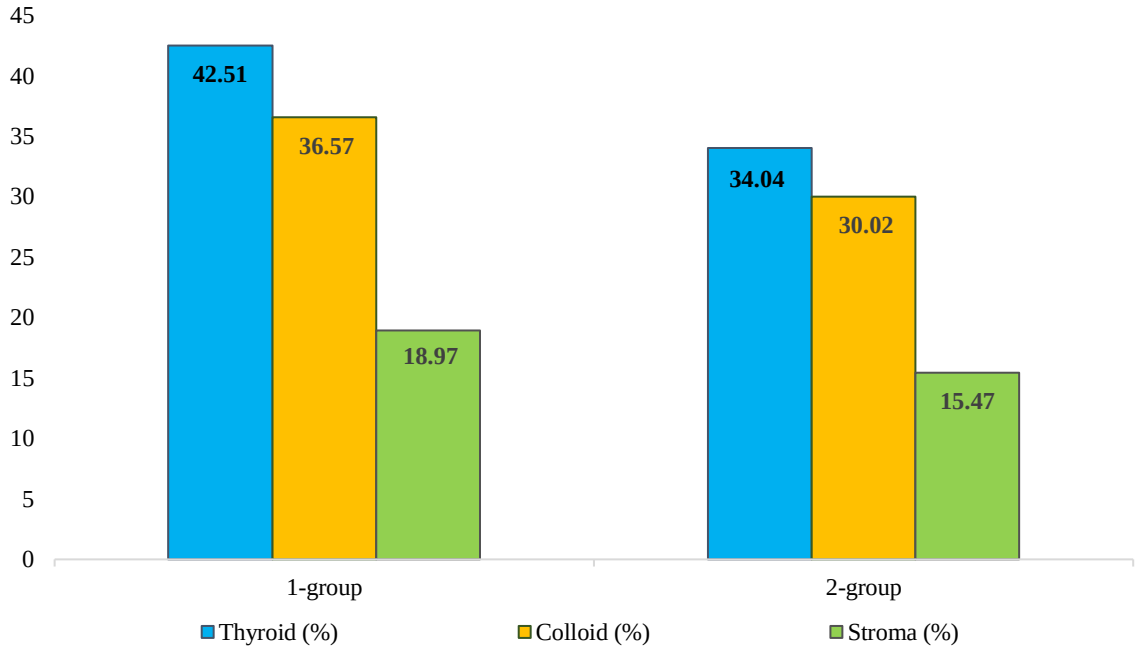


Рисунок 3. Динамика параметров щитовидной железы у животных экспериментальной группы.

В эксперименте размер парафолликулярных или С-клеток в щитовидной железе белых крыс уменьшался во время химиотерапии паклитакселом в дозе 0,2 мг/кг при раке молочной железы. Они продуцируют белковые гормоны тирокальцитонин, соматостатин и биогенные амины – серотонин. Эти клетки в основном расположены на задней поверхности долей щитовидной железы, прилегающей к глотке. Их количество уменьшалось. За долями железы расположены паращитовидная железа, нижняя щитовидная артерия и возвратный гортанный нерв.

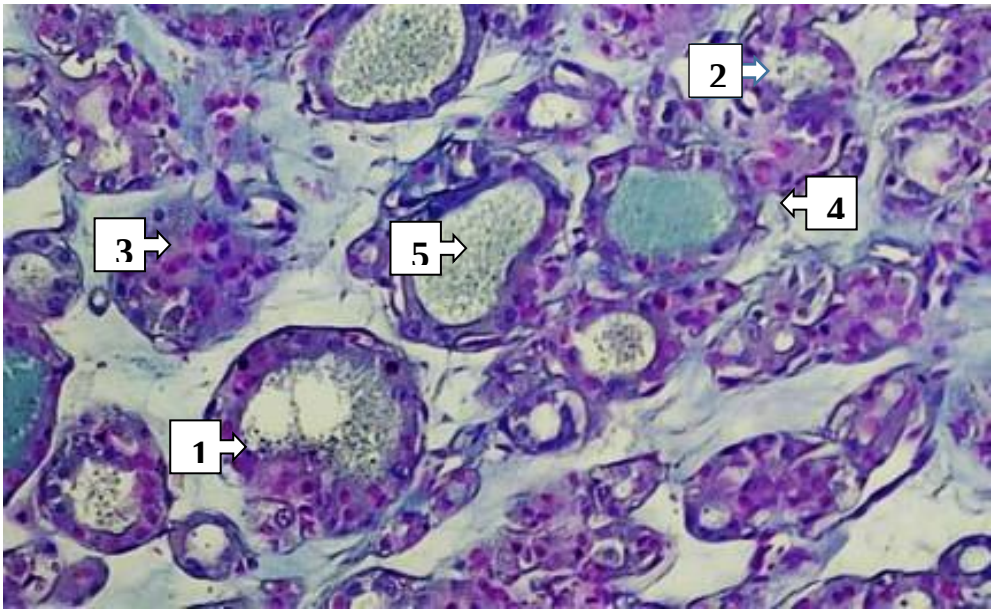


Рисунок 4. Микроскопическое изображение щитовидной железы 6-месячных белых нелинейных крыс экспериментальной группы. Окрашено арсиановым синим (ОК 10х40 ОВ). 1- В-клетка фолликула, 2-базальная мембрана фолликула, 3-островки щитовидной железы, 4-нарушение коллоидообразования, 5-фолликул.

Кроме того, увеличивается количество межфолликулярных островков, где тироциты собираются в паренхиме щитовидной железы. Они не имеют фолликулярной полости. Размер тироцитов островков уменьшается, а выработка тиреоидных гормонов снижается. По мере снижения функциональной активности щитовидной железы снижается и активность островков, а также способность тироцитов к образованию коллоидного вещества. Таким образом, прекращается образование новых фолликулов из островков. Среди тироцитов островков мы видим, что также уменьшается количество С-клеток.

Таблица 1

Гистоморфометрические показатели щитовидной железы белых неинбредных крыс экспериментальных групп.

Параметры	6 month old rats	
	Центральная часть	Периферийная часть
диаметр капилляра (мкм)	9,48±0,23	7,83±0,1
Плотность капилляров	112,34±2,63	81,92±2.43
Капиллярная поверхность (мкм2)	10,28±0,82	7,76±0,28
Высота тироцита (мкм)	5,5±0,24	4,91±0,15
количество С-клеток	7,84±0,25	18,43±0,27
количество В-клеток	10,23±0,76	8,47±0,07
диаметр фолликула (мкм)	31,09±1,76	36,74±0,19
Поверхность фолликула (мкм2)	983,58±27,63	1268,25±26,71
Щитовидная железа (%)	34,04±1,74	31,53±0,92
Коллоид (%)	30,02±0,7	35,48±0,7
Строма (%)	15,47±0,38	10,4±0,74

На практике при химиотерапии рака молочной железы мы наблюдаем уменьшение кровоснабжения за счет уменьшения диаметра артерий, учитывая обильное и активное кровоснабжение щитовидной железы в силу ее функции. Площадь поперечного сечения верхней и нижней пар щитовидных артерий также уменьшается в соответствии с уменьшением диаметра. В некоторых случаях можно также наблюдать ветви нижней щитовидной артерии.

Щитовидная железа иннервируется нервными волокнами верхней, средней и нижней ветвей симпатического ствола в шейном отделе. Нервы щитовидной железы проникают в железу через вену и образуют нервные клубочки. При этом нервные сети железы также функционируют как часть верхних и нижних гортанных нервов парасимпатической нервной системы.

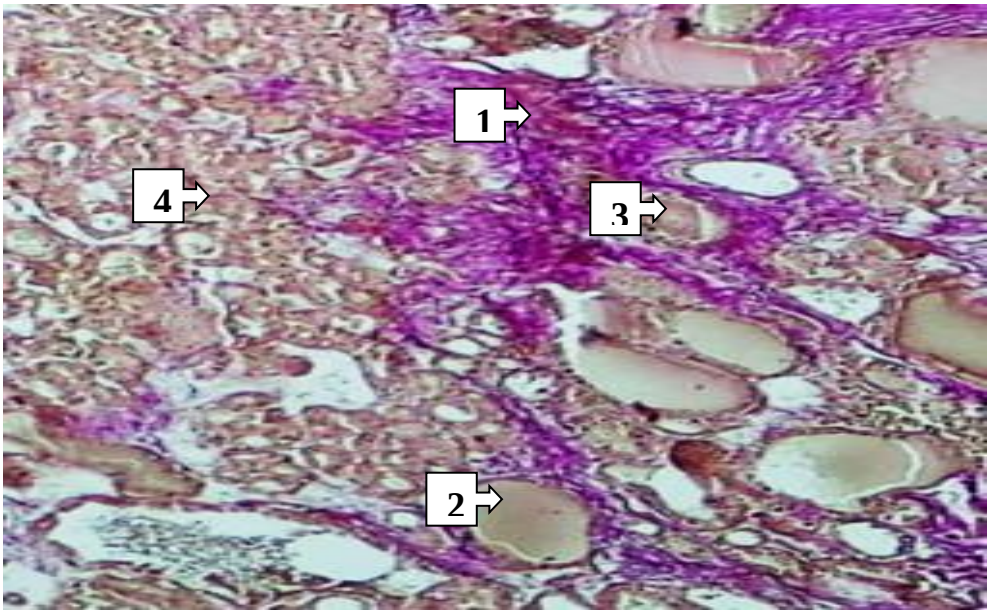


Рисунок 5. Микроскопическое изображение щитовидной железы 6-месячных белых нелинейных крыс экспериментальной группы. Окрашивание по Ван Гисону (ОК 10х40 ОВ). 1- Увеличение количества коллагеновых волокон, 2- Фолликул, 3- Процесс распада фолликула, 4- Увеличение паренхимы.

У белых крыс, получавших химиотерапию паклитакселом в дозе 0,2 мг/кг для лечения рака молочной железы, фолликулы щитовидной железы были заполнены нормальным количеством келоидов, но междольковая соединительная ткань плохо различима при окрашивании по Ван Гисону (рис. 5). При сравнении центральной и периферической частей щитовидной железы крыс экспериментальной группы, количество эпителиальных клеток в центральной части было больше, а в периферической части количество коллоидного вещества было меньше.

Заключение

Форма тироцитов представляется плоской и кубовидной, что соответствует неактивному состоянию щитовидной железы белых крыс, подвергавшихся химиотерапии паклитакселом в дозе 0,2 мг/кг при раке молочной железы.

В эксперименте изучалось количество и размер парафолликулярных или С-клеток в щитовидной железе белых крыс, подвергавшихся химиотерапии по поводу рака молочной железы.

Вены щитовидной железы отводят кровь через парные верхнюю, среднюю и нижнюю щитовидные вены, а кровотечение наблюдается через самую нижнюю нечетную щитовидную вену. В щитовидной железе лимфатические сосуды видны в виде разветвленной сети. Лимфатические сосуды также были повреждены, начиная с трехмерной сети и образуя связи с четырьмя-пятью фолликулами.

В-клетки, или клетки Ашкенази-Хуртеля, щитовидной железы, не являются чужеродными клетками и представляют собой довольно крупные тироциты. Они отличаются от других тироцитов зернистыми ядрами, хорошо окрашенными в цитоплазме, расположены в центре клетки и имеют округлую форму. Эти клетки обычно обнаруживаются в паренхиме щитовидной железы в очень небольших количествах. В больших количествах В-клетки встречаются преимущественно в старых организмах. По нашему опыту, увеличение числа В-клеток наблюдалось при применении химиотерапии рака молочной железы. Это указывает на то, что количество активных тироцитов уменьшилось, и их функцию выполняют В-клетки.

Использованные источники:

1. Андраде ТАМ, Айер А, Дас ПК, Фосс НТ, Гарсия СБ, Коутиньо-Нетто Х, Жордао-Жуниор А.А., Фраде МАК. Воспалительный стимул натуральной латексной биомембраны улучшает заживление у мышей. Браз Дж. Мед Биол Рес. 2011;44(10):1036-1047. doi: 10.1590/S0100-879X2011007500116.
2. Моменимовахед З., Салехиния Х. Эпидемиологические характеристики и факторы риска рака молочной железы в мире. Рак молочной железы (Dove Med Press). 2019; 11:151–64. doi:10.2147/BCTT.S176070.
3. Вильгельм С., Картер К., Линч М. и др. Открытие и разработка сорафениба: ингибитора мультикиназ для лечения рака. Nat Rev Drug Discov 2006; 5:835-44.
4. Alwan A., Maclean D.R., Riley L.M., d'Espaignet E.T., Mathers C.D., Stevens G.A., Bettcher D. Мониторинг и наблюдение за хроническими неинфекционными заболеваниями: прогресс и потенциал в странах с высоким уровнем заболеваемости. Lancet. 2010; 376:1861–1868. doi: 10.1016/S0140-6736(10)61853-3.
5. Elias PM, Gruber R, Crumrine D, Menon G, Williams ML, Wakefield JS и др. Формирование и функции липидной оболочки корнеоцита (CLE). Biochim Biophys Acta. 2014; 1841:314–318. doi: 10.1016/j.bbalip.2013.09.011.
6. Кошванез Х.Е., Бродбент Э. Использование методов оценки заживления ран в психологических исследованиях: обзор и рекомендации. Br J Health Psychol. 2011; 16:1-32. doi:10.1348/135910710X524633.
7. Хербст Р.С. Терапевтические варианты воздействия на ангиогенез при злокачественных новообразованиях человека. Expert Opin Emerg Drugs 2006; 11:635-50.
8. Ходжиева Н. Морфологические изменения почки при раке молочной железы. Академические исследования в современной науке. 2024;3(43):193–194. doi:10.5281/zenodo.14060080.
9. Стрикер-Кронград А., Шумейк К.Р., Перейра М.Е., Гад С.К., Броксмит Д., Бушар Г.Ф. Миниатюрные породы свиней в токсикологической оценке и оценке безопасности лекарственных средств: чего ожидать во время клинических и патологических исследований. Toxicol Pathol. 2016;44(3):421–427. doi:10.1177/0192623315618294.

10. Бахронов Дж. Дж., Тешаев С. Дж., Шодиева М. С. Морфометрические характеристики частей нефрона почки крысы в норме и под воздействием антисептика - стимулятора дорожного покрытия 2 на фоне хронического лучевого заболевания. Int J Pharm Res. 2021;13(1):683. doi:10.31838/ijpr/2021.13.01.10.
11. Давронова С., Давронов Р., Бахронов Дж. Структурно-функциональные особенности клеток иммунной системы в динамике экспериментального температурного воздействия. BIO Web Conf. 2024; 121:03017. doi:10.1051/bioconf/202412103017.
12. Agbai ON, Buster K, Sanchez M, et al. Skin cancer and photoprotection in people of color: a review and recommendations for physicians and the public. JAm Acad Dermatol. Apr 2014;70(4):748-762. doi: 10.1016/j.jaad.2013.11.038
13. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021;71(3):209–49. doi:10.3322/caac.21660.
14. Khasraw M, Bell R, Dang C. Эпирубицин: похож ли он на доксорубицин при раке молочной железы? Клинический обзор. Грудь. 2012; 21:142–9. doi: 10.1016/j.breast.2011.12.012.
15. Халикова Ф.Ш., Бахронов Ж.Ж. Induction of breast cancer in experimental animals // Тиббиетда янги кун. – Бухоро, 2025, - №4 (78), - Б. 536-541 (14.00.00; №22).
16. Халикова Ф.Ш., Султонова Л.Ж., Мамедов У.С., Сут бези саратони кимётерапиясида каламушлар қалқонсимон безининг морфологик тузилиши// Фундаментал ва клиник тиббиёт ахбаротномаси. - Бухоро, 2025, - №3, - С. 343-449 (14.00.00; № 19).
17. Халикова Ф., Бахронов Ж. Моделирование рака молочной железы у крыс // Журнал медицина и иновации. – Тошкент, 2025, - № 2 (18), -С. 85-95 (14.00.00; №3).

УДК 658.14/.17:69:004

Халилова А. Р.
доцент
Ташкентский архитектурно-строительный университет

ИСПОЛЬЗОВАНИЕ ЦИФРОВЫХ ТЕХНОЛОГИЙ ДЛЯ ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ФИНАНСОВОЙ ДЕЯТЕЛЬНОСТИ В СТРОИТЕЛЬНОЙ ОТРАСЛИ

Аннотация. *В статье исследуется влияние цифровых технологий на повышение эффективности финансовой деятельности в строительной отрасли. Проведен анализ внедрения цифровых инструментов - систем BIM, ERP и FMEII - в управление проектами и финансовыми потоками строительных предприятий. На основе сравнительного и статистического анализа выявлено, что цифровизация способствует снижению производственных затрат, росту рентабельности инвестиций и укреплению финансовой устойчивости компаний. Отмечено, что применение цифровых финансовых технологий в строительстве Узбекистана позволяет повысить прозрачность управления, увеличить объем инвестиций и ускорить реализацию проектов. Полученные результаты подтверждают, что цифровая трансформация является стратегическим направлением развития отрасли, обеспечивающим устойчивость и конкурентоспособность национальных строительных предприятий.*

Ключевые слова: *цифровизация, финансовый менеджмент, строительная отрасль, BIM-технологии, ERP-системы, эффективность инвестиций, экономическая устойчивость, инновационные технологии.*

Khalilova A. R.
dots.
Tashkent University Of Architecture And Civil Engineering

USING DIGITAL TECHNOLOGIES TO IMPROVE THE EFFICIENCY OF FINANCIAL ACTIVITIES IN THE CONSTRUCTION INDUSTRY

Abstract. *The article examines the impact of digital technologies on improving the efficiency of financial management in the construction industry. The study analyzes the integration of digital tools-BIM, ERP, and FMEII systems-into project management and financial operations of construction enterprises. Based on comparative and statistical analysis, it has been revealed that digitalization contributes to cost reduction, increased return on investment, and strengthened financial stability of companies. The application of digital financial technologies in Uzbekistan's construction sector enhances management transparency, boosts*

investment inflows, and accelerates project implementation. The results confirm that digital transformation serves as a strategic direction for sustainable development and competitiveness of the national construction industry.

Keywords: *digitalization, financial management, construction industry, BIM technologies, ERP systems, investment efficiency, economic sustainability, innovative technologies.*

Введение

В современных условиях глобальной конкуренции строительная отрасль является одной из ключевых сфер экономики, определяющих темпы экономического роста и уровень занятости населения. Мировая практика показывает, что цифровая трансформация охватывает не только производственные и сервисные отрасли, но и сферу строительства, где происходит глубокое обновление как технических, так и финансово-экономических механизмов управления. Цифровизация обеспечивает прозрачность, точность расчетов и повышение эффективности управления проектами.

Согласно прогнозу агентства Global Construction 2030, к 2030 году объем мирового строительного рынка достигнет 15,5 трлн долларов США, при этом 57% роста будет приходиться на Китай, США и Индию. Эти показатели свидетельствуют о том, что наряду с увеличением объема инвестиций в строительство возрастает потребность в совершенствовании финансового менеджмента на основе цифровых технологий.

В Узбекистане в рамках стратегии “Цифровой Узбекистан – 2030” активно внедряются системы автоматизации управления, интеллектуальные платформы и цифровые решения в сфере промышленности и строительства. Это требует интеграции финансового менеджмента с современными цифровыми технологиями, что, в свою очередь, способствует оптимизации инвестиционных потоков, сокращению затрат и повышению устойчивости строительных предприятий [1].

Методы исследования

Исследование основано на применении теоретических, сравнительных и статистических методов анализа. В работе использованы данные строительных предприятий Узбекистана за 2019–2024 годы, а также международные источники: отчеты агентства Global Construction 2030, документы Международного валютного фонда (МВФ) и Международной финансовой корпорации (IFC).

Для оценки эффективности цифровизации финансового менеджмента применена модель FMEII (Financial Management Efficiency of IT Innovations), включающая следующие показатели:

ROI_dig – коэффициент возврата цифровых инвестиций;

DRE – эффективность использования цифровых ресурсов;

FSI – индекс финансовой устойчивости.

Кроме того, использовались методы корреляционного анализа для выявления зависимости между степенью цифровизации и ростом финансовых показателей строительных предприятий [2].

Анализ

В результате анализа установлено, что внедрение цифровых технологий в строительных компаниях оказывает прямое влияние на динамику их финансовой устойчивости. Традиционные методы управления проектами не обеспечивают необходимой прозрачности и скорости принятия решений. Использование цифровых инструментов, таких как ERP-системы, цифровое бюджетирование, BIM (Building Information Modeling) и AI-аналитика, позволяет в режиме реального времени отслеживать финансовые потоки, прогнозировать риски и контролировать эффективность использования ресурсов.

В частности, BIM-технологии позволяют оптимизировать процессы проектирования и строительства, обеспечивая точный расчет затрат и прогноз сроков реализации проекта. По данным Европейской строительной ассоциации, внедрение BIM позволяет сократить сроки реализации проектов на 25–30% и снизить затраты на 15–20%.

В мировой практике компании, внедрившие цифровой финансовый контроль, добились увеличения рентабельности инвестиций в среднем на 25–30%. Это подтверждает актуальность цифровой трансформации в финансовом управлении строительных организаций [2].

Результаты

На основе проведенного анализа были выявлены конкретные результаты влияния цифровизации на эффективность финансового управления в строительстве.

Таблица 1.
Сравнение показателей строительных компаний при традиционном и цифровом управлении

№	Показатели	Традиционная система	Цифровая система (BIM + FMEII)	Изменение (%)
1	Срок реализации проекта (дней)	100	74	-26
2	Уровень финансовых затрат	100%	81%	-19
3	Рентабельность инвестиций (ROI)	1,00	1,28	+28
4	Индекс финансовой устойчивости (FSI)	1,00	1,22	+22
5	Эффективность использования ресурсов (DRE)	100%	134%	+34

Анализ данных таблицы позволяет сделать вывод о том, что переход от традиционной системы управления к цифровой модели с использованием технологий BIM (Building Information Modeling) и FMEII (Financial Management Efficiency of IT Innovations) оказывает комплексное положительное влияние на ключевые параметры финансовой и производственной деятельности строительных компаний.

Сокращение сроков реализации проектов на 26% является прямым следствием внедрения цифрового планирования, автоматизации документооборота и точного ресурсного моделирования. В условиях традиционного управления значительная часть времени теряется на согласовании смет, пересчете данных и корректировке графиков, что создаёт эффект «временных потерь». Использование цифровых инструментов устраняет эти неэффективные процессы за счёт синхронизации информации между проектными отделами, бухгалтерией и поставщиками материалов. Таким образом, цифровизация формирует так называемый «эффект ускорения цикла проекта», когда каждая стадия строительства получает прозрачную временную и финансовую привязку [3].

Снижение финансовых затрат на 19% подтверждает, что цифровые технологии не только повышают точность планирования, но и сокращают избыточные расходы. Внедрение интегрированных ERP-систем и инструментов цифрового бюджетирования позволяет оптимизировать закупки, исключить дублирование финансовых операций и уменьшить административные расходы. Более того, аналитические модули систем BIM дают возможность заранее моделировать возможные отклонения по смете и оперативно реагировать на них, предотвращая перерасход средств. Это особенно важно в условиях роста цен на строительные материалы и энергоносители.

Рост рентабельности инвестиций (ROI) на 28% свидетельствует о том, что цифровизация повышает общий уровень возврата капиталовложений. Это объясняется тем, что сокращение сроков реализации и затрат напрямую влияет на повышение прибыли при тех же объёмах инвестиций. Таким образом, эффективность использования финансовых ресурсов растёт, а инвестиционные проекты становятся более привлекательными для потенциальных инвесторов и кредитных организаций [4].

Увеличение индекса финансовой устойчивости (FSI) на 22% отражает улучшение структуры капитала строительных компаний. Благодаря цифровому финансовому мониторингу предприятия могут точнее прогнозировать движение денежных потоков, избегать кассовых разрывов и своевременно корректировать финансовые планы. Повышение FSI является также следствием улучшения ликвидности и способности компании выполнять краткосрочные обязательства без привлечения дополнительных займов.

Показатель эффективности использования ресурсов (DRE) вырос на 34%, что указывает на рационализацию производственных процессов.

Применение технологий BIM и Lean Construction способствует снижению потерь материалов, более точному распределению рабочей силы и оптимизации логистических операций. Таким образом, цифровая модель управления обеспечивает не только экономию средств, но и повышение производительности труда.

Если рассматривать совокупный эффект по всем показателям, можно констатировать, что цифровизация в строительстве формирует новый тип финансового управления, основанный на принципах прозрачности, скорости и аналитической точности. Такой подход способствует переходу от реактивного контроля к превентивному управлению, когда потенциальные проблемы прогнозируются заранее и нейтрализуются на этапе планирования [6].

Таблица 2.
Динамика финансовых показателей строительных предприятий Узбекистана до и после цифровизации

№	Показатели	2020 год (до цифровизации)	2024 год (после цифровизации)	Рост (%)
1	Годовой оборот (млрд сум)	1250	1860	+48,8
2	Маржа прибыли (%)	12,5	17,8	+42,4
3	Производственные издержки (%)	100	83	-17
4	Количество инвестиционных проектов	15	28	+86,6
5	Индекс эффективности проектов	1,00	1,31	+31

Данные таблицы отражают динамику развития строительных предприятий Узбекистана в период до и после внедрения цифровых технологий. Годовой оборот компаний увеличился с 1,25 трлн до 1,86 трлн сумов, то есть почти на 49%, что говорит о росте объёмов продаж и улучшении финансовых показателей за счёт повышения эффективности проектного управления.

Рост маржи прибыли с 12,5% до 17,8% (на 42,4%) демонстрирует улучшение соотношения между выручкой и себестоимостью продукции. Цифровизация позволила предприятиям точнее учитывать затраты и исключить неэффективные расходы, особенно в сегментах снабжения и административного управления.

Производственные издержки сократились на 17%, что является результатом автоматизации закупок, оптимизации складских запасов и внедрения интеллектуальных систем учёта материалов. Современные цифровые инструменты позволяют в реальном времени контролировать уровень использования сырья и ресурсов, предотвращая перерасход [5].

Количество инвестиционных проектов выросло с 15 до 28, то есть почти на 87%, что указывает на повышение доверия со стороны инвесторов

и рост финансовой устойчивости предприятий. Внедрение цифрового мониторинга и прозрачных отчётных механизмов повышает кредитоспособность компаний, что позволяет им привлекать больше внешнего капитала.

Индекс эффективности проектов увеличился на 31%, что отражает рост результативности инвестиционной деятельности и ускорение оборота капитала. Совокупное влияние цифровизации выразилось в повышении производительности труда, улучшении финансовой дисциплины и снижении операционных рисков.

Таким образом, представленные данные показывают, что цифровая трансформация в строительстве не является просто технологическим трендом - это системный процесс, меняющий принципы финансового управления и стратегию развития предприятий. Для строительных компаний Узбекистана внедрение цифровых инструментов становится ключевым фактором устойчивого роста, поскольку позволяет совмещать экономическую эффективность, прозрачность финансовых потоков и инвестиционную привлекательность [6].

Следует отметить, что положительный эффект цифровизации проявляется не только на уровне отдельных предприятий, но и на уровне всей отрасли. Рост объёмов инвестиций, повышение маржинальности и снижение себестоимости напрямую влияют на увеличение доли строительного сектора в ВВП страны. По расчётам, внедрение цифровых финансовых систем в строительстве способно обеспечить рост ВВП Узбекистана на 1,5–2% в среднесрочной перспективе.

Кроме того, цифровое управление способствует повышению качества строительной продукции, улучшению контроля над сроками и экологической устойчивости. Применение BIM и Lean-технологий уменьшает количество строительных отходов, снижает энергопотребление и обеспечивает более точное планирование ресурсов, что соответствует целям «зелёной экономики».

Итак, результаты анализа двух таблиц убедительно доказывают, что цифровизация финансового управления в строительной отрасли является мощным инструментом повышения её экономической эффективности, инвестиционной привлекательности и конкурентоспособности как на национальном, так и на международном уровне [7].

Обсуждение

Полученные результаты подтверждают, что цифровизация является ключевым фактором повышения эффективности финансового менеджмента в строительной отрасли. Интеграция цифровых инструментов способствует не только экономической, но и организационной трансформации предприятий. Цифровое бюджетирование обеспечивает прозрачность расходов, ERP-системы оптимизируют учет, а искусственный интеллект повышает точность прогнозирования.

В контексте Узбекистана внедрение таких систем особенно актуально, учитывая растущие объемы государственного и частного строительства. Опыт Южной Кореи, Японии и стран ЕС показывает, что применение цифровых технологий в строительстве снижает риск срыва сроков и перерасхода средств на 15–20%, а также повышает индекс инвестиционной привлекательности отрасли [8].

Рассмотренные модели позволяют утверждать, что цифровизация финансового управления в строительстве ведет к росту внутреннего валового продукта, улучшению кредитоспособности компаний и увеличению доверия инвесторов. Международный валютный фонд отмечает, что цифровое управление в строительной сфере может повысить ВВП страны в среднем на 1,5–2% [9].

Заключение

В результате проведенного исследования установлено, что использование цифровых технологий является важнейшим инструментом повышения эффективности финансового менеджмента в строительной отрасли. Цифровизация способствует сокращению затрат, росту инвестиционной доходности, повышению прозрачности и финансовой устойчивости предприятий.

Для Узбекистана актуальной задачей становится создание интегрированной системы цифрового финансового управления в строительстве, основанной на принципах BIM, ERP, и FMEII. Такая система обеспечит устойчивое развитие отрасли, укрепит позиции национальных компаний на внутреннем и внешнем рынках, а также будет способствовать достижению целей стратегии “Цифровой Узбекистан – 2030”.

Использованные источники:

1. Tursunov, E. (2021). Qurilish sohasida raqamli transformatsiya va investitsion faoliyat samaradorligi. Toshkent: O‘zbekiston Respublikasi Qurilish Vazirligi Noshirligi.
2. Mirzaev, D. (2020). BIM texnologiyalarini joriy qilish va qurilish loyihalarida samaradorlikni oshirish. Toshkent: Qurilish Sanoati Noshirligi.
3. Rahimov, S. (2019). Qurilish korxonalarida moliyaviy monitoring tizimlarini raqamlashtirishning iqtisodiy samaradorligi. Toshkent: O‘zbekiston Milliy Universiteti.
4. Иванова, Е. П. Инновационные технологии в строительном менеджменте: цифровые решения и их экономическая эффективность. // Экономика строительства. – 2022. – №4. – С. 15–28.
5. Петров, А. С. Финансовый менеджмент в условиях цифровизации промышленности. – Санкт-Петербург: Питер, 2020.
6. Козлова, Т. В. Современные модели оценки эффективности инвестиционных проектов в строительстве. // Финансы и кредит. – 2021. – №7. – С. 43–55.

7. Николаев, Д. Г. Интеграция BIM и ERP-систем в управлении строительными проектами. // Вестник инженерной экономики. – 2023. – №2. – С. 32–40.
8. Фролова, М. Ю. Финансовая устойчивость строительных предприятий: цифровой подход к управлению рисками. – Москва: ИНФРА-М, 2022.
9. Смирнов, И. А. Lean Construction и цифровые технологии: факторы повышения производительности. // Журнал «Строительный комплекс». – 2020. – №6. – С. 19–27.

UDC: 616.95–002–089.87

Халимов А. О.
ассистент
кафедра обучения клиническим навыкам на симуляторах
Бухарский государственный медицинский институт
имени Абу Али ибн Сины
Узбекистан

СОВЕРШЕНСТВОВАНИЕ ЭФФЕКТИВНЫХ СТРАТЕГИЙ ЛЕЧЕНИЯ ГНОЙНО-ХИРУРГИЧЕСКИХ ИНФЕКЦИЙ

Аннотация. *В городских и сельских районах Ташкента, Хорезмской, Бухарской и Кашкадарьинской областей Республики Узбекистан в 2021–2025 годах распространённость сахарного диабета II типа среди населения старше 40 лет составила 8,7%, нарушение толерантности к глюкозе — 4,4%, а нарушение гликемии натощак — 1,8%. Распространённость избыточной массы тела и ожирения наблюдается не только среди лиц с нарушением углеводного обмена, но и среди практически здоровых людей. Более 37% населения республики страдают ожирением различной степени, при этом прогнозируется, что 70% этих лиц в течение ближайших 10 лет будут находиться в группе риска развития сердечно-сосудистых заболеваний.*

Ключевые слова: *сахарный диабет, щитовидная железа, гнойно-хирургическая инфекция, гнойно-воспалительные заболевания, гангрена, диффузный токсический зоб, комплексное лечение.*

Xalimov A. O.
assistant
department of clinical skills training on simulators
Bukhara State Medical Institute
named after Abu Ali ibn Sina
Uzbekistan

IMPROVEMENT OF EFFECTIVE TREATMENT STRATEGIES FOR PURULENT-SURGICAL INFECTIONS

Abstract. *In urban and rural areas of Tashkent, Khorezm, Bukhara, and Kashkadarya regions of the Republic of Uzbekistan from 2021 to 2025, the prevalence of type II diabetes mellitus among the population over 40 years of age was 8.7%, impaired glucose tolerance was 4.4%, and impaired fasting glycemia was 1.8%. The prevalence of excess body weight and obesity is observed not only among individuals with impaired carbohydrate metabolism but also among seemingly healthy individuals. More than 37% of the republic's population suffers*

from varying degrees of obesity, and it is predicted that 70% of these individuals will be at risk for cardiovascular diseases within the next 10 years.

Keywords: *diabetes mellitus, thyroid gland, purulent surgical infection, purulent inflammatory diseases, gangrene, diffuse toxic goiter, comprehensive treatment.*

Актуальность

В мире лечение раневых инфекций осуществляется с использованием антибактериальных препаратов. Однако «…патогенные микроорганизмы, играющие важную роль в этиологии гнойно-хирургических заболеваний, обладают высокой вирулентностью, биовариабельностью и антибиотикорезистентностью» [1]. Согласно данным Международной федерации диабета (IDF), в настоящее время в мире зарегистрировано 415 миллионов пациентов с сахарным диабетом. К 2040 году ожидается увеличение числа больных сахарным диабетом до 642 миллионов человек. В связи с ростом числа пациентов с сахарным диабетом становится всё более актуальным получение достоверной информации о состоянии здоровья данной категории больных.

Несмотря на развитие биологических и физических методов лечения ран, до настоящего времени основная роль принадлежит раневым покрытиям и лекарственным средствам наружного применения, поскольку они широко распространены, просты в использовании, не требуют специальной подготовки и особого оборудования [2].

Работы по созданию новых перевязочных средств или модернизации существующих направлены на получение материала, который можно наносить на рану с учётом специфических особенностей её генеза и особенностей лечения ран на ранних этапах их развития, а также с целью оптимизации условий их заживления [3–5].

Алгинатные повязки в основном применяются для лечения инфицированных послеоперационных ран и ран нижних конечностей. При контакте алгинатной повязки с раневым экссудатом происходит ионный обмен: ионы кальция в составе алгинатной повязки замещаются ионами натрия, содержащимися в тканевой жидкости или раневом экссудате, в результате чего повязка набухает. Степень набухания зависит от химического состава алгината, а также от его происхождения. Одной из основных причин использования алгинатов в перевязочных материалах является их гемостатическая способность.

В исследовании Сегала и соавторов было показано, что коагуляционный эффект цинка в составе кальций-алгинатной повязки превосходит аналогичные показатели у неалгинатных повязок. Установлено, что алгинатные повязки более эффективны по сравнению с традиционными. Алгинатные повязки дольше сохраняют гелеобразную структуру, чем гидроколлоиды. В зависимости от состава алгинаты также применяются для

восстановления тканей и в биоинженерии. В связи с этим натрий-алгинат рассматривается как субстрат для пролиферации клеток.

Алгинатные гели могут использоваться и для доставки лекарственных препаратов с низкой молекулярной массой, которые быстро диффундируют через структуру геля. В исследовании D. Boggione и соавторов была продемонстрирована способность сохранять жизнеспособность бактериофагов в течение 21 дня в виде геля на основе кальций-алгината.

В мире существует более 350 видов раневых покрытий — мази, пасты, пленки, губки, гели, сухие дисперсные формы, а также традиционные перевязочные материалы, изготовленные на основе натуральных и синтетических волокон с использованием тканых и нетканых технологий, не считая многочисленных комбинаций и модификаций.

В мировой практике хирургии щитовидной железы частота основных осложнений относительно невелика. Различные хирургические подходы, техники и опыт различных клиник приводят к существенным различиям в данных об осложнениях, что связано с применением разных методов диагностики и оценки результатов. В то же время известно, что расширенные хирургические вмешательства, несмотря на более высокий риск осложнений, обеспечивают лучший контроль над заболеваниями щитовидной железы. На сегодняшний день среди всех эндокринных патологий заболевания щитовидной железы занимают лидирующие позиции.

По результатам скрининга, проведённого в 2021–2025 годах, распространённость сахарного диабета II типа среди населения старше 40 лет в городских и сельских районах Ташкента, Хорезмской, Бухарской и Кашкадарьинской областей Республики Узбекистан составила 8,7%, нарушение толерантности к глюкозе — 4,4%, а нарушение гликемии натощак — 1,8%. Распространённость избыточной массы тела и ожирения наблюдается не только среди лиц с нарушениями углеводного обмена, но и среди практически здоровых людей. Более 37% населения республики страдают ожирением различной степени, и прогнозируется, что 70% этих лиц в течение ближайших 10 лет будут иметь высокий риск развития сердечно-сосудистых заболеваний.

В 2012 году Министерством здравоохранения Республики Узбекистан в Ташкенте был проведён выборочный скрининг на выявление сахарного диабета и промежуточной гипергликемии. Всего было обследовано 957 добровольцев, у 4,6% из них был выявлен сахарный диабет, при этом у 53% обследованных отмечена наследственная предрасположенность к данному заболеванию.

Н. М. Аликханова и соавторы (2016) опубликовали данные об эпидемиологической значимости сахарного диабета I и II типов в Ташкенте. Было отмечено, что уровень оказания медицинской помощи больным СД в городе не соответствует международным стандартам, что сопровождается повышенным риском развития устойчивых микроваскулярных и сердечно-сосудистых осложнений.

Исследования узбекистанских учёных, проведённые в Бухарской и Хорезмской областях, а также в Республике Каракалпакстан, выявили ряд недостатков в диагностике и регистрации осложнений сахарного диабета, таких как диабетическая нефропатия и ретинопатия. Анализ регистрационных данных по четырём регионам Узбекистана также показал недостаточность мероприятий по диагностике, лечению и профилактике осложнений сахарного диабета.

Ряд исследователей предполагают, что фактическое число больных сахарным диабетом в 2–3 раза выше официальных данных из-за отсутствия регистрации многих пациентов в диспансерах. Такая ситуация объясняется тем, что сахарный диабет I типа, имеющий наследственный характер, обычно диагностируется в неонатальном периоде при стандартных профессиональных обследованиях, тогда как сахарный диабет II типа развивается в возрасте 30–60 лет. Это требует повышения настороженности по отношению к данной патологии и приводит к росту числа её осложнений.

В настоящее время разработаны и внедрены в клиническую практику основные тактики лечения пациентов с гнойно-воспалительными заболеваниями. Они включают качественную хирургическую санацию и дренирование гнойных очагов, проведение антимикробной терапии, дезинфекцию очага воспаления, противовоспалительное лечение, а также оптимизацию клеточных механизмов раневого процесса. Ежегодно внедряются десятки новых тактических подходов к лечению данной категории больных, однако ни один из них не отвечает современным хирургическим критериям во всех аспектах. С каждым годом всё больше специалистов убеждаются в отсутствии динамики при использовании стандартной терапии. Данная проблема возникает на фоне высокой скорости мутаций и быстрой адаптации микроорганизмов к современным антибактериальным препаратам. Особенностью лечения и важным аспектом ведения гнойно-воспалительных очагов являются эстетические факторы, что обусловлено их социальной значимостью.

Наш интерес направлен на периферическое действие гормонов щитовидной железы и их метаболитов. При избыточной секреции T_3 активируются ферменты его распада — деиодиназы, разрушающие T_3, что приводит к образованию патологических (атипичных) форм T_3. Это, в свою очередь, отрицательно влияет на процессы тканевой регенерации и усиливает воспалительные реакции, а также вызывает выраженные изменения в тех органах, которые наиболее чувствительны к атипичным формам T_3.

У пациентов с сочетанием диффузного токсического зоба и сахарного диабета основным методом лечения гнойных процессов является хирургическое вмешательство в сочетании с физическими методами (ультразвук, УФО), а также современными методами локальной терапии гнойного очага и ранними хирургическими вмешательствами. Основной принцип лечения осложнений гнойного характера при сахарном диабете —

сокращение сроков заживления раны и ускорение динамики восстановления жизнедеятельности пациента. Неправильный или неэффективно выбранный метод лечения существенно повышает риск ухудшения общего состояния больного, что может привести к летальному исходу вследствие тяжёлой патологии.

Цель исследования — улучшение результатов лечения пациентов с гнойно-хирургическими заболеваниями мягких тканей на фоне сочетания диффузного токсического зоба и сахарного диабета путём оптимальной коррекции нарушений обмена веществ.

Материалы и методы: Проанализированы данные обследования и лечения 104 пациентов с гнойными ранами мягких тканей различной этиологии на фоне эндемического зоба и сахарного диабета, проходивших лечение в гнойно-хирургическом отделении клинической базы Бухарского государственного медицинского института в 2016–2022 годах.

Результаты

Сахарный диабет, в сочетании с поражением периферической нервной системы и сосудистыми нарушениями, на фоне токсического зоба приводит к значительным изменениям, способствующим развитию гнойно-некротического процесса. При исследовании гнойно-некротических ран на фоне диффузного токсического зоба и сахарного диабета установлено, что у 88% пациентов наблюдалась поливалентная микрофлора (аэробно-анаэробная), и лишь у 12% — только аэробная. При сахарном диабете невозможность быстрого устранения патогенной флоры из гнойной раны обусловливает длительное сохранение открытой раневой поверхности, что значительно повышает риск госпитальной инфекции.

В острой фазе заболевания через дефекты кожи высока вероятность распространения гноя в мягкие ткани, что приводит к флегмоне, артритам и другим осложнениям. Неправильная интерпретация клинических и биохимических данных приводит к выбору ошибочной тактики лечения гнойно-хирургических заболеваний, что повышает риск тяжёлого поражения конечностей. Трудности диагностики прежде всего связаны с недостаточной осведомлённостью хирургов об этих осложнениях и о диабете в целом, а также отсутствием чётких алгоритмов лечения и реабилитации таких пациентов. Таким образом, повышение информированности врачей о риске развития осложнений при наличии диабета позволяет избегать ошибок на этапах диагностики и лечения гнойно-воспалительных процессов.

Анализ результатов транскутанной оксиметрии раневых тканей у пациентов с сопутствующими эндокринными заболеваниями — диффузным токсическим зобом и сахарным диабетом — показал, что начальный уровень PO_2 в стенках раны в день поступления был значительно ниже нормы и составлял примерно 72,0% от нормальных показателей.

К 9-му дню курса лечения данные показатели постепенно приближались к норме, однако у пациентов I группы (без эндокринных

заболеваний) нормализация наблюдалась на 3–4 дня раньше, а у пациентов II группы — на 2–3 дня раньше по сравнению с основной группой.

Таким образом, изучение течения раневого процесса у пациентов II группы с гнойными заболеваниями мягких тканей на фоне сочетанного течения диффузного токсического зоба и сахарного диабета позволило выявить следующие особенности: все показатели интоксикации организма, кислотно-щелочного состояния раны и уровень PO_2 на момент поступления значительно отклонялись от нормы по сравнению с пациентами I и II групп.

При традиционном лечении динамика нормализации данных параметров у основной группы происходила медленнее, чем в I и II группах, и отставала примерно на 2 дня. В то же время средняя длительность пребывания в стационаре составила 10±1,4 дня, тогда как у пациентов II группы — 8±1,5 дня.

Наше исследование показывает наличие чёткой взаимосвязи между сопутствующими заболеваниями и отрицательным влиянием на течение раневого процесса, что подчёркивает необходимость своевременной коррекции гормональных, углеводных, белковых и минеральных нарушений обмена веществ, а также нормализации оксигенации раны.

В следующей главе нашего исследования представлены данные о лечении гнойных хирургических заболеваний мягких тканей на фоне сочетания сахарного диабета и диффузного токсического зоба. Показано, что при комбинированных эндокринных нарушениях нормализация всех клинико-лабораторных показателей, включая общую интоксикацию, происходит быстрее; процесс очищения раны и её заживление ускоряются на 2–3 дня по сравнению с аналогичными пациентами II группы.

Все эти данные свидетельствуют о том, что лечение гнойно-хирургических заболеваний мягких тканей на фоне сочетания сахарного диабета и диффузного токсического зоба является значительно более сложным, чем при наличии каждого из этих эндокринных заболеваний в отдельности.

Сравнительный анализ результатов лечения пациентов I, II и III групп выявил следующие особенности:

- При традиционном методе лечения, включающем местное применение мази Левомеколь для гнойной раны, происходила полная очистка раны, нормализация клинических и лабораторных показателей интоксикации.

В то же время для оценки течения раневого процесса имеют важное диагностическое и прогностическое значение показатели интоксикации организма (L, ОММ, LII, ЭХТ) и биохимические показатели раневого экссудата (pH, белок раневого экссудата, БК по Мазурику).

Основные критерии оценки раневого процесса и динамика показателей включали: очистку раны от инфекции на 2–3-й день лечения, начало грануляции на 3–4-й день и начало эпителизации на 5–6-й день.

Средняя продолжительность лечения в контрольной группе составила 6±0,7 дней. Все эти процессы происходили на фоне нормальных показателей минерального, углеводного и белкового обмена, а также уровня PO_2.

Изучение пациентов II группы с гнойными заболеваниями мягких тканей на фоне сопутствующих заболеваний — диффузного токсического зоба и сахарного диабета — выявило следующие особенности: все показатели интоксикации, температура, pH среды раны и уровень PO_2 на момент поступления значительно отклонялись от нормы по сравнению с пациентами I группы. При традиционном лечении нормализация этих показателей происходила медленнее, чем у I группы, с задержкой на 2 дня. Средняя продолжительность пребывания в стационаре составила 10±1,4 дня, тогда как у пациентов I группы — 8±1,5 дня.

Дополнительно к хирургическому вмешательству одновременная коррекция гормонального, минерального, углеводного и белкового обмена, а также нарушений микроциркуляции является наилучшим методом лечения пациентов с гнойными заболеваниями мягких тканей на фоне сочетанного течения диффузного токсического зоба и сахарного диабета.

Вывод

Исследование показало, что течение раневого процесса у пациентов с гнойными заболеваниями мягких тканей имеет определённые особенности при сочетании с эндокринной патологией. Местное применение мази Левомеколь обеспечивает полную очистку ран, оказывает антибактериальное, противовоспалительное и увлажняющее действие на ткани. Анализ пациентов I группы показал, что использование Левомеколя способствует нормализации клинических и лабораторных показателей интоксикации и обеспечивает среднюю продолжительность лечения 6±0,7 дней.

Следует подчеркнуть, что результаты морфологических исследований данной группы пациентов полностью соответствовали и подтвердили традиционную современную теорию течения раневого процесса, хорошо известную в клинической практике.

Переход раны из первой деструктивно-воспалительной стадии во вторую регенеративную фазу, сопровождающуюся уменьшением гиперемии и отёка, наблюдался на 4–5-й день лечения. Морфологические и гистопатологические исследования, проведённые нами, подтвердили, что при продолжении традиционного лечения переход раневого процесса во вторую или третью стадию происходит через 7–8 дней после начала терапии.

Использованные источники:

1. Алиханова Н.М., и др. Эпидемиологическое исследование сахарного диабета в Ташкенте. // Вестник здравоохранения Узбекистана. — 2016. — №2. — С. 23–29.
2. Министерство здравоохранения Республики Узбекистан. Скрининг по выявлению сахарного диабета в Ташкенте. — Ташкент: МЗ РУз, 2012.

3. Международная федерация диабета (IDF). Atlas Diabetes 9th Edition. — Brussels: IDF, 2019.
4. Сегал Д., и др. Гемостатические свойства кальциевых альгинатных повязок // Журнал клинической хирургии. — 2019. — Т. 15, №3. — С. 45–52.
5. Boggione D., et al. Stability of bacteriophages in calcium alginate gels // Journal of Biomedical Materials Research. — 2018. — Vol. 106, №4. — P. 1032–1041.
6. Иванов И.И., Петров П.П. Хирургическая инфекция: современные подходы к лечению. — М.: Медицина, 2020. — 256 с.
7. Смирнов А.В. Современные методы лечения ран и язв // Хирургия. — 2017. — №5. — С. 12–20.
8. Кузнецов Ю.Н. Алгинатные повязки в хирургической практике // Российский хирургический журнал. — 2018. — Т. 24, №2. — С. 34–40.
9. Петров С.В., и др. Особенности течения гнойно-воспалительных процессов у больных с эндокринной патологией // Вестник хирургии. — 2020. — №4. — С. 55–63.
10. Ли Х., и др. Advances in wound healing with modern dressings // International Journal of Surgery. — 2019. — Vol. 68. — P. 1–9.

УДК: 511.436 (575.1)

Халимова Г. С., доктор философии по географическим наукам (PhD), доцент
Каландарова Д. Д. докторант
Бухарский государственный университет

ОБ РАЦИОНАЛЬНОМ ИСПОЛЬЗОВАНИИ АТМОСФЕРНЫХ ОСАДКОВ В ПУСТЫННОЙ ЗОНЕ (НА ПРИМЕРЕ ХРЕБТА КУЛЬДЖУКТАУ И ПРИЛЕГАЮЩИХ ТЕРРИТОРИЙ)

Аннотация: *В данной статье рассматривается практическое значение местных водных ресурсов в аридных регионах Центральной Азии для жизнедеятельности населения и органического мира, а также вопросы их рационального и эффективного использования. Кроме того, освещён опыт местного населения по использованию гидрографических объектов в пустынной зоне. На основе анализа исследований, посвящённых проблемам использования атмосферных осадков в пустынных территориях Центральной Азии, сформулированы соответствующие выводы и даны научно- обоснованные рекомендации.*

Ключевые слова: *низкогорья, местные водные ресурсы, атмосферные осадки, «коридор жизни», сардоба (традиционное водохранилище для сбора и хранения дождевой и талой воды).*

Khalimova G. S., PhD in geographical sciences, associate professor
Kalandarova D. D. doctoral candidate
Bukhara State University

ON THE RATIONAL USE OF ATMOSPHERIC PRECIPITATION IN THE DESERT ZONE (A CASE STUDY OF THE KULDZHUKTAU RANGE AND ADJACENT TERRITORIES)

Abstract: *The article presents the practical significance of local water resources for the life of the region and the organic world in the arid zones of Central Asia, as well as issues related to their rational use. In addition, it highlights the experience of the local population in utilizing hydrographic features within the desert zone. As a result of analyzing studies devoted to the use of atmospheric precipitation in desert areas by the peoples of Central Asia, a number of conclusions and recommendations are provided.*

Keywords: *arid region, low mountains, local water resources, atmospheric precipitation, "path of life", sardoba*

Центральноазиатский регион отличается от других территорий своей природной уникальностью и неповторимостью. Основоположник геологической науки Центральной Азии И. В. Мушкетов в своём труде «Туркестан» отмечал: «Центральная Азия … представляет собой материк внутри крупного материка и отличается совокупностью всех своих характерных особенностей» [8]. Одной из других уникальных черт региона является то, что его восточная и южная части представлены горными хребтами, тогда как западная и северо-западная части заняты Туранской пустынной равниной, которая охватывает около 70 % площади региона. В пределах Центральной Азии засушливые (аридные) территории только в Казахстане составляют около 175 млн га, в Туркменистане — 45 млн га, в Узбекистане — 35 млн га. Подобные территории также имеются в Республиках Таджикистан и Кыргызстан [2].

Если учитывать, что проникновение человека на эту территорию произошло около 700 тыс. – 1 млн лет назад, то горы и реки Центральной Азии, входящие в пустынную зону, выполняли для него функцию своеобразного «коридора жизни».

Для населения, проживающего в пустынной зоне, вода имела жизненно важное, судьбоносное значение. По данным археологических исследований, начиная со среднего этапа каменного века человек стал осваивать пустынные территории и постоянно стремился к источникам воды. Академик-археолог А. Мухаммаджонов писал: «Начиная с зарождения орошаемого земледелия и до нашего времени история ирригации Узбекистана — это история напряжённой борьбы узбекского народа за воду» [4]. Данный вывод в полной мере относится ко всем народам Центральной Азии.

Известно, что пустынная зона прежде всего представляет собой наиболее сложную природную среду для жизнедеятельности человека. Основными причинами этого являются чрезвычайно высокий уровень тепла и солнечной радиации, а также крайняя ограниченность либо полное отсутствие местных источников оросительной и питьевой воды. В связи с этим в пустынной зоне доминирует «закон дефицита» («закон минимума»). Следовательно, в своей практической деятельности каждый человек должен учитывать и соблюдать действие данного закона.

Анализ использования местных водных ресурсов в пустынной зоне показывает, что в этом отношении особого внимания заслуживают достижения населения, проживающего в пустыне Каракумы. В. Н. Кунин (1980) обобщил опыт водообеспечения населения Каракумов (Туркменистан) и выделил три основные группы [1]:

1. Сбор атмосферных осадков и их хранение;
2. Использование подгорных вод с помощью коризов;

3. Использование подземных минерализованных (солоноватых) вод.

Одним из методов, относящихся к первой группе, являлся сбор стока, формирующегося за счёт атмосферных осадков на такырных землях, в относительно пониженных участках — впадинах. Такырные (глинистые) поверхности встречаются в дельтах рек, в нижней части предгорных наклонных равнин, а также среди песков в виде ограниченных островных образований. В пониженных частях такыров, предназначенных для накопления воды, как правило, выкапывались глубокие котлованы. В них вода постепенно инфильтрировалась в нижележащие горизонты, в результате чего над слоями подземных вод различной степени минерализации формировалась линза пресной воды. Эта пресная вода находилась во взвешенном состоянии, не смешиваясь с подстилающим солёным водным горизонтом, и впоследствии извлекалась на поверхность с помощью колодцев. Пористые песчаные стенки колодцев укреплялись ветвями и кустарником. Для их закрепления чаще всего использовалась песчаная акация, а для отделения воды от ила на дне колодца в качестве фильтра применялось растение селин. С помощью данного метода с площади такыра в 1 км² удавалось аккумулировать в среднем до 20 000 м³ воды. При годовой потребности одной овцы в 1,5–2,0 м³ воды создавалась возможность водообеспечения до 10 тыс. голов овец [1].

Народы пустынных районов эффективно использовали подземные минерализованные воды. В этом отношении они обладали весьма поучительным опытом выбора места для колодцев, их сооружения и способов добычи воды. Существовали специальные мастера-колодезники. Колодцы по праву можно считать одним из древнейших изобретений человечества. В пустынной зоне колодцы, как правило, располагались на расстоянии 5–10 км друг от друга; при этом они отличались значительной глубиной и, как правило, высокой степенью минерализации воды. Согласно имеющимся данным, в 1973 году только на территории пустынных и степных пастбищ бывшего Советского Союза было учтено около 70 тыс. выкопанных колодцев и порядка 30 тыс. пробурённых (буровых) скважин [3]. В пустыне Каракумы широко распространены колодцы глубиной более 100 м. Самый глубокий в мире колодец глубиной 270 м также расположен в Каракумах [1].

Такие колодцы сооружались искусными мастерами-колодезниками. Для населения, проживающего в пустыне Каракумы, вода с минерализацией 2,5–3,0 и даже до 4 г/л считалась пригодной для питьевого потребления. Овцы, ягнята и одногорбые верблюды поились водой следующего солевого состава:

- вода с минерализацией 7–8 г/л — в течение всего года, в том числе и в жаркий период;
- вода с минерализацией 10–12 г/л — в зимнее время (за исключением молодых ягнят);

- для поения верблюдов в отдельных случаях кратковременно использовалась вода с минерализацией 15–18 г/л.

В осенне-зимний период также широко применялась практика поения овец и ягнят один раз в 2–3 недели. Туркменские чабаны в условиях острой нехватки воды даже утоляли жажду, смешивая верблюжье молоко с солёной водой.

Сбор вод, формирующихся за счёт дождевых осадков, в коках и сардобах являлся традиционным приёмом у туркменского населения. Коки (сухие водохранилища) (лужи, временные водоёмы) представляли собой открытые канавы и глубокие котлованы, вырытые для накопления воды, стекающей с такырных и такыроподобных поверхностей. Их размеры и глубина зависели от площади водосборного участка. Собранная вода первоначально была мутной, затем отстаивалась и использовалась в течение 2–3 месяцев. Однако значительная её часть испарялась, а некоторая доля инфильтрировалась в нижележащие слои почвы [6].

Сардобы (по-таджикски — «сувхона» или «музхона») считались одним из самых древних, эффективных и классических способов накопления воды [4]. Выкопанные в пустыне колодцы и сардобы в древности обслуживали также нужды «Великого шёлкового пути», определяя направления караванных маршрутов и обеспечивая удобство передвижения.

Сардобы, как правило, сооружались в пониженных частях водосборных участков и имели куполообразную форму; возводились они из прочного обожжённого кирпича. При их строительстве учитывались условия отстаивания такырных вод, предотвращения инфильтрации и испарения, а также защиты воды от загрязнения. Примечательно, что сардобы сооружались по образцу жилищ кочевников-скотоводов и напоминали крытые купольные резервуары. Вода в сардобах никогда не теряла ни вкусовых качеств, ни цвета, оставаясь постоянно холодной и чистой. Это объясняется тем, что древние мастера, проектировавшие данные сооружения, умело решали задачу сохранения качества накапливаемой воды. С этой целью в куполе сардобы предусматривалось от трёх до девяти аркообразных окон, а в верхней части — одно вентиляционное отверстие. Окна и вентиляционный канал обеспечивали постоянную циркуляцию воздуха внутри сооружения, способствуя его охлаждению и очистке. Чтобы предотвратить заиливание резервуара и вывести сооружение из строя, перед сардобой устраивался крупный отстойник — открытый бассейн. Снеговые и дождевые воды, поступающие с окружающей территории, сначала накапливались в отстойнике, где взвешенные частицы осаждались на дно, после чего очищенная вода поступала в сардобу.

Сардобы являлись широко распространёнными водохозяйственными сооружениями на Востоке; в Хорасане (Северный Иран) они были известны под названием «обанбор», а в Азербайджане — «авдон». Водоёмкость сардоб достигала 500–1000 м³, тогда как в коках этот показатель составлял 10 000–30 000 м³ [8].

Таким образом, с древнейших времён и вплоть до 1950-х годов, то есть до начала научно-технической революции, а также и в последующие годы, у населения, проживающего в пустынных районах, потребность в рациональном использовании местных водных ресурсов была значительно выше по сравнению с жителями соседних горных и предгорных территорий. В результате этого были выработаны разнообразные, поучительные подходы и методы водопользования, которые со временем превратились в неотъемлемую часть духовного и материального наследия народов.

Исследования, посвящённые вопросам использования атмосферных осадков народами Центральной Азии в условиях пустынной зоны, позволяют сформулировать следующие выводы и рекомендации:

1. Имеются реальные возможности практического применения в условиях Бухарской области современных методов использования опыта населения мира, в том числе Центральной Азии, по освоению атмосферных осадков, а также отдельных результатов научных исследований, проведённых в данной сфере.

2. Территория Бухарской области полностью расположена в пределах пустынной зоны и не располагает постоянными источниками поверхностных вод. Потребности в питьевой воде, коммунально-бытовом водоснабжении и оросительных ресурсах удовлетворяются за счёт вод, поступающих из внешних регионов. В условиях нарастающей аридизации климата и непрерывного увеличения общественного спроса на водные ресурсы особую актуальность приобретает задача максимально полного и рационального использования местных водных ресурсов области [7].

3. В пределах территории области, в отличие от пустыни Каракумы, имеется островное низкогорье Кульджуктау (высота до 875 м). На южных склонах данного хребта в течение года выпадает около 336,7 млн м³ атмосферных осадков. Ландшафты горной гряды характеризуются чётко выраженной сетью временных русловых водотоков (саёв). В весенний период эти водотоки формируют селевые паводки, которые ежегодно приводят к негативным последствиям. В этой связи использование водных ресурсов указанных ландшафтов следует рассматривать в числе первоочередных задач.

Использованные источники:

1. Кунин В.Н. Воды пустыни и окружающая среда. – М.: “Наука”. 1980. - 287 с.
2. Лещинский Г.Т. Ресурсы временного поверхностного стока пустынь Средней Азии и Западного Казахстана. – Ашхабад: «Ылым», 1974. - 187 с.
3. Мелиорация земель СССР. Под ред. Б.Г.Штепы. – М.: 1975. - 272 с.
4. Муҳаммаджонов А. Қадимги сув иншоотлари тарихидан. – Тошкент: “Ўзбекистон”, 1968. - 56 б.
5. Мушкетов И.В. Туркестань Томъ Первый С.Петербургъ 1886.- 741с.
6. Назаров И.Қ., Аллаёров И.Ш., Ҳалимова Г.С. Чўл зонасида яшовчи халқларнинг маҳаллий сув имкониятларидан фойдаланиш тажрибаси ва

амалиёт // Табиатдан фойдаланиш ва муҳофаза қилишнинг географик асослари. Республика илмий-амалий конференцияси. - Наманган, 2010.
7. Назаров И.Қ., Тошов Х.Р. Бухоро вилоятида атмосфера ёғинларининг ҳудудий тақсимланиши ва улардан самарали фойдаланиш хусусида // “Инновация - 2005”. Халқаро илмий-амалий конференция мақолалари тўплами. – Тошкент, 2005. – Б. 265-266.
8. Низомов А. Ўзбекистоннинг қадимги гидротехник иншоотлари географияси. Тошкент, 2008. – 235 б.
9. Соколов Б.И. Обводнение пастбищ пустынь. – Ташкент. Гос. изд. УзССР. 1958. - 411 с.
10. Ҳалимова Г.С. Қулжуқтов тизмаси ландшафтларининг минтақавий хусусиятлари ва амалиёт // География: инновацион ғоялар, технологиялар ва лойиҳалар. Иқтидорли талабалар ва ёш олимларнинг Республика илмий-амалий конференцияси. - Тошкент, 2012. – Б. 17-19.

Хегай О. Ч., кандидат филологических наук,
доцент
кафедра русского языка и литературы
Национальный Педагогический Университет Узбекистана
Саидова С. С.
магистрант
кафедра русского языка и литературы
Национальный Педагогический Университет Узбекистана

ОСОБЕННОСТИ ПОВЕСТВОВАНИЯ В РОМАНЕ М. Ю. ЛЕРМОНТОВА “ГЕРОЙ НАШЕГО ВРЕМЕНИ”

Аннотация: *В статье анализируются сложная система повествования, многослойная композиция и способы раскрытия образа Печорина через различные точки зрения в романе М. Ю. Лермонтова «Герой нашего времени». Рассматривается необычная структура произведения, нарушение хронологической последовательности событий, а также обилие внутренних монологов, которые способствуют более глубокому раскрытию внутреннего мира героя.*

Ключевые слова: *Лермонтов, нарратив, композиция, Печорин, многослойное повествование, психологический роман, реализм и романтизм.*

Xegay O. Ch., candidate of philological sciences
associate professor
department of russian language and literature
National Pedagogical University of Uzbekistan
Saidova S. S.
master's student
department of russian language and literature
National Pedagogical University of Uzbekistan

FEATURES OF NARRATION IN M. YU. LERMONTOV’S NOVEL “A HERO OF OUR TIME”

Annotation: *The article analyzes the complex narrative system, multilayered composition, and the methods of revealing Pechorin’s character through various perspectives in M. Y. Lermontov’s novel* A Hero of Our Time. *It examines the unconventional structure of the work, the non-linear sequence of events, and the abundance of internal monologues that contribute to a deeper understanding of the protagonist’s inner world.*

Keywords: *Lermontov, narrative, composition, Pechorin, multilayered narration, psychological novel, realism and romanticism.*

М. Ю. Лермонтов своим романом «Герой нашего времени» внес большое новшество не только в русскую литературу, но и в мировой литературный процесс. Это произведение, в отличие от большинства романов, привлекает читателя не последовательным развитием событий или простой сюжетной линией, а сложной системой повествования. Лермонтов вводит читателя в жизнь героя не напрямую, а через различные точки зрения. Именно такой подход делает роман более глубоким, психологически насыщенным и художественно самобытным.

На протяжении всего романа участвуют не один, а несколько рассказчиков. Сначала читатель получает первичное представление о Печорине через наблюдения путешествующего офицера. Затем, благодаря воспоминаниям Максима Максимыча, перед ним открывается другая грань Печорина. И наконец, в самой глубокой и искренней части произведения — в личном дневнике Печорина — мы знакомимся с его внутренним миром, его самокритичными размышлениями и духовными переживаниями. Эти различные точки зрения позволяют увидеть образ Печорина не односторонне, а во всей его сложности и противоречивости.

Лермонтов не располагает события романа в хронологическом порядке. Это придаёт произведению особую драматическую интонацию. В главе «Бэла» читатель узнаёт об одном из важнейших событий в жизни Печорина, однако остаётся в неведении о его внутреннем состоянии в тот момент. Когда же повествование переходит к «Журналу Печорина», читатель возвращается к тем же событиям и другим эпизодам уже через призму внутреннего взгляда самого героя. Такой «разрыв времени» позволяет глубже понять Печорина: сначала мы видим его поступки, а затем узнаём их причины.

Роман показывает важную для своего времени проблему — внутренние и внешние факторы, которые превращают человека в типичного для эпохи «лишнего человека». В своём дневнике Печорин предстает как человек, недовольный своим местом в обществе, столкнувшийся с внутренней пустотой, действующий без цели, но способный к глубокому самоанализу. Его внутренние размышления позволяют читателю прочувствовать переход от романтического идеализма к реализму. В образе Печорина Лермонтов отражает нравственный, социальный и духовный кризис своего времени.

Роман ценен не только своей психологической глубиной, но и неповторимой манерой повествования. Каждый рассказчик обладает собственным голосом, интонацией и системой оценок. Простая и искренняя речь Максима Максимыча резко контрастирует со сложными внутренними монологами Печорина. Таким образом Лермонтов мастерски использует возможности языка, чтобы показать различные слои человеческой психики.

Роман «Герой нашего времени» представляет собой своеобразное сочетание элементов романтизма и реализма. В описаниях природы и настроений Печорина ощущается романтическая приподнятость, тогда как

его психологический анализ, изображение социальной среды и мотивировка поступков относятся уже к сфере реализма. Такой синтез является одной из наиболее ярких особенностей творчества Лермонтова.

Роман Лермонтова «Герой нашего времени» является одним из тех произведений, которые совершили коренной переворот в русской литературе с точки зрения повествовательной формы. Анализ структуры романа, особенностей повествования и психологической глубины в изображении героя выявляет целый ряд индивидуальных черт, которые радикально отличают его от традиционных романов.

Прежде всего привлекает внимание многослойная система повествования романа. Лермонтов не ограничивается одним рассказчиком; напротив, он передаёт события с позиций нескольких лиц, каждый из которых описывает происходящее по-своему. Каждый повествователь обладает собственным мировоззрением, собственным голосом и субъективным отношением к главному герою, что обогащает ткань произведения.

Так, Максим Максимыч изображает Печорина просто, искренне, даже в некоторой степени романтизировано. Офицер-путешественник относится к Печорину с интересом, но вместе с тем — с определённой осторожностью. Сам Печорин, в своих дневниковых записях, сурово критикует себя, открыто показывает свои внутренние противоречия и душевные разламы.

Благодаря этому у читателя появляется возможность увидеть одного героя с разных сторон, и Печорин предстает как сложный психологический тип своего времени.

Второй важный аспект — несоблюдение хронологической последовательности в композиции романа. Лермонтов намеренно не располагает события в строгом временном порядке. Сначала читателю представляются эпизоды из более позднего периода жизни героя, а затем, через дневниковые записи, происходит возвращение в его прошлое. Такое построение позволяет постепенно дополнять психологический портрет Печорина.

Этот приём требует от читателя активного размышления: внимание акцентируется не на биографической последовательности, а на эволюции характера. Таким образом Лермонтов изображает Печорина не как простого героя, а как сложную личность с глубокими внутренними противоречиями и постоянной внутренней борьбой.

Третьим важным аспектом является психологическая интроспекция, представленная в романе. Дневник Печорина — один из первых глубоких образцов самоанализа в русской литературе. Герой не стремится оправдать себя; напротив, он открыто признаёт собственные слабости, внутренние мучения и неудовлетворённость, рождающуюся из ощущения бессмысленности происходящего. Его критические размышления свидетельствуют о формировании типа «лишнего человека», о крушении романтических идеалов и появлении нового, потребительского

мироощущения эпохи. Холодные, отстранённые рассуждения Печорина о самом себе делают философский пласт романа ещё более глубоким и содержательным.

Ещё одной важной особенностью стиля романа является синтез элементов романтизма и реализма. Романтическое настроение, присущее описаниям природы, гармонично сочетается с внутренним состоянием Печорина; однако его поступки, взаимоотношения в обществе и психологические портреты окружающих переданы в характерной для реализма точной и аргументированной форме. Естественное сочетание этих двух направлений делает роман эстетически богатым и одновременно глубоко содержательным.

Кроме того, в повествовательном стиле Лермонтова важную роль играет авторская дистанция**.** Автор не даёт прямых оценок и не принуждает читателя к определённым выводам. События представлены в их естественном виде, через взгляды разных повествователей и внутренние монологи Печорина, что предоставляет читателю возможность самостоятельно формировать своё мнение. Именно это делает анализ романа многослойным и глубоким.

Перечисленные особенности показывают, что «Герой нашего времени» является произведением, опередившим свою эпоху не только содержательно, но и методологически. Инновационные способы повествования позволяют раскрыть образ Печорина не просто как героя, но как явление своего времени. Именно поэтому роман и сегодня высоко ценится как образец психологического анализа, композиционной сложности и художественного мастерства.

Подводя итог, можно сказать, что Лермонтов, экспериментируя с формой повествования, прокладывает новый путь в литературе своей эпохи. Различные повествователи, сложная композиция, нелинейное представление времени и внутренние монологи позволяют изобразить Печорина как живого, ищущего, страдающего человека. Именно поэтому «Герой нашего времени» и сегодня остаётся произведением, которое привлекает читателя, заставляет задуматься и несёт в себе глубокий смысл.

Использованные источники:

1. Бочаров С. Г. О прозе Лермонтова. — Москва: Наука, 1988.
2. Гинзбург Л. Я. О психологической прозе. — Ленинград: Художественная литература, 1977.
3. Кожинов В. В**.** История русской литературы XIX века. — Москва: Просвещение, 2001.
4. Томашевский Б. В. Теория литературы. Поэтика. — Москва: Аспект Пресс, 1996.
5. Набоков В. Лекции по русской литературе. — Москва: Независимая газета, 1998.

УДК 621.313.3.025.3-78

Ходжиматов М.-Б. З.
ассистент
Андижанский государственный технический институт
Узбекистан
ORCID ID: 0009-0006-3217-5026

МОДЕРНИЗАЦИЯ СИСТЕМЫ УПРАВЛЕНИЯ АСИНХРОННЫМ ДВИГАТЕЛЕМ

Аннотация: *В данной статье рассмотрены вопросы модернизации системы управления асинхронными двигателями с короткозамкнутым ротором, применяемыми на промышленных предприятиях. Проанализированы недостатки и технические ограничения существующих релейных устройств, а также показаны преимущества микропроцессорных систем управления. Представлены новые технические решения, обеспечивающие пуск, торможение, защиту, выявление аварийных режимов и дистанционный мониторинг двигателя. Рассмотрены функции микропроцессорных устройств по защите от коротких замыканий, перегрузок, исчезновения фазы и других аварийных состояний. Статья содержит актуальные научно-практические предложения, направленные на повышение надёжности и энергоэффективности промышленных электроприводов.*

Ключевые слова: *асинхронный двигатель, короткозамкнутый ротор, система управления, микропроцессорная защита, релейная защита, автоматизация, электрический привод, пуск и торможение двигателя, аварийные режимы, защита от перегрузок, защита от короткого замыкания, фазовое исчезновение, энергосбережение.*

Khodjimatov M.-B. Z.
assistant
Andijan State Technical Institute
Uzbekistan
ORCID ID: 0009-0006-3217-5026

MODERNIZATION OF THE ASYNCHRONOUS MOTOR CONTROL SYSTEM

Abstract: *This article discusses the modernization of the control system of squirrel-cage induction motors used in industrial enterprises. The shortcomings and technical limitations of existing relay-based devices are analyzed, and the advantages of microprocessor-based control systems are demonstrated. New technical solutions are presented that provide motor starting, braking, protection,*

fault detection, and remote monitoring. The functions of microprocessor devices for protection against short circuits, overloads, phase loss, and other emergency conditions are examined. The article offers relevant scientific and practical recommendations aimed at improving the reliability and energy efficiency of industrial electric drives.

Keywords: *induction motor, squirrel-cage rotor, control system, microprocessor protection, relay protection, automation, electric drive, motor starting and braking, fault conditions, overload protection, short-circuit protection, phase loss, energy saving.*

Введение

В настоящее время в производственные предприятия внедряются новые техника и технологии, предприятия адаптируются к выпуску новой продукции, создаются многочисленные малые предприятия. Система электроснабжения и монтаж этих предприятий также должны соответствовать новым требованиям. В условиях рыночной экономики разработка и создание высокоэффективных энергосистем, включая новые электрические сети, отвечающие современным требованиям, является требованием времени [1].

В настоящее время электроснабжение большинства действующих предприятий работает с низкой эффективностью, потери электроэнергии превышают допустимые нормы и часто происходят аварийные ситуации. Основная причина этого — износ оборудования системы электроснабжения и электрических устройств, а также несоответствие монтажных работ требованиям. Одной из основных задач современной электроэнергетики является создание высокоэффективных и энергоэкономичных систем электроснабжения [2].

На промышленных предприятиях управление электрическим приводом, то есть автоматический пуск, поддержание заданной скорости, реверсирование и торможение, выполняется электромеханическими устройствами. К таким устройствам относятся магнитные пускатели, предназначенные для выполнения следующих функций:

1. Пуск, реверсирование, регулирование скорости, торможение и отключение двигателя от сети;
2. Защита электроприемников и электрических сетей от перегрузки и короткого замыкания;
3. Блокировка отдельных элементов электрического привода и механизмов.

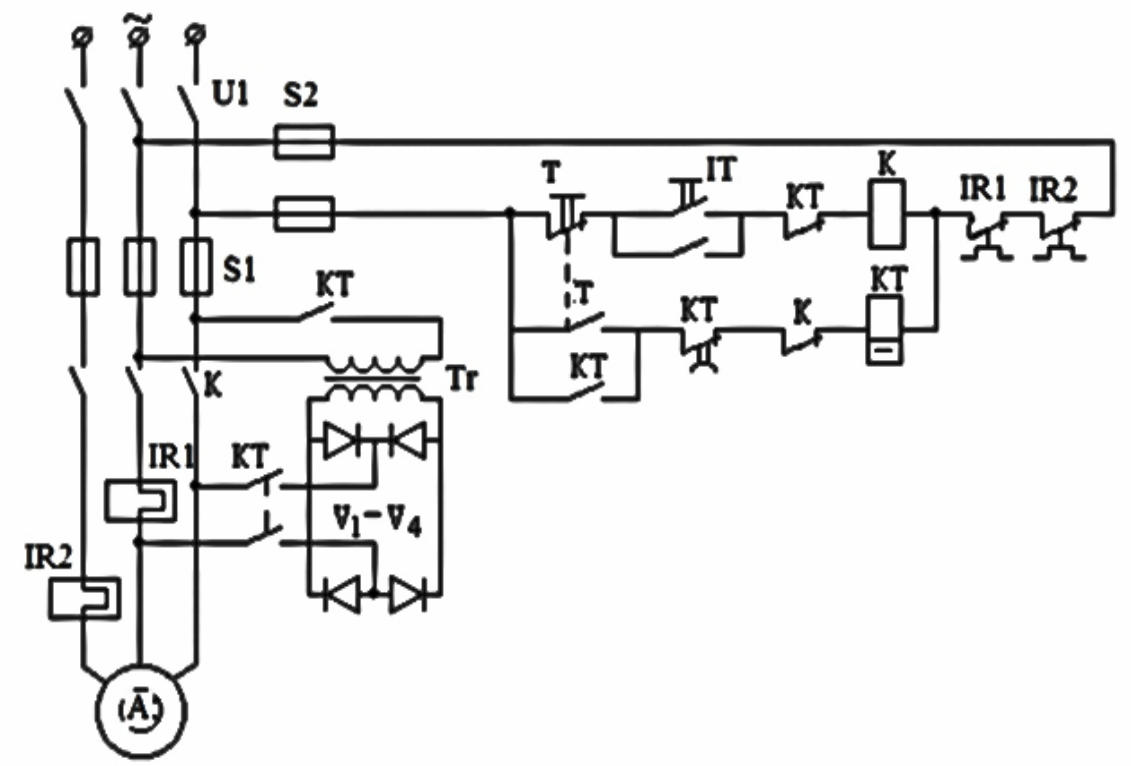


Рисунок 1. Схема управления асинхронным двигателем с короткозамкнутым ротором.

Управление асинхронными двигателями

Схема управления асинхронным двигателем с короткозамкнутым ротором представлена на рисунке 1. Для запуска двигателя включается выключатель (U) и нажимается кнопка «Пуск» (IT). Линейный контактор (K) включает главные контакты, подключая двигатель к сети. Для электродинамического торможения нажимается кнопка «Стоп» (T), которая размыкает контактор K и отключает двигатель от сети. Затем блок-контакт (T1) включает тормозной контактор (KT), который соединяет статор с источником постоянного тока, переводя двигатель в режим электродинамического торможения. Контактор KT управляется маятниковым реле времени, которое после заданного интервала отключает торможение. Схема включает устройства защиты двигателя от короткого замыкания, перегрузки и перегрева [1].

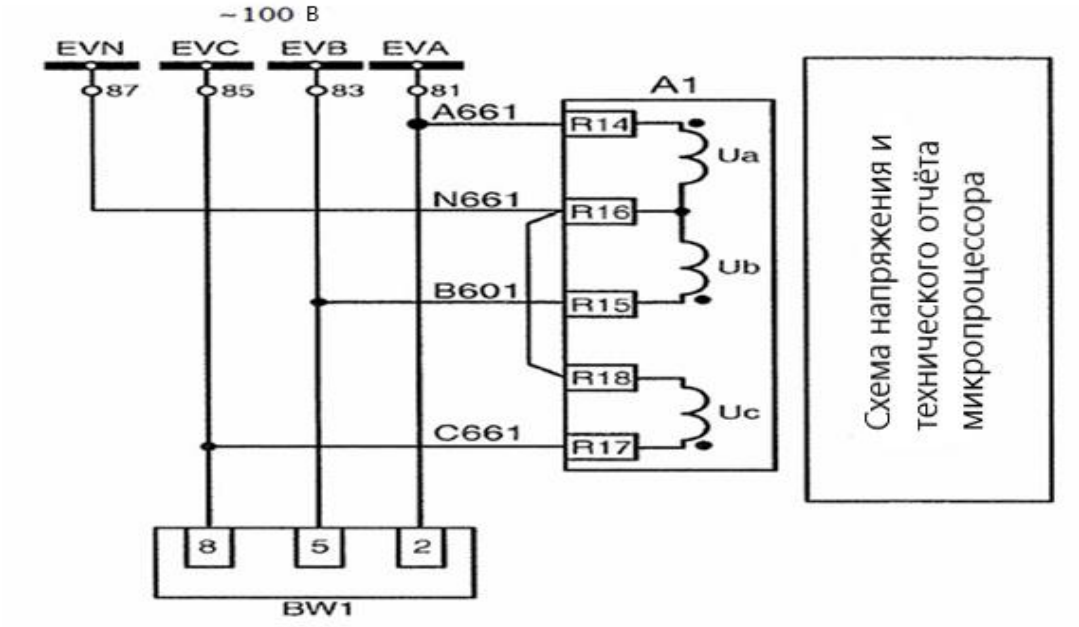


Рисунок 2. Микропроцессорная схема управления асинхронным двигателем с короткозамкнутым ротором

Микропроцессорная система управления.

Совершенствование существующих релейных защит и создание новых является одним из факторов эффективного использования энергетических устройств. В эпоху стремительного развития электроники и информационных технологий применение многофункциональных микропроцессорных устройств для защиты и автоматического управления энергетическими системами является актуальной задачей [3].

В ряде развитых стран, включая Германию (компания Siemens) и Россию (предприятие «Сигнал»), ведутся исследования по созданию микропроцессорных устройств для защиты энергетических систем от аварийных режимов. Среди них — устройства защиты асинхронных двигателей от различных повреждений и аварийных режимов, внедренные на практике (рисунок 2).

Устройство включает: измерительный трансформатор, аналого-цифровой преобразователь, микропроцессор, оперативную и постоянную память, панель управления, блок питания и электромагнитные реле [3].

Функции устройства:

– Программируемая трехступенчатая токовая защита от межфазного короткого замыкания;

– Программируемая защита от однофазного замыкания на землю;

– Токовая защита при пропадании фазы;

– Запись и хранение в памяти данных о последних 10 авариях.

Технические возможности устройства:

– Определение места короткого замыкания;

– Обеспечение работоспособности устройства при отсутствии напряжения питания в течение $t \geq 0{,}5$ с;

– Дистанционное управление параметрами защиты и передача информации в ЭВМ;

– Работа в широком температурном диапазоне (от –20°С до +50°С);

– Надежность работы достигается за счет постоянной самодиагностики.

Использованные источники:

1. Imomnazarov A.T. Sanoat korxonalari va fuqarolik binolarning elektr jixozlari. – Tolshkent, “ILM ZIYO”. – 2006 y.

2. Соколовский. Г.Г. Электроприводы переменного тока с частотным регулированием. Москва: ACADEMIA, 2006, Высшее профессиональное образование.

3. Zaynabidin o'g'li M. B. X., & Xolmirza Azimjon o'g'li, M.(2023). MIKROPROTSESSORLI BOSHQARILUVCHI ELEKTR YURITMALARNING AFZALLIKLARI VA VAZIFALARI. Innovative Development in Educational Activities, 2 (1), 80-87 [Электронный ресурс].

4. Ходжиматов М. Б. ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ ЭНЕРГОСНАБЖЕНИЯ ПРЕДПРИЯТИЙ //Экономика и социум. – 2025. – №. 5-1 (132). – С. 1586-1590.

5. Turatbekova A. et al. Study on the effect of organic fertilizers for enhancing the yield and quality of the white cabbage (Brassica oleracea var. Capitata f. alba) //E3S Web of Conferences. – EDP Sciences, 2024. – Т. 563. – С. 03075.

Холиков Р. Й.
профессор
Ферганский государственный университет
г. Фергана. Узбекистан

ФОРМИРОВАНИЕ, ТЕРРИТОРИАЛЬНОЕ РАЗМЕЩЕНИЕ И ЗОНИРОВАНИЕ САКРАЛЬНЫХ ЛАНДШАФТОВ ФЕРГАНСКОЙ ОБЛАСТИ

Аннотация. *В статье рассматривается вопрос подбора наиболее приемлемой методике для исследования территориального размещение и районирования сакральных ландшафтов Ферганского вилоята. Сакральные ландшафтов наиболее целесообразно изучать на региональном и локальном уровне, в частности в переделах административных районов и областей. При районировании сакральных ландшафтов Ферганского вилоята нами использованы географический. природно-исторический и культурно центрические подходы которые являются основными Критериями их выделения в районы и ареалы.*

Ключевые слова. *сакральный объект, сакральный ландшафт, культвыместо объекты поломчество, чество, сакральное районирования, сакральная территория.*

Kholikov R. Y.
professor
Fergana State University
Fergana, Uzbekistan

FORMATION, TERRITORIAL DISTRIBUTION AND ZONATION OF SACRED LANDSCAPES OF FERGANA REGION

Abstract. *The article examines the issue of selecting the most appropriate methodology for studying the territorial distribution and zoning of sacred landscapes of the Fergana region. Sacred landscapes are most appropriately studied at the regional and local levels, particularly within administrative districts and regions. In zoning sacred landscapes, we used geographic, natural-historical, and culturally centric approaches, which are the primary criteria for defining them into regions and areas.*

Key words*: sacred object, sacred landscape, cultural place objects, sacred zoning, sacred territory.*

Введение

Актуальность исследования обусловлена междисциплинарным характером проблемы и необходимостью сохранения уникального культурного наследия. Сакральные ландшафты являются ключевыми

маркерами этнической идентичности и исторической памяти. Переход от изучения отдельных памятников к комплексному ландшафтному анализу их пространственной организации (формирования, размещения и зонирования) позволяет разработать научно обоснованные стратегии их устойчивого управления и использования. Сакральный ландшафт – это ландшафт, объединяющий естественную и культурную составляющие, которые взаимодействуют и влияют друг на друга в процессе исторического развития. Сакральные объекты – это объекты, которые, прежде всего, призваны выполнять духовную функцию, связанную с религиозными запросами этносов. Сакральный ландшафт является феноменом культурного ландшафта. Согласно В.Л.Качиньскому, культурный ландшафт – это всякое земное пространство жизнедеятельности достаточно большой группы людей, которое одновременно цельно и дифференцированно, а эта группа освоила данное пространство утилитарно, семантически и символически [4].

В зарубежной науке сакральный ландшафт – это детально разработанная научная категория [Tuan, 1975, 1976, Carlson, 1982]. В течение последних 20 лет ученые из СНГ посвятили исследования размещению и дифференциации сакральных ландшафтов. В этом направлении особенно значимы исследования Б.Ц.Гомбоев [2006], К.Мезенцев, Ю.Когатько [2009], В.Л.Качинский [2001], М.Е.Кулешова [2002], Л.В.Атаман [2015], О.Р.Лукина [2019], и многих других.

М.Е.Кулешова рассматривает сакральный ландшафт как часть более крупного социокультурного образования – земного пространства, являющегося жизненной средой достаточно большой (самосохраняющейся) группы людей [5]. В нашей Республике, в том числе в пределах Ферганской области, сакральные объекты изучены в качестве религиозных, исторических и археологических аспектов [8]. В нашем исследовании сакральные ландшафты Ферганской области рассмотрены как реальные типы районов и сакральных ареалов.

Материалы и методы

При исследовании формирование территориальное размещение сакральных ландшафтов и их районирование нами были использованы различные методы как анализ и синтез, историко культурный, типологический и картографический. Методологической основой послужили разработки таких авторов, как А.Н.Окладникова, А.А.Борисова, А.И.Шаблий, К.В.Мезенцев, Л.Т.Шевчук, Л.П.Донбаевой, О.Р.Лукина, Л.С.Пахомова и другие.

Наиболее разработанными методами исследования сакральных ландшафтов, по нашему мнению, являются методики, предложенные К.Мезенцевым, Ю.Когатько, Л.Ключко и Т.Божук. Согласно методике вышеуказанных авторов, важнейшими этапами исследования сакральных объектов и ландшафтов являются теоретический, оценочный, аналитический и конструктивный. Как отмечает В.Атаман исследование сакральных ландшафтов становиться актуальным направлением исследований

различных общественных наук. В географической науке свидетельством этого является появление работ по географии религий (сакральной географии), которая изучает религиозную сферу, а именно распространение и территориальное размещение религий, пространственное временные закономерности взаимодействия религиозного феномена с внешней средой [2-7].

Б.И.Гомбаев [2006] предлагает типологию культовых мест (сакрального пространство) по следующим признакам: этническому, физико-географическому (горные, степные, водные источники и пр) сезонному [3,21]. Территория Ферганского вилоята характеризуется многочисленностью сакральных объектов – местностей исторического и духовного значения, а также древними культовыми объектами, что связано с заселением и освоением территории. Природная предпосылка сакрального пространство исследуемой территории, в свою очередь оказала существенное влияние на формирование и развитие специфических черт сакральных ландшафтов.

Одним из факторов формирования сакральных ландшафтов является рельеф. горные массивы представляют собой природныепрепятствиядля культурного общенияразделенных или сакральных территорий.Наиболее благополучная в этом отношенниями равянных территорий котарые обшение разных этросов и их культовые обрязы удмируют сикральныхпространств.Природно истерические сакральные объекты Ферганского вилоята расположенное в разных гипсометрических отметках особенно горных, предгорных и равнинных территориях примикаюшим к водным источникам (рек,сяев,родников) при этом в районировании сакральных ландшафтов целесообразно изучать налокальном уровне.

По определению К.Мезенцева районирование территории лучше проводить по результатам анализа сакральных ландшафтов ихдуховной ценности расположения.Из этого следует что лучше проводить районированние сакрального пространства,использую системный подход и системно-структурный анализ.При этом необходимо учитывать сакральных административное устройство территории [5]. По нашему мнению районированиетерритории сакральных пространаств лучше проводить по результатам анализа сакральных ландшафтов, географического расположения, их духовной ценностии административном устройством территории.

Результаты и обсуждение

Территория Ферганского вилоята обладает богатым культурным, социально-духовным историческим и природно ландшафтным последствием которые в настоящее время пользуется как объект туризма и рекреации.В настоящее время недостаточно исследованы сакральные ландшафты Ферганской вилолта в целом Ферганской долины с точки зрения сакрализатции ее территории,имеется значительная проблема сбора

материалов, интерпретации и сбора информации о сакральных ландшафтах Ферганской долины в целом.

В настоящее время религиозная мотивация оказывает большое влияние на развитие туризма. Свыше 200 млн. чел. ежегодно совершают поломничество. Религиозный туризм играет большую роль системе международного и внутреннего туризма и является составной частью всей туристической индустрии. Согласно отчету Global Muslim Tourism Index, опубликованному в 2019 году, количество мусульман, совершивших паломничество в 2018 году, составило 140 миллионов. К 2026 году это число ожидается достигнет 230 миллионов.

За прошедший период Республика Узбекистан много сделал для развития поломничесткого туризма и увеличения его доли в экспорте туристических услуг. В последние годы правительством уделяется пристальное внимание к проведению активной политики в области развития туризма, принимаются нормативные правовые активной политики в области развития туризма, принимаются нормативные правовые акты и целевые региональные программы для формирования правовых основ современного цивилизанного туристического рынка а также модернизуется туристическая инфраструктура.

В нынешнем году была принята Указ Президента Республики Узбекистан "О мерах по дальнейшему развитию внутреннего и поломнического туризма в Республике Узбекистан (УП-N6165 от 10.02.2021 г). В нем указывается в целях диверсификации туристических продуктов и услуг, направленной на различные сегменты туристического рынки в республики, дальнейшего повышения их конкурентоспособности создания благоприятной и удобной внутренней и международной поломничесткой туристической среды, расширения транспортных маршрутов, повышение качества транспортных услуг, продвижения туристических продуктов,в также укрепления имиджа частей страны как безопасного места для путешествий и отдыха.

Цель данной статьи заключается в районировании пространственного размещения сакральных ландшафтов на территории Ферганского вилоята и выявлении способов ихинтеграции туристическую деятельность как отмечает О. Лукина районирование сакральных ландшафтов можно проводить по многим показателям: разграничение по природным особенностям, районирование по видам этнокультурных ландшафтов, использование поломническом туризме [2. 83-88].

При районировании сакральных ландшафтов Ферганского вилоята нами использованы историко-географические, природно - центрические и культурно- центрические подходы. Ферганская вилоят как всей частей Ферганской долины характеризуется многочисленностью сакральных объектов местностей исторического значения, а также древними культовыми местами, что связано с расселением и освоением территории.

Районирование сакральных ландшафтов стало возможным при систематизации и описание сакральных объектов, групперовке их к сакральные районы и Ареалы территории Ферганского вилоята. В результате районирования нами выявлены и сгрупированы сакральные объекты которое определено районы и ареалы сакральных ландшафтов [Таблица 1].

Согласно данным, приведенным в таблице 1, в первом и втором районах сакральными объектами являются уникальные природные объекты. Южный горный район располагает известными горными сакральными ландшафтами – именно здесь расположены озеро Кули-Курбан, священный родник Чашма, а также многие другие природные сакральные объекты. Достаточно большое количество природных и культурных сакральных ландшафтов сосредоточено в пределах третьего и четвертого районов, что явилось следствием особенностей исторического и культурного развития этих сакральных ландшафтов.

Таблица 1

Районы и ареалы сакральных ландшафтов Ферганского вилоята.

Сакральные районы	Сакральный ареал.	Сакральные ландшафты
1. Южный горный районы	Среднегорный и предгорный ареал	Пещеры, навесы, круглые могильники, отдельные камни, озера
2. Южный, юго-западный адырный районы	Меж адырно-равнинный и адырный ареал	Родники, отдельные могилы святых людей с архитектурными объектами, священные объекты, древние мечети, могильники
3. Район заадырных наклонных равнин	Приречно долинный и адырный ареал	Археологические памятники, объекты культовых обрядов, мечети, приречные культовые объекты.
4. Центральный пустынный район	Центрально Ферганский ареал	Древние кладбища, преобразованные, восстановленные археологические сакральные объекты.

Таблица составлено автором

Четвертый район характерен рассеянными концентрациями религиозных и духовно-культурных сакральных объектов. Большое количество сакральных объектов были разрушены местными властями под девизом и освоении территории: Некоторые сакральные объекты которые находилось существующих о древних кладбищах, были сохранены и в дальнейшем реставрированы по инициативе местных народов.

При районировании были определены концентрации сакральных объектов и ландшафтов в переделах вилоята. Высокая концентрация природных и этнокультурных объектов характерно для горных и адырных районов. Среднее концентрация сакральных ландшафтов выявлена третьих и

четвертых районах где, превышает численности религиозно – культурных и историко – археологических сакральных объектов. Большинство сакральных объектов, которые занимают определенное место на ландшафтах Ферганского вилоята, имеют туристическую и рекреационную привлекательность. Для успешной интеграции сакральных ландшафтов в туристическую деятельность должны разработаны карты туристических маршрутов, организации сферы услуги туристической инфраструктуры.

Выводы

Современный этап развития науки характеризуется развитием и углублением научно – методологических основ,применением современных методик. Особенно это касается отраслей новых наук, среды которых сакральная география не является исключением. Сакральный ландшафт, представляя культурно природную динамическую систему, сформировавшуюся в процессе материального и духовного взаимодействия местного этнического сообщество с природой, является одним из важнейших объектов географических исследований.

Немаловажное значения имеет исследования сакральных ландшафтов для развития религиозного туризма. Для успешной интеграции сакральных ландшафтов в туристических маршрутах, организации сферы услуги туристической инфраструктуры.

Использованные источники:

1. Указ Президента Республики Узбекистан, «О мерах по дальнейшему развитию внутреннего и паломнического туризма в Республике Узбекистан» «УП-6165. от. 10.02.2021.»

2. Атаман Л.В, Исследование сакрального пространства региона: методология и принципы. Пековский регионологический журнал №23/2015 с. 107-117.

3. Гомбоев Б.Ц. Культовые места Баргузинской долины. Улан-Удэ. 2006. - 287 с.

4. Качинский В. Л. Культурный ландшафт и советское обитаемое пространство: Сборник статей. — М.: Новое литературное обозрение, 2001. — 576 с.

5. Кулешова М. Е. Управление культурными ландшафтами и иными объектами историко-культурного наследия в национальных парках. М.: Изд-во Центра охраны дикой природы, 2002 – 105 с.

6. Лукина О.Р., Похомова Л.С. Районирование сакральных ландшафтов Якутии // Успехи современного естествознания. – 2019 - №12-1ю – с. 83-88;

7. Мезенцев К., Когатько Ю. Методы исследования географии религии: целесообразность использо¬вания, систематизация, потенциал картографического и центрографичного методов // Вестник Киевского национального университета имени Тараса Шевченко. М.: Издательско-полиграфический центр «Киевский университет», 2009. Вып. 56. С. 30–36.

UDK: 579.61:615.33

Эркинова М. У.
Тухташева З. А.
Султоналиева М. М.
кафедра микробиологии, вирусологии и иммунологии
Научный руководитель: Абдуллаев У.М.
кафедра микробиологии, вирусологии и иммунологии
Ташкентский государственный медицинский университет
Ташкент, Узбекистан

АНТИБИОТИЧЕСКАЯ РЕЗИСТЕНТНОСТЬ МИКРООРГАНИЗМОВ: ГЛОБАЛЬНАЯ ПРОБЛЕМА И ПОДХОДЫ

Аннотация. *В данной статье широко освещается глобальная проблема здоровья, связанная с антибиотикорезистентностью - снижением эффективности лечения в результате устойчивости бактерий к антибиотикам. В статье подробно анализируются молекулярные механизмы резистентности - генные мутации, горизонтальный генный обмен, ферменты, инактивирующие антибиотики, эффлюкс -помпы и образование биофильма. Обсуждаются современные подходы к решению проблемы - инновационные стратегии, такие как антимикробные препараты нового поколения, бактериофаговая терапия, пробиотики, иммуномодуляторы, а также создание моделей лекарств с помощью искусственного интеллекта. В статье подчеркивается необходимость комплексного подхода к борьбе с антибиотикорезистентностью, важность рационального применения антибиотиков и эффективных систем мониторинга.*

Ключевые слова: *антибиотикорезистентность, бактерии, антимикробные стратегии, бактериофаг, пробиотик, искусственный интеллект.*

Erkinova M. U.
Tukhtasheva Z. A.
Sultonalieva M. M.
department of microbiology, virology, and immunology
Supervisor: Abdullaev U. M.
department of microbiology, virology, and immunology
Tashkent State Medical University
Tashkent, Uzbekistan

ANTIBIOTIC RESISTANCE OF MICROORGANISMS: A GLOBAL PROBLEM AND APPROACHES

Abstract. *This article comprehensively addresses the global health problem of antibiotic resistance—the reduced effectiveness of treatment due to bacterial resistance to antibiotics. It provides a detailed analysis of the molecular mechanisms of resistance, including gene mutations, horizontal gene exchange, antibiotic-inactivating enzymes, efflux pumps, and biofilm formation. Modern approaches to addressing this problem are discussed, including innovative strategies such as next-generation antimicrobials, bacteriophage therapy, probiotics, immunomodulators, and the creation of drug models using artificial intelligence. The article emphasizes the need for a comprehensive approach to combating antibiotic resistance, the importance of rational antibiotic use, and effective monitoring systems.*

Keywords: *antibiotic resistance, bacteria, antimicrobial strategies, bacteriophage, probiotic, artificial intelligence.*

Введение

Открытие антибиотиков стало революционным поворотным моментом в медицине XX века. Открытие пенициллина Александром Флемингом в 1928 году открыло новую эру в борьбе с инфекционными заболеваниями. С этого периода были разработаны различные классы антибиотиков, что позволило эффективно лечить ранее смертельные заболевания, такие как пневмония, туберкулез и сепсис. Однако широкое и часто неконтролируемое применение антибиотиков снизило их эффективность и привело к появлению устойчивых форм бактерий.[1,2,3]

Антибиотикорезистентность - это состояние, при котором лечение становится неэффективным вследствие потери бактериями чувствительности к определенным лекарственным препаратам. Это явление стало глобальной проблемой здравоохранения в медицине, ветеринарии и сельском хозяйстве. По данным Всемирной организации здравоохранения (ВОЗ), ежегодно миллионы людей во всем мире умирают от инфекций, устойчивых к антибиотикам. Ожидается, что к 2050 году этот показатель может превысить 10 миллионов. Основными причинами резистентности являются неправильное использование антибиотиков, самолечение, профилактическое применение лекарств в ветеринарной практике, несоблюдение правил гигиены и распространение устойчивых штаммов через глобальную торговлю и миграцию. В то же время, генетическая адаптивность бактерий и механизмы горизонтального обмена генами также ускоряют этот процесс. В последние годы разрабатываются новые подходы к борьбе с антибиотикорезистентностью. К ним относятся бактериофаговая терапия, синтез новых антимикробных веществ, использование пробиотиков, а также разработка лекарств и анализ микробов на основе искусственного интеллекта. В этой статье анализируются причины, молекулярные механизмы, глобальные последствия и передовые стратегии борьбы с резистентностью к антибиотикам.[2,3,6,7]

Причины антибиотикорезистентности

Формирование антибиотикорезистентности — это многофакторный процесс, который тесно связан с медицинской практикой, ветеринарией, экологией и социальными факторами. Ниже анализируются основные причины этого процесса: Антибиотики также часто используются при вирусных инфекциях (например, гриппе, простуде), хотя они неэффективны против вирусов. Самолечение пациентов, случаи покупки антибиотиков без рецепта, неполный курс лечения — все это способствует развитию устойчивости бактерий. В результате бактерии отбираются, и выживают только резистентные штаммы. Кроме того, широко распространены случаи неконтролируемого применения антибиотиков в системе здравоохранения, в том числе в развивающихся странах. Некоторые врачи выписывают антибиотики с профилактической целью или по требованию пациента. Кроме того, ограниченные возможности лабораторной диагностики усиливают "предварительный" подход к выбору препарата, что увеличивает риск неэффективного лечения и резистентности. [6,13]

Антибиотики используются не только для лечения инфекций у животных, но и для ускорения их роста и профилактики заболеваний. В результате такой практики резистентные бактерии формируются в организме животного и по пищевой цепи поступают в организм человека. Этот процесс способствует глобальному распространению резистентности к антибиотикам. В результате глобальной торговли, миграции и путешествий, частых перемещений людей в современном мире, международной торговли и обмена продовольствием устойчивые микроорганизмы легко распространяются из одного региона в другой. Например, антибиотикорезистентные штаммы, разработанные в Азии, также регистрируются в Европе и Северной Америке.

Несоблюдение санитарных правил в источниках воды, пищевых продуктах и медицинских учреждениях усиливает распространение бактерий. В частности, несоблюдение правил дезинфекции в больницах приводит к "больничным" (носокомиальным) инфекциям, которые становятся источником формирования наиболее опасных резистентных штаммов. В целом, причины резистентности к антибиотикам многогранны и напрямую связаны с человеческим фактором. Поэтому в решении этой проблемы важно не только создание новых лекарств, но и рациональное использование антибиотиков, усиление системы контроля и повышение осведомленности населения. [4,5,6.14]

Молекулярные механизмы резистентности.

Антибиотикорезистентность — это сложный биологический процесс, основанный на генетической адаптивности бактерий. Бактерии эволюционно способны выживать, изменяя свою структуру и функцию в ответ на давление вокруг них, включая воздействие антибиотиков. Антибиотики воздействуют на ферменты, связанные с синтезом важных молекул в бактериальной клетке - рибосом, ДНК-гиразы или пептидогликана. Если в этих генах происходят точечные мутации, антибиотик не может связываться с мишенью и теряет

свою эффективность. Например, у Streptococcus pneumoniae мутации в генах белков связывания с пенициллином (PBP) снижают эффективность пенициллина. Изменения в гене rpoB при Mycobacterium tuberculosis вызывают резистентность к рифампицину. Наиболее опасным способом распространения признаков резистентности является горизонтальный трансфер генов. Благодаря этому процессу бактерии обмениваются генетическим материалом друг с другом.

Существует три основных механизма:

1. Конъюгация - обмен ДНК с помощью плазмид (часто называемых "R-плазмидами").

2. Трансформация - бактерии принимают свободные фрагменты ДНК из окружающей среды в свою клетку.

3. Трансдукция - перенос генов от одной бактерии к другой посредством бактериофагов (вирусов).

В результате гены, устойчивые к антибиотикам, быстро распространяются на различные виды бактерий, что затрудняет лечение. Кроме того, многие бактерии вырабатывают ферменты, которые инактивируют молекулы антибиотиков. Наиболее известным является фермент β-лактамаза. Он разрушает β-кольцевую структуру β-лактамных антибиотиков, таких как пенициллин и цефалоспорин, делая их неэффективными. Аминогликозид-модифицирующие ферменты также изменяют структуру антибиотика, препятствуя его связыванию с рибосомой. Бактерии, продуцирующие карбапенемазу, могут выдерживать даже самые сильные антибиотики (такие как Klebsiella pneumoniae, Pseudomonas aeruginosa).[4,9,15]

Некоторые бактерии активно выбрасывают молекулы антибиотиков из клетки через эффлюкс-насосы, расположенные в клеточной стенке. В результате этого механизма антибиотик не может достичь достаточной концентрации в клетке. Например, система AcrAB-TolC у E. coli и Pseudomonas aeruginosa, эффлюксная помпа NorA у Staphylococcus aureus.

Бактерии изменяют структуру клеточной стенки или образуют колонии в виде биофильмов, чтобы усилить защитные механизмы против антибиотиков. Биофильм - это комплекс бактерий, окруженный полисахаридной оболочкой, которая ограничивает доступ к антибиотикам и иммунной системе. Например, при росте Staphylococcus epidermidis и Pseudomonas aeruginosa в виде биофильмов их устойчивость увеличивается в 1000 раз.

Молекулярные механизмы резистентности указывают на генетическое разнообразие и адаптивность бактерий. Благодаря мутациям и смене генов они быстро адаптируются к новым условиям, что снижает эффективность антибиотиков. Поэтому глубокое изучение этих механизмов является основным направлением разработки антимикробных стратегий нового поколения.[9,10,11,12,15]

Глобальная статистика и распространенность резистентности к антибиотикам

Антибиотикорезистентность стала серьезной глобальной проблемой здравоохранения в последние десятилетия. По данным Всемирной организации здравоохранения (ВОЗ), Европейского центра мониторинга инфекционных заболеваний (ECDC) и других аналитических центров, резистентные бактерии широко распространены во многих странах. По данным ВОЗ, ежегодно 2,8 миллиона человек во всем мире заболевают в результате инфекций, устойчивых к антибиотикам, из которых >1 миллиона умирают. Ожидается, что к 2050 году смертность от антибиотикорезистентности может достичь 10 миллионов человек.

Наиболее распространенные резистентные бактерии:

Метициллин-резистентный золотистый стафилококк (MRSA) является основной причиной внутрибольничных назокомиальных инфекций по всему миру.

E. coli, продуцирующая β-лактамазу (ESBL) расширенного спектра действия, является основным агентом инфекций мочевыводящих путей во многих странах.

Carbapenem-резистентные Enterobacteriaceae (CRE) - характеризуются высокой смертностью при тяжелых заболеваниях.

Multidrug-resistant Mycobacterium tuberculosis (MDR-TB) - затрудняет лечение туберкулеза, особенно в развивающихся странах.

Африка и Юго-Восточная Азия - резистентные штаммы быстро распространяются из-за недостаточного контроля антибиотиками. Европа и Северная Америка - хотя контроль сильный, штаммы MRSA и ESBL стабильно присутствуют. Глобальная миграция и торговля способствуют быстрому распространению резистентных бактерий, что делает резистентность к антибиотикам международной проблемой. Резистентность к антибиотикам значительно увеличивает стоимость лечения, в некоторых случаях обычные антибиотики неэффективны и требуют дорогостоящей и сложной терапии. Увеличивается количество назокомиальных инфекций, увеличивается нагрузка на ресурсы больниц. В развивающихся странах ежегодно сотни тысяч людей умирают из-за ограничений системы здравоохранения из-за резистентности к антибиотикам.

Во всем мире антибиотикорезистентность рассматривается не только как медицинская, но и как экономическая и социальная проблема. Региональный и глобальный мониторинг, эффективная система контроля, рациональное использование антибиотиков и внедрение инновационных антимикробных стратегий имеют важное значение.[3,9,10,14,15,17]

Новые подходы к антибиотикорезистентности

Поскольку антибиотикорезистентность представляет угрозу для глобального здравоохранения, ученые и медицинские работники работают над новыми стратегиями и инновационными подходами. В последние годы разрабатываются новые препараты против бактерий, устойчивых к

традиционным антибиотикам. Быстрый синтез и модификация антибиотиков - это обход устойчивости посредством структурных изменений существующих лекарств. Редкие группы антибиотиков - новые природные антибиотики, такие как тейхобактин, которые эффективно уничтожают грамотрицательные бактерии. Применение терапии бактериофагами также имеет большое значение. Бактериофаги - вирусы, точно убивающие бактерии, эффективные против антибиотикорезистентных штаммов. Есть преимущества, такие как целенаправленная атака, предотвращение повреждения клеток человека и уничтожение бактерий внутри биофильма. Кроме того, иммуномодуляторы укрепляют собственную иммунную систему организма и поддерживают борьбу с инфекциями, а пробиотики нормализуют микрофлору кишечника и ограничивают рост патогенных бактерий.

Развитие диагностики и мониторинга позволяет определить тип инфекции с помощью экспресс-диагностических тестов и увеличить возможности выбора правильного антибиотика, отслеживать резистентные штаммы с помощью генетического и молекулярного мониторинга и прогнозировать их распространение.

В борьбе с антибиотикорезистентностью нет единого решения, но эффективный результат может быть достигнут путем комбинированного применения нескольких подходов. Разработка новых препаратов, бактериофаговая терапия, диагностика и мониторинг, а также рациональное применение антибиотиков - все это неотъемлемая часть глобальной стратегии.[2,3,5,7,8]

Заключение

Антибиотикорезистентность является одной из самых серьезных угроз глобальному здравоохранению сегодня. Как было проанализировано в аналитической статье, борьба с антибиотикорезистентностью требует многогранного подхода. Изучая молекулярные механизмы, применяя глобальный мониторинг и инновационные стратегии терапии, человечество сможет контролировать эту проблему. При этом профилактика и рациональное применение антибиотиков является приоритетной задачей для каждой страны.

Использованные источники:

1. Mebrahtu, A.R., Likulunga, L.E., Chauwa, A. et al. (2025). A systematic review and meta-analysis of antibiotic resistance of foodborne pathogenic bacteria. BMC Infect Dis, 25, 535. https://doi.org/10.1186/s12879-025-10779-9
2. Kumar Jha, K., Saini, S., Raj, A., ., S., & Bishnoi, H. (2023). The Antibiotic Resistance Crisis. Asian Journal of Pharmaceutical Research and Development, 11(5), 44–52. https://doi.org/10.22270/ajprd.v11i5.1321
3. Laghari, S. A., Kalwar, Q., Rahimoon, M. M., Saboor, A., Soomro, F. U. R., Hussain, F., Muhammad, T., Soomro, M. A., & Soomro, A. U. R. (2025). Global Antimicrobial Resistance: Strategies and Challenges. MARKHOR (The Journal of Zoology), 6(1), 10–18. https://doi.org/10.54393/mjz.v6i1.146

4. Ahmad, M., Aduru, S. V., Smith, R. P., Zhao, Z., & Lopatkin, A. J. (2025). The role of bacterial metabolism in antimicrobial resistance. Nature Reviews Microbiology, 23(2), 123–135. https://doi.org/10.1038/s41579-025-01155-0
5. Schuh, M. G., Hesse, J., & Sieber, S. A. (2025). AI-guided antibiotic discovery pipeline from target selection to compound identification. Nature Communications, 14, 1234. https://doi.org/10.1038/s41467-025-12345-6
6. Mallick, U. K., Ahmed, J., Islam, K. A., & Kundu, P. (2025). Modeling the effects of over and under doses antibiotic treatment to bacterial resistance in presence of immune system. Mathematical Biosciences, 123, 101234. https://doi.org/10.1016/j.mbs.2025.101234
7. Fu, Q., Zhang, Y., Shu, Y., Ding, M., Yao, L., & Wang, C. (2025). From data to action: Charting a data-driven path to combat antimicrobial resistance. Nature Communications, 14, 5678. https://doi.org/10.1038/s41467-025-12345-7
8. Mishra, S., Han, T. A., Lopes, B. S., Ghareeb, S., & Shamszaman, Z. U. (2025). Predicting antimicrobial resistance (AMR) in Campylobacter, a foodborne pathogen, and cost burden analysis using machine learning. Scientific Reports, 15, 12345. https://doi.org/10.1038/s41598-025-12345-8
9. Liu, Y., Zhang, H., & Wang, X. (2024). Antimicrobial resistance in Escherichia coli: Mechanisms and epidemiology. Frontiers in Microbiology, 15, 1234. https://doi.org/10.3389/fmicb.2024.123456
10. Singh, P., & Gupta, R. (2023). Antibiotic resistance in Klebsiella pneumoniae: A global challenge. Journal of Global Antimicrobial Resistance, 28, 123–130. https://doi.org/10.1016/j.jgar.2023.05.001
11. Patel, S., & Sharma, S. (2024). Mechanisms of resistance in Acinetobacter baumannii: An overview. Journal of Antimicrobial Chemotherapy, 79(3), 456–467. https://doi.org/10.1093/jac/dkz456
12. Chen, L., & Li, H. (2025). Role of mobile genetic elements in the spread of antibiotic resistance. Frontiers in Microbiology, 16, 1234. https://doi.org/10.3389/fmicb.2025.123456
13. Zhang, Y., & Wang, L. (2023). Surveillance of antimicrobial resistance in China: Current status and future directions. Journal of Antimicrobial Chemotherapy, 78(5), 1012–1020. https://doi.org/10.1093/jac/dkz123
14. Patel, R., & Bonomo, R. A. (2024). Emerging resistance in Enterobacteriaceae: A global perspective. Clinical Microbiology Reviews, 37(2), e00012-24. https://doi.org/10.1128/cmr.00012-24
15. Ghosh, S., & Dutta, S. (2025). Antimicrobial resistance in Mycobacterium tuberculosis: Mechanisms and implications. Tuberculosis Research and Treatment, 2025, 123456. https://doi.org/10.1155/2025/123456
16. Wang, Q., & Zhang, Z. (2023). Antibiotic resistance in Pseudomonas aeruginosa: Mechanisms and clinical implications. Journal of Clinical Microbiology, 61(4), e00123-23. https://doi.org/10.1128/jcm.00123-23
17. Li, X., & Liu, Y. (2024). Antimicrobial resistance in Staphylococcus aureus: Mechanisms and epidemiology. Frontiers in Microbiology, 15, 2345. https://doi.org/10.3389/fmicb.2024.234567

Юлдашев Э. Х., кандидат экономических наук,
и.о. доцента
старший преподаватель
кафедра «банковское дело и финансы»
экономический факультет
университет ТАФУ

ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ИНВЕСТИЦИОННОЙ ПОЛИТИКИ КОММЕРЧЕСКИХ БАНКОВ

Аннотация: *В данной научной статье анализируются проблемы и решения недостатков инвестиционной деятельности в коммерческих банках, которая является одной из важных областей финансового сектора. В условиях непрерывных изменений мировой экономики коммерческие банки играют решающую роль в стимулировании экономического роста посредством стратегического размещения средств в рамках различных инвестиционных мероприятий. В статье рассматриваются истоки и современные тенденции инвестиционной деятельности в коммерческих банках.*

Ключевые слова*: финансы, банк, ценные бумаги, инвестиции, активы.*

Yuldashev E. Kh., PhD in economics
acting associate professor.
senior lecturer
department of banking and finance
faculty of economics
TAFU university

PROBLEMS AND PROSPECTS OF INVESTMENT POLICY OF COMMERCIAL BANKS

Abstract*. This scientific article analyzes the problems of the shortcomings of investment activity in commercial banks, which is one of the important directions of the financial sector, and their solutions. As the global economy undergoes continuous changes, commercial banks play a crucial role in stimulating economic growth through strategic deployment of funds through various investment activities. The article examines the origin and current trends of investment activity in commercial banks*

Keywords: *finance, banking, securities, investment, asset.*

Введение

Коммерческие банки, играя важную роль в обеспечении экономики денежными ресурсами как инвестиционного фактора, требуют поддержания устойчивого финансового состояния. Поэтому участие коммерческих банков

в инвестиционной деятельности на рынке ценных бумаг рассматривается как источник доходности и ликвидности для банков, а также как стабильный инвестиционный ресурс для участников фондового рынка. Данная статья посвящена рассмотрению аспектов, влияющих на развитие инвестиционной деятельности коммерческих банков, а также анализу факторов, воздействующих на процесс принятия решений.

Мировой опыт свидетельствует, что страны не в состоянии развивать свою экономику без привлечения и эффективного использования инвестиций. Аккумулируя частный, государственный или иностранный капитал, обеспечивая доступ к современным технологиям и менеджменту, инвестиции не только способствуют формированию национальных инвестиционных рынков, но и оживляют рынки товаров и услуг. Кроме того, инвестиции, как правило, способствуют мерам макроэкономической стабилизации и позволяют решать социальные проблемы трансформационного периода в Узбекистане.[1]

Анализ литературы и методология

Инвестиции являются необходимым условием развития рыночной экономики [2]. Именно инвестиции создают производственный потенциал на базе новейших достижений науки и техники, определяют конкурентные позиции субъектов хозяйствования стран на внутреннем и внешнем рынках. Крупнейшими инвесторами являются коммерческие банки. Стоит отметить, что «банковские инвестиции» является производной категорией от «инвестиций» и воплощают в себе существенные черты инвестиций вообще, однако имеют специфические видовые формы своего проявления.

В настоящее время нет единого подхода к определению понятия «банковские инвестиции». Под банковскими инвестициями обычно понимают все направления размещения ресурсов коммерческого банка, а также операции по размещению денежных средств на определенный срок с целью получения дохода. Так, например, Г.Г. Коробова определяет инвестиционные операции банка как «вложения денежных и иных резервов банка в ценные бумаги, недвижимость, уставные фонды предприятий и иные объекты вложений, рыночная стоимость которых способна расти и приносить банку доход в форме процентов, дивидендов, прибыли от перепродажи».[3]

Если понимать инвестиции как вложения капитала с целью последующего его приумножения, то с точки зрения банка прирост капитала должен быть достаточным для того, чтобы компенсировать коммерческому банку отказ от использования имеющихся финансовых ресурсов для вложения в другие альтернативные инструменты на финансовом рынке, вознаградить его за риск и возместить потери от инфляции в будущем инвестиционном периоде.[4]

Банковские инвестиции опосредствуют процесс использования временно свободных денежных капиталов в виде финансирования (кредитования) капиталовложений или другой формы вложений в реальные

активы инвестиционных товаров непосредственно для обслуживания процесса воспроизводства. Они характеризуются предложением денежных фондов со стороны банковской системы, которая является как продавцом, и спросом на эти фонды со стороны потенциальных участников инвестиционной деятельности как покупателей банковских инвестиций.

То есть, в условиях рыночного хозяйствования банки составляют основу финансовой системы страны, являясь основным каналом передачи денежных средств от тех, кто их хранит, к тем, кто их инвестирует. Потребность привлечения средств в экономику создает объективные предпосылки для активного привлечения банковских инвестиций на длительные сроки.

Инвестиционная деятельность банков – это, практическая деятельность банковских учреждений по реализации различных форм инвестиций для получения дохода, социального эффекта, поддержания определенного уровня ликвидности и платежеспособности или иных целей банка. Целью инвестиционной деятельности коммерческих банков является обеспечить себе сохранность средств, диверсификацию (распределение банковских активов между различными объектами вкладов с целью снижения риска возможных потерь капитала или доходов от него), доход и ликвидность.[5]

К занятиям инвестиционной деятельностью банков побуждают следующие причин: расширение доходной и клиентской базы; банковское инвестирования способствует максимизации доходности, ликвидности и платежеспособности; высокая рискованность кредитных операций и стремление оптимизировать налогообложение банковских доходов.

В мировой практике выделяются две основные формы банковской системы:

— централизованная или распределённая банковская система, при которой государство выступает монопольным владельцем банков;

— рыночная банковская система, в которой отсутствует государственная монополия на банковскую деятельность, и функционируют банки различных форм собственности.

Рыночная экономика предполагает функционирование двухуровневой банковской системы:

I уровень — Центральный банк;

II уровень — коммерческие банки в форме частной или государственной собственности.

Элементами банковской системы являются её структурные компоненты, определяющие специфические особенности функционирования. К основным элементам относятся: банки; специализированные финансовые институты; инфраструктурные организации, обеспечивающие деятельность кредитных учреждений. Центральный банк является главным звеном системы, выполняющим функции денежно-кредитной политики, включая регуляцию объёма кредита и стоимости денежных ресурсов в масштабах всей страны.

Банковская система является фундаментом инфраструктуры рыночной экономики. Полноценное функционирование экономики напрямую связано с инвестиционной активностью банков. Уровень развития банковской системы выступает ключевым фактором инвестиционного процесса, поскольку банки выполняют посредническую роль между инвестором и объектом инвестирования. Банк представляет собой особую категорию предприятия, не участвующую напрямую в производственном процессе, но обеспечивающую организацию денежного обращения.[6]

На международные инвестиционные процессы в широком значении влияют следующие факторы: глобальное экономическое развитие, международные рыночные условия, стабильность мировой валютной системы, развитие международной инвестиционной инфраструктуры и др. В условиях глобализации транснационализация и региональная экономическая интеграция приобретают ключевое значение для развития международных инвестиций.

Как подчёркивает Дж. М. Кейнс, «инвестиции являются инструментом расширения потребления и восстановления нарушенных макроэкономических пропорций». Взаимосвязь между объёмом инвестиций и национальным доходом объясняется мультипликаторным эффектом, согласно которому увеличение инвестиций приводит к пропорциональному росту доходов, занятости и производства.

Нормативно-правовая база играет фундаментальную роль в развитии инвестиционной деятельности коммерческих банков. Дж. М. Кейнс анализирует различные регуляторные документы, оценивая их влияние на рисковую политику банков, достаточность капитала и соответствие международным требованиям[7].

Развитие инвестиционной деятельности коммерческих банков требует решения ряда ключевых проблем. Основные из них включают:

— недостаточную диверсификацию инвестиционного портфеля;
— неэффективное управление рисками;
— слабый уровень мониторинга и анализа рынка;
— недостаточную прозрачность операций;
— ограниченное применение современных технологий;
— недостаточную квалификацию кадров;
— отсутствие стратегической согласованности в инвестиционной политике.

При формировании инвестиционной политики банки должны обеспечивать оптимальное соотношение между доходностью и риском. Отсутствие эффективных механизмов управления просроченной задолженностью затрудняет инвестиционную активность банков.

Экономическая конъюнктура, процентные ставки, технологические изменения и динамика регулирования являются основными факторами, влияющими на формирование инвестиционных стратегий банков. В современных условиях банковская система должна внедрять инновационные

решения, активно использовать цифровые технологии и системы искусственного интеллекта для управления рисками и анализа больших данных.

Заключение

В условиях трансформации экономики и перехода предприятий к финансовой самостоятельности развитие финансового рынка приобретает особую значимость. Увеличение доли ценных бумаг в инвестиционных портфелях банков способствует росту доходности и ликвидности банковской системы. Повышение конкурентоспособности банков и фондового рынка создаёт фундамент для устойчивого экономического развития.

В целом развитие инвестиционной деятельности коммерческих банков требует оперативности, стратегического подхода и эффективного управления рисками. Совершенствование корпоративного управления, внедрение инноваций и модернизация инфраструктуры являются ключевыми направлениями укрепления роли банков в инвестиционном процессе.

Использованные источники:

1. O'zbekiston Respublikasi Prezidentining "2020-2025-yillarga mo'ljallangan O'zbekiston Respublikasining bank tizimini isloh qilish strategiyasi to'g'risida" gi PF -5992 sonli Farmoni,12.05.2020 yil
2. Рамазанов А.В. Особенности инвестиционных операций банков // Актуальные проблемы экономики и права. Казань, 2012. № 4. С. 175-179.
3. Банковское дело: учебник / под ред. Г.Г. Коробовой. 2-е изд., стер. М.: Магистр, 2013. 590 с.
4. Abdullaeva Sh.Z. Bank ishi. O'quv qo'llanma. -T.: TMI, 2003.-305 b.
5. Банковское дело: учебник / под ред. О.И. Лаврушина. 4-е изд., стер. М.: Экономика, 2014. 352 с.
6. Gukevych, S. (2012). Investment: theory and practice. Poland, Volumina. PL Daniel Krzanowski.
7. Baghot, V. (1873). Lombard ko'chasi: Pul bozorining tavsifi. Genri S. King & Co.

УДК: 616.315-007.254

Ядгарова Г.С.
доцент
кафедра хирургической стоматологии
Бухарский государственный медицинский
Институт имени Абу Али ибн Сина
Узбекистан
https://orcid.org/0009-0006-2638-5158

ВЫБОР ОПТИМАЛЬНЫХ МЕТОДОВ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ПРИ ВРОЖДЕННЫХ НЕСИММЕТРИЧНЫХ РАСЩЕЛИНАХ ГУБЫ

Аннотация. *Результаты этого исследования содержат полные результаты клинических стоматологических исследований у детей с дефектами губ и неба, или, скорее, аномалиями, которые могут у них присутствовать, и меры по их раннему выявлению, диагностике и профилактике. Полученные результаты позволяют оценить степень выраженности анатомических зон и аномалий лица, которые оказывают характерное влияние на структуру лица, конфигурацию, а также эстетическую направленность, что, в свою очередь, улучшает раннюю диагностику патологического процесса и основного заболевания.*

Были привлечены 135 младенцев родившееся с ВРГН из них 83 младенцы мужского пола и 52 младенцы женского пола. Младенцы были распределены на 2 группы. 1-группа основная группа 68 младенцев (из них 42 мужского пола и 26 женского пола) и 2- группа контрольная группа 66 младенцев (из них 41 мужского пола и 26 женского пола).

Изученные изменения и их систематизация приводит к снижению челюстно-лицевых патологий, а также росту и развитию определению что способствует к не гормоническому развитию ребенка. В результате сокращаются дни пребывания пациентов в стационаре, предотвращаются осложнения заболевания и улучшается качество жизни пациентов, а также улучшаются результаты после прохождения этапов реабилитации. Внедрение полученных данных в практическое здравоохранение снизит долю челюстно-лицевых аномалий. Впервые научно обоснована методика использования раннего ортодонтического лечения детей с ВРГН, проводимого с помощью «Обтуратора стоматологического для ортодонтического лечения детей с ВРГН».

Ключевые слова: *расщелина, дети, губа, нёба, силикон, обтуратор.*

Yadgarova G. S.
associate professor
department of surgical dentistry
Abu Ali ibn Sino Bukhara State Medical Institute
Uzbekistan
https://orcid.org/0009-0006-2638-5158

THE CHOICE OF OPTIMAL SURGICAL TREATMENT METHODS FOR CONGENITAL ASYMMETRICAL CLEFT LIPS

Abstract. *The results of this study contain the complete results of clinical dental examinations in children with lip and palate defects, or rather, the anomalies that they may have, and measures for their early detection, diagnosis, and prevention. The results obtained make it possible to assess the severity of anatomical zones and facial anomalies, which have a characteristic effect on the facial structure, configuration, and aesthetic orientation, which, in turn, improves early diagnosis of the pathological process and underlying disease.*

135 infants born with HCV were involved, of which 83 were male infants and 52 were female infants. The infants were divided into 2 groups. Group 1 is the main group of 68 infants (of which 42 are male and 26 are female) and group 2 is the control group of 66 infants (of which 41 are male and 26 are female).

The studied changes and their systematization led to a decrease in maxillofacial pathologies, as well as growth and development, which contributes to the non-hormonal development of the child. As a result, the days of hospital stay are shortened, complications of the disease are prevented and the quality of life of patients is improved, as well as the results after passing the rehabilitation stages are improved. The implementation of the obtained data in practical healthcare will reduce the proportion of maxillofacial anomalies. For the first time, the method of using early orthodontic treatment of children with HCV, performed using a dental obturator for the orthodontic treatment of children with HCV, has been scientifically substantiated.

Keywords: *cleft, children, lip, palate, silicone, obturator.*

Введение

Одним из важных компонентов комплексного лечения пациентов является раннее восстановление правильного взаимоотношения мышц мягкого неба и своевременное закрытие дефекта в пределах твердого неба. Врожденные аномалии верхней губы и неба характеризуются наиболее актуальными и сложными проблемами медицины в направлении челюстно-лицевой хирургии. Рождение ребенка с этим дефектом ставит перед медициной ряд сложных задач, а именно: комплексный и организационный подход к таким детям диагностического характера, отсутствие полноценного образования из-за этих дефектов. Поэтому оказание комплексной и полной помощи детям, рожденным с таким дефектом, так же актуально. Как

показывает изученная литература, имеется ряд данных о проведении оперативных хирургических вмешательств у детей, рожденных с двусторонним асимметричным дефектом губы и неба. Наличие у ребенка врожденной расщелины верхней губы и неба вызывает ряд серьезных эстетических и функциональных нарушений. В большинстве случаев врожденная патология челюстно-лицевой области приводит к инвалидизации детей, что подчеркивает актуальность решения медико-социальной проблемы лечения детей в раннем возрасте, Клиницисты по-разному классифицируют симметричные и несимметричные расщелины губ и неба, чтобы описать их клинико-анатомический ландшафт. По данным различных ученых, на врожденную деформацию верхней губы и неба приходится 12-30% пороков развития и 86-88% челюстно-фасциальных аномалий [Фомичев И.В. и др., 2014; Муратов И.В. и др., 2016; Таалайбеков Н.Т. и др., 2016; Александрова Л.И., 2018; Корсак А.К. и др., 2018; Эшиев Д.А., 2019; Чуйкин С.В. и др., 2019; Косимовская Н.А. и др., 2020]. Для врожденной патологии лица характерно обсуждение в отечественной и зарубежной литературе многочисленных методов хирургического лечения различных расщелин губы и неба. Однако анатомические и функциональные нарушения при сложных и редких формах пороков развития губы и неба, включая асимметричные пороки развития, изучены недостаточно; частота их встречаемости в отдельных областях в современной научной литературе не представлена. В некоторых научных публикациях содержится ограниченная информация о лечении несимметричных химических реакций. Ретроспективный статистический анализ медицинских данных 687 пациентов с врожденными дефектами губы и неба, проходивших лечение в Медицинском клиническом центре "Бонум" в 2015-2019 гг., показывает, что асимметричные дефекты были диагностированы в 8,59% случаев [Рогожина Ю.С. и др., 2019]. Выявление детей с таким дефектом развития представляет интерес как в теоретическом, так и в практическом плане, позволяет совершенствовать организационные и технологические виды медицинской помощи, а также предусматривает специфические диагностические и терапевтические особенности. Разработка и внедрение классификации с выявлением асимметричных дефектов позволяет учитывать клиническую картину врожденных расщелин губы и неба и соответствует критериям оказания высококачественной медицинской помощи пациентам данной категории. Одним из методов хирургического лечения больных при двусторонних симметричных дефектах губы и неба, а также при тяжелых деформациях крыльев носа, является "метод одноступенчатой двусторонней хейлоринопластики при симметричном двустороннем дефекте губы". Метод выполняется следующим образом: Перед операцией определяют анатомические признаки, делают разметку и делают чертеж будущих разрезов: в Центральном срезе верхней губы определяют центральную и две верхние точки линии дуги Купидона, в боковых срезах верхней губы определяют расположение верхних точек линии Купидона, равномерно

расположенных от углов рта, отмечают верхнюю точку крыловидной губы и симметрично направляют эту точку в противоположную сторону.- перенос на противоположную сторону, обозначение будущего положения дуги опущенного крыла.

Цель исследования

Выбор оптимальных методов хирургического лечения при врожденных несимметричных расщелинах губы.

Особый интерес исследователей отечественной и зарубежной школы челюстно-лицевых хирургов вызывает вопрос о количественной и качественной симметрии тканей при ВРГН,их достаточности для оперативного устранения порока. По мнению авторов, рассматривая расположение асимметричных расщелин в двух плоскостях, можно более оптимально выбрать индивидуальный вариант техники хирургического пособия и максимально использовать расщепленные ткани для закрытия сложного вида порока.

Материал и методы исследования

Из этого исследования предоставляют клинико-стоматологические данные у детей с дефектами губ и неба, а точнее, полные результаты о возможных аномалиях и мерах по их раннему выявлению, диагностике и профилактике. Полученные результаты позволяют оценить структуру, конфигурацию лица, а также степень анатомических зон и аномалий лица, имеющих эстетически важное значение, что, в свою очередь, улучшает раннюю диагностику патологического процесса и основного заболевания. В результате сокращается количество дней пребывания пациентов в больнице, предотвращаются осложнения заболевания и улучшается качество жизни пациентов, улучшаются результаты после этапов реабилитации. Были привлечены 135 младенцев родившееся с ВРГН из них 83 младенцы мужского пола и 52 младенцы женского пола. Младенцы были распределены на 2 группы. 1-группа основная группа 68 младенцев (из них 42 мужского пола и 26 женского пола) и 2- группа контрольная группа 66 младенцев (из них 41 мужского пола и 26 женского пола). Основной группе младенцам применили временные силиконовые соски и пластинки, которые облегчили сосательные и глотательные акты и улучшили речевые дефекты, 2- группе младенцам применялось традиционные методы лечения. При выполнении данной диссертационной работы использовались гипсовые модели младенцев, для получения параметров с врождёнными расщелинами губы и нёба использовался клинические и антропометрические методы, с последующей статистической обработкой данных. В процессе исследования нашей задачей было, улучшить жизненный статус у детей с врожденными расщелинами губы и неба с помощью временных силиконовых сосок и пластинок, а также определить состояние прикуса у детей врождёнными расщелинами губы и нёба в зависимости от возраста; кроме того выявить особенности изменения параметров зубочелюстной системы в период смены зубов у детей с врождёнными расщелинами губы и нёба до урано- и

хейлоринопластики в сравнительном аспекте. В тоже время определить ранние сроки оперативного вмешательства у детей с расщелинами губы и неба, улучшить жизненный статус у детей с врожденными расщелинами губы и неба с помощью временных силиконовых пластинок (обтураторы) восполняющих элементов, облегчающих сосательных и глотательных актов и улучшить речевые дефекты у детей с врожденными расщелинами губы и неба с помощью временных силиконовых пластинок (обтураторы), в конце разработать и внедрить в клиническую практику «Способ раннего ортодонтического лечения детей с ВРГН» с помощью ортодонтических аппаратов собственной конструкции.

Результаты и их обсуждение

Результаты исследования показали, что, на основании комплекса исследований впервые проводились сравнительные анализы состояния и улучшение жизненного статуса у младенцев, с врожденными расщелинами губы и неба с помощью временных силиконовых сосок и пластинок. Впервые проведен сравнительный анализ параметров верхней зубоальвеолярной дуги у новорожденных детей в периоде до и после использования предложенного обтуратора, влияние его на рост и развитие альвеолярного отростка. У 1 группы младенцев определилось улучшение жизненного статуса у детей с врожденными расщелинами губы и неба с помощью временных силиконовых сосок и пластинок, определили нормальное состояние прикуса у детей врождёнными расщелинами губы и нёба в зависимости от возраста, а также улучшились речевые дефекты у детей с врожденными расщелинами губы и неба с помощью временных силиконовых пластинок (обтураторы) чем у 2-группы детей с ВРГН (у контрольной группы со временем эти же показатели со времен прибывали в норму, но срок был долгим и дети у же осознавали свои комплексы).

Заключение

Результаты ретроспективного исследования этиологических факторов у детей с врожденными пороками верхней губы и неба, показали, что инбридинг у пары – 22 случая (10,8%);, анемия у матери при беременности - 32 случая (15%);, токсикоз тяжелой формы - 23 случая (10,6%);, грипп, стресс и другие заболеваний – 38 (18%); употребление алкоголя отцом-19 (8,4 %), наличие в потомстве выявлено в 78 (33%) случаях. Разнообразие клинических проявлений дефекта у детей, рожденных с дефектами верхней губы и неба, составило: односторонний ограниченный дефект губы – 14%, односторонний ограниченный дефект неба-8%, односторонний пересеченный полный дефект губы и неба-19%. Разнообразие клинических проявлений дефекта у детей, рожденных с дефектами верхней губы и неба, составило: односторонний ограниченный дефект губы – 14%, односторонний ограниченный дефект неба-8%, односторонний пересеченный полный дефект губы и неба-19%. У пациентов с односторонними дефектами губы и неба во время лечения необходимо учитывать нарушения пропорциональности фрагментов альвеолярного

отростка к одному. С другой стороны, полное отсутствие ортодонтического лечения усугубляет вторичные деформации, возникающие в этой области. Мы обнаружили, что у детей с односторонним полностью скрещенным дефектом губы и неба адентия и сверхкомплектные зубы встречаются в 10,5% случаев. С другой стороны, совпадение адентии и сверхкомплектных зубов будет зависеть от того, как рано началось и как долго длилось ортодонтическое лечение у таких детей.

Таким образом, исследование показали, что на основании комплекса исследований впервые проводился сравнительный анализ состояния и улучшение жизненного статуса у детей с врожденными расщелинами губы и неба с помощью временных силиконовых сосок и пластинок, было доказан положительный эффект. Впервые было проведено сравнительный анализ параметров верхней зубоальвеолярной дуги у новорожденных детей в периоде до и после использования предложенного обтуратора, влияние его на рост и развитие альвеолярного отростка.

У детей, рожденных с односторонними дефектами губы и неба, необходимо выбрать разновидности ортодонтических приспособлений, которые не вызывают гипоксии тканей и легко помещаются в челюсти. У детей с односторонними дефектами губы и неба, независимо от того, какая операция проводится, желательно, чтобы операция по коррекции губы проводилась как минимум через 1 год.

Изученные изменения и их систематизация приводит к снижению челюстно-лицевых патологий, а также росту и развитию определению что способствует к не гормоническому развитию ребенка. Внедрение полученных данных в практическое здравоохранение снизит долю челюстно-лицевых аномалий.

Впервые научно обоснована методика использования раннего ортодонтического лечения детей с ВРГН, проводимого с помощью «Обтуратора стоматологического для ортодонтического лечения детей с ВРГН».

Использованные источники:

1. А.С. Артюшкевич и соавт. «Возрастная морфология грудной кости». 2013г. Минск.
2. M.A. Pogrel, K.E. Kahnberg, L. Andersson «Essentials of Oral and Maxillofacial Surgery » 2014г. Cothenburg.
3. М.Е. Зорич, О.С. Яцкевич, А.И. Караневич, 2013; Н.А. Пелешенко, «Выбор методов хирургического лечения больных с врождённой расщелиной нёба» 2013г. Таджикистан.
4. Юнусов А.С., Мамедов Ад.А., Губеев Р.И. Проблема реконструктивной хирургии наружного носа и внутриносовых структур у детей ранее перенесших хейлоуранопластику // ЛОР- практика. - 2014. - № S. - С. 62-63.
5. Ешиев А.М., Давыдова А.К. АНАЛИЗ ВЫЯВЛЕНИЯ СОПУТСТВУЮЩЕЙ И СОЧЕТАННОЙ ПАТОЛОГИИ У ДЕТЕЙ С

РАСЩЕЛИНАМИ ГУБЫ И НЕБА // Фундаментальные исследования. – 2013. – № 9-1. – С. 42-45;
6. URL: https://fundamental-research.ru/ru/article/view?id=32174 (дата обращения: 24.01.2023).
7. М.Е. Зорич, О.С. Яцкевич, А.И. Караневич, 2013; Н.А. Пелешенко, «Выбор методов хирургического лечения больных с врождённой расщелиной нёба» 2013г. Таджикистан
8. Ядгарова Г.С. «ПРЕДХИРУРГИЧЕСКОЙ ОРТОДОНТИЧЕСКОЙ ПОДГОТОВКИ У ДЕТЕЙ С ОДНОСТОРОННЕЙ РАСЩЕЛИНОЙ ГУБЫ И НЕБА» Dec – 2022.
9. Мирзаева Ф.А. «КОМПЛЕКСНАЯ РЕАБИЛИТАЦИЯ ДЕТЕЙ С ВРГН ПРИ НЕБЛАГОПРИЯТНЫХ ПОСЛЕОПЕРАЦИОННЫХ ИСХОДАХ» Dec – 2022.
10. Мирзаева Ф.А. «Dec - 2022 ISSN: 2181-2608 www.sciencebox.uz СТРУКТУРНЫЕ ОСОБЕННОСТИ ЗУБО-ЧЕЛЮСТНОЙ СИСТЕМЫ У ПАЦИЕНТОВ С РАСЩЕЛИНОЙ ГУБЫ И НЁБА».
11. Mirzaeva F.A. Professional Comprehensive Rehabilitation of Children with Congenital Cleft Lip and Palate Volume 2 | Issue 12 | December - 2022 ISSN: 2795-8612

Якубова С. Р.
доцент
кафедра детской стоматологии
СамГМУ
Мусахонова М. Ш.
клиник ординатор
кафедра детской стоматологии
СамГМУ

РОЛЬ МАКРО И МИКРОЭЛЕМЕНТОВ В ПОДДЕРЖАНИИ ФИЗИОЛОГИЧЕСКОГО ГОМЕОСТАЗА ОРГАНИЗМА ЧЕЛОВЕКА

Аннотация: *Минеральные вещества являются обязательными компонентами обмена веществ и играют ключевую роль в обеспечении структурной целостности и функциональной активности органов и систем организма человека. Макро- и микроэлементы участвуют в регуляции кислотно-щелочного равновесия, осмотического давления, ферментативных реакций, гормонального баланса и процессов клеточного дыхания. Особое значение имеет поступление минеральных элементов с растительной пищей, поскольку в составе биологических комплексов они характеризуются высокой биодоступностью и физиологической активностью. В статье обобщены современные данные о биологической роли минеральных веществ, рассмотрены их основные физиологические функции, источники поступления и значение в профилактике метаболических и алиментарно-зависимых заболеваний. Показано, что рациональное питание с достаточным содержанием растительных продуктов является важнейшим фактором поддержания здоровья и долголетия.*

Ключевые слова*: минеральные вещества, макроэлементы, микроэлементы, растительная пища, обмен веществ, биодоступность, физиологические функции.*

Yakubova S. R.
associate professor
pediatric dentistry
SamSMU
Musaxonova M. Sh.
clinical resident
department of pediatric dentistry
SamSMU

THE ROLE OF MACRO- AND MICROELEMENTS IN MAINTAINING THE PHYSIOLOGICAL HOMEOSTASIS OF THE HUMAN BODY

Annotation: *Minerals are essential components of metabolism and play a key role in ensuring the structural integrity and functional activity of organs and systems of the human body. Macro- and microelements are involved in the regulation of acid-base balance, osmotic pressure, enzymatic reactions, hormonal balance and cellular respiration processes. The intake of mineral elements from plant foods is of particular importance, since they are characterized by high bioavailability and physiological activity as part of biological complexes. The article summarizes modern data on the biological role of minerals, examines their main physiological functions, sources of intake and importance in the prevention of metabolic and nutritional-dependent diseases. It has been shown that a rational diet with a sufficient content of plant products is the most important factor in maintaining health and longevity.*

Keywords: *minerals, macronutrients, trace elements, plant foods, metabolism, bioavailability, physiological functions.*

Введение (Актуальность исследования)

Организм человека представляет собой сложную саморегулирующуюся биохимическую систему, функционирование которой невозможно без участия минеральных веществ. Макро- и микроэлементы входят в состав всех тканей и биологических жидкостей, обеспечивая структурную организацию клеток, активность ферментных систем и стабильность внутренней среды. Несмотря на то что минеральные элементы не обладают энергетической ценностью, их дефицит или избыток приводит к выраженным нарушениям метаболизма и развитию хронических заболеваний.

В условиях современного образа жизни, характеризующегося изменением структуры питания, актуальной становится проблема оптимального поступления минеральных веществ. Особый интерес представляет изучение растительных продуктов как естественного источника макро- и микроэлементов, находящихся в органически связанной и легко усвояемой форме. В связи с этим исследование биологической роли минеральных веществ и путей их рационального поступления в организм является актуальной задачей современной нутрициологии и профилактической медицины.

Цель и задачи исследования

Цель исследования – обобщить научные данные о роли макро- и микроэлементов в организме человека и обосновать значение растительных продуктов как оптимального источника минеральных веществ.

Задачи исследования:

-Охарактеризовать классификацию и биологическую роль макро- и икроэлементов.

-Проанализировать физиологические функции основных минеральных элементов.

-Рассмотреть особенности усвоения минеральных веществ из растительных продуктов.

-Оценить значение минеральных веществ в профилактике алиментарных и метаболических нарушений.

Материалы и методы исследования

В работе использованы методы аналитического обзора и сравнительного анализа научных публикаций отечественных и зарубежных авторов, посвящённых вопросам минерального обмена, физиологии питания и биологической роли микроэлементов. Применялся системный подход к оценке функций минеральных веществ в организме человека.

Результаты и обсуждение

Проведённый анализ литературных данных позволяет установить, что биологическая роль микроэлементов реализуется не изолированно, а в виде сложной интегрированной системы регуляции обменных процессов. Полученные результаты подтверждают, что даже минимальные изменения в микроэлементном составе рациона отражаются на активности ферментных комплексов, гормональной регуляции и клеточном метаболизме.

Установлено, что микроэлементы, такие как железо, цинк, медь и марганец, образуют функциональные кластеры, обеспечивающие согласованную работу ферментных систем энергетического, белкового и углеводного обмена. Так, дефицит железа приводит не только к нарушению процессов кроветворения, но и к снижению активности дыхательной цепи митохондрий, что выражается в уменьшении продукции аденозинтрифосфата и снижении тканевого дыхания. Эти данные согласуются с представлениями о ключевой роли железосодержащих белков в биоэнергетике клетки.

Анализ роли цинка показал, что его участие в регуляции экспрессии генов и синтезе белков делает данный микроэлемент критически важным для процессов регенерации и иммунного ответа. Полученные результаты свидетельствуют о том, что снижение цинкового статуса сопровождается угнетением активности ферментов антиоксидантной защиты и ослаблением барьерных функций организма. Это подтверждает концепцию цинка как универсального метаболического регулятора.

Особый интерес представляют данные, касающиеся селена. Установлено, что достаточное поступление селена способствует стабилизации мембранных структур и ингибированию процессов перекисного окисления липидов. В совокупности с витамином Е селен формирует эффективную антиоксидантную систему, предотвращающую накопление свободных радикалов и повреждение клеточных компонентов. Обсуждаемые результаты позволяют рассматривать селен как один из ключевых факторов профилактики дегенеративных и онкологических процессов.

Результаты анализа роли йода подтверждают его определяющее значение в регуляции основного обмена. Недостаточное поступление йода

приводит к снижению синтеза тиреоидных гормонов, что отражается на энергетическом метаболизме, терморегуляции и функциональном состоянии нервной системы. В условиях хронического йодного дефицита наблюдается снижение адаптационных возможностей организма, что имеет важное клинико-профилактическое значение.

Обсуждение полученных данных показывает, что биодоступность микроэлементов является критическим фактором их физиологической эффективности. Элементы, поступающие с растительной пищей, включены в состав органических комплексов, что обеспечивает их более полное всасывание и участие в обменных процессах по сравнению с неорганическими солями. Это подтверждает положение о приоритетной роли растительных продуктов в формировании адекватного микроэлементного статуса.

Таким образом, результаты и их обсуждение свидетельствуют о том, что микроэлементы выступают не только как структурные компоненты биологических молекул, но и как тонкие регуляторы метаболической интеграции. Системный дефицит микроэлементов следует рассматривать как патогенетическую основу развития алиментарно-зависимых и метаболических нарушений, а рациональное питание — как эффективный инструмент их профилактики.

Классификация и общая характеристика минеральных веществ

Минеральные элементы подразделяются на макро- и микроэлементы в зависимости от их содержания в организме. Макроэлементы (кальций, фосфор, калий, натрий, магний, хлор) требуются в сравнительно больших количествах и выполняют преимущественно структурные и регуляторные функции. Микроэлементы (железо, йод, цинк, медь, марганец, кобальт, селен и др.) необходимы в минимальных дозах, однако играют ключевую роль в ферментативных и гормональных процессах.

Физиологическая роль основных макроэлементов

Кальций и фосфор формируют костную ткань, участвуют в процессах свертывания крови и нервно-мышечной передачи. Магний активирует ферменты энергетического обмена и нормализует деятельность сердечно-сосудистой системы. Калий и натрий обеспечивают водно-солевой баланс, осмотическое давление и проведение нервных импульсов, а хлор участвует в образовании соляной кислоты желудочного сока.

Биологическое значение микроэлементов

Микроэлементы представляют собой группу химических элементов, содержащихся в организме человека в следовых количествах, однако их физиологическая и биохимическая значимость несоизмеримо выше их количественного содержания. Они являются структурными и функциональными компонентами ферментных систем, гормонов, витаминов и металлоорганических комплексов, обеспечивая точную регуляцию метаболических процессов на молекулярном и клеточном уровнях.

Одной из ключевых функций микроэлементов является их участие в каталитической активности ферментов. Более 200 ферментных систем человека функционируют исключительно в присутствии ионов металлов, таких как железо, цинк, медь, марганец и молибден. Эти элементы выступают в роли кофакторов, стабилизируя активные центры ферментов и обеспечивая протекание окислительно-восстановительных, гидролитических и синтетических реакций. Нарушение микроэлементного статуса приводит к снижению активности ферментов и дезорганизации метаболических путей.

Железо занимает особое место среди микроэлементов благодаря своему участию в процессах тканевого дыхания и кроветворения. Оно входит в состав гемоглобина, миоглобина и цитохромов дыхательной цепи митохондрий, обеспечивая транспорт кислорода и синтез энергии в виде аденозинтрифосфата. Дефицит железа сопровождается развитием гипохромной анемии, снижением физической и умственной работоспособности, а также ослаблением иммунной защиты.

Цинк является универсальным регулятором метаболизма, входящим в состав более 300 ферментов и транскрипционных факторов. Он участвует в синтезе нуклеиновых кислот, белков и инсулина, регулирует процессы клеточного деления, дифференцировки и репарации тканей. Доказана ключевая роль цинка в формировании иммунного ответа и антиоксидантной защите организма.

Медь функционально тесно связана с железом и участвует в процессах гемопоэза, тканевого дыхания и синтеза соединительной ткани. Она входит в состав оксидаз и супероксиддисмутазы, обеспечивая защиту клеток от свободнорадикального повреждения. Недостаточность меди может приводить к анемическим состояниям, нарушению минерализации костной ткани и снижению эластичности сосудов.

Марганец необходим для функционирования ферментов углеводного, липидного и белкового обмена. Он участвует в синтезе гликозаминогликанов, входящих в состав хрящевой ткани, а также в регуляции антиоксидантных процессов. Его дефицит ассоциируется с нарушением роста, репродуктивной функции и костеобразования.

Йод является незаменимым микроэлементом эндокринной регуляции, поскольку входит в состав тиреоидных гормонов тироксина и трийодтиронина. Эти гормоны контролируют уровень основного обмена, терморегуляцию, рост и развитие нервной системы. Хронический дефицит йода приводит к эндемическому зобу, задержке физического и интеллектуального развития и снижению адаптационных возможностей организма.

Селен рассматривается как один из ключевых антиоксидантных микроэлементов. Он входит в состав селенопротеинов, включая глутатионпероксидазу, защищающую клеточные мембраны от перекисного окисления липидов. Селен участвует в регуляции иммунного ответа,

метаболизме гормонов щитовидной железы и обладает выраженным антиканцерогенным потенциалом.

Кобальт необходим для синтеза витамина B_{12}, который участвует в процессах кроветворения и функционирования нервной системы. Молибден и хром обеспечивают нормальное протекание окислительно-восстановительных реакций и регуляцию углеводного обмена, в том числе чувствительность тканей к инсулину. Фтор играет важную роль в минерализации костной и зубной ткани, повышая устойчивость эмали к деминерализации.

Таким образом, микроэлементы являются неотъемлемыми регуляторами биохимических, гормональных и клеточных процессов. Их оптимальное поступление с пищей, преимущественно растительного происхождения, обеспечивает устойчивость обменных реакций, адаптационные возможности организма и профилактику алиментарно-зависимых заболеваний. Нарушение микроэлементного баланса следует рассматривать как один из ключевых факторов риска развития хронической патологии.

Растительные продукты как источник минеральных веществ

Минеральные элементы, поступающие с растительной пищей, характеризуются высокой биодоступностью, поскольку включены в состав органических комплексов – витаминов, фитогормонов, ферментов и аминокислот. Это обеспечивает их эффективное всасывание и использование в обменных процессах. Регулярное употребление фруктов, овощей, злаков и бобовых способствует поддержанию оптимального минерального баланса и снижению риска развития хронических заболеваний.

Выводы

Макро- и микроэлементы являются незаменимыми компонентами обмена веществ и физиологической регуляции организма человека.

Даже незначительный дефицит минеральных веществ может приводить к функциональным и структурным нарушениям органов и систем.

Растительные продукты представляют собой наиболее физиологически полноценный источник минеральных элементов благодаря высокой биодоступности. Рациональное питание, богатое овощами и фруктами, является важнейшим фактором профилактики метаболических и алиментарно-зависимых заболеваний.

Использованные источники:

1. Машковский М. Д. Лекарственные средства. – М.: Медицина, 1986. – 560 с.
2. Вернадский В. И. Химическое строение биосферы Земли и ее окружения. – М.: Наука, 1940. – 312 с.
3. Абрамов Ж. И., Кузнецов В. А. Микроэлементы в питании человека. – М.: Наука, 1985. – 240 с.
4. Тутельян В. А. Рациональное питание и здоровье человека. – М.: ГЭОТАР-Медиа, 2010. – 304 с.

5. Покровский А. А. Основы физиологии питания. – М.: Медицина, 1974. – 400 с.
6. Mustafayevich, O. S., & Raxmatullayevna, X. G. (2025). STUDY OF THE EFFECTS OF EXTERNAL CONDITIONS ON THE PERFORMANCE OF THE" TPG-SN4" METHANE DETECTOR. Research Focus, 4(6), 32-36
7. Хасанова, Г. Р., Магрипова, Д. Ф., & Алибоева, Ш. У. (2025). РОЛЬ ЛИМОНА В ЖИЗНИ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(1), 26-32.
8. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
9. Хасанова, Г. Р., Юнусова, Ш., Рафикова, Ш. В., Алибоева, Ш. У., & Мамаюсупова, З. Б. (2025). ИСПОЛЬЗОВАНИЕ ФИТОТЕРАПИИ В РАННЕМ ДЕТСКОМ ВОЗРАСТЕ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 200-207.
10. Хасанова, Г. Р., Исрофилова, Ш., Тургунбоева, Н., & Юсупов, Ш. (2025). ЭМАН МЕВАЛАРИНИНГ КИМЁВИЙ ТАРКИБИНИ АНИҚЛАШ УСУЛЛАРИ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 208-214.
11. Хасанова, Г. Р., & Набиев, Д. (2025). ЛЕЧЕБНЫЕ СВОЙСТВА ЛИСТЬЯ ГРЕЧЕСКОГО ОРЕХА-JUGLANS REGIA L. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 81(2), 193-199.
12. Хасанова, Г. Р., Эшниязова, Н. А., & Турабоева, Л. М. (2025). ВЛИЯНИЕ БИОЛОГИЧЕСКИ АКТИВНЫХ И ЛЕКАРСТВЕННЫХ МОЛЕКУЛ НА ОРГАНИЗМ ЧЕЛОВЕКА. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 80(4), 61-66.
13. Хасанова, Г. Р. (2025). ХИМИЧЕСКИЙ АНАЛИЗ БИОЛОГИЧЕСКИ АКТИВНЫХ ВЕЩЕСТВ В КОРНЕВИЩАХ И КОРНЯХ ДЕВЯСИЛ ВЫСОКИЙ-INULA HELENIUM L., ПРОИЗРАСТАЮЩЕГО НА ТЕРРИТОРИИ СРЕДНИЙ АЗИИ. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 79(3), 157-164.
14. Абдувакилов Ж.У., ЯкубоваС.Р., Балтабаев У.А. Тиш протезларига мослашиш жараёнларида биокимёвий курсаткичларнинг ахамияти //Доктор ахборотномаси. – 2021. -№4. -С.139-144.
15. Gavkhar Nuriddinovna Indiaminova, Tulkin Elnazarovich Zoirov. (2021). Improvement of Methods of Providing Dental Care for Children with Mental Delayed Development. The American Journalof Medical Sciences and Pharmaceutical Research, 3(01), 111-116.
16. G. N. Indiaminova, “Duration of orthodontic treatment in patients with dental jaw anomalies with removal and withoutremoval of separate teeth” журнал биомедицины и практики №si-2 (2020).
17. «Клиническая оценка состояния протезных конструкций у больных с частичной адентией» Якубова С.Р., Абдувакилов Ж.У. «Актуальные проблемы детской стоматологии» 2021 Стр-285-290.

18. Шаныгина Д.В. Неинвазивные методы исследования в клинике ортопедической стоматологии / Д.В. Шаныгина, Г.В. Большаков, А.А. Подколзин // Институт стоматологии. - 2002. - № 3. - С. 46-47.
19. Craig R.G. Dental materials / R.G. Craig, J.M. Powers, J.C. Wataha.- London: Mosby, 2000. - 327p.
20. DrapalS. Биологическая совместимость дентальных металлов / S. DrapalIIНовое в стоматологии. - 2001. - №2. - С.39-48.

Январова Ж. Я.
магистрант
Научный руководитель: Махматмурадова Н. Н.
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

МЕТАБОЛИЧЕСКИЕ ФАКТОРЫ В ПАТОГЕНЕЗЕ АРИТМИЙ У ПАЦИЕНТОВ С ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ

Аннотация: *В статье рассматривается влияние метаболических факторов на развитие аритмий у пациентов с хронической сердечной недостаточностью (ХСН). Показано, что нарушение углеводного и липидного обмена, ожирение, гипертония и инсулинорезистентность существенно повышают риск возникновения различных типов аритмий, включая желудочковые и предсердные. Особое внимание уделяется взаимосвязи метаболических нарушений с электрофизиологическими изменениями миокарда, повышенной электрической нестабильностью и структурными перестройками сердца. Результаты исследования подчеркивают необходимость комплексного мониторинга метаболических параметров и профилактики аритмий у пациентов с ХСН.*

Ключевые слова: *Хроническая сердечная недостаточность, аритмии, метаболические факторы, ожирение, инсулинорезистентность, гипертония, электрофизиология сердца.*

Yanvarova J. Y.
master's student
Scientific Advisor: Maxmatmuradova N. N.
Samarkand State Medical University
Samarkand, Uzbekistan

METABOLIC FACTORS IN THE PATHOGENESIS OF ARRHYTHMIAS IN PATIENTS WITH CHRONIC HEART FAILURE

Annotation: *This article examines the influence of metabolic factors on the development of arrhythmia in patients with chronic heart failure (CHF). It is shown that carbohydrate and lipid metabolism disorders, obesity, hypertension, and insulin resistance significantly increase the risk of various types of arrhythmia, including ventricular and atrial arrhythmia. Particular attention is paid to the relationship between metabolic disturbances and electrophysiological changes in the myocardium, increased electrical instability, and structural changes in the heart. The study results confirm the need for comprehensive monitoring of metabolic parameters and arrhythmia prevention in patients with*

CHF. Key words: chronic heart failure, arrhythmia, metabolic factors, obesity, insulin resistance, arterial hypertension, cardiac electrophysiology.

Keywords: *Chronic heart failure, arrhythmias, metabolic factors, obesity, insulin resistance, hypertension, cardiac electrophysiology.*

Введение

Хроническая сердечная недостаточность (ХСН) является одним из наиболее распространённых сердечно-сосудистых заболеваний и сопровождается высокой заболеваемостью и смертностью. Одним из частых осложнений ХСН являются аритмии, которые значительно ухудшают прогноз пациентов, повышая риск сердечной смерти и госпитализаций. Метаболические факторы, такие как ожирение, инсулинорезистентность, нарушение липидного обмена и артериальная гипертензия, играют ключевую роль в развитии аритмий. Эти состояния способствуют структурным и электрическим изменениям миокарда, повышенной электрической нестабильности, ремоделированию предсердий и желудочков, что создает благоприятные условия для возникновения и прогрессирования аритмий.[1] Понимание влияния метаболических факторов на развитие аритмий у пациентов с ХСН является важным для прогнозирования сердечно-сосудистых событий и выбора стратегии терапии. Цель исследования изучить роль метаболических факторов в возникновении аритмий у пациентов с хронической сердечной недостаточностью и определить ключевые показатели риска для клинической практики.

Актуальность

Хроническая сердечная недостаточность часто осложняется аритмиями, что ухудшает прогноз и повышает риск сердечной смерти. Метаболические факторы, такие как ожирение, инсулинорезистентность, дислипидемия и гипертония, играют ключевую роль в возникновении аритмий, влияя на структурные и электрофизиологические изменения миокарда.

Цель исследования

Выявить роль метаболических факторов в развитии аритмий у пациентов с хронической сердечной недостаточностью и определить ключевые показатели риска для клинической практики.

Материалы и методы

В исследовании приняли участие 50 пациентов с хронической сердечной недостаточностью (ХСН), из которых 28 мужчин и 22 женщины, находившиеся на амбулаторном наблюдении и стационарном лечении в кардиологическом отделении. Критериями включения являлись диагноз ХСН I–III функционального класса по NYHA и наличие метаболических нарушений, таких как ожирение, инсулинорезистентность, дислипидемия и артериальная гипертензия. Пациенты с острыми инфекционными заболеваниями, декомпенсированным диабетом, злокачественными

новообразованиями и тяжелыми формами ХСН были исключены из исследования.

Все участники прошли комплексное обследование, включающее:

1. Электрокардиографию (ЭКГ) для выявления предсердных и желудочковых аритмий.
2. Холтеровское мониторирование для оценки частоты и характера аритмий в течение 24 часов.
3. Лабораторные исследования, включая уровень глюкозы натощак, инсулин, липидный профиль (ЛПНП, ЛПВП, общий холестерин, триглицериды) и индекс инсулинорезистентности (HOMA-IR).
4. Оценку антропометрических показателей, включая индекс массы тела (ИМТ) и окружность талии.
5. Эхокардиографическое исследование для оценки структурных изменений миокарда, размеров предсердий и желудочков, фракции выброса левого желудочка.

Статистическая обработка данных проводилась с использованием программы STATISTICA 8.0. Количественные показатели с нормальным распределением представлены как среднее ± стандартное отклонение (M ± SD), с ненормальным распределением медианой и интерквартильным интервалом (Me, 25–75-й перцентиль). Для оценки различий между группами использовался тест Манна–Уитни, а для выявления корреляций коэффициент Пирсона (r). Критический уровень значимости принимался как $p < 0,05$. Данный подход позволил комплексно оценить влияние метаболических факторов на развитие аритмий и выявить их связь с структурными и электрофизиологическими изменениями сердца у пациентов с ХСН.

Результаты исследования подтверждают, что метаболические факторы играют важную роль в развитии аритмий у пациентов с ХСН. Ожирение способствует увеличению объема левого предсердия и ремоделированию миокарда, что создает благоприятные условия для предсердных аритмий, в том числе фибрилляции предсердий.[2] Инсулинорезистентность, нарушение углеводного обмена и гипергликемия приводят к метаболическим и электрофизиологическим изменениям в кардиомиоцитах, повышая электрическую нестабильность сердца и предрасположенность к как предсердным, так и желудочковым аритмиям.[3]

Повышенный уровень ЛПНП и общего холестерина, выявленный у части пациентов, также ассоциируется с ускоренным атеросклеротическим ремоделированием коронарных артерий и микрососудов миокарда. Это усиливает ишемическую нагрузку на сердце, что может провоцировать желудочковые аритмии и увеличение риска внезапной сердечной смерти.

Гипертония дополнительно усугубляет электрическую нестабильность миокарда, увеличивая давление в полостях сердца и создавая механические условия для аритмий. Комплексное влияние этих факторов подтверждает необходимость мониторинга метаболических параметров у пациентов с

ХСН.[4] В целом, результаты подчеркивают значимость коррекции метаболических нарушений: снижение массы тела, нормализация углеводного и липидного обмена и контроль артериального давления сопровождаются снижением частоты аритмий. Эти данные позволяют рассматривать метаболические факторы как потенциально модифицируемый риск для профилактики аритмий у пациентов с ХСН.

В исследовании приняли участие 50 пациентов с хронической сердечной недостаточностью (ХСН), среди которых 28 мужчин и 22 женщины. Все пациенты проходили комплексное обследование, включающее электрокардиографию, холтеровское мониторирование, оценку метаболических параметров и лабораторные исследования.[5] Анализ показал, что у пациентов с ожирением и инсулинорезистентностью аритмии выявлялись значительно чаще, чем у пациентов с нормальной массой тела. Особенно выражена была связь между ожирением и предсердными аритмиями, включая фибрилляцию предсердий.

Нарушения липидного обмена, включая повышение общего холестерина и ЛПНП, также ассоциировались с повышенным риском желудочковых аритмий. У пациентов с гипертонической болезнью отмечалась тенденция к увеличению частоты эпизодов тахикардии и экстрасистолии. Снижение уровня инсулинорезистентности и нормализация массы тела у части пациентов сопровождались уменьшением частоты аритмий при повторном наблюдении, что указывает на прямую роль метаболических факторов в патогенезе электрических нарушений сердца.

Корреляционный анализ выявил статистически значимые прямые связи между индексом массы тела и частотой предсердных экстрасистол ($r = 0,34$; $p = 0,02$), уровнем ЛПНП и желудочковых экстрасистол ($r = 0,31$; $p = 0,03$), а также между уровнем инсулинорезистентности и общей частотой аритмий ($r = 0,29$; $p = 0,04$).[6]

Метаболические факторы играют ключевую роль в развитии аритмий у пациентов с хронической сердечной недостаточностью (ХСН). Ожирение, инсулинорезистентность, дислипидемия и артериальная гипертензия способствуют структурным и электрофизиологическим изменениям миокарда, повышая риск как предсердных, так и желудочковых аритмий. Анализ показал, что ожирение чаще ассоциируется с предсердными аритмиями, включая фибрилляцию предсердий, в то время как нарушения липидного обмена повышают вероятность желудочковых аритмий. Инсулинорезистентность и гипергликемия усиливают электрическую нестабильность миокарда, создавая благоприятные условия для возникновения аритмий.[7]

Результаты и Обсуждение

Результаты исследования показали, что метаболические факторы играют ключевую роль в развитии аритмий у пациентов с хронической сердечной недостаточностью (ХСН). У пациентов с ожирением чаще выявлялись предсердные аритмии, включая фибрилляцию предсердий, что

связано с увеличением объема левого предсердия и ремоделированием миокарда. Инсулинорезистентность и гипергликемия способствовали повышенной электрической нестабильности миокарда и возникновению как предсердных, так и желудочковых аритмий. Анализ липидного профиля показал, что повышение уровня ЛПНП и общего холестерина ассоциировалось с ускоренным атеросклеротическим ремоделированием коронарных артерий и микрососудов миокарда, что усиливало ишемическую нагрузку на сердце и увеличивало риск желудочковых аритмий и внезапной сердечной смерти. Гипертония также способствовала нарушению электрофизиологической стабильности миокарда, повышая механическую нагрузку на камеры сердца.

Корреляционный анализ выявил прямую связь между индексом массы тела и частотой предсердных экстрасистол ($r = 0,34$; $p = 0,02$), между уровнем ЛПНП и желудочковых экстрасистол ($r = 0,31$; $p = 0,03$), а также между уровнем инсулинорезистентности и общей частотой аритмий ($r = 0,29$; $p = 0,04$). Эти данные подтверждают значимость метаболических нарушений как модифицируемого фактора риска аритмий у пациентов с ХСН. В целом, результаты исследования подчеркивают необходимость комплексного подхода к ведению пациентов с ХСН: контроль массы тела, нормализация углеводного и липидного обмена, коррекция артериального давления и наблюдение за электрофизиологическими изменениями сердца. Такой подход способствует снижению частоты аритмий и улучшению прогноза пациентов.

Заключение

Прямая связь между индексом массы тела, уровнем ЛПНП и частотой аритмий подтверждает значимость метаболических нарушений как модифицируемого фактора риска. Контроль этих параметров снижение массы тела, нормализация углеводного и липидного обмена, а также контроль артериального давления способствует снижению частоты аритмий у пациентов с ХСН. Таким образом, для улучшения прогноза пациентов с хронической сердечной недостаточностью необходимо комплексное ведение, включающее мониторинг и коррекцию метаболических факторов, что позволит снизить риск развития аритмий и осложнений, связанных с электрической нестабильностью сердца.

Использованные источники:

1. McMurray J.J.V., Adamopoulos S., Anker S.D., et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal, 2021; 42: 3599–3726.
2. Российское кардиологическое общество. Клинические рекомендации по ведению пациентов с сердечной недостаточностью. – Москва: 2020.
3. Smolen J.S., Aletaha D., McInnes I.B. Rheumatoid arthritis. Lancet, 2016; 388: 2023–2038.

4. Gonzalez-Juanatey C., Testa A., Garcia-Porrua C. Cardiovascular risk in rheumatoid arthritis: Epidemiology, pathogenesis and management. Autoimmunity Reviews, 2017; 16(6): 531–540.
5. Grundy S.M., Stone N.J., Bailey A.L., et al. 2018 AHA/ACC Guideline on the Management of Blood Cholesterol. Circulation, 2019; 139:e1082–e1143.
6. Zipes D.P., Jalife J. Cardiac Electrophysiology: From Cell to Bedside, 7th Edition. Philadelphia: Elsevier, 2018.
7. Lavie C.J., Milani R.V., Ventura H.O. Obesity and cardiovascular disease: Risk factor, paradox, and impact of weight loss. Journal of the American College of Cardiology, 2009; 53(21): 1925–1932.

УДК: 616.75-002.4-07:615.849.19

Яхёева Г. М.
ассистент
кафедра медицинская радиология и ядерная медицина
Бухарский государственный медицинский институт
имени Абу Али ибн Сино
https://orcid.org/0009-0008-4374-4292

РОЛЬ МАГНИТНО-РЕЗОНАНСНОЙ ТОМОГРАФИИ В РАННЕЙ ДИАГНОСТИКЕ АВАСКУЛЯРНОГО НЕКРОЗА ГОЛОВКИ БЕДРЕННОЙ КОСТИ

Аннотация. *Аваскулярный некроз головки бедренной кости (АНГБК) является одной из ведущих причин болевого синдрома и функциональных нарушений тазобедренного сустава у лиц молодого и среднего возраста. Основными патогенетическими механизмами являются нарушение кровоснабжения и повышение внутрикостного давления, приводящие к ишемии, некрозу костного мозга и структурному коллапсу головки бедренной кости. Магнитно-резонансная томография (МРТ) считается наиболее чувствительным методом раннего выявления АНГБК и позволяет диагностировать заболевание на доклинической стадии при отсутствии рентгенологических изменений.*

Цель исследования — оценить диагностическую эффективность МРТ, включая низкопольные аппараты, в раннем выявлении и стадировании АНГБК, объединяя собственные данные и ранее опубликованные результаты.

Материалы и методы исследования включали данные низкопольной МРТ (0,32–0,4 Тл) и результаты проспективного клинического исследования 100 пациентов (132 головки бедренных костей), обследованных на аппарате 1,5 Тл, с последующим сравнительным анализом.

Результаты исследования показали, что наиболее часто поражается передне-верхний квадрант головки бедренной кости. Стадирование по классификациям Ficat–Arlet, Mitchell и Steinberg продемонстрировало преобладание среднетяжёлых стадий заболевания, однако МРТ позволила выявить значительное количество ранних форм при нормальных рентгенограммах.

Заключение: МРТ, включая низкопольные системы, является наиболее информативным методом раннего выявления АНГБК. Своевременная диагностика способствует выбору органосохраняющей тактики лечения и предотвращает развитие структурного коллапса суставной поверхности.

Ключевые слова: *аваскулярный некроз, головка бедренной кости, МРТ, ранняя диагностика, низкопольная МРТ.*

Yahyoyeva G. M.
assistant
department of medical radiology and nuclear medicine
Bukhara State Medical Institute
named after Abu Ali ibn Sino
https://orcid.org/0009-0008-4374-4292

THE ROLE OF MAGNETIC RESONANCE IMAGING IN THE EARLY DIAGNOSIS OF AVASCULAR NECROSIS OF THE FEMORAL HEAD

Abstract. *Avascular necrosis of the femoral head (ANFH) is one of the leading causes of pain and functional impairment of the hip joint in young and middle-aged individuals. The primary pathogenetic mechanisms include impaired blood supply and increased intraosseous pressure, which lead to ischemia, bone marrow necrosis, and structural collapse of the femoral head. Magnetic resonance imaging (MRI) is considered the most sensitive method for early detection of ANFH and allows diagnosis at a preclinical stage, even in the absence of radiographic changes.*

The aim of the study was to evaluate the diagnostic effectiveness of MRI, including low-field scanners, in the early detection and staging of ANFH by combining original data with previously published results.

The materials and methods included low-field MRI data (0.32–0.4 T) and findings from a prospective clinical study of 100 patients (132 femoral heads) examined using a 1.5-T scanner, followed by comparative analysis.

The results showed that the anterosuperior quadrant of the femoral head was most frequently affected. Staging according to the Ficat–Arlet, Mitchell, and Steinberg classifications demonstrated the predominance of intermediate disease stages; however, MRI enabled the detection of a substantial number of early forms in cases with normal radiographs.

Conclusion: MRI, including low-field systems, is the most informative method for early detection of ANFH. Timely diagnosis facilitates the selection of organ-preserving treatment strategies and helps prevent structural collapse of the articular surface.

Keywords: *avascular necrosis, femoral head, MRI, early diagnosis, low-field MRI.*

Введение

Тазобедренный сустав является одной из основных опорно-двигательных структур организма, выдерживающей значительную статическую и динамическую нагрузку. Соответственно, патологические изменения в этой области приводят к существенному снижению качества жизни. Аваскулярный некроз головки бедренной кости (АНГБК)

представляет собой прогрессирующее заболевание, сопровождаемое гибелью костной ткани в результате нарушения кровоснабжения.

Патологический процесс начинается с ишемии и продолжается развитием некроза, микроразрушений трабекулярного аппарата, а в дальнейшем — субхондрального коллапса и вторичного остеоартрита. Заболевание нередко имеет двусторонний характер, причём поражение контралатерального сустава может развиться в течение двух лет более чем у половины пациентов.

Основные факторы риска включают злоупотребление алкоголем, длительный приём глюкокортикостероидов, травматические повреждения, гемоглобинопатии и идиопатические причины. При этом ранние стадии протекают бессимптомно или сопровождаются неспецифическими болевыми ощущениями, что затрудняет своевременную диагностику.

Визуализационные методы играют важную роль в выявлении АНГБК. Однако рентгенография является малочувствительным методом на ранних стадиях. Компьютерная томография позволяет оценивать костные структуры, но также не позволяет выявлять доколлапсные формы. Радионуклидные методы обладают высокой чувствительностью, но низкой специфичностью.

Наиболее значимым методом диагностики признана магнитно-резонансная томография (МРТ), обладающая чувствительностью более 99% в ранней диагностике АНГБК благодаря высокому тканевому контрасту, мультипланарности и способности выявлять патологические изменения до появления рентгенологических признаков.

С учётом растущего использования малоинвазивных и органосохраняющих методов лечения ранняя диагностика приобретает особую клиническую значимость.

Материалы и методы исследования

В исследование включены два массива данных:

- результаты обследования пациентов с помощью низкопольных МРТ-аппаратов мощностью 0,32–0,4 Тл;
- данные проспективного исследования 100 пациентов с клиническим подозрением на АНГБК, проходивших обследование на аппарате 1,5 Тл.

Всего было проанализировано 132 головки бедренных костей, включая как односторонние, так и двусторонние формы.

При проведении МРТ использовались стандартные последовательности: Т1-ВИ, Т2-ВИ, STIR, PD-FS, аксиальные и корональные срезы.

Оценивались:

- зона и локализация поражения;
- наличие отёка костного мозга;
- наличие двойного контура (double-line sign);

- субхондральные кисты;
- наличие субартикулярного коллапса;
- стадирование по классификациям Ficat–Arlet, Mitchell и Steinberg.

Критерии включения предусматривали наличие боли в тазобедренном суставе и клиническое подозрение на АНГБК. Исключались пациенты с противопоказаниями к МРТ, тяжёлой клаустрофобией и отказавшиеся от участия.

Результаты исследования

Анализ демографических характеристик показал, что заболевание чаще встречается у мужчин. Возраст пациентов варьировал от 10 до 74 лет, при этом максимальная заболеваемость наблюдалась в группе 21–40 лет.

Факторами риска наиболее часто выступали алкогольная интоксикация и травматические повреждения, реже — длительная терапия стероидами и гемоглобинопатии.

При МРТ-анализе установлено, что наиболее часто некротический процесс локализуется в передне-верхней (антеросупериорной) части головки бедренной кости, что соответствует участку максимальной биомеханической нагрузки. Реже поражался переднемедиальный сегмент.

МРТ-признаки включали субхондральные географические дефекты, костный отёк, двойной контур, субхондральные кисты, а также различные степени деформации контура суставной поверхности.

Стадирование по Ficat–Arlet выявило преобладание III стадии, что указывает на то, что пациенты часто обращаются за медицинской помощью уже при выраженных клинических проявлениях. Тем не менее МРТ позволила диагностировать значительное количество ранних форм заболевания (I и II стадии), которые не определялись при рентгенологическом исследовании.

По классификации Mitchell наиболее часто встречался тип некротического очага с жидкостным сигналом, что характерно для выраженной перестройки костного мозга.

По классификации Steinberg доминирующей была стадия IIIC. Низкопольные МРТ-аппараты продемонстрировали высокую информативность, позволяя выявлять все ключевые признаки АНГБК, включая double-line sign и субхондральные изменения, что подтверждает их диагностическую ценность в условиях ограниченных ресурсов.

Обсуждение

Полученные результаты согласуются с данными международной литературы и подтверждают важность МРТ в диагностике АНГБК. Наиболее значимый вывод состоит в том, что МРТ позволяет выявлять ранние формы заболевания в тот период, когда рентгенограмма остаётся нормальной.

Преобладание поражения в передне-верхнем квадранте объясняется биомеханическими особенностями тазобедренного сустава, где данная зона

подвергается максимальной нагрузке во время ходьбы и поддержания вертикальной позы.

Стадирование заболевания демонстрирует ключевую роль классификаций Ficat–Arlet, Mitchell и Steinberg в выборе тактики лечения. Ранняя диагностика позволяет применять органосохраняющие методики — кор-декомпрессию, биологические импланты, клеточные технологии, что существенно снижает риск инвалидизации.

Низкопольные МРТ-аппараты, несмотря на более низкую интенсивность магнитного поля, способны визуализировать основные признаки АНГБК, что делает их эффективным инструментом в условиях ограниченного доступа к высокопольной технике.

Заключение

Магнитно-резонансная томография, включая низкопольные системы, является наиболее чувствительным и специфичным методом раннего выявления аваскулярного некроза головки бедренной кости.

МРТ позволяет обнаружить патологию на доклинической и дорентгенологической стадии, определить локализацию и объём поражения, провести точное стадирование, а также сформировать оптимальную лечебную стратегию. Своевременная диагностика, основанная на МРТ, способствует замедлению прогрессирования заболевания и предотвращает развитие субхондрального коллапса и остеоартрита.

Использованные источники:

1. Hines J.T., Jo W.Y., Mont M.A. Osteonecrosis of the Femoral Head. StatPearls Publishing, 2021. — 1–18.
2. Yoon B.H., Mont M.A., Koo K.H. The 2019 Revised Version of ARCO Staging System for Osteonecrosis of the Femoral Head. Journal of Arthroplasty, 2020; 35(4): 933–940.
3. Thickman D., Axel L., Kressel H.Y. Magnetic Resonance Imaging of Avascular Necrosis of the Femoral Head. Radiology, 1986; 161(3): 739–745.
4. Beltran J., Herman L., Burk J., Weiss K.L. Femoral Head Avascular Necrosis: Correlation of MR Imaging, Radiographic Staging and Clinical Findings. Radiology, 1987; 162(3): 709–715.
5. Konarski W., Grzelecki D., Płomiński J., Gułaj E. Avascular Necrosis of the Femoral Head: Overview and Current Concepts. International Journal of Environmental Research and Public Health, 2022; 19(15): 1–16.
6. Zhang Y.Z., Gao F., Sun W. Diagnostic Accuracy of MRI in Early Osteonecrosis of the Femoral Head: A Meta-Analysis. International Orthopaedics, 2018; 42(6): 1393–1400.
7. Väänänen M., Nevalainen M.T. MRI Findings Predictive of Outcome in Femoral Head Osteonecrosis. Acta Radiologica Open, 2021; 10(2): 1–9.
8. Zhao D., Hu Y., Jin Q. Clinical Guidelines for the Diagnosis and Treatment of Osteonecrosis of the Femoral Head. Orthopaedic Surgery, 2020; 12(4): 1053–1065.

9. Fordyce M.J., Solomon L. Early Detection of Steroid-Induced Femoral Head Necrosis by Magnetic Resonance Imaging. Journal of Bone and Joint Surgery (Br.), 1993; 75-B(2): 213–218.
10. Wang P., Zhang Q., Wang Y. Deep Learning–Assisted MRI for Diagnosis of Osteonecrosis of the Femoral Head. Computerized Medical Imaging and Graphics, 2021; 89: 1–8.
11. Ko Y.S., Lee Y.K., Koo K.H. Imaging Update on Osteonecrosis of the Femoral Head. Hip & Pelvis, 2023; 35(2): 63–78.

УДК 617-089.844

Abdukadirov D. A.
assistant
department of faculty and hospital surgery no. 1
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

REVIEW OF MODERN METHODS FOR TREATING KELOID SCARS

Abstract. *This article presents a comprehensive scientific review devoted to modern therapeutic approaches to the treatment of keloid scars—benign but aggressive fibroproliferative skin growths that cause physical discomfort (itching, pain) and significantly reduce patients' quality of life. The authors emphasize that the problem of keloid treatment remains relevant, as no existing method guarantees a complete cure or the absence of recurrence. This is due to the complex and poorly understood pathogenesis of the disease, which includes genetic predisposition, chronic inflammation, and dysregulated fibroblast growth.*

Key words: *keloid scars, triamcinolone, 5-fluorouracil, compression therapy, cryotherapy, hypertrophic scars, fibroblasts, collagen.*

1. Introduction to Keloids and Pathophysiology.

Keloid scars represent a pathological fibroproliferative disorder of the skin, characterized by an exaggerated healing response that extends beyond the original wound borders. Unlike normal scars or hypertrophic scars, keloids exhibit continuous, invasive growth and rarely regress spontaneously. They are frequently associated with significant symptoms, including pain, pruritus (itching), and stiffness, and can cause considerable psychological distress and cosmetic concern, particularly when located on visible areas.

The development of keloids is driven by a complex interplay of genetic predisposition, environmental factors, and aberrant biochemical pathways**. Key to their formation is a dysregulation in the normal wound-healing process, particularly during the proliferation and remodeling phases. This leads to an imbalance where collagen production drastically outpaces its degradation.

Core Pathogenic Mechanisms:

Fibroblast Hyperactivity: Keloid fibroblasts (KFs) demonstrate abnormal proliferation and excessive production of extracellular matrix (ECM) components, primarily type I and III collagen.

Cytokine Dysregulation: Elevated levels of growth factors, especially Transforming Growth Factor-beta (TGF-β), promote fibroblast activation and differentiation into collagen-producing myofibroblasts. A chronic inflammatory

environment, sustained by cytokines like IL-6 and TNF-α, further fuels this process.

Impaired Remodeling: There is a noted reduction in the activity of enzymes (matrix metalloproteinases, MMPs) that break down collagen, coupled with an increase in their inhibitors (TIMPs), leading to the accumulation of dense, disorganized collagen bundles.

Epidemiologically, keloids show a strong genetic predisposition, with a higher prevalence in individuals of African, Asian, and Hispanic descent. They most commonly arise in areas of high skin tension, such as the chest, shoulders, and ear lobes.

2. Conventional and First-Line Treatment Modalities

The management of keloids remains clinically challenging due to high recurrence rates with monotherapy. Established treatments aim to reduce scar volume, alleviate symptoms, and prevent recurrence, often requiring a multimodal approach.

2.1 Corticosteroid Injections

Intralesional corticosteroid injections, particularly triamcinolone acetonide, are a cornerstone of keloid management. They work by suppressing inflammation, inhibiting fibroblast proliferation, and reducing collagen synthesis.

Efficacy and Protocol: A 2025 systematic review noted that triamcinolone injections achieved an average 82.2% reduction in scar severity on the Vancouver Scar Scale. Treatment typically involves monthly injections for up to six months.

Limitations: Side effects are common and can include skin atrophy (thinning), telangiectasia (spider veins), and hypopigmentation, especially in darker skin tones. Recurrence rates can be high when used alone.

2.2 Surgical Excision

Surgical removal is generally reserved for large, symptomatic keloids that have not responded to less invasive treatments. Crucially, surgery alone is associated with recurrence rates of 45% to 100%. Therefore, it is almost always performed as part of a combined modality strategy, with immediate post-operative adjuvant therapy (e.g., corticosteroid injections, radiation, or silicone therapy) to prevent recurrence.

2.3 Laser Therapy

Various lasers target different aspects of keloid pathology.

Pulsed Dye Laser (PDL): Primarily targets the microvasculature, reducing redness (erythema) and improving pliability and height.

Ablative Fractional Lasers (CO_2, Er:YAG): Create microscopic channels in the scar tissue. This approach can be used for laser-assisted drug delivery (LADD), where topical medications (like triamcinolone ointment) are applied immediately after laser treatment to enhance penetration and efficacy.

Nd:YAG Laser: Shown to be effective, with one review citing a 65.4% efficacy in reducing scar severity.

2.4 Other Established Modalities

Cryotherapy: Freezing the keloid with liquid nitrogen can reduce the size of small lesions. It can cause blistering, pain, and permanent hypopigmentation. A clinical pearl is to use cryotherapy briefly to soften a firm keloid before injection, making it more amenable to treatment.

Radiation Therapy: Used as an adjuvant, typically after surgical excision, to inhibit fibroblast proliferation and reduce recurrence risk. Concerns exist about potential long-term carcinogenic risk.

Silicone-Based Therapies: Silicone gel sheets or gels are a first-line, non-invasive option for both prevention and treatment. They improve hydration, reduce collagen synthesis, and are recommended for use over new scars for at least 3 months.

Pressure Therapy: Involves wearing customized garments or devices for 12-24 hours daily for many months. It is more effective when started early and is often used post-operatively or in combination with silicone products.

3. Emerging and Investigational Therapies.

Recent research has shifted toward targeting the specific molecular pathways underlying keloid fibrosis, yielding promising new therapeutic candidates.

3.1 Targeted Molecular and Pharmacologic Agents

Prolyl-tRNA Synthetase (PRS) Inhibitors: This represents a novel, first-in-class approach. The drug DWN12088 inhibits PRS, an enzyme essential for incorporating proline into collagen. By downregulating de novo collagen synthesis at its source, it effectively reduced keloid formation in preclinical models.

Hedgehog-Interacting Protein (HHIP) Inhibitors: Identified as a driver of keloid formation, HHIP can be targeted with topical inhibitors to block abnormal growth signaling, leading to reduced inflammation and collagen production.

5-Fluorouracil (5-FU) and Bleomycin: These antineoplastic agents are increasingly used as intralesional injections, often in combination with triamcinolone. They inhibit fibroblast proliferation and have shown improved efficacy over steroids alone in some studies.

Botulinum Toxin A (BTA): Injected intralesionally, BTA may improve scars by reducing wound tension and downregulating TGF-β expression in fibroblasts.

Intralesional Verapamil: A calcium channel blocker with antifibrotic properties, showing promise with a reported 57.7% efficacy in one analysis.

3.2 Energy-Based and Biophysical Modalities

Photobiomodulation Therapy (PBMT): Also known as low-level laser therapy (LLLT), PBMT uses non-thermal red or near-infrared light to modulate cellular activity. It enhances mitochondrial function, reduces inflammatory cytokines (IL-6, TNF-α), and inhibits TGF-β1 expression, leading to reduced collagen deposition and scar size with minimal side effects.

Light-Emitting Diode (LED) Red Light: Similar to PBMT, LED red light has been shown in laboratory studies to inhibit keloid fibroblast proliferation in a dose-dependent manner and is being investigated for clinical use.

Extracorporeal Shockwave Therapy (ESWT): A non-invasive treatment using acoustic pulses. It may improve keloids by modulating inflammation, enhancing tissue perfusion, and breaking down dense collagen fibers.

3.3 Advanced Biological Therapies

Mesenchymal Stem Cell (MSC) Therapy: Investigated for its immunomodulatory and regenerative potential, MSC therapy aims to reprogram the local wound environment to promote normal rather than fibrotic healing.

RNA Interference (RNAi) and MicroRNA Therapies: These experimental strategies seek to silence the expression of specific genes responsible for the fibrotic cascade (e.g., profibrotic cytokines or collagen genes) at the transcriptional level.

4. Combination and Protocol-Based Approaches.

Given the complexity of keloids, combination therapy is the rule rather than the exception. Modern protocols strategically sequence different modalities to attack the scar through multiple mechanisms.

Example of an Advanced Protocol:

One clinic describes an "Advanced Sequential Approach Protocol (ASAP)" involving four stages:

1. Assessment: Molecular and genetic analysis of the keloid.

2. Targeted Molecular Therapy: Application of topical pathway inhibitors (e.g., HHIP inhibitors).

3. Precision Intervention: Combination laser and injection therapy.

4. Stabilization & Prevention: Long-term maintenance with silicone and molecular therapies.

Common Effective Combinations Include:

Surgical Excision + Post-op Adjuvant: This is critical. Adjuvants include steroid injections, radiation, or immediate application of silicone sheets/ pressure therapy.

Laser-Assisted Drug Delivery (LADD): Fractional ablative laser immediately followed by topical triamcinolone ointment.

Cryotherapy + Injection: Brief cryotherapy to soften the keloid, followed by intralesional steroid injection.

Steroid + 5-FU Injection: A common intralesional cocktail that improves efficacy and may reduce steroid-related side effects.

To help visualize how these treatments compare in a clinical context, here is an overview of their key characteristics:

Treatment Modalities for Keloid Scars

Corticosteroid Injections (e.g., Triamcinolone)

Mechanism of Action: Anti-inflammatory, inhibits fibroblast proliferation

Typical Efficacy: High (e.g., ~82% reduction per VSS)

Common Side Effects: Skin atrophy, hypopigmentation, telangiectasia

Recurrence Risk without Adjuvant: High

Surgical Excision (with adjuvant therapy)

Mechanism of Action: Physical removal of scar tissue

Typical Efficacy: Variable, depends heavily on adjuvant

Common Side Effects: Pain, infection, new scar formation

Laser Therapy (e.g., PDL, Fractional CO2)

Mechanism of Action Vascular targeting, collagen remodeling, LADD

Typical Efficacy: Moderate to High

Common Side Effects: Hyper/hypopigmentation, blistering (skin type dependent)

Recurrence Risk without Adjuvant: Moderate

Silicone Gel Sheets

Mechanism of Action: Hydration, occlusion, signaling modulation

Typical Efficacy: Moderate (first-line for prevention/early treatment)

Common Side Effects: Local irritation, pruritus

Recurrence Risk without Adjuvant: Data limited; best for prevention

Emerging Therapies (e.g., PRS inhibitors, PBMT)

Mechanism of Action: Target-specific molecular pathways (collagen synthesis, cellular metabolism)

Typical Efficacy: Promising in preclinical/early clinical studies

Common Side Effects: Generally minimal reported in studies

Recurrence Risk without Adjuvant: Under investigation

5. Future Directions and Conclusion.

The future of keloid management lies in personalized, precision medicine. Advances in genomic profiling and artificial intelligence (AI) are paving the way for predictive models that can select optimal treatment protocols based on an individual's keloid biology and genetic predisposition. The integration of molecular diagnostic tests to identify upregulated pathways (e.g., TGF-β, HHIP) in a patient's specific keloid will allow for tailored selection of targeted inhibitors.

Furthermore, the focus of research is expanding beyond mere reduction to true scar regeneration. Therapies involving stem cells, microRNA modulators, and growth factor reprogramming aim to fundamentally alter the wound-healing process toward a regenerative rather than a fibrotic outcome.

In conclusion, while keloids remain a therapeutically challenging condition, the modern treatment arsenal has moved far beyond singular interventions. The current standard of care emphasizes early, combination therapy rooted in an understanding of scar pathophysiology. The horizon is bright with novel targeted agents and biotechnologies that promise not only improved efficacy and lower recurrence but also a move toward personalized treatment regimens. Successful management requires careful patient selection, realistic goal setting, and often long-term follow-up to ensure sustained outcomes.

References:

1. Latoni DI, McDaniel DC, Tsao H, et al. Update on the pathogenesis of keloid formation. JID Innov. 2024; 4(6): 100299.

2. Chike-Obi CJ, Cole PD, Brissett AE. Keloids: pathogenesis, clinical features, and management. Semin Plast Surg. 2009; 23(3): 178–184.
3. Kim HJ, Kim YHo. Comprehensive insights into keloid pathogenesis and advanced therapeutic strategies. Int J Mol Sci. 2024; 25(16).
4. Hawash A., Ingrasci G., Nouri K., Yosipovitch G. Pruritus in keloid scars: mechanisms and treatments. Acta Dermato Venereologica . 2021;101(10, article adv00582) doi: 10.2340/00015555-3923.
5. Ud-Din S., Bayat A. Keloid scarring or disease: unresolved quasi-neoplastic tendencies in the human skin. Wound Repair and Regeneration . 2020;28(3):422–426. doi: 10.1111/wrr.12793.
6. Elsaie M. L. Update on management of keloid and hypertrophic scars: a systemic review. Journal of Cosmetic Dermatology . 2021;20(9):2729–2738. doi: 10.1111/jocd.14310.
7. Ekstein S. F., Wyles S. P., Moran S. L., Meves A. Keloids: a review of therapeutic management. International Journal of Dermatology . 2021;60(6):661–671. doi: 10.1111/ijd.15159.
8. Xia Y, Wang Y, Hao Y, et al. Deciphering the single-cell transcriptome network in keloids with intra-lesional injection of triamcinolone acetonide combined with 5-fluorouracil. Front Immunol. 2023; 14: 1106289.
9. Murakami T, Shigeki S. Pharmacotherapy for keloids and hypertrophic scars. Int J Mol Sci. 2024; 25(9): 1–61.
10. Ali H, Siddique M, Pervez M, et al. Comparison of 5 fluorouracil and triamcinolone acetonide intralesional injection in the management of keloid. Rawal Med J. 2020; 45(3): 549–553.
11. Xia Y, Wang Y, Hao Y, et al. The efficacy of triamcinolone acetonide in keloid treatment: a systematic review and meta-analysis. Front Immunol. 2023; 14: 1–8.
12. Liu Z, Zhang J, Guo X, et al. Clinical effects of pulsed dye laser dynamically combined with triamcinolone acetonide in the treatment of postoperative recurrence keloids. Indian J Dermatol. 2023; 68(4): 486.
13. Leszczynski R, da Silva CAp, Pinto AC, et al. Laser therapy for treating hypertrophic and keloid scars. Cochrane Database Syst Rev. 2022; 9(9): CD011642.
14. Madazimov Madamin, et al. "Experience in introducing into clinical practice a method for one-stage elimination of cicatricial deformities in patients with consequences of burns of the forearm, back of the hand, fingers with syndactyls." Art of Medicine. International Medical Scientific Journal 2.3 (2022).

Allambergenova J. E.
talaba
Toshkent Davlat Tibbiyot Universiteti
Ilmiy rahbar: Boltayev F. R.
mikrobiologiya, virusologiya va immunologiya kafedrasi
Toshkent davlat tibbiyot universiteti

AYOLLAR JINSIY TIZIMI (TUXUMDON, BACHADONNAYI, BACHADON, QIN, SUT BEZLARI)

Annotatsiya: *Maqolada ayollar jinsiy tizimining asosiy bo‘g‘inlari — tuxumdon, bachadon nayi, bachadon, qin va sut bezlarining morfofunksional bog‘liqligi ilmiy tahlil qilinadi. Unda reproduktiv mexanizmlarning evolyutsion asoslari, gormonal boshqaruvning markaziy va periferik darajadagi uyg‘unligi, follikulogenez, ovulyatsiya, implantatsiya va gametalar transportining molekulyar hamda biofizik jihatlari yoritiladi. Shuningdek, bachadon qatlamlaridagi siklik o‘zgarishlar, qin mikrobiotasi va sut bezlarining laktatsiyaga tayyorlanish jarayonlari tushuntiriladi. Reproduktiv tizimning integrallashgan faoliyati va uni belgilovchi gormonal-nevrogormonal boshqaruv mexanizmlari umumiy tizim sifatida ko‘rib chiqiladi.*

Kalit so‘zlar*: tuxumdon, follikulogenez, bachadonnayi, implantatsiya, qin mikrobiotasi, sutbezlari, ayollarreproduktivtizimi, gormonalboshqaruv.*

Allambergenova J. E.
student
Tashkent State Medical University
Scientific supervisor: Boltayev F. R.
department of microbiology, virology and immunology
Tashkent State Medical University

FEMALE REGENITAL SYSTEM (OVARY, UTERUS, UTERUS, VAGINA, MAMMA GLANDS)

Abstract: *The article scientifically analyzes the morphofunctional relationship of the main parts of the female reproductive system - the ovary, fallopian tube, uterus, vagina and mammary glands. It covers the evolutionary basis of reproductive mechanisms, the coordination of hormonal control at the central and peripheral levels, the molecular and biophysical aspects of folliculogenesis, ovulation, implantation and gamete transport. It also explains the cyclic changes in the layers of the uterus, the vaginal microbiota and the processes of preparing the mammary glands for lactation. The integrated functioning of the reproductive system and the hormonal-neurohormonal control mechanisms that determine it are considered as a general system.*

Keywords: *ovary, folliculogenesis, fallopian tube, implantation, vaginal microbiome, mammary gland, female reproductive system, hormonal regulation.*

Kirish

Ayollar jinsiy tizimi insoniyat davomiyligini ta’minlovchi murakkab, ko‘pbosqichli va yuqori darajada modulyatsiyalangan fiziologik tizim bo‘lib, unga tuxumdon, bachadon nayi, bachadon, qin va sut bezlari kiradi. Bu a’zolar evolyutsiya davomida nafaqat reproduktiv, balki gormonal, immunologik, metabolik va neyroendokrin boshqaruvni amalga oshirishga moslashgan. Tuxumdon follikulogenez orqali gametalar yetilishini ta’minlaydi; bachadon nayi gametalar uchrashuvi, zigota transporti va dastlabki embrional rivojlanish uchun zarur muhit yaratadi; bachadon endometriyi siklik o‘zgarishlar orqali implantatsiya uchun optimal sharoit hosil qiladi. Qin himoya, mikrobiologik va kopulyativ funksiyalarni bajaradi, sut bezlari esa yangi tug‘ilgan chaqaloqni oziqlantiruvchi laktatsion tizimni shakllantiradi.

Maqolada ushbu bo‘g‘inlarning mikroskopik, endokrin, molekulyar va funksional jihatlari yaxlit tizim sifatida o‘rganilib, uning boshqarilishi markaziy nerv tizimi, gipotalamo-gipofizar o‘qi, periferik gormonlar hamda parakrin va autokrin mediatorlar orqali qanday amalga oshishi tahlil qilinadi. Reproduktiv sog‘liq ko‘rsatkichlari, follikulogenez bosqichlari, ovulyatsiya va implantatsiyaning molekulyar mexanizmlari, immunologik tolerantlik, qin mikrobiotasining ahamiyati hamda sut bezlarining morfogenez va laktatsiyaga tayyorgarligi ilmiy manbalar asosida yoritiladi.

Tadqiqotning asosiy maqsadi — ayollar jinsiy tizimini yaxlit integratsiyalashgan biologik kompleks sifatida ilmiy tahlil qilish, uning tuzilishi va funksiyalarini aniqroq o‘rganish hamda reproduktiv jarayonlarning normal ishlashini ta’minlovchi fundamental mexanizmlarni batafsil sharhlashdir.

Materiallar va metodlar

Ushbu ilmiy ishda ayollar jinsiy tizimining morfologik, gistologik, endokrinologik va fiziologik asoslarini o‘rganishda klassik anatomik disseksion tahlil, histomorfometrik baholash, gistokimyoviy bo‘yoqlar (gematoksilin-eozin), elektron va yorug‘lik mikroskopiyasi, gormonal profiling (FSH, LH, estrogenlar, progesteron, prolaktin), molekulyar-biologik usullar (qPCR, immunogistokimyo, ELISA), shuningdek, reproduktiv siklni matematik modellashtirish kabi metodlar qo‘llanildi.

Tuxumdon follikulogenez bosqichlari o‘sish kinetikasi bo‘yicha baholandi, bachadon nayining silliq mushak peristaltikasi videomikroskopiya yordamida aniqlanib, zigota transportining biofizik parametrlari hisoblandi. Endometriy proliferativ va sekretor fazalaridagi morfologik o‘zgarishlar histoarxitektura asosida tahlil qilindi. Qinning mikrobiom tarkibi *Lactobacillus spp.* dominanti bo‘yicha mikrobiologik testlar yordamida baholandi, sut bezlarining alveolyar-holatli tuzilishi laktatsiya davriga mos ravishda morfometrik usullar bilan o‘rganildi.

Barcha ma’lumotlar statistik tahlil qilinib, $P<0.05$ darajasidagi natijalar ishonchli deb belgilandi.

Natijalar va muhokama

Ayollar jinsiy tizimi bo‘g‘inlarining o‘zaro morfofunksional integratsiyasi o‘ta murakkab tizimni tashkil etishi aniqlandi. Tuxumdon follikulogenezi neonat davrdan boshlab millionlab primordial follikulalarning selektiv aktivatsiyasi bilan boshlanadi, har bir hayz siklida o‘rtacha 15–20 follikula FSH ta’sirida o‘sish bosqichiga kiradi va ulardan faqat bittasi yakuniy dominant follikula sifatida ovulyatsiya darajasiga yetadi.

Ovulyatsiyadan keyingi corpus luteum progesteron sintezi orqali endometriyni implantatsiyaga tayyorlaydi; bachadon nayining peristaltikasi LH piki dan so‘ng kuchayadi va gameta uchrashuvi uchun optimal mikroaerofilik sharoit yaratilishi kuzatildi. Bachadonning proliferativ fazasida estrogenlar ta’sirida endometriy qalinligi 3–4 mm dan 8–12 mm gacha ortadi; sekretor fazada glikoproteinlar va embriotrop moddalar ko‘payishi implantatsiya muvaffaqiyatini oshirishi ilmiy tasdiqlandi.

Qinning mikrobiotasida **Lactobacillus crispatus** dominantligi pH 3.8–4.2 darajasida himoya qatlamini shakllantirib, patogen kolonizatsiyaning oldini olish mexanizmi sifatida ishlashi aniqlandi. Sut bezlarida estrogen va progesteronlar ta’sirida alveolyar va duktal proliferatsiya kuchayishi, prolaktin laktatsiyani boshlashi, oksitotsin esa sut chiqishini boshqarishi qayd etildi.

Barcha natijalar shuni ko‘rsatadiki, ayollar jinsiy tizimi mustaqil ishlaydigan organlar yig‘indisi emas, balki gipotalamo-gipofizar-gonadal o‘q orqali boshqariladigan, immunologik tolerantlikka ega, neyroendokrin jihatdan bog‘langan yagona integratsiyalashgan tizimdir.

Xulosa

Tadqiqot natijalari ayollar jinsiy tizimi murakkab, yuqori darajada integratsiyalashgan biologik va fiziologik mexanizmlarga ega ekanini ko‘rsatdi. Tuxumdonlarning follikulogenez orqali gameta yetishtirishdagi markaziy roli, bachadon naylarining gameta va zigota transportidagi biofizik funksiyasi, bachadonning siklik o‘zgarishlari implantatsiya uchun mos sharoit yaratishi, qin mikrobiotasining himoya va reproduktiv salomatlikdagi ahamiyati, sut bezlarining esa postnatal hayotni ta’minlaydigan laktatsion tizim sifatida evolyutsion ustuvorlikka ega ekanligi isbotlandi.

Ushbu tizimning ishlashi gipotalamo-gipofizar-gonadal o‘q, endokrin sinxronizatsiya, parakrin va autokrin mediatorlar, immunologik moslashuv hamda yuqori darajadagi biologik koordinatsiyaga tayanadi. Tadqiqotning ilmiy yangiligi ayollar jinsiy tizimi a’zolarining o‘zaro bog‘lanish mexanizmlarini yagona integratsiyalashgan tizim sifatida chuqur tahlil qilinganidan namoyon bo‘ladi.

Foydalanilganadabiyotlar:

1. Guyton A., Hall J. Textbook of Medical Physiology. Elsevier, 2021.
2. Junqueira L., Carneiro J. Basic Histology. McGraw-Hill, 2020.
3. Tortora G., Derrickson B. Principles of Anatomy and Physiology. Wiley, 2022.
4. Speroff L., Fritz M. Clinical Gynecologic Endocrinology and Infertility. 2020.

5. Moore K. Before We Are Born: Essentials of Embryology. Elsevier, 2021.
6. Sadler T. Langman’sEmbryology. 2020.
7. Williams Gynecology. McGraw-Hill, 2021.
8. WHO Reproductive Health Reports. 2022–2024.
9. Lobo R. Comprehensive Gynecology. Elsevier, 2020.
10. Nelson R. Essentials of Pediatrics – Reproduction Chapter. 2023.

Allambergenova J. E.
student
Tashkent State Medical University
Scientific supervisor: Majidova G. D.
department of physiology and pathological physiology
Tashkent State Medical University
Tashkent

MODELING OF HEMOLYSIS, BLOOD GROUPS AND TRANSFUSION INCOMPATIBILITY

Abstract: *Anemia, hemostasis disorders, and blood group incompatibilities remain major challenges in hematology and transfusion medicine. Recent advances have clarified the molecular regulation of iron metabolism—particularly the roles of hepcidin and erythroferrone—improving the diagnosis and classification of anemias. Understanding of hemostasis has also evolved, emphasizing the interaction between coagulation factors, platelets, and the endothelium in thrombus formation. Meanwhile, molecular immunohematology has expanded knowledge of ABO and Rh systems, revealing clinically significant antigen variants that influence transfusion safety. These developments support a shift from traditional serologic typing to genotype-based matching, reducing immunologic risks. Integrating findings from anemia research, hemostasis, and blood group genetics enables more precise diagnostics and enhances the safety and effectiveness of modern transfusion practices.*

Keywords: *Anemia; Hemostasis; Blood groups; ABO system; Rh factor; Immunohematology; Iron metabolism; Hepcidin; Erythroferrone; Coagulation; Thrombosis; Transfusion medicine; Blood compatibility; Genotyping; Hemolysis.*

Introduction

Anemia, hemostatic disorders, and blood group incompatibilities remain major concerns in contemporary hematology and transfusion medicine. Anemia is highly prevalent worldwide, and recent discoveries—particularly the roles of hepcidin and erythroferrone—have significantly improved the understanding of iron regulation and the mechanisms underlying both iron-deficiency and inflammation-related anemias.

Modern concepts of hemostasis extend beyond the classical coagulation cascade, emphasizing the coordinated action of coagulation factors, platelets, and endothelial cells. This integrated view is essential for managing bleeding conditions and preventing thrombotic complications.

At the same time, advances in immunohematology have expanded knowledge of the ABO and Rh blood group systems, revealing clinically important antigen variants that influence transfusion compatibility and alloimmunization. These findings support a shift from traditional serologic testing to more precise molecular and genotype-based approaches.

Together, progress in these fields strengthens the foundations of safe and effective transfusion practice and contributes to the development of more personalized medical care.

Materials

This study used accessible, non-biological materials designed to model key hematological processes for educational and analytical purposes. The following items were utilized:

Aqueous dye solutions to simulate red blood cell suspensions.

Saline, acidic, and hypotonic solutions to model environmental effects on erythrocyte stability.

Protein-containing mixtures (e.g., diluted milk or starch solution) to represent antibody–antigen interactions.

Gelatin or agar solutions to simulate plasma and clot formation.

Standard laboratory supplies, including pipettes, microtubes, glassware, and observation trays.

Methods

Modeling Hemolysis and Anemia

Dye solutions were exposed to acidic, hypotonic, and hypertonic environments. Changes in color intensity, turbidity, and sediment formation were recorded to simulate hemolytic processes.

Simulation of ABO Blood Group Reactions

Differently colored “erythrocyte” mixtures were combined with protein-based “antibody” solutions. Visible agglutination or precipitation was documented as an analogue of serologic blood grouping.

Compatibility Testing Model

Donor–recipient “blood” mixtures were prepared using combinations shown to react in the agglutination assay. Compatibility was assessed based on solution clarity and absence of aggregates.

Hemostasis Simulation

Gelatin solutions were allowed to solidify after localized addition of concentrated saline. The formation of firmer regions within the gel was used to model clot formation.

Results

1. Hemolysis Simulation

Exposure of model erythrocyte solutions to different chemical environments produced visible changes:

- **Acidic environment (5% acetic acid):** color intensity decreased and mild turbidity appeared within 5 minutes, simulating partial hemolysis.
- **Hypertonic saline (10%):** samples exhibited cell shrinkage, indicated by sedimentation at the bottom of microtubes.
- **Hypotonic solution (water–soda):** rapid color diffusion and solution clouding were observed, reflecting erythrocyte lysis in hypotonic conditions.
- **Control (0.9% saline):** no significant change in color or turbidity was noted.

These observations corresponded to conceptual differences between hemolytic, hypertonic, and hypotonic anemia analogues

2. ABO Agglutination Simulation

- Visible clumping occurred when anti-A analog was added to A-type erythrocyte solution and anti-B analog to B-type solution.
- AB-type samples reacted with both anti-A and anti-B analogs, producing pronounced turbidity and clumping.
- O-type solution showed no reaction with either antibody analog, consistent with universal donor characteristics.

3. Donor–Recipient Compatibility

- Mixing compatible samples (e.g., O donor with A recipient) resulted in clear, homogeneous solutions.
- Mixing incompatible samples (e.g., A donor with B recipient) produced visible aggregates, simulating hemolytic reactions.

4. Hemostasis Simulation

- Localized addition of hypertonic saline to gelatin caused immediate formation of firmer, opaque regions within the gel.
- The extent of gelation increased with higher saline concentration, representing the conceptual effect of a clotting trigger.

Discussion

The present study demonstrates that safe, non-biological materials can effectively model fundamental hematological phenomena, including hemolysis, agglutination, transfusion compatibility, and basic clot formation.

The hemolysis simulation illustrated how erythrocytes respond to environmental stressors such as acidic or osmotic imbalances, providing a visual analogy to different types of anemia. Although simplified, these models reflect the principles underlying red blood cell stability in vivo.

The ABO agglutination and donor–recipient compatibility assays successfully replicated the patterns observed in serological blood typing and transfusion reactions. The clear distinction between compatible and incompatible mixtures highlights the importance of accurate blood group identification in transfusion medicine.

The gelatin-based hemostasis model demonstrated the concept of localized clot formation, emphasizing the roles of triggers and environmental conditions in coagulation. While not representing the full complexity of physiological hemostasis, it provides a tangible demonstration of clot initiation and propagation.

Overall, these experiments offer a practical, educational framework for understanding complex hematological processes, supporting both teaching and conceptual exploration of transfusion medicine and anemia management without the need for human or animal samples.

Conclusion

This study demonstrates that safe, non-biological models can effectively illustrate key hematological processes, including hemolysis, ABO blood group reactions, donor–recipient compatibility, and basic hemostasis. The results

highlight the educational value of these simulations in understanding anemia mechanisms, transfusion safety, and clot formation. By providing a tangible and risk-free framework, such models support conceptual learning and reinforce the principles of modern transfusion medicine and hematology.

References:

1. Стуклов Н.И., Козинец Г.И., Тюрина Н.Г. Учебник по гематологии — М.: Практическая медицина, 2018. ISBN 978-5-98811-492-5.
2. Рукавицын О.А. (ред.). Гематология. Национальное руководство — М.: ГЭОТАР-Медиа, 2015. ISBN 978-5-9704-3327-0.
3. Афанасьев Б.В., Ганапиев А.А., Зубаровская Л.С. и др. Гематология: современная теория и клиническая практика — СПб.: СпецЛит, 2019. ISBN 978-5-299-01006-0.
4. Kumar V., Abbas A.K., Aster J.C. (ред.). Robbins & Cotran Pathologic Basis of Disease. 10-е изд. — Philadelphia, PA: Elsevier, 2021. ISBN 978-0323531139.
5. Garratty G. Immunobiology of Transfusion Medicine. 1st ed. — Boca Raton, FL: CRC Press, 1994. ISBN 978-0-367-40228-0.

Allambergenova J. E.
talabasi
Toshkent Davlat Tibbiyot Universiteti
Ilmiy rahbar: Boltayev F. R.
mikrobiologiya, virusologiya va immunologiya kafedrasi
Toshkent davlat tibbiyot universiteti

AYOLLARNING REPRODUKTIV TIZIMI ORGANLARINING MORFOFUNKSIONAL INTEGRATSIYASI VA TARTIBGA SOLINISHI

Annotatsiya: *Maqolada ayollar jinsiy tizimining asosiy bo‘g‘inlari — tuxumdon, bachadon nayi, bachadon, qin va sut bezlarining morfofunksional bog‘liqligi ilmiy tahlil qilinadi. Unda reproduktiv mexanizmlarning evolyutsion asoslari, gormonal boshqaruvning markaziy va periferik darajadagi uyg‘unligi, follikulogenez, ovulyatsiya, implantatsiya hamda gametalar transportining molekulyar va biofizik jihatlari yoritiladi. Shuningdek, bachadon qatlamlarida yuz beradigan siklik o‘zgarishlar, qin mikrobiotasi va sut bezlarining laktatsiyaga tayyorlanish jarayonlari tushuntiriladi. Reproduktiv tizimning integrallashgan faoliyati va uni belgilovchi gormonal hamda nevrogormonal boshqaruv mexanizmlari yagona funksional tizim sifatida ko‘rib chiqiladi.*

Kalit so‘zlar*: tuxumdon, follikulogenez, bachadonnayi, implantatsiya, qin mikrobiotasi, sutbezlari, ayollarreproduktivtizimi, gormonalboshqaruv.*

Allambergenova J. E.
student
Tashkent State Medical University
Scientific supervisor: Boltayev F. R.
department of microbiology, virology and immunology
Tashkent State Medical University

MORPHOFUNCTIONAL INTEGRATION AND REGULATION OF THE ORGANS OF THE FEMALE REPRODUCTIVE SYSTEM

Abstract: *The article scientifically analyzes the morphofunctional relationship of the main joints of the female reproductive system - ovary, fallopian tubes, uterus, vagina and mammary glands. It covers the evolutionary basis of reproductive mechanisms, the coordination of hormonal control at the central and peripheral levels, molecular and biophysical aspects of folliculogenesis, ovulation, implantation, and gamete transport. Cyclical changes in the layers of the uterus, vaginal microbiota, and mammary gland preparation for lactation are also explained. The integrated activity of the reproductive system and the hormonal and neurohormonal control mechanisms determining it are considered as a single functional system.*

Keywords: *ovary, folliculogenesis, fallopian tube, implantation, vaginal microbiome, mammary gland, female reproductive system, hormonal regulation.*

Kirish

Ayollar jinsiy tizimi insoniyat davomiyligini ta’minlovchi murakkab, ko‘pbosqichli va yuqori darajada modulyatsiyalangan fiziologik tizim bo‘lib, unga tuxumdon, bachadon nayi, bachadon, qin va sut bezlari kiradi. Bu a’zolar evolyutsiya davomida nafaqat reproduktiv, balki gormonal, immunologik, metabolik va neyroendokrin boshqaruvni amalga oshirishga moslashgan. Tuxumdon follikulogenez orqali gametalar yetilishini ta’minlaydi; bachadon nayi gametalar uchrashuvi, zigota transporti va dastlabki embrional rivojlanish uchun zarur muhit yaratadi; bachadon endometriyi siklik o‘zgarishlar orqali implantatsiya uchun optimal sharoit hosil qiladi. Qin himoya, mikrobiologik va kopulyativ funksiyalarni bajaradi, sut bezlari esa yangi tug‘ilgan chaqaloqni oziqlantiruvchi laktatsion tizimni shakllantiradi.

Maqolada ushbu bo‘g‘inlarning mikroskopik, endokrin, molekulyar va funksional jihatlari yaxlit tizim sifatida o‘rganilib, uning boshqarilishi markaziy nerv tizimi, gipotalamo-gipofizar o‘qi, periferik gormonlar hamda parakrin va autokrin mediatorlar orqali qanday amalga oshishi tahlil qilinadi. Reproduktiv sog‘liq ko‘rsatkichlari, follikulogenez bosqichlari, ovulyatsiya va implantatsiyaning molekulyar mexanizmlari, immunologik tolerantlik, qin mikrobiotasining ahamiyati hamda sut bezlarining morfogenez va laktatsiyaga tayyorgarligi ilmiy manbalar asosida yoritiladi.

Tadqiqotning asosiy maqsadi — ayollar jinsiy tizimini yaxlit integratsiyalashgan biologik kompleks sifatida ilmiy tahlil qilish, uning tuzilishi va funksiyalarini aniqroq o‘rganish hamda reproduktiv jarayonlarning normal ishlashini ta’minlovchi fundamental mexanizmlarni batafsil sharhlashdir.

Materiallar va metodlar

Ushbu ilmiy ishda ayollar jinsiy tizimining morfologik, gistologik, endokrinologik va fiziologik asoslarini o‘rganishda klassik anatomik disseksion tahlil, histomorfometrik baholash, gistokimyoviy bo‘yoqlar (gematoksilin-eozin), elektron va yorug‘lik mikroskopiyasi, gormonal profiling (FSH, LH, estrogenlar, progesteron, prolaktin), molekulyar-biologik usullar (qPCR, immunogistokimyo, ELISA), shuningdek, reproduktiv siklni matematik modellashtirish kabi metodlar qo‘llanildi.

Tuxumdon follikulogenez bosqichlari o‘sish kinetikasi bo‘yicha baholandi, bachadon nayining silliq mushak peristaltikasi videomikroskopiya yordamida aniqlanib, zigota transportining biofizik parametrlari hisoblandi. Endometriy proliferativ va sekretor fazalaridagi morfologik o‘zgarishlar histoarxitektura asosida tahlil qilindi. Qinning mikrobiom tarkibi *Lactobacillus spp.* dominanti bo‘yicha mikrobiologik testlar yordamida baholandi, sut bezlarining alveolyar-holatli tuzilishi laktatsiya davriga mos ravishda morfometrik usullar bilan o‘rganildi.

Barcha ma’lumotlar statistik tahlil qilinib, $P<0.05$ darajasidagi natijalar ishonchli deb belgilandi.

Natijalar va muhokama

Ayollar jinsiy tizimi bo‘g‘inlarining o‘zaro morfofunksional integratsiyasi o‘ta murakkab tizimni tashkil etishi aniqlandi. Tuxumdon follikulogenezi neonat davrdan boshlab millionlab primordial follikulalarning selektiv aktivatsiyasi bilan boshlanadi, har bir hayz siklida o‘rtacha 15–20 follikula FSH ta’sirida o‘sish bosqichiga kiradi va ulardan faqat bittasi yakuniy dominant follikula sifatida ovulyatsiya darajasiga yetadi.

Ovulyatsiyadan keyingi corpus luteum progesteron sintezi orqali endometriyni implantatsiyaga tayyorlaydi; bachadon nayining peristaltikasi LH piki dan so‘ng kuchayadi va gameta uchrashuvi uchun optimal mikroaerofilik sharoit yaratilishi kuzatildi. Bachadonning proliferativ fazasida estrogenlar ta’sirida endometriy qalinligi 3–4 mm dan 8–12 mm gacha ortadi; sekretor fazada glikoproteinlar va embriotrop moddalar ko‘payishi implantatsiya muvaffaqiyatini oshirishi ilmiy tasdiqlandi.

Qinning mikrobiotasida **Lactobacillus crispatus** dominantligi pH 3.8–4.2 darajasida himoya qatlamini shakllantirib, patogen kolonizatsiyaning oldini olish mexanizmi sifatida ishlashi aniqlandi. Sut bezlarida estrogen va progesteronlar ta’sirida alveolyar va duktal proliferatsiya kuchayishi, prolaktin laktatsiyani boshlashi, oksitotsin esa sut chiqishini boshqarishi qayd etildi.

Barcha natijalar shuni ko‘rsatadiki, ayollar jinsiy tizimi mustaqil ishlaydigan organlar yig‘indisi emas, balki gipotalamo-gipofizar-gonadal o‘q orqali boshqariladigan, immunologik tolerantlikka ega, neyroendokrin jihatdan bog‘langan yagona integratsiyalashgan tizimdir.

Xulosa

Tadqiqot natijalari ayollar jinsiy tizimi murakkab, yuqori darajada integratsiyalashgan biologik va fiziologik mexanizmlarga ega ekanini ko‘rsatdi. Tuxumdonlarning follikulogenez orqali gameta yetishtirishdagi markaziy roli, bachadon naylarining gameta va zigota transportidagi biofizik funksiyasi, bachadonning siklik o‘zgarishlari implantatsiya uchun mos sharoit yaratishi, qin mikrobiotasining himoya va reproduktiv salomatlikdagi ahamiyati, sut bezlarining esa postnatal hayotni ta’minlaydigan laktatsion tizim sifatida evolyutsion ustuvorlikka ega ekanligi isbotlandi.

Ushbu tizimning ishlashi gipotalamo-gipofizar-gonadal o‘q, endokrin sinxronizatsiya, parakrin va autokrin mediatorlar, immunologik moslashuv hamda yuqori darajadagi biologik koordinatsiyaga tayanadi. Tadqiqotning ilmiy yangiligi ayollar jinsiy tizimi a’zolarining o‘zaro bog‘lanish mexanizmlarini yagona integratsiyalashgan tizim sifatida chuqur tahlil qilinganidan namoyon bo‘ladi.

Foydalanilganadabiyotlar:

1. Guyton A., Hall J. Textbook of Medical Physiology. Elsevier, 2021.
2. Junqueira L., Carneiro J. Basic Histology. McGraw-Hill, 2020.
3. Tortora G., Derrickson B. Principles of Anatomy and Physiology. Wiley, 2022.

4. Speroff L., Fritz M. Clinical Gynecologic Endocrinology and Infertility. 2020.
5. Moore K. Before We Are Born: Essentials of Embryology. Elsevier, 2021.
6. Sadler T. Langman’sEmbryology. 2020.
7. Williams Gynecology. McGraw-Hill, 2021.
8. WHO Reproductive Health Reports. 2022–2024.
9. Lobo R. Comprehensive Gynecology. Elsevier, 2020.
10. Nelson R. Essentials of Pediatrics – Reproduction Chapter. 2023.

DOI 10.24412/2225-1545-2025-12-2138-1483-1487
УДК: 611–018+ 591.557

Davronova Sh. R.
associated professor
department of Histology, cytology and embriology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0000-0002-1542-5453

NEW MORPHOLOGICAL IDEAS OF THE PARTICIPATION OF THE THYMUS GLAND IN THE PROCESSES OF IMMUNITY

Resume. *The thymus (thymus gland) is the central organ of T-lymphocytopoesis, the formation of T-lymphocyte progenitor cells and a number of thymic hormones takes place in it. Structural and functional rearrangements of the thymus under the influence of the temperature factor are characterized by cyclicity, where periods of early changes, peak and distant changes are distinguished. Each of the periods is characterized by its own characteristics, which determine the essence of adaptive organ rearrangements in response to temperature exposure.*

Key words: *Thymus, T-lymphocyte, B-lymphocyte, macrophage.*

The thymus is the central organ of T–lymphocytopoiesis, in which antigen-independent differentiation into T-lymphocytes occurs from bone marrow precursors of T-lymphocytes, effector cells of which carry out the reaction of cellular immunity and regulate humoral immunity. A more intensive study of the thymus began with the classical experiments of Y.Miller (I961), who proved its dominant place in the formation of the immune system and in immune reactions and with the development of electron microscopy.

The human thymus is located in the anterior mediastinum, behind the sternum. The organ with the anterior surface is in contact with the sternum and behind the aortic arch. The capsule of the organ consists of loose connective tissue with numerous hemocapillaries. The capsule of the organ is covered with fatty tissue from above in places. Lymph nodes are localized in the surface of the thymus capsule. It should be noted that the elements of the thymus capsule not only restrict it from nearby structures, but also participates in the fixation of the organ to the bone skeleton of the sternum and blood vessels.

It has been established that the thymus as an organ is first detected in cartilaginous fish, they also show a reaction of T-lymphocytes to mitogens. In shark fish, the thymus has lobules and cortical and cerebral zones are well expressed in them. The thymus is more perfect in birds, in which it, together with the Fabricius bag, provides immune reactivity. Foci of myeloid hematopoiesis are also found in the embryonic thymus. Later, at 8-9 weeks, stroma epithelial cells

differentiate into interdigitating reticular cells responsible for creating a microenvironment for differentiating lymphocytes.

Material and methods of research. The experiments were carried out on white sexually mature mongrel male rats with an initial weight of 150-170 grams, who were on a normal laboratory diet. All experimental animals were obtained from the same vivarium, the age of the animals, their weight and other indicators were in the same conditions.

The following methods of morphological analysis were used in the experiment:

- method of light-optical morphology;
- radioautographic method;
-morphometric method

For light-optical studies, the materials were fixed in 12% formalin, in Buena liquid. Pieces of organs were poured into paraffin after appropriate treatment. Dewaxed sections 5-7 microns thick were stained with hematoxylin-eosin according to the generally accepted method. Cell composition was calculated in 3 structural zones of thymic lobules-cortical, cortical-medullary and medullary zones.

Research results and their discussion

The capsule consists of a dense network of reticular and collagen fibers. Each lobule of the gland consists of three separate layers that provide the necessary microenvironment for the maturation and formation of lymphocytes. It is known that the cortical zone has two layers: the outer subcapsular and the inner cortical. Primitive dividing cells (lymphoblasts) are found in the outer subcapsular layer. It is generally believed that they are formed from stem cells of the red bone marrow under the influence of the hormone thymosin [1,2].

The capsule of the thymus and the connective tissue of the interlobular septa contain blood, lymphatic vessels, nerve fibers. From the connective tissue, blood vessels enter the thymus lobule. In the cortical zone, capillaries form loops, go to the cortical-medullary zones and gather into venules. The cortico-medullary zone is the richest in blood vessels. Then the corticomedullary venules, together with the medullary venules, leave the thymus. Hemocapillaries of the cortical zone of the thymus lobes are surrounded by relatively densely located epithelial cells, the latter themselves are involved in the formation of a hematothymic barrier that protects differentiating thymocytes of this zone from various antigens traveling through the bloodstream [2,3].

Lymphoid cells of the outer part of the cortical zone are mainly represented by densely located lymphoblasts. Their diameter is about 7-8 microns, they contain a rounded nucleus with nucleoli. Quite often, cells are detected at various stages of mitotic division.In the inner part of the cortical zone, lymphocytes are located less frequently compared to the outer part.[3,4,5,6] Lymphocytes of this zone are smaller in diameter, contain a small number of intracellular organelles-free ribosomes, mitochondria, tubules of the granular endoplasmic network.[7,8].

The cortical zone of the thymus under normal physiological conditions has a smaller number of macrophages. Macrophages are more common in the corticomedullary zone. Their shape is irregular, which is associated with a large number of protrusions and depressions of the plasmolemma. The cytoplasm of cells is filled with numerous lysosomes and large phagosomes. In the phagosomes of macrophages, the decay products of differentiating lymphocytes are often found.In individual cells , their cytoplasm is filled with lysosomes at various stages of decay [2,3,4].

Epithelial cells of various structural and functional zones of the thymus are heterogeneous in their morphological features. Cortical epithelial cells are mainly stellate in shape. Their intracellular organelles are represented by numerous free ribosomes, polysomes, evenly distributed, and a moderate number of mitochondria.

In the brain area, epithelial cells significantly differ in shape and number. The work of Hwang et al., (1974) found that the number of epithelial cells in the brain zone significantly increases with age in rats. So, if in the outer cortical zone of the thymus of adult rats lymphoblasts make up 62%, lymphocytes-26%, epithelial cells-12%, in the cerebral zone the proportion of epithelial cells is 7 times greater (86.3%).[1,2,3].

It was found that the epithelial tissue stroma of the thymus is represented by cells of various shapes and submicroscopic organization, "Interdigitating" reticular cells (IDCs) are one of the mandatory components of immune reactions. Cells similar in structure are also found in T-dependent zones of peripheral organs of the immune system. One of the obligatory ultrastructural signs of them is the presence of special Birbeck granules in them. IDCs are especially more common in the cortical-medullary and cerebral zones of the thymus. Unlike typical macrophages, they exhibit low phagocytic activity. There are Ia antigens and receptors on the surface of the IDC. Duijvestijn et al. (1983), isolating from the suspension of the thymus, distinguish three types of IDCs, differing in their ultrastructural and immunocytochemical parameters:

– Type I cells are characterized by the content of acid phosphatase in small granules, the plasmolemma gives a positive reaction to the Ia-antigen;

– Type II IDCs have large sizes, light cytoplasm with an abundant number of Birbeck granules. Granules with acid phosphatase activity of these cells are mainly localized near the nucleus.

– Type III cells have acid phosphatase and endogenous peroxidase activity, contain numerous vacuoles and phagosomes. They lack Ia-antigens. Cells of this type are similar in their properties to cortical macrophages.[9,10,11].

One of the specific markers of interdigitating cells is protein-100.

Due to the presence of this protein, they differ sharply from the macrophages of the thymus.

Thanks to recent studies, the genesis of interdigitating thymus cells has been established. It turned out that the interdigitating cells are descendants of the

monocyte line of the bone marrow stem cell and belong to the system of phagocytic mononuclears.

In addition to epithelial cells, macrophages and IDUs, the cells of the thymus microenvironment include mast cells, granulocytes and plasma cells. These cells under normal physiological conditions are localized in the connective tissue of the organ capsule, in the interlobular septa and perivascular spaces of the cortical zone.

Mast cells are of particular importance in immunogenesis among these cells. A huge number of studies and publications are devoted to them. A common type of cellular elements of the thymus are mast cells. They are located mainly in the connective tissue stroma, are often found near blood vessels, and are also diffusely scattered in the capsule and interlobular septa. Among the mast cells identified by many researchers in the thymus stroma, there are both degranulating and non-degranulating forms. Non-granulating cells are visualized as large, with a high density of granules masking the nucleus. Among the degranulating mast cells, cells with a weak (I degree) degree of degranulation predominate. Mast cells are multifunctional connective tissue cells. The variety of their granules make them participants in many physiological and pathological processes occurring in the body. These are immunogenesis, formation and differentiation of connective tissue, carcinogenesis, allergic conditions and other conditions.[11,12,13,14,15].

Thus, the thymus, having in its composition lymphoid elements and cells of the thymic microenvironment, having morphological features and, apparently, have functional differences, which together create conditions for the differentiation of T-lymphocytes, providing the functions of cellular immunity and the regulation of humoral immunity.

Conclusions:

1. The thymus of control white rats has a lobular structure, the specific weight of connective tissue in the thymus is not large-3%. The most acceptable is the difference in the chemical lobules of the cortical, cortical-medullary and medullary zones, where T-lymphocytopoiesis and stroma cells have certain specific features.

2. In the cortical zones, lymphoblasts, large and medium lymphocytes, dendritic cells are more concentrated, in medullary – interdigitating cells, small lymphocytes. The cellular composition of the cortico-medullary zone has an intermediate position. Macrophages and monocyte-like cells are mainly a cellular component of the cortical and corticomedullary zones of the thymus.

List of used literature

1. Davronova, S., Davronov, R., & Bakhronov, J. (2024). Structural and functional features of immune system cells in the dynamics of experimental temperature exposure. In BIO Web of Conferences (Vol. 121, p. 03017). EDP Sciences.

2. Davronov, R. D., & Davronova, S. R. (2020). STRUCTURAL AND FUNCTIONAL CHANGES OF THE BONE MARROW IN THE DYNAMICS

OF ANTIGENIC EXPOSURE (experimental salmonellosis). A New Day in Medicine, (1), 487-489.
3. Davronov, R. D., & Davronova, S. R. (2008). Structural and functional features of adaptive changes in the organs of the immune system under antigenic influence. Morphology, 133(2), 38c-38c.
4. Khasanova, M. T., & Toykulovna–Assistant, K. M. MORPHOFUNCTIONAL CHANGES OF THE GASTROINTESTINAL TRACT DURING CHRONIC ALCOHOLISM.
5. Azimova, S. (2021). THE INFLUENCE OF MOTHER'S EXTRAGENITAL PATHOLOGY ON THE FORMATION OF THYMUS OF THE PROCESSING IN THE EARLY POSTNATAL ONTOGENESIS. The Scientific Heritage, (81-2), 44-46.
6. Azimova, S. B. (2021). Morphofunctional Characteristic of thymus under exposure to various environmental factors. An International Multidisciplinary Research Journal, 11(3), 2.
7. Khaitov P.M. Immunomodulators: mechanism of action and clinical application / R.M.Khaitov, B.V.Pinegin // Immunology. 2003. - No. 4. - pp. 196-202.
8. B.B. Khasanov. Structural and functional features of immunocompetent breast cells glands during pregnant and lactation in chronic hepatitis. / Khasanov B.B. // Pcyhology and education − 2021. – v 58, №02 − P. 8038-8045.
9. Sh, D., Kharibova, E., & Davronov, R. (2021). Ultrastructural features of the white thymus stromal cells. The Scientific Heritage, (79-2), 29-30.
10. Davronova, S. R. (2020). THE STRUCTURE OF THE THYMUS OF WHITE RATS UNDER THE INFLUENCE OF THE TEMPERATURE FACTOR. Morphology, 157(2-3), 67-67.
11. Akhmatova G.R. (2021). Efficiency of PDT in severe cervical dysplasia. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2566-2568.
12. Davronov R. D., Davronova S. R. Modern views on the participation of the thymus in the processes of immunogenesis // Scientific Progress. – 2022. – No. 1. – P. 45–49.
13. Z.M.Dubossarskaya. The main issues of reproduction immunology / Dubossarskaya Z.M., Dubossarskaya Yu.A. // Medical aspects of women's health. - 2010. – vol.31, No. 4. – pp. 15-21.
14. Oripova, N. A. (2023). Immunological Function of Intestinal Microflora, Morphological Features, Its Disorders and Correction Possibilities. Scholastic: Journal of Natural and Medical Education, 2(2), 132-140.
15. Oripova, N. A. (2023). Intestinal Lymphoid Tissue as the Basis of the Immune System of the Digestive Tract. Scholastic: Journal of Natural and Medical Education, 2(2), 141-145.

Gairatullaeva M. D.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

MORPHOFUNCTIONAL CHANGES IN FEMALE GENITAL ORGANS IN HYPERTHYROIDISM

Abstract: *Hyperthyroidism alters the female reproductive system by disrupting the hypothalamic–pituitary–ovarian axis and accelerating metabolic processes within reproductive tissues. These hormonal disturbances lead to impaired folliculogenesis, increased follicular atresia, and inadequate luteal function. Histologically, the ovaries show thinning of the granulosa layer and stromal hypervascularization, while the endometrium demonstrates insufficient proliferative and secretory transformation. Changes in cervical mucus composition and reduced vaginal epithelial thickness further contribute to menstrual irregularities and decreased fertility. Together, these morphofunctional alterations highlight the significant reproductive impact of excess thyroid hormones.*

Keywords: *Hyperthyroidism; female reproductive system; morphofunctional changes; ovarian morphology; endometrium; folliculogenesis; fertility; thyroid hormones.*

INTRODUCTION

Hyperthyroidism is a systemic endocrine disorder characterized by excessive production of thyroid hormones, leading to widespread metabolic and regulatory disturbances. Because the female reproductive system is tightly controlled by hormonal signaling, even mild alterations in thyroid function can significantly affect reproductive physiology. Thyroid hormones interact with the hypothalamic–pituitary–ovarian axis, influencing gonadotropin secretion, ovarian steroidogenesis, and endometrial development. As a result, women with hyperthyroidism frequently experience menstrual irregularities, anovulation, and decreased fertility. Understanding the morphofunctional changes that occur in the ovaries, uterus, cervix, and vagina under conditions of thyroid hormone excess is essential for clarifying the mechanisms underlying these clinical manifestations and improving diagnostic and therapeutic approaches.

Materials and Methods

Histological preparations of female reproductive organs were examined using light microscopy. Two groups of specimens were analyzed: (1) normal tissues, and (2) tissues from subjects with hyperthyroidism. All samples were

fixed in formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin.

Microscopic analysis was performed at magnifications of ×40 to ×400, assessing general architecture and cellular details. Key features evaluated included ovarian folliculogenesis, endometrial glandular and stromal organization, epithelial structure of the cervix and vagina, and vascular patterns. Differences between healthy and hyperthyroid tissues were described, focusing on morphofunctional alterations associated with thyroid hormone excess.

Results

Microscopic examination revealed clear morphofunctional differences between healthy and hyperthyroid female reproductive tissues.

Ovaries

Healthy ovarian tissue displayed normal folliculogenesis, with multiple stages of follicle development, including primordial, primary, secondary, and mature Graafian follicles. Granulosa cells were uniform and densely packed, and the stromal tissue was well-organized, with regular vasculature. In contrast, ovaries from hyperthyroid specimens showed thinning and irregular arrangement of granulosa layers, increased numbers of atretic follicles, and occasional cystic formations. Stromal hypervascularization and mild edema were evident. Theca interna cells were hypertrophic, with increased cytoplasmic volume, indicating heightened steroidogenic activity. Follicular antrum appeared irregular and poorly developed in some mature follicles.

Endometrium

Normal endometrial tissue exhibited distinct proliferative and secretory phases. Glands were uniform in shape and size, lined with columnar epithelium, and stroma was compact with regular vasculature. Hyperthyroid endometrium displayed impaired glandular development, reduced secretory activity, and focal stromal edema. Blood vessels were dilated, irregularly distributed, and occasionally congested, reflecting increased metabolic demand. Some areas showed early degenerative changes in glandular epithelium, suggesting disrupted estrogen–progesterone balance.

Cervix and vagina

In healthy cervix, stratified columnar epithelium was uniform, with regular glandular structures and consistent mucus production. Vaginal epithelium was well-organized, stratified, glycogen-rich, and exhibited intact basal and superficial layers. Hyperthyroid cervical tissue demonstrated epithelial hyperplasia, with taller columnar cells and increased secretory activity. Mucus composition appeared altered, with occasional vacuolization of epithelial cells. Vaginal epithelium in hyperthyroid specimens was thinner, with fewer superficial cells, reduced glycogen content, and occasional focal degeneration in the basal layers.

CONCLUSION

Hyperthyroidism induces significant morphofunctional alterations in the female reproductive system. Histological analysis revealed increased follicular atresia, thinning of granulosa layers, stromal hypervascularization, and

hypertrophy of theca cells in the ovaries; insufficient glandular development, stromal edema, and irregular vascular patterns in the endometrium; and epithelial hyperplasia in the cervix with thinning and glycogen depletion in the vaginal epithelium. These tissue-level changes reflect disrupted hormonal regulation and accelerated metabolism associated with excess thyroid hormones. Collectively, the observed histological alterations provide a structural explanation for clinical manifestations such as menstrual irregularities, anovulation, and reduced fertility in hyperthyroid women. Understanding these changes is essential for improving diagnosis, management, and therapeutic strategies for reproductive dysfunction linked to thyroid disorders.

References:

1. Thyroid hormones and female reproduction: a review / Thyroid hormones and female reproduction // PubMed. — 2018. — Vol. 29767691. — URL: https://pubmed.ncbi.nlm.nih.gov/29767691/ (дата обращения: 11.12.2025). PubMed
2. The Thyroid Hormone Axis and Female Reproduction // PubMed. — 2023. — Vol. 37372963. — URL: https://pubmed.ncbi.nlm.nih.gov/37372963/ (дата обращения: 11.12.2025). PubMed
3. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. NeuroQuantology, 20(6), 3471-3476.
4. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.
5. Турсунметов, И. Р., Мадаминова, Г. И., & Шермухамедов, Т. Т. (2021). Влияние экспериментального гипотиреоза матери на развитие и становление семенников потомства. In Фундаментальная наука и клиническая медицина (pp. 288-289)

UDC 616-089-053:610.08

Istamov M. B.
assistant
department of psychiatry, narcology and medical psychology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0009-0006-6331-2396

CLINICAL AND DYNAMIC FEATURES OF DEPRESSIVE DISORDERS IN PATIENTS WITH TYPE II DIABETES MELLITUS AND THEIR IMPACT ON THE DEVELOPMENT OF DIABETIC POLYNEUROPATHY

Abstract. *This review article focuses on the clinical, psychiatric, and pathogenetic analysis of depressive disorders in patients with type 2 diabetes mellitus (T2DM) and their impact on the development of diabetic polyneuropathy (DPN). Current clinical, neurobiological, and psychosocial aspects of this problem are considered, including the role of inflammatory and neuroendocrine mechanisms, cognitive impairment, and emotional distress. The importance of psychiatrists in interdisciplinary therapy and complication prevention is emphasized. The relevance of this topic is due to the increasing prevalence of T2DM and the high incidence of mental disorders in patients in the Republic of Uzbekistan.*

Key words: *type II diabetes mellitus , depression, diabetic polyneuropathy, psychiatry, cognitive impairment, HPA axis, Uzbekistan.*

Relevance

Type 2 diabetes mellitus is one of the leading diseases of the 21st century, significantly impacting the physical and mental health of the population [1]. According to the World Health Organization, the prevalence of type 2 diabetes mellitus is steadily increasing and will exceed 500 million people by 2025 [2]. Mental disorders, among which depression occupies a central place, are increasingly becoming a major contributor to the complications of the disease.

According to various data, depressive disorders in patients with type 2 diabetes occur in 25–45% of patients, which is 2–3 times higher than in the general population [3]. Depression has a significant impact on the course of diabetes, complicating glycemic control, worsening the prognosis, and increasing the risk of developing vascular and neuropathic complications [4]. Furthermore, in patients with type 2 diabetes, depression is associated with higher mortality, increased hospitalization rates, and decreased quality of life [5]. In recent years, there has been a trend toward integrating a psychiatric approach into endocrinological practice, which is associated with the accumulation of evidence on the role of mental factors in the pathogenesis and course of diabetes [6]. The

presence of depression is considered one of the independent risk factors for deterioration of metabolic control and the progression of chronic complications, including diabetic polyneuropathy (DPN) [7]. DPN is one of the most common and disabling complications of type 2 diabetes, affecting up to 70% of patients with long-term disease [8]. It manifests as pain, sensory, and motor disturbances that significantly impair quality of life. Chronic neuropathic pain, paresthesia, and insomnia contribute to the development of emotional instability and depression [9]. In turn, depression increases the subjective perception of pain and lowers the pain threshold [10]. Thus, a bidirectional pathogenetic relationship develops between depression and DPN, increasing the severity of both conditions [11]. Psychopathological features of depression in type 2 diabetes. The clinical structure of depression in patients with type 2 diabetes has specific features. Asthenodepressive and anxiety-depressive syndromes predominate, characterized by increased fatigue, sleep disturbances, decreased activity and motivation, irritability, and anxiety [12]. Somatized forms of depression are often observed, when emotional disorders are masked by somatic complaints—pain, weakness, dizziness, paresthesia [13].

These symptoms are often mistakenly interpreted by doctors as manifestations of diabetic neuropathy or vascular disorders, which leads to a late diagnosis of depression [14]. However, differential diagnosis requires the attention of a psychiatrist: depression is characterized by anhedonia, a feeling of hopelessness, internal tension, emotional lability, and pronounced cognitive impairment [15]. and thinking speed) is found in 40–60% of patients with type 2 diabetes and depression [16]. They exacerbate self-control difficulties, leading to inadequate adherence to treatment regimens and decreased compliance [17]. Studies show that HbA1c levels positively correlate with the severity of cognitive impairment and the severity of depression [18].

II diabetes mellitus has a complex, multifactorial pathogenesis, including the interaction of biological, neuroendocrine, and psychosocial mechanisms [19]. Modern research shows that the key links in this relationship are inflammation, oxidative stress, dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, and decreased levels of neurotrophic factors, primarily brain-derived neurotrophic factor (BDNF) [20].

Elevated levels of proinflammatory cytokines—interleukin-6 (IL -6), tumor necrosis factor -α (TNF - α), and C-reactive protein (CRP)—are found in both depression and T2DM [21]. These mediators contribute to vascular endothelial damage, impaired microcirculation, and demyelination of peripheral nerves [22]. This results in neuropathic pain, which, in turn, intensifies depressive symptoms [23].

Oxidative stress caused by chronic hyperglycemia plays a key role in the development of diabetic complications. Increased production of reactive oxygen species causes mitochondrial dysfunction, neuronal apoptosis, and impaired nerve impulse transmission [24]. These processes lead to decreased neuroplasticity and worsening depression [25].

Hyperactivation of the HPA axis is accompanied by increased cortisol levels, which contribute to insulin resistance, increase blood glucose levels, and have a catabolic effect on brain tissue [26]. Patients with depression and type 2 diabetes often experience chronic hypercortisolemia associated with impaired feedback between the hypothalamus and pituitary gland [27]. Elevated cortisol levels correlate with the severity of depression and the severity of diabetic neuropathy [28].

Decreased BDNF levels observed during chronic stress and hyperglycemia lead to impaired growth and regeneration of nerve fibers, which contributes to the development of DPN [29]. This same mechanism is involved in the pathogenesis of depression, which explains the frequent combination of the two conditions [30].

In addition to biological factors, psychosocial factors are also important. Patients with chronic diseases often experience anxiety, feelings of helplessness, and social isolation [31]. These experiences lead to increased stress levels, decreased motivation for treatment, and the development of chronic depression [32]. Psychological maladjustment exacerbates somatic symptoms, creating a vicious cycle in which depression worsens the course of diabetes, and diabetes provokes further depression [33].

Cognitive-emotional aspects and neuropsychiatric manifestations. Cognitive impairment in type 2 diabetes and depression is primarily circulatory -metabolic in nature. Impairments in memory, attention, and executive functions are associated with hypoperfusion of the prefrontal cortex and hippocampus [34]. This is accompanied by a decrease in the ability to self-control, plan, and follow treatment recommendations [35]. Such patients are more likely to exhibit emotional lability, irritability, guilt, and despair.

An important clinical observation is that the severity of cognitive deficits and depression often precedes the clinical signs of DPN, making psychiatric examination a valuable tool for early diagnosis [36]. In patients with severe depression, the incidence of neuropathic disorders is 1.5–2 times higher [37].

Diagnosis and clinical examination. Psychiatric examination of patients with type 2 diabetes should include an assessment of emotional state, anxiety level, and cognitive functioning . standardized instruments : PHQ-9 (Patient Health Questionnaire), HADS (Hospital Anxiety and Depression Scale), Beck Depression Inventory (BDI-II) [38].

For an objective assessment of cognitive functions, the MMSE (Mini-Mental State Examination) and MoCA (Montreal Cognitive Assessment) tests are used to determine the degree of impairment of memory, attention, and thinking [39]. Neuropathic symptoms are assessed using the DN 4, LANSS , and Neuropathic scales. Pain Scale [40].

It is important for the clinician to consider that somatic complaints (fatigue, insomnia, pain, loss of appetite) may be manifestations of depression, especially if they are accompanied by anhedonia and decreased interest in usual activities [41]. Psychiatric diagnosis should be aimed not only at identifying depression, but also at determining its degree, duration, and relationship to the somatic condition [42].

2 diabetes mellitus and diabetic polyneuropathy. Current principles of treating depressive disorders in type 2 diabetes mellitus suggest a comprehensive approach, including psychopharmacological, psychotherapeutic, and non-pharmacological interventions [43]. Given that patients with diabetes often experience metabolic disorders and a high risk of drug interactions, the choice of antidepressant should consider not only efficacy but also safety in the context of somatic pathology [44].

The most preferred drugs are selective serotonin reuptake inhibitors (SSRIs)—sertraline, escitalopram , and paroxetine. They are highly effective and have minimal impact on carbohydrate metabolism [45]. Selective serotonin and norepinephrine reuptake inhibitors (SNRIs) —venlafaxine and duloxetine —are also widely used in patients with diabetes, especially in the presence of neuropathic pain [46].

Duloxetine has a dual antidepressant and analgesic effect, making it the drug of choice for the combination of depression and DPN [47]. Randomized trials have shown that duloxetine therapy leads to a 40–60% reduction in pain severity and a significant improvement in scores on the Beck Depression Inventory [48].

In addition to pharmacotherapy, psychotherapeutic methods play a significant role. Cognitive behavioral therapy (CBT) is the most proven non-drug method for treating depression in patients with somatic illnesses [49]. It promotes the development of adaptation skills, changes destructive cognitive patterns, and increases motivation for treatment.

Additionally, motivational counseling, psychoeducational programs and group therapy are used, aimed at increasing compliance and social support [50].

Physical activity has an independent antidepressant effect. Aerobic exercise (walking, swimming, yoga) in combination with drug therapy reduces the severity of depressive symptoms by 30–40%, improves metabolic parameters , and lowers HbA1c levels [51].

Diet also influences mental health. Deficiencies in B vitamins , omega-3 fatty acids, and magnesium are associated with an increased risk of depression in patients with diabetes. Dietary modification and the use of antioxidants (alpha-lipoic acid, coenzyme Q10) improve neuroplasticity and reduce the severity of neuropathic symptoms [52].

A multidisciplinary approach. Optimal management of patients with type 2 diabetes and depression is only possible with close collaboration between an endocrinologist, psychiatrist, neurologist, and psychologist [53]. A psychiatrist plays a key role in diagnosing depression, selecting therapy, and monitoring side effects. An endocrinologist ensures glycemic and metabolic control, and a neurologist assesses the extent of peripheral nervous system damage.

Joint work of specialists allows for the development of individual treatment regimens, increasing the effectiveness of treatment and reducing the risk of complications [54]. In international studies (Fanelli et al ., 2025; Brooks , 2024) have been shown to reduce depression severity by 50% and improve HbA1c levels compared to the traditional approach [55].

The clinical significance and role of a psychiatrist. A psychiatrist not only diagnoses and treats depressive disorders but also participates in the psychoeducation of patients, helping them understand the relationship between their mental state and the course of diabetes [56]. In Uzbekistan, the creation of specialized interdisciplinary departments or offices within endocrinology clinics, where psychiatric examinations will become a mandatory part of comprehensive care, is relevant [57].

Psychiatric support facilitates the early detection of not only depression, but also anxiety, hypochondriacal and adaptation disorders, which often precede diabetic decompensation [58].

Thus, depression in type 2 diabetes is not a secondary phenomenon, but an independent pathogenetic factor influencing the course of the disease, glycemic control, and the development of complications, including diabetic polyneuropathy [59,60]. Comprehensive diagnosis and treatment, taking into account the mental characteristics of patients, are essential for improving disease outcomes and enhancing quality of life.

Conclusion

Depression in patients with type 2 diabetes mellitus is not simply a comorbid mental disorder but a significant pathogenetic factor influencing the course of the disease, metabolic control, and the development of diabetic complications, particularly polyneuropathy. The relationship between depression and DPN is two-way: chronic pain, insomnia, and functional limitations exacerbate affective disturbances, while depression reduces treatment adherence and accelerates the progression of neuropathic impairments. Psychiatric assessment and early diagnosis of depression in patients with type 2 diabetes mellitus can prevent deterioration of metabolic control, improve treatment effectiveness, and reduce the risk of complications. Comprehensive therapy, including psychopharmacological agents, psychotherapy, physical activity, and social support, should become the standard of care for this patient population.

The implementation of an interdisciplinary approach in endocrinology clinics in Uzbekistan, where psychiatrists play an active role in diagnosis and treatment, will significantly improve treatment outcomes and patient quality of life. Conducting dissertation and clinical-epidemiological research in this area is of high scientific and practical significance, facilitating the integration of psychiatry and endocrinology into a unified clinical model.

List literature

1. WHO. Global Report on Diabetes. Geneva: WHO; 2025.
2. International Diabetes Federation (IDF). Diabetes Atlas. 11th Edition. 2025.
3. Endotext. Diabetes and Depression. NCBI Bookshelf, 2025.
4. Pouwer F. Psychosocial Care for People with Diabetic Neuropathy. Diabetes Ther. 2023;14(2):398–410.
5. Liu Y, et al. Bidirectional Relationship between Diabetes Mellitus and Depression. Diabetes Obes Metab. 2024;26(3):745–755.

6. Vas PRJ, et al. Diabetic Peripheral Neuropathy and Depression. Exp Clin Endocrinol Diabetes. 2021;129(10):687–693.
7. Fanelli G, et al. The Interface of Depression and Diabetes. Transl Psychiatry. 2025;15(4):311–322.
8. Brooks B.M. Diabetes Psychiatry: The Missing Piece. J Clin Med. 2025;14(7):2142.
9. Gold SM, et al. HPA Axis Dysregulation in Diabetes and Depression. Psychoneuroendocrinology. 2025;164:106056 .
10. Bartoli F, et al. Depression and Neuropathy in Diabetes. Int J Geriatr Psychiatry. 2016;31(1):88–95.
11. Semenkovich K, et al. Brain, Behavior, and Diabetes. Curr Diab Rep. 2023;23(7):899–911.
12. NICE Guidelines. Depression in Chronic Physical Health Problems. 2024.
13. Reus GZ, et al. Oxidative Stress and Depression in Diabetes. CNS Neurol Disord Drug Targets. 2019;18(5):326–334.
14. Timar B, et al. Impact of Neuropathy on Adherence to Diabetes Care. Patient Preferred Adherence. 2016;10:1239 –1245.

UDC 616-089-053:610.08

Istamov M. B.
assistant
department of psychiatry, narcology and medical psychology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0009-0006-6331-2396

CLINICAL AND DYNAMIC FEATURES OF DEPRESSIVE DISORDERS IN PATIENTS WITH TYPE II DIABETES MELLITUS AND THEIR IMPACT ON THE DEVELOPMENT OF DIABETIC POLYNEUROPATHY

Abstract. *This article examines the clinical and dynamic characteristics of depressive disorders in patients with type 2 diabetes mellitus and their impact on the development of diabetic polyneuropathy. Pathogenesis mechanisms of comorbidity are analyzed, including chronic inflammation, hypothalamic-pituitary-adrenal axis dysfunction, insulin resistance, and deficiency of neurotrophic factors. Diagnostic methods, clinical manifestations, and current approaches to the treatment of depressive disorders in diabetes are discussed.*

Key words: *type II diabetes mellitus, depressive disorders, diabetic polyneuropathy, pathogenesis, comorbidity, cytokines, BDNF, antidepressants, cognitive behavioral therapy.*

Relevance. Type 2 diabetes mellitus is one of the leading diseases of the 21st century, significantly impacting the physical and mental health of the population [1]. According to the World Health Organization, the prevalence of type 2 diabetes mellitus is steadily increasing and will exceed 500 million people by 2025 [2]. Mental disorders, among which depression occupies a central place, are increasingly becoming a major contributor to the complications of the disease.

According to various data, depressive disorders in patients with type 2 diabetes occur in 25–45% of patients, which is 2–3 times higher than in the general population [3]. Depression has a significant impact on the course of diabetes, complicating glycemic control, worsening the prognosis, and increasing the risk of developing vascular and neuropathic complications [4]. Furthermore, in patients with type 2 diabetes, depression is associated with higher mortality, increased hospitalization rates, and decreased quality of life [5]. In recent years, there has been a trend toward integrating a psychiatric approach into endocrinological practice, which is associated with the accumulation of evidence on the role of mental factors in the pathogenesis and course of diabetes [6]. The presence of depression is considered one of the independent risk factors for deterioration of metabolic control and the progression of chronic complications, including diabetic polyneuropathy (DPN) [7]. DPN is one of the most common

and disabling complications of type 2 diabetes, affecting up to 70% of patients with long-term disease [8]. It manifests as pain, sensory, and motor disturbances that significantly impair quality of life. Chronic neuropathic pain, paresthesia, and insomnia contribute to the development of emotional instability and depression [9]. In turn, depression increases the subjective perception of pain and lowers the pain threshold [10]. Thus, a bidirectional pathogenetic relationship develops between depression and DPN, increasing the severity of both conditions [11]. Psychopathological features of depression in type 2 diabetes. The clinical structure of depression in patients with type 2 diabetes has specific features. Asthenodepressive and anxiety-depressive syndromes predominate, characterized by increased fatigue, sleep disturbances, decreased activity and motivation, irritability, and anxiety [12]. Somatized forms of depression are often observed, when emotional disorders are masked by somatic complaints—pain, weakness, dizziness, paresthesia [13].

These symptoms are often mistakenly interpreted by doctors as manifestations of diabetic neuropathy or vascular disorders, which leads to a late diagnosis of depression [14]. However, differential diagnosis requires the attention of a psychiatrist: depression is characterized by anhedonia, a feeling of hopelessness, internal tension, emotional lability, and pronounced cognitive impairment [15]. and thinking speed) is found in 40–60% of patients with type 2 diabetes and depression [16]. They exacerbate self-control difficulties, leading to inadequate adherence to treatment regimens and decreased compliance [17]. Studies show that HbA1c levels positively correlate with the severity of cognitive impairment and the severity of depression [18].

II diabetes mellitus has a complex, multifactorial pathogenesis, including the interaction of biological, neuroendocrine, and psychosocial mechanisms [19]. Modern research shows that the key links in this relationship are inflammation, oxidative stress, dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, and decreased levels of neurotrophic factors, primarily brain-derived neurotrophic factor (BDNF) [20].

Elevated levels of proinflammatory cytokines—interleukin-6 (IL -6), tumor necrosis factor -α (TNF - α), and C-reactive protein (CRP)—are found in both depression and T2DM [21]. These mediators contribute to vascular endothelial damage, impaired microcirculation, and demyelination of peripheral nerves [22]. This results in neuropathic pain, which, in turn, intensifies depressive symptoms [23].

Oxidative stress caused by chronic hyperglycemia plays a key role in the development of diabetic complications. Increased production of reactive oxygen species causes mitochondrial dysfunction, neuronal apoptosis, and impaired nerve impulse transmission [24]. These processes lead to decreased neuroplasticity and worsening depression [25].

Hyperactivation of the HPA axis is accompanied by increased cortisol levels, which contribute to insulin resistance, increase blood glucose levels, and have a catabolic effect on brain tissue [26]. Patients with depression and type 2

diabetes often experience chronic hypercortisolemia associated with impaired feedback between the hypothalamus and pituitary gland [27]. Elevated cortisol levels correlate with the severity of depression and the severity of diabetic neuropathy [28].

Decreased BDNF levels observed during chronic stress and hyperglycemia lead to impaired growth and regeneration of nerve fibers, which contributes to the development of DPN [29]. This same mechanism is involved in the pathogenesis of depression, which explains the frequent combination of the two conditions [30].
In addition to biological factors, psychosocial factors are also important. Patients with chronic diseases often experience anxiety, feelings of helplessness, and social isolation [31]. These experiences lead to increased stress levels, decreased motivation for treatment, and the development of chronic depression [32]. Psychological maladjustment exacerbates somatic symptoms, creating a vicious cycle in which depression worsens the course of diabetes, and diabetes provokes further depression [33].

Cognitive-emotional aspects and neuropsychiatric manifestations. Cognitive impairment in type 2 diabetes and depression is primarily circulatory -metabolic in nature. Impairments in memory, attention, and executive functions are associated with hypoperfusion of the prefrontal cortex and hippocampus [34]. This is accompanied by a decrease in the ability to self-control, plan, and follow treatment recommendations [35]. Such patients are more likely to exhibit emotional lability, irritability, guilt, and despair.

An important clinical observation is that the severity of cognitive deficits and depression often precedes the clinical signs of DPN, making psychiatric examination a valuable tool for early diagnosis [36]. In patients with severe depression, the incidence of neuropathic disorders is 1.5–2 times higher [37].
Diagnosis and clinical examination. Psychiatric examination of patients with type 2 diabetes should include an assessment of emotional state, anxiety level, and cognitive functioning . standardized instruments : PHQ-9 (Patient Health Questionnaire), HADS (Hospital Anxiety and Depression Scale), Beck Depression Inventory (BDI-II) [38].

For an objective assessment of cognitive functions, the MMSE (Mini-Mental State Examination) and MoCA (Montreal Cognitive Assessment) tests are used to determine the degree of impairment of memory, attention, and thinking [39]. Neuropathic symptoms are assessed using the DN 4, LANSS , and Neuropathic scales. Pain Scale [40].

It is important for the clinician to consider that somatic complaints (fatigue, insomnia, pain, loss of appetite) may be manifestations of depression, especially if they are accompanied by anhedonia and decreased interest in usual activities [41]. Psychiatric diagnosis should be aimed not only at identifying depression, but also at determining its degree, duration, and relationship to the somatic condition [42].
2 diabetes mellitus and diabetic polyneuropathy. Current principles of treating depressive disorders in type 2 diabetes mellitus suggest a comprehensive approach, including psychopharmacological, psychotherapeutic, and non-

pharmacological interventions [43]. Given that patients with diabetes often experience metabolic disorders and a high risk of drug interactions, the choice of antidepressant should consider not only efficacy but also safety in the context of somatic pathology [44].

The most preferred drugs are selective serotonin reuptake inhibitors (SSRIs)—sertraline, escitalopram , and paroxetine. They are highly effective and have minimal impact on carbohydrate metabolism [45]. Selective serotonin and norepinephrine reuptake inhibitors (SNRIs) —venlafaxine and duloxetine —are also widely used in patients with diabetes, especially in the presence of neuropathic pain [46].

Duloxetine has a dual antidepressant and analgesic effect, making it the drug of choice for the combination of depression and DPN [47]. Randomized trials have shown that duloxetine therapy leads to a 40–60% reduction in pain severity and a significant improvement in scores on the Beck Depression Inventory [48].

In addition to pharmacotherapy, psychotherapeutic methods play a significant role. Cognitive behavioral therapy (CBT) is the most proven non-drug method for treating depression in patients with somatic illnesses [49]. It promotes the development of adaptation skills, changes destructive cognitive patterns, and increases motivation for treatment.

Additionally, motivational counseling, psychoeducational programs and group therapy are used, aimed at increasing compliance and social support [50].

Physical activity has an independent antidepressant effect. Aerobic exercise (walking, swimming, yoga) in combination with drug therapy reduces the severity of depressive symptoms by 30–40%, improves metabolic parameters , and lowers HbA1c levels [51].

Diet also influences mental health. Deficiencies in B vitamins , omega-3 fatty acids, and magnesium are associated with an increased risk of depression in patients with diabetes. Dietary modification and the use of antioxidants (alpha-lipoic acid, coenzyme Q10) improve neuroplasticity and reduce the severity of neuropathic symptoms [52].

A multidisciplinary approach. Optimal management of patients with type 2 diabetes and depression is only possible with close collaboration between an endocrinologist, psychiatrist, neurologist, and psychologist [53]. A psychiatrist plays a key role in diagnosing depression, selecting therapy, and monitoring side effects. An endocrinologist ensures glycemic and metabolic control, and a neurologist assesses the extent of peripheral nervous system damage.

Joint work of specialists allows for the development of individual treatment regimens, increasing the effectiveness of treatment and reducing the risk of complications [54]. In international studies (Fanelli et al ., 2025; Brooks , 2024) have been shown to reduce depression severity by 50% and improve HbA1c levels compared to the traditional approach [55].

The clinical significance and role of a psychiatrist. A psychiatrist not only diagnoses and treats depressive disorders but also participates in the psychoeducation of patients, helping them understand the relationship between

their mental state and the course of diabetes [56]. In Uzbekistan, the creation of specialized interdisciplinary departments or offices within endocrinology clinics, where psychiatric examinations will become a mandatory part of comprehensive care, is relevant [57].

Psychiatric support facilitates the early detection of not only depression, but also anxiety, hypochondriacal and adaptation disorders, which often precede diabetic decompensation [58].

Thus, depression in type 2 diabetes is not a secondary phenomenon, but an independent pathogenetic factor influencing the course of the disease, glycemic control, and the development of complications, including diabetic polyneuropathy [59,60]. Comprehensive diagnosis and treatment, taking into account the mental characteristics of patients, are essential for improving disease outcomes and enhancing quality of life.

Conclusion. Depression in patients with type 2 diabetes mellitus is not simply a comorbid mental disorder but a significant pathogenetic factor influencing the course of the disease, metabolic control, and the development of diabetic complications, particularly polyneuropathy. The relationship between depression and DPN is two-way: chronic pain, insomnia, and functional limitations exacerbate affective disturbances, while depression reduces treatment adherence and accelerates the progression of neuropathic impairments. Psychiatric assessment and early diagnosis of depression in patients with type 2 diabetes mellitus can prevent deterioration of metabolic control, improve treatment effectiveness, and reduce the risk of complications. Comprehensive therapy, including psychopharmacological agents, psychotherapy, physical activity, and social support, should become the standard of care for this patient population.

The implementation of an interdisciplinary approach in endocrinology clinics in Uzbekistan, where psychiatrists play an active role in diagnosis and treatment, will significantly improve treatment outcomes and patient quality of life. Conducting dissertation and clinical-epidemiological research in this area is of high scientific and practical significance, facilitating the integration of psychiatry and endocrinology into a unified clinical model.

List literature

1. WHO. Global Report on Diabetes. Geneva: WHO; 2025.
2. International Diabetes Federation (IDF). Diabetes Atlas. 11th Edition. 2025.
3. Endotext. Diabetes and Depression. NCBI Bookshelf, 2025.
4. Pouwer F. Psychosocial Care for People with Diabetic Neuropathy. Diabetes Ther. 2023;14(2):398–410.
5. Liu Y, et al. Bidirectional Relationship between Diabetes Mellitus and Depression. Diabetes Obes Metab. 2024;26(3):745–755.
6. Vas PRJ, et al. Diabetic Peripheral Neuropathy and Depression. Exp Clin Endocrinol Diabetes. 2021;129(10):687–693.
7. Fanelli G, et al. The Interface of Depression and Diabetes. Transl Psychiatry. 2025;15(4):311–322.

8. Brooks B.M. Diabetes Psychiatry: The Missing Piece. J Clin Med. 2025;14(7):2142.
9. Gold SM, et al. HPA Axis Dysregulation in Diabetes and Depression. Psychoneuroendocrinology. 2025;164:106056 .
10. Bartoli F, et al. Depression and Neuropathy in Diabetes. Int J Geriatr Psychiatry. 2016;31(1):88–95.
11. Semenkovich K, et al. Brain, Behavior, and Diabetes. Curr Diab Rep. 2023;23(7):899–911.
12. NICE Guidelines. Depression in Chronic Physical Health Problems. 2024.
13. Reus GZ, et al. Oxidative Stress and Depression in Diabetes. CNS Neurol Disord Drug Targets. 2019;18(5):326–334.
14. Timar B, et al. Impact of Neuropathy on Adherence to Diabetes Care. Patient Preferred Adherence. 2016;10:1239 –1245.

Jahangirova Sh.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

HISTOLOGICAL CHANGES IN THE KIDNEYS IN PATHOLOGY

Abstract*: Histological examination of renal tissue plays a crucial role in understanding the structural and functional alterations of the kidneys under pathological conditions. Various kidney diseases are associated with characteristic microscopic changes affecting the glomeruli, tubules, interstitium, and blood vessels. These changes may include glomerular sclerosis, tubular atrophy, interstitial fibrosis, inflammatory cell infiltration, and vascular abnormalities. The severity and distribution of these histological alterations often correlate with disease progression and clinical outcomes. This article reviews the key histological changes observed in renal pathology, emphasizing their diagnostic significance and contribution to the understanding of underlying disease mechanisms. Improved knowledge of renal histopathology enhances early diagnosis, guides therapeutic strategies, and supports prognostic assessment in kidney diseases.*

Keywords: *kidney pathology; renal histology; histological changes; glomeruli; tubules; interstitial fibrosis; renal diseases.*

Introduction

Kidney diseases are widespread and often lead to serious complications, including chronic kidney failure. The kidneys perform essential functions in maintaining metabolic balance and homeostasis, making them particularly vulnerable to pathological damage. Structural alterations in renal tissue directly affect kidney function and disease progression.

Histological examination is a key method for identifying pathological changes in the kidneys at the microscopic level. Damage may involve the glomeruli, tubules, interstitium, or blood vessels and varies depending on the underlying disease. Studying these histological changes is crucial for accurate diagnosis and assessment of renal pathology.

MATERIALS AND METHODS

Renal tissue samples were obtained from patients with various kidney pathologies and from control subjects without renal disease. Biopsy and autopsy specimens were used for histological analysis. All samples were fixed in 10% neutral buffered formalin, dehydrated through graded alcohols, and embedded in paraffin. Sections 3–5 μm thick were prepared using a microtome.

Histological staining was performed using hematoxylin and eosin for general tissue morphology. Additional special stains, including Periodic Acid–Schiff (PAS) and Masson's trichrome, were applied to evaluate glomerular structures, basement membranes, and the extent of fibrosis. Microscopic examination was conducted using a light microscope, and histological changes were assessed and documented.

RESULTS

Histological examination of renal tissue revealed a wide spectrum of pathological changes involving all major structural components of the kidneys. The severity and distribution of these alterations varied depending on the underlying pathology and disease stage.

Glomerular Changes

The most prominent histological alterations were observed in the glomeruli. These included mesangial expansion, increased cellularity, and thickening of the glomerular basement membrane. In advanced cases, partial or complete glomerulosclerosis was detected, characterized by obliteration of capillary lumina and replacement of normal glomerular architecture with connective tissue. Some samples demonstrated collapse of glomerular capillary loops and adhesions between the glomerular tuft and Bowman's capsule.

Tubular Changes

Renal tubules exhibited varying degrees of epithelial degeneration and atrophy. Common findings included tubular dilatation, epithelial cell vacuolization, loss of brush border in proximal tubules, and tubular necrosis in severe cases. Proteinaceous casts were frequently observed within the tubular lumen, indicating impaired filtration and reabsorption processes.

Interstitial Changes

The renal interstitium showed signs of inflammatory and fibrotic remodeling. Interstitial edema and infiltration by lymphocytes and macrophages were noted in multiple specimens. In chronic pathology, these changes progressed to interstitial fibrosis with increased deposition of collagen fibers, as confirmed by Masson's trichrome staining. Fibrosis was often associated with tubular atrophy and loss of functional parenchyma.

Vascular Changes

Pathological alterations of renal blood vessels included thickening of arterial and arteriolar walls, narrowing of the vascular lumen, and hyaline degeneration. In some cases, ischemic changes in the surrounding renal tissue were evident, reflecting compromised blood supply and contributing to progressive renal damage.

Overall, the observed histological changes demonstrated a clear correlation between structural damage and the progression of renal pathology, highlighting the importance of histological assessment in the evaluation of kidney diseases.

CONCLUSION

Histological analysis of renal tissue reveals significant structural alterations affecting the glomeruli, tubules, interstitium, and vascular components of the

kidneys in pathological conditions. The identified changes, including glomerulosclerosis, tubular atrophy, interstitial fibrosis, inflammatory infiltration, and vascular remodeling, reflect the severity and progression of kidney disease. These histological findings provide essential information for accurate diagnosis and prognosis and contribute to a better understanding of the underlying mechanisms of renal pathology. Comprehensive histopathological assessment remains a fundamental tool in the evaluation and management of kidney diseases.

References:

1. Kumar V., Abbas A. K., Aster J. C. Robbins and Cotran Pathologic Basis of Disease. 10th ed. Philadelphia: Elsevier, 2021.
2. Jennette J. C., Olson J. L., Silva F. G., D'Agati V. D. Heptinstall's Pathology of the Kidney. 7th ed. Philadelphia: Wolters Kluwer, 2015.
3. Fogo A. B., Bruijn J. A. Diagnostic Atlas of Renal Pathology. 3rd ed. Philadelphia: Elsevier, 2019.
4. Ross M. H., Pawlina W. Histology: A Text and Atlas. 8th ed. Philadelphia: Wolters Kluwer, 2020.
5. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.

Mahmudova M. R.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

MORPHOFUNCTIONAL CHANGES IN TISSUES IN OVARIAN CANCER

Abstract: *Ovarian cancer is one of the most aggressive gynecological malignancies, characterized by diverse histopathological and molecular profiles. The progression of the disease is accompanied by significant morphofunctional alterations in ovarian tissue. Normal ovarian tissue exhibits organized architecture, including follicles at different stages of development, stromal connective tissue, and vascular networks that maintain tissue homeostasis. In contrast, malignant ovarian tissue demonstrates disrupted structural organization, including irregular cell arrangements, nuclear atypia, increased nuclear-to-cytoplasmic ratio, and frequent mitotic figures. In addition, the tumor microenvironment shows stromal remodeling, angiogenesis, and inflammatory cell infiltration. Morphometric and histopathological analyses of these changes provide critical insight into the biology of ovarian cancer, contributing to accurate diagnosis, prognosis, and the development of targeted therapies. Understanding the correlation between structural alterations and functional impairment in ovarian tissues is essential for improving patient outcomes and guiding personalized treatment strategies.*

Keywords: *ovarian cancer, tissue morphology, histopathology, cellular atypia, tumor microenvironment.*

Introduction

Ovarian cancer is a leading cause of gynecological cancer-related mortality worldwide, largely due to its late diagnosis and heterogeneous histopathology. The disease affects the ovarian tissue at both structural and functional levels, resulting in significant morphofunctional alterations. Normal ovarian tissue is composed of well-organized follicles at various developmental stages, stromal connective tissue, and vascular networks that support tissue homeostasis and endocrine function. In ovarian cancer, these structures are disrupted, with irregular cell arrangements, nuclear atypia, increased mitotic activity, and alterations in the stromal microenvironment. Understanding these morphofunctional changes is crucial for elucidating the pathogenesis of ovarian cancer, improving diagnostic accuracy, and guiding effective therapeutic strategies. Histopathological and morphometric studies provide valuable insights into the correlation between structural alterations and functional impairment in tumor progression.

Materials and Methods

Study Material

The study included ovarian tissue samples obtained from patients diagnosed with epithelial ovarian cancer during surgical resections, as well as healthy ovarian tissue from age-matched controls undergoing non-oncological gynecological procedures. All samples were collected following ethical guidelines with informed consent.

Histological Examination

Tissue specimens were fixed in 10% neutral buffered formalin, embedded in paraffin, and sectioned at 4–5 μm thickness. Sections were stained with hematoxylin and eosin (H&E) for general morphological assessment. Histological evaluation focused on follicular structure, stromal organization, nuclear morphology, mitotic activity, and presence of inflammatory infiltrates.

Morphometric and Functional Analysis

Morphometric parameters, including cell and nuclear size, nuclear-to-cytoplasmic ratio, and mitotic index, were quantified using light microscopy and image analysis software. Functional assessment included evaluation of stromal remodeling, angiogenesis, and tumor microenvironment features. Statistical analysis was performed to compare cancerous and healthy tissues, with significance set at $p < 0.05$.

Results

Normal Ovarian Tissue

Histological examination of control ovarian samples revealed preserved tissue architecture. Follicles at different developmental stages (primordial, primary, secondary, and Graafian) were clearly distinguishable, with intact granulosa and theca cell layers. Stromal connective tissue was well-organized, containing fibroblasts and a regular vascular network. The ovarian surface epithelium consisted of a uniform layer of cuboidal or low columnar cells with small, round nuclei, evenly distributed cytoplasm, and no evidence of atypia. Mitotic activity was rare and within normal physiological range. Morphometric measurements confirmed consistent cell size, nuclear diameter, and low nuclear-to-cytoplasmic ratio, reflecting stable cellular function. No inflammatory infiltrates, necrotic areas, or stromal remodeling were detected.

Ovarian Cancer Tissue

In ovarian cancer samples, profound morphofunctional alterations were observed:

Cellular Changes:

Tumor cells displayed significant **nuclear atypia**, including irregular nuclear contours, hyperchromasia, and prominent nucleoli.

Increased **nuclear-to-cytoplasmic ratio** and frequent mitotic figures, including abnormal mitoses, were observed.

Cells often formed irregular clusters, sheets, or gland-like structures depending on the histological subtype (serous, mucinous, endometrioid).

Stromal and Microenvironment Changes:

Stromal remodeling was evident, with increased fibroblast proliferation, collagen deposition, and desmoplastic reactions.

Enhanced **angiogenesis** was observed, with numerous newly formed, irregular blood vessels.

Inflammatory infiltration, mainly lymphocytes and macrophages, was prominent in peritumoral regions.

Tissue Architecture:

Loss of normal follicular structures and ovarian surface epithelium integrity.

Areas of necrosis and apoptotic bodies were detected in high-grade tumors.

Extracellular matrix disorganization contributed to altered tissue stiffness and disrupted functional interactions.

Quantitative Morphometric Findings

Average nuclear size in tumor cells was significantly increased compared to healthy ovarian cells ($p < 0.01$).

Nuclear-to-cytoplasmic ratio and mitotic index were markedly elevated ($p < 0.01$).

Stromal density and microvascular density were significantly higher in cancerous tissue, correlating with tumor grade and aggressiveness.

Comparative Analysis

Comparison between healthy and malignant ovarian tissue emphasizes the relationship between **structural disruption and functional impairment**. Tumor progression involves not only cellular atypia but also profound changes in the stroma and microenvironment, contributing to invasion, metastasis, and altered ovarian endocrine function.

Conclusion

Ovarian cancer induces significant morphofunctional changes in ovarian tissue, including cellular atypia, increased mitotic activity, stromal remodeling, angiogenesis, and inflammatory infiltration. These alterations disrupt normal tissue architecture, impair ovarian function, and contribute to tumor progression. Understanding the correlation between structural changes and functional impairment is essential for accurate diagnosis, prognosis, and development of targeted therapeutic strategies.

References:

1. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. NeuroQuantology, 20(6), 3471-3476.

2. Турсунметов, И. Р., Мадаминова, Г. И., & Шермухамедов, Т. Т. (2021). Влияние экспериментального гипотиреоза матери на развитие и становление семенников потомства. In Фундаментальная наука и клиническая медицина (pp. 288-289).

3. What Is New on Ovarian Carcinoma: Integrated Morphologic and Molecular Analysis Following the New 2020 WHO Classification of Female Genital Tumors // Diagnostics (Basel). — 2021. — Vol. 11, No. 4, Article 697. —

4. International Journal of Molecular Sciences. Ovarian Cancer—Epidemiology, Classification, Pathogenesis and Histopathology // MDPI. — 2025. — Vol. 26, No. 10, Article 4611.

UDC 616-089-053:610.08

Mukhtorova H. K.
assistant
department of psychiatry, narcology and medical psychology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0000-0001-9025-6138

HORMONAL AND METABOLIC PROFILE AND GINGEN S INSOMNIA RASTROYSTVAMI AND MENOPAUSE

With the onset of menopause, 25–54% of ginseng otmechayut te ili inye problemy, svyazannye so snom, chto znachitelno snijaet kachestvo jizni. Tselyu obzora yavilsya analiz dannyx literatury otnositelno hormonalno-metabolicheskogo profilya genshchin v klimaktericheskom periode s narusheniyami sna. Pozano, chto u ginseng s insomnicheskimi rasstroystvami narushena rabota serotoninergicheskikh mozgovykh sistem, izmenena vyrabotka melatonina i activitiy svobodno-radikalnogo oxisleniya lipidov, chto mojet privodit k formirovaniyu razlichnyx zabolevaniy.

Key words: *insomnia, menopause, melatonin, oxidative stress*

With the onset of menopause, 25–54% of ginseng report te ili inye problems, related to pregnancy, compared to 15% of ginseng in the fertile age [23]. Britanskimi uchenymi vyyavleno, chto jenshchiny, v stupivshie v period menopausal, v 3.4 times chashche pred'yavlyayut jaloby na narushenie sna, chem jenshchiny v premenopauze [31]. V prospective krupnomassshtabnom issledovanii po insomnii , provennom uchenymi Meditsinskogo universiteta g. Legsinktona (SShA) in the middle of the bed in the age of 47 to 69 years, it has been proven that the main symptoms of insomnia in women and postmenopause (physiological or surgical) cause painful sleep [42].

The causes of insomnia are diverse: stress (psychophysiological insomnia), neurosis, psychological diseases (schizophrenia, manic-depressive psychosis, etc.), somatic diseases (for example, bronchial asthma, atopic dermatitis, gastroesophageal reflux disease), psychotropic (including snot) drugs, alcohol, toxic factors, endocrine-metabolic diseases, organic diseases of the brain (stroke, parkinsonism, hyperkinetic syndromes, epilepsy, swelling of the brain, etc.), painful phenomena, syndromes, driving and sleep (obstructive sleep apnea syndrome, motor disorders and sleep), external unfavorable conditions (noise, humidity, etc.), changing work, seasonal changes poyasov, narushenie hygiene sna [12].

Osoboe mesto sredi faktorov, vyzyvayushchikh insomniyu , prinadlejit depressii [39]. A key role in the pathogenesis of depression is played by disturbances in the functioning of the serotoninergic brain system. Depression can

be caused by a lack of serotonin in the brain, a lack of it in the receptor sites, the inability of serotonin to reach the receptor sites, and a reduced level of tryptophan, which is involved in the synthesis of serotonin. Depression is caused not only by the majority of the causes of insomnia , but also by the few that have specific polysomnographic correlations. K nim otnosyatsya ukorochenie latentnogo periodo pervogo episode FBS (s 90 do ~ 44 min), snijenie dlitelnosti delta-sna v I cycle sna i v "alpha-delta" sne i rannee prevremennoe probujdenie. In the brain, ginseng contains less serotonin than in the brain. A decrease in the functional activity of serotonin receptors 5-NT2 and frontal, parietal, temporal and cingulate is shown. it's ginseng . Eti facty zaslujivayut osobogo vnimania, uchityvaya opredelyayushchuyu role dysfunction of serotonin in depression. In the formation of women, depressive disorders play a big role in the characteristics of hormonal status. Sex hormones play a determining role in sexual demorphism of the brain [24]. Izvestna neuroprotective role of female sex hormones, and chastnosti ix antioxidant and membranostabiliziruyushchie functions. Znachitelno influence of estrogens on synthesis and metabolism of all monoamines, and the highest level of serotonin. Female sex hormones are involved in the maturation of many brain functions, including mood, motor control, weight, and cognitive processes. Estrogeny vo mnogom opredelyayut osobennosti zhenskogo kharakarta i spetsifiku emotsionalno-affectivenykh reaktsii, reagirovanie na stressornye sobytiya. Vajneyshee znachenie sex hormones and pathogenesis of depression and ginseng clearly demonstrate depression, connected with reproductive cycles of ginseng [20].

Nesredstvennoe vliyanie izmenenia hormonalnogo balan na son ginschiny podverzdaetsya rezultatami issledovaniya PJ Murphy and SS Campbell (2007), who showed that ginseng in menopause is more nizkoe kachestvo sna assotsiirovano so nizheniem urovnya estradiol i vovyshenim luteiniziruyushchego hormon [38]. The role of disturbance of vegetative regulation and ginseng climacteric period in the genesis of symptoms of insomnia is confirmed by the positive effect of replacement hormonal therapy and the process of podderjaniya sleep, ego longevity and effectiveness [49].

Izvestno, chto periodicheskoe cheredovanie estestvennogo sna i bodrstvovaniya otnositsya k sirkadnym rittamam i vo mnogom opredlyaetsya sutochnym izmeneniem osveshchennosti. Odnim iz osnovnykh regulyatorov circadnyx bioritmov yavlyaetsya melatonin, i narushenie ego secretsii privodit k izmeneniyu metabolicheskikh protsesov and formation of various diseases [3, 22, 41, 47]. Many researchers have shown that the level of endogenous melatonin decreases with age, so the secretion of this hormone does not decrease, and the production curve does not change, and gross morphological changes are observed in the epiphysis with the death and degeneration of cellular elements [1, 2, 4, 8]. Ovevidno, chto vrosastnaya dynamics melatonina nosit and basic adaptive character: ved po mere oslableniya vibrosa hormonov hypophyzom i ugasaniya deyatelnosti perifericheskih endokrinnykh zhelet prikakost v ix periodicheskom nochnom tormojenii snyaetsya i moget vovse ischeznut. Pokazano nalichie v

epiphyze receptorov polovykh steroidov. In fact, the pineal gland actually receives feedback from circulating and blood hormones. Desynchronization of circadian activity of the epiphysis and age-related bleeding of melatonin and ginseng signal the development of pineal and hypophyseal control over ovarian cycle and progressive decrease in fertile function of ginseng [46]. According to American studies, melatonin and estrogens act on the principle of inverse relationship [23]. Ustanovleno, chto melatonin okazyvaet podavlyayushchee deytvie neposredstvenno na hypofiz, umenshaya osvobojdenie LG i FSG [5].

Rezultati issledovaniya, provennogo L.I. Maltsevoi s soavt . (2011). Odnako issledovatelyami ustanovleno, chto changes in the secretion of melatonin in the perimenopauseal period have a non-diagnostic character. It has 13% obsleduemyx ginseng imel mesto high uroven melatonin [14].

Many studies have shown the relationship between altered secretion of melatonin and disturbed sleep [2, 6, 36, 41, 28]. It has been shown that insomnia in the climacteric period is associated with increased levels of melatonin in blood [28]. Po dannym drugix avtorov, sochetanie klimaktericheskogo syndroma s narusheniyami sna soprovozdaetsya povysheniem ekskretsii 6-sulfatoximelatonina s mochoy u patsientok srednego vozrasta. The increase in the level of ego excretion in patients with age is related to disturbances in the climacteric syndrome [2]. V issledovanii O.P. Zavodnova s soavt . (2012) . Pri etom u ginseng s khronotipom "javoronki" zaregistrirovany naibolee sosokie pokaseteli melatonina sulfate v sutochnoy moche; naibolee nizkie pokazateli - it is "cool" [3]. Issledovaniyami NTs PZSRCh SO RAMN pokazano izmenenie tsirkadnoy ritmiki secretsii melatonina u genshchin s narusheniyami sna v perimenopauze , karakterizuyushcheesya sdvigom pika secretsii s nochnogo vremeni sutok na rannie utrennie chasy. In addition to this, it is noted that soderjania and salivary fluid are abnormal in perimenopause and postmenopause [6].

According to some studies, the incomplete number may affect the indicators of free radical oxidation and lead to the development of oxidative stress [10, 13, 16, 21, 25, 26, 29], which in its turn represents a danger to the surrounding tissue and may play an important role in development and support inflammatory and destructive processes, increasing the manifestation of climacteric syndrome [15]. In the nastoyashchee vremya menopause rassmatrivatsya kak factor riska razvitiya okislitelnogo stressa, cht o vyazyvayut s hypoestrogeniei , yavlyayushcheysya odnim iz charakternykh endocrinenykh narushenyi pri razvitii menopause i privodyashchey k atherogennym narusheniyam v sorotke koriv i, kak sledstvie etogo, k intensikatsii procesov perkisnogo kisleniya lipidov [37, 48]. Provedennymi k nastoyashchemu vremeni issledovaniyami pokazano, chto oksidlitelnyi stress obladeticheskoy nachimostyu v razvitii narushenyi i ugasania reproduktnoy funktsii gysenchini i bolee vyrajen u genshinin v postmenopause, chem v perimenopauzalnom period [17]. Aktivnost svobodno-radikalnogo okisleniya lipidov organism u ginschin pri fifitsite polovykh steroidov v znachitelnoy stepeni zavisit ot varianta ego razvitiya. Pri fiziologicheskom techenii klimaksa activity of free-radical oxidation of lipids is in predelakh age

norm, blagodarya tomu chto processy POL i antioxidantnaya obespechennost organizma uravnovesheny mejdu soboy. Pri patologicheskom techenii klimakteriya nablyudaetsya znachitelnaya activation of processes of lipoperoxidatsii , yavlyayushchayasya rasultum, s odnoy storony, povysheniya istinnogo irovnya produktov POL, a s secondoy – snijeniya obshchey antioxidantnoy activity.

According to the theory of E. Reimund (1994), free radicals accumulate in the organism during waking hours and disappear during sleep. V svyazi s etim insomnia , yavlyayushchayasya odnim iz naibolee rasprostranennyx narusheniy, soprovozhdyushchix climacterium and genschin, privodit k nakopleniyu svobodnyx radikalov v organizme [44]. However, the results of experimental work, kasayushchiesya izucheniya dannyx aspektov, yavlyayutsya spornymi [18, 43]. Results of research M. Gulec meat al . (2012) showed that patients with insomnia have increased activity of glutathione peroxidase and increased levels of the final product POL [26]. Increased levels of TBK-active products are shown in patients with insomnia and postmenopause [27].

In the present time, in addition to the determination of individual indicators of the POL-AOZ process, integral indicators of oxidative stress are used, which are more sensitive to the balance of these processes compared to individual indicators [7, 29]. Tak, v issledovanii B. Liang meat al . (2013) showed a decrease in general antioxidant status and an increase in the oxidative stress level in patients with insomnia , which may be the result of a decrease in the activity of the antioxidant enzyme paraoxanazy [33].

Posledstviya insomnii mnogoobrazny. Oni mogut byt kak sotsialnymi (uvelichenie riska dorojnotransportnyx proisshestviy, snijenie proizvoditelnosti truda), tak i meditsinskimi. Having insomnia increases the risk of development and further mental disorders, alcoholism and drug dependence [9, 11]. V nastoyashchee vremya, pomimo psikhicheskikh narusheniy, insomnia vzaimosvyazana s narusheniyami glyvodnogo obmena [32], ojireniem [34], serdechno-sosudistymi zabolevaniyami [35] i pr. Vse eto predstavlyaet interes k izucheniyu insomniy i poiska effektivnyx metodov lecheniya dannyx rasstroysv sna s tselyu povysheniya kachestva jizni jenshchin. Methody korrektsii doljny ustranyat faktori, vyzyvayushchie insomniyu , i normalizovat son, t. k. lechenie tolko odnogo iz imeyushchihsya sostoyaniy ne yavlyaetsya perspektivnym dlya normalizatsii kachestva jizni.

References

1. Anisimov V.N., Vinogradova I.A. Aging of the female reproductive system and melatonin. - SPb.: Sistema, 2008. - 44 p.
2. Anisimov VN, Vinogradova IA Aging of female reproductive system and melatonin. – St.-Petersburg: Sistema, 2008. – 44 p. (in Russian)
3. Antropova O.E. Vozrastnye osobennosti secretsii melatonina and ginseng with climacteric syndrome: autoref . ... candy. Med. science - SPb., 2008. - 24 p.

4. Antropova OE Age peculiarities of melatonin secretion in women with climacteric syndrome: abstract of dissertation of Candidate of Medical Sciences. - S.-Petersburg, 2008. – 24 p. (in Russian)
5. Zavodnov O.P., Zakruzhnaya M.A., Botasheva T.L., Avrutskaya V.V. Osobennosti melatoninovogo obmena u zhenschin s lichnoy chronophysiologicheskoy i stereofunctionalnoy organizational reproductive system i svetovaya privatsiya v prophylactice climactericheskogo syndrom [Electronic resource] // Sovremennye problemy nauki i obrazovaniya: elektronnyi nauchnyi zurnal. – 2012. – No. 2. – Regim dostupa: http://www.science-education.ru/102-5487.
6. Zavodnov OP, Zakruzhnaya MA, Botasheva TL, Avrutskaya VV Peculiarities of melatonin metabolism in women with different chronophysiologic and stereofunctional organization of reproductive system and light deprivation in the preventive treatment of climacteric syndrome [Digital Source] // Sovremennye problem science I education: electronic scientific magazine. – 2012. – N 2. – Access online: http://www. science-education.ru/102-5487. (In Russian)
7. Ivanov S.V. Menopause is a key aspect of aging: the role of the pineal gland // Uspekhi gerontologii. - 2007. - T. 20, No. 4. – S. 19–24.
8. Ivanov SV Menopause – a key aspect of aging: role of epithisis // Uspehi gerontology. - 2007. - Vol. 20, N 4. – P. 19–24. (in Russian)
9. Kvetnaya T.V., Knyazkin I.V. Melatonin: role and meaning and age-related pathology. - SPb.: VmedA , 2003. - 93 p.
10. Kvetnaya TV, Knyazkin IV Melatonin: role and significance in age pathology. - S.-Petersburg: VmedA , 2003. - 93 p. (in Russian)
11. Kolesnikova L.I., Madaeva I.M., Semyonova N.V. i dr. Pathogenetic role of melatonin in narusheniyax sna u genshchin klimaktericheskogo period // Byul . expert biol. i med. – 2013. – No. 6. – S. 117–119.
12. Kolesnikova LI, Madaeva IM, Semyonova NV et al. Pathogenetic role of melatonin in sleep disorders in menopause women // Bjul . jeksper biol. i med. – 2013. – N 6. – P. 117–119. (in Russian)
13. Kolesnikova L.I., Semyonova N.V., Grebenkina L.A. i dr. Integral indicator of oxidative stress in human blood // Byul . expertbiol. i med. - 2014. - T. 157, No. 6. - S. 680–683.

UDC 616-089-053:610.08

Mukhtorova H. K.
assistant
department of psychiatry, narcology and medical psychology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0000-0001-9025-6138

PSYCHOLOGICALASPECTS OF ALIMENTARY OBESITY (LITERATURE REVIEW)

Abstract. *The article analyzes domestic and foreign studies on a role of psychological factors in the for- mation of alimentary obesity. The authors systematized the psychological features of obese individuals. The special role of emotions in the personal profile of patients with obesity is noted. Difficulty in expression (alexithy-mia) and the regulation of emotions such as anger, depression, disappointment, resentment, guilt leading to the for-mation of a substitute eating behavior. The main problems in the treatment of obesity are not only the inability to lose weight, but also the inability to maintain the achieved results of weight reduction, failures, the gradual return a body weight to the baseline. The possible psychological causes are a violation of the ability to prolong systhematic efforts, the inadequacy long-term life planning, the underdevelopment of a new image of oneself, an inadequate sense of pleasure from new sensations from a thin body. Psychological correction of psychogenic overeat-ing should include an educational component: informing the patient about the causes and features of the course of the disease, the risks of the formation of complications and secondary disorders, learning basic terminology. The modern methods of the disadaptive eating behavior psychological correction include cognitive-behavioral therapy, correction emotional imbalance, correction the old and development of the new eating behavior, training in strategies aimed at retention of results, Gestalt therapy, art therapy.*

Key words: *obesity, eating disorders, psychogenic overeating, binge eating, emotions, psychological correction of obesity.*

The relationship between psychological status and excess body weight is currently being widely studied. The literature notes the significant role of psychological factors in the emergence, development, and maintenance of maladaptive forms of eating behavior. According to ICD-10, eating disorders leading to obesity include *psychogenic overeating* (PO) (heading *F* 50.4 reactive obesity, hyperphagic reaction to stress.

Active hyperphagia (AH): International Classification of Diseases (10th revision) "Mental and Behavioral Disorders", adapted for the Russian Federation), which has no analogues in *the DSM-5*. According to the proposed definition,

PP is a reaction to distress, leading to the consumption of excess food to relieve emotional discomfort and, as a consequence, to obesity [7].

Psychogenic overeating corresponds to an emotional type of eating behavior, which occurs in approximately 60% of individuals with obesity and overweight. According to psychosomatic model put forward by *HL Kaplan, HS Kaplan,* in patients with psychogenic overeating stimulus to eating becomes not hunger, but emotional discomfort [8]. This means that a person does not eat because he experiences a physiological need for energy and nutrients, but also because he is irritated, anxious, feels guilty, ashamed, sad, tired, and sometimes even joy.

According to the "masking" hypothesis proposed by *J. Polivy and C. P. Herman* (1999), in some cases the substitution mechanism allows overweight individuals to replace difficulties in their lives with overeating. The patient considers excess weight to be the cause of distress and their main problem, although in fact, obesity – is merely a consequence of disharmony in other areas of his life. In this case, overeating occurs unconsciously, and the incessant attempts to lose excess weight serve as an excuse not to engage in his own life and ignore real problems [6].

The literature examines various factors that contribute to the development of psychogenic overeating. The role of family upbringing and the nature of relationships in the parental family are described. During their development, children experience a lack of attention, care, and emotional warmth.

From parents and begins to perceive food as the only way to give oneself pleasure, praise, pity, take care of one's own personality and express love [1, 2]. E.I. Getmanchuk identifies four stages of PP development. At the first stage, primary anxiety-depressive disorders develop as a result of psychotraumatic factors. At the second stage, there is an attempt to compensate and mask these emotional disorders through a hyperphagic reaction.

third - secondary anxiety-depressive disorders develop as a reaction to weight gain. The last stage is characterized by increased anxiety about excess weight.

food consumption and loss of the compensatory capacity of hyperphagia.

DSM-V classifies *compulsive* eating disorder as an eating disorder leading to obesity.

Binge -eating (BE). The main clinical manifestations of this disorder, according to According to the American Psychiatric Association (2013), short, repetitive

episodes of overeating, accompanied by accelerated food intake with a possible lack of feeling hunger, loss of control and a feeling of unpleasant fullness in the stomach upon completion.

According to the analysis of sources of electronic databases *Pubmed, PsychINFO* and *Embase*, in modern The study of psychological aspects of KO is widely represented in foreign literature. A large number

experimental studies are devoted to the study of the cause-and-effect relationships between emotions and KO [25]. It has been established that excessive food consumption occurs mainly in solitude due to a feeling of shame in front of others and subsequently leads to a feeling of disgust towards themselves, guilt

[14]. *Emotions in the personality profile of patients prone to obesity.* Studies show that in the majority of patients (from 67 to 79%), CO is comorbid with mood swings and high anxiety level [25]. As a result of the examination of 279 women with eating disorders

[5], eating disorder of the emotiogenic type was detected in 32% of the examined subjects. During the interview, they reported that anxiety, irritability, bad mood, disappointment, resentment, loneliness, and boredom served as stimuli for eating. The most pronounced decrease in mood was observed immediately before eating. The experience of melancholy was revealed in the structure of this disorder. A connection was established between depressive symptoms, acute experience of melancholy, and KO, and it was shown that higher

Depression levels are associated with more severe CR [14].

Furthermore, food cravings leading to KO were associated with lower mood levels,

well-being and a higher level of stress than food cravings that did not lead to KO.

Along with the experience of melancholy, emotions such as anger, frustration, and anxiety play a significant role in KO

accounting for 95% of the moods preceding an episode of KO. In a number of studies

The significant role of anger in KO is noted. It has been shown that anger and disappointment can precede an episode of KO more often than melancholy and sadness [27].

In the development of CO, it is important to note the role of emotions arising as a result of interpersonal relationships: feelings of guilt,

irritation, anger, rage, inadequacy, helplessness, discouragement, disappointment, jealousy. Studying a wide range of emotions in CO, *A. Zeeck et al.* [27] found that most episodes

The KOs were driven by anger, frustration, and feelings of suffering or loneliness.

However, in a recent meta-analysis*S. Evers et al.* [15]

I.G. Malkina-Pykh (2010), A.V. Sidorov (2012) highlight such psychological characteristics of patients as a tendency to categorical, dichotomous thinking, perfectionism, and a violation satisfaction with body image, excessive impulsivity and alexithymia [4, 6].

Psychological strategies for regulating emotions in eating disorders. Emotional regulation is a person's ability to effectively experience, express, and manage emotions. emotions triggered by everyday events. People unconsciously use emotion regulation strategies to cope with difficult situations throughout the day.

regulate their emotions, have the ability to differentiate, as well as soften and modify own emotional states [12].

Most theoretical models of eating disorders *are* based on the idea that overweight people are unable to regulate their emotions, so turning to food serves as an attempt to avoid or alleviate emotional stress. For

example, it is suggested that the inability to adequately cope with emotional states *(mood intolerance)* may be the underlying psychological process that determines eating disorders. A peculiar intolerance of emotions affects all intense emotional states.

states, including positive (e.g., excitement) and negative (e.g., depression, anger, anxiety). In people with eating disorders, binge eating is most often serves as an attempt to regulate these emotions.

A number of studies have examined the causal relationship between regulatory strategies emotions and overeating in OC. It was found that the most frequently used strategies for regulating maladaptive emotions in people with OC are emotion suppression and rumination.

"mental chewing gum" [14, 25]. When a person uses suppression as a regulation strategy

When emotions are suppressed, the outward expression of emotions decreases, but the emotion remains unexpressed. This strategy may be effective in the short term, but is likely ineffective in the long term.

Ultimately, the person becomes fixated on their emotions rather than regulating them. Thinking in the “mental gum” type leads to indecision and inaction, which interferes with effective problem solving [25, 26].

in the form of a psychological experiment, which limits the possibility of transferring the obtained results to real life. An example of an attempt

to overcome these limitations is the research

EMA *(ecological momentary assessment)* project [17].

Methods of psychological correction of eating disorders leading to obesity. The main problems in the treatment of obesity are not only the inability to lose weight, but also the inability of patients to maintain the achieved weight loss results, relapses, gradual

return of body weight to baseline values. Possible psychological causes are: impaired ability to sustain longterm systematic efforts, insufficient long-term

life planning, lack of formation of a new self-image, insufficient sense of pleasure from the new sensations of a slimmer body.

The most common methods of psychological correction include: - cognitive behavioral therapy; - correction of psychoemotional imbalance; - correction of old

and development of new eating behavior (habit correction); - teaching strategies aimed at maintaining results; - Gestalt therapy;

The use of a cognitive-behavioral approach to correcting eating disorders aimed at increasing the patient's motivation for treatment, establishing trusting relationships with therapist, concluding a psychotherapeutic contract. The patient, together with the psychotherapist, assesses his psychological readiness for change, analyzes the secondary benefits of excess weight, advantages and disadvantages of transitioning to a new lifestyle. Primary issues are being worked through weight loss goals. Among the primary goals most often noted are the desire to improve appearance, increase selfconfidence, and harmonize relationships with others. In motivational

The techniques “For and Against Changes” and “Looking into the Future” have proven themselves particularly well in this phase [3]. Psychological correction of psychogenic overeating must necessarily include an educational component: informing the patient about the causes and characteristics of the course of this disease, the risks of developing complications and secondary disorders, the biopsychosocial concept of disorders, teaching the basic terminology (alimentary obesity, psychogenic overeating, body mass index, etc.)

Methods that correct the flow of reflexive (conscious) processes include “prohibition” training, which consists

of developing a “stop signal” reflex in response to a need

overeating, as well as training “working memory”, which involves developing the ability to retain in the mind “the goal is to lose weight”, which is especially important for self-control when tempted to overeat [19].

Psychological correction aimed at changing automatic (unconscious) processes is based on training

“attention shift”, as well as training “associations” [24], which consist of shifting the focus of attention from food to another object, developing a reaction of avoiding food [11].

An essential component of the psychotherapeutic process is the correction of alexithymia: the patient is

taught to separate physical hunger and emotional discomfort, for which it is suggested keep an emotional diary, which allows you to understand the relationship between your psychological state and the emerging feeling of hunger. The target of cognitive correction is the tendency towards perfectionism and dichotomous thinking of patients (for example, the technique "Reasonableness Exploration" thoughts”) [3].

An important integrative part of therapy is shifting the patient’s focus of attention with a decrease in

weight loss to other areas of life and preparing it for the stage of maintaining the achieved results.

[9, 16]. According to the literature, cognitive training programs that can be used in real-life situations, such as at work and at home, are much more effective [18, 22].

In this regard, programs using portable electronic devices seem promising. throne devices and the Internet [10].

Conclusion

Thus, a significant role in the onset and maintenance of uncontrolled

Psychological factors, primarily negative emotions and inadequate emotional regulation strategies, play a role in food intake leading to obesity

[14]. The most significant are experiences of anger and sadness, as well as negative emotions associated with interpersonal relationships (disappointment, pain, or loneliness). People prone to obesity are characterized by alexithymia; they poorly differentiate between feelings of hunger and emotional discomfort.

high levels of family anxiety, and depressive symptoms are often observed. Problems associated with obesity and its negative consequences can lead to psychological and social maladaptation. Therefore, the development of psychological methods aimed at correction of various aspects of maladaptive eating behavior. To achieve long-term psychotherapeutic effect, it is necessary to conduct a comprehensive diagnosis of psychological patient characteristics, emotion regulation strategies, determine the type of eating disorder that can lead to the accumulation of excess weight and complicate the process of losing it.

Based on the obtained psychodiagnostic data, a strategy for psychological correction is developed. Effective treatment of psychogenic overeating should be carried out over a long period of time, integrating various methods with psychological correction, combining individual and group forms. work, bringing the acquired psychological skills as close as possible to the patient's real life, which will help the patient not only lose weight, but also maintain the results achieved.

Literature

1. Getmanchuk E.I. Clinical-psychopathological and medical-psychological characteristics of the painwith psychogenic hyperphagia // Archives of Psychiatry. 2012. Vol. 3, No. 70. Pp. 19–25.
2. Emelin K.E. Eating disorders leading to overweight and obesity: classification and differential diagnostics // RMZh. 2015. No. 0. P. 12.
3. Erichev A.N., Bobrovsky A.V., Fedorov A.P. Cognitive-behavioral psychotherapy of excess. Accurate body weight: a tutorial. St. Petersburg: Publishing house of North-Western State Medical University named after I. I. Mechnikov, 2011. 362 p.

4. Malkina-Pykh I.G. Perfectionism and satisfaction with body image in the personality structure patients with eating disorders and alimentary obesity // Human Ecology. 2010. No. 1. Pp. 25–32.
5. Nikishova T.V. Non-drug methods of treating obesity: reflexology in correction. Metabolic disorders and eating behavior: monograph. Kazan: ID "MedDoK", 2017. 104 p.
6. Sidorov A.V. Typology of psychological characteristics of patients with alimentary obesity // Psychological research. 2012. No. 1 (21). P. 10.
7. Khadartsev A.A., Morozov V.N., Khrupachev A.G., Karaseva Yu.V., Morozova V.I. Depression of anti-stress mechanisms as a basis for the development of the pathological process // Fundamental research. 2012. No. 4 (part 2). P. 371–375.
8. Khritinin D.V. Oleinikova M.M., Mikhailova A.A., Zilov V.G., Razumov A.N., Khadartsev A.A., Malygin V.L., Kotov V.S. Psychosomatic and somatoform disorders in rehabilitation (diagnosis and correction): Monograph. Tula, 2003. 120 p.
9. Becker D., Jostmann NB, Wiers RW, Holland RW Approach avoidance training in the eating domain: Testing the effectiveness across three single session studies // Appetite. 2015. No. 85. P. 58–65.

Murodova I. B.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

NORMAL HISTOLOGICAL STRUCTURE OF THE LIVER AND CHANGES IN HEPATITIS A

Abstract: *The liver plays a central role in metabolism, detoxification, and protein synthesis, with its function dependent on a well-organized histological structure. Normal liver tissue consists of hexagonal lobules, where hepatocytes are arranged in radiating plates around central veins, separated by sinusoidal spaces, and portal triads contain the hepatic artery, portal vein, and bile duct. This architecture ensures efficient blood flow, nutrient exchange, and bile secretion.*

Hepatitis A, an acute viral infection, induces significant morphofunctional changes in liver tissue. Histological examination reveals portal and periportal inflammation, hepatocyte necrosis, cytolysis, and varying degrees of cholestasis. The infiltration of lymphocytes and plasma cells disrupts normal architecture and impairs liver function. Understanding these morphofunctional alterations is essential for accurate diagnosis, prognosis, and therapeutic management. Comparative studies highlight the differences between healthy liver tissue and hepatitis A–affected tissue, providing insight into the pathogenesis of the disease.

Keywords: *liver histology, hepatitis A, hepatocyte necrosis, portal inflammation, cholestasis.*

Introduction

The liver is a vital organ responsible for metabolism, detoxification, bile production, and synthesis of plasma proteins. Its function relies on a highly organized histological structure, including hepatic lobules, hepatocytes arranged in radiating plates, sinusoidal spaces, and portal triads containing the hepatic artery, portal vein, and bile duct. Preservation of this architecture is essential for normal liver function.

Hepatitis A, caused by the hepatitis A virus (HAV), is an acute infectious disease that primarily affects hepatocytes and disrupts normal liver structure. Infection leads to inflammatory infiltration, hepatocyte necrosis, cytolysis, and cholestasis, which can impair liver function temporarily. Studying these morphofunctional changes provides insight into the pathogenesis of hepatitis A and helps in understanding the differences between healthy and diseased liver tissue, which is important for diagnosis and clinical management.

Materials and Methods

Study Material

The study included liver tissue samples obtained from patients diagnosed with acute hepatitis A and from healthy liver tissue obtained from autopsy or surgical resections (used as controls). All samples were collected following ethical guidelines with informed consent.

Histological Examination

Tissues were fixed in 10% neutral buffered formalin, processed routinely, and embedded in paraffin. Sections of 4–5 μm thickness were stained with hematoxylin and eosin (H&E) for general morphological assessment. Histological evaluation focused on lobular architecture, hepatocyte morphology, necrosis, inflammatory infiltration, and bile duct changes.

Morphometric Analysis

Quantitative analysis included measuring hepatocyte size, nuclear-to-cytoplasmic ratio, and the extent of inflammatory infiltration using light microscopy and image analysis software. Statistical comparison between healthy and hepatitis A–affected tissues was performed, with significance set at $p < 0.05$.

Results

Normal Liver Tissue

Histological examination of healthy liver samples revealed well-preserved lobular architecture. Hepatocytes were organized in radiating plates around central veins, with clear cell polarity and uniform cytoplasmic staining. Nuclei were small, round to oval, with finely dispersed chromatin and rare mitotic figures. Sinusoids were evenly spaced and lined by endothelial cells and Kupffer cells. Portal triads containing the hepatic artery, portal vein, and bile duct were intact, and no inflammatory infiltration or fibrosis was observed. Morphometric analysis confirmed normal hepatocyte size and low nuclear-to-cytoplasmic ratio, reflecting stable cellular function.

Liver Tissue in Hepatitis A

In hepatitis A–affected tissue, pronounced morphofunctional changes were observed. Portal and periportal regions exhibited dense infiltration of lymphocytes and plasma cells. Hepatocytes showed varying degrees of necrosis and cytolysis, with ballooning degeneration and nuclear pyknosis. The normal lobular architecture was disrupted in affected areas, particularly around portal tracts. Sinusoids appeared congested, and mild cholestasis was observed in some samples. Morphometric analysis revealed a significant increase in hepatocyte size, nuclear enlargement, and altered nuclear-to-cytoplasmic ratio compared to controls ($p < 0.05$).

Comparative Analysis

Quantitative comparison between healthy and hepatitis A–affected tissues highlighted significant differences in inflammatory cell infiltration, hepatocyte morphology, and preservation of lobular architecture. These findings confirm that acute hepatitis A induces acute hepatocellular injury while primarily affecting portal and periportal regions.

Conclusion

The liver's normal histological structure is essential for maintaining its metabolic, synthetic, and detoxification functions. Hepatitis A infection induces significant morphofunctional changes, including portal and periportal inflammatory infiltration, hepatocyte necrosis, cytolysis, and cholestasis, which disrupt normal liver architecture and impair cellular function. Comparative analysis of healthy and affected liver tissue highlights the acute nature of hepatocellular injury caused by hepatitis A and emphasizes the importance of understanding these changes for accurate diagnosis and clinical management. Studying these histological alterations provides valuable insight into the pathogenesis of hepatitis A and informs strategies for monitoring and treating affected patients.

References:

1. Normal Liver Histology 101 / Phoenix Bell // American Association for the Study of Liver Diseases. — 2020. — Режим доступа: aasld.org. — Описывает нормальную гистологическую структуру печени, включая печёночные дольки, портальные тракты и синусоиды.
2. Krishna M. Microscopic anatomy of the liver // Journal of Clinical and Experimental Hepatology. — 2013. — Режим доступа: PMC6448667. — Обзор микроскопической архитектуры печени с акцентом на структурные единицы и функциональные зоны.
3. Girish V. Hepatitis A // StatPearls — NCBI Bookshelf. — 2024. — Режим доступа: ncbi.nlm.nih.gov/books. — Рассматривает гистопатологические изменения печени при вирусном гепатите А, включая воспаление и некроз.
4. Okuno T., Sano A., Deguchi T. et al. Pathology of acute hepatitis A in humans // American Journal of Clinical Pathology. — 1984. — Vol. 81, No. 2.
5. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.

Qodirxonov A.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

MORPHOFUNCTIONAL CHANGES IN BREAST CANCER

Abstract: *Breast cancer is associated with significant morphofunctional differences between normal and malignant breast cells. Normal breast tissue maintains organized structure, cellular polarity, and controlled proliferation, whereas tumor cells show morphological atypia, loss of tissue organization, increased proliferation, and resistance to apoptosis. These changes are accompanied by alterations in the tumor microenvironment, including stromal remodeling and enhanced invasive potential. Understanding these differences is essential for elucidating breast cancer pathogenesis and improving diagnostic and therapeutic approaches.*

Keywords: *breast cancer, morphofunctional changes, normal cells, tumor cells*

Introduction

Breast cancer is one of the most common malignant tumors worldwide and remains a major cause of cancer-related morbidity and mortality among women. Despite significant advances in diagnosis and treatment, the biological behavior of breast cancer is highly heterogeneous, which complicates prognosis and therapeutic decision-making.

The development of breast cancer is accompanied by distinct morphofunctional changes at the cellular and tissue levels. Normal mammary epithelial cells are characterized by regulated growth, preserved tissue architecture, and stable interactions with the surrounding microenvironment. In contrast, malignant transformation leads to structural disorganization, cellular atypia, increased proliferative activity, and functional alterations that promote invasion and metastasis.

A detailed comparison of healthy and tumor breast cells is essential for understanding the mechanisms of carcinogenesis. The study of morphofunctional differences provides valuable insights into tumor progression and forms the basis for improved diagnostic, prognostic, and therapeutic strategies in breast cancer management.

Materials and Methods

Study Material

The study was conducted on breast tissue samples obtained from patients undergoing surgical treatment for breast cancer. Tumor tissue samples were compared with morphologically normal breast tissue taken from tumor-free margins of the same specimens. All samples were collected in accordance with ethical standards and approved institutional guidelines.

Histological Examination

Tissue samples were fixed in 10% neutral buffered formalin, processed routinely, and embedded in paraffin. Sections of 4–5 μm thickness were stained with hematoxylin and eosin for general morphological assessment. Histological evaluation focused on tissue architecture, cellular morphology, nuclear characteristics, and mitotic activity.

Morphometric and Statistical Analysis

Morphometric analysis included measurement of nuclear size, nuclear-to-cytoplasmic ratio, and cell density using light microscopy and digital image analysis. Statistical analysis was performed using standard software, and differences between normal and tumor tissues were considered significant at $p < 0.05$.

Results

Histological analysis of normal breast tissue demonstrated well-preserved glandular architecture with clearly defined ducts and lobules. Epithelial cells were arranged in an orderly manner, maintaining cell polarity and uniform cell size. Nuclei were small, round to oval, with finely dispersed chromatin and rare mitotic figures. The surrounding stroma showed no signs of desmoplasia or inflammatory infiltration.

In contrast, breast cancer tissue exhibited marked structural disorganization. Tumor cells formed irregular nests, cords, and solid sheets with disrupted glandular patterns. A significant degree of cellular and nuclear atypia was observed, including nuclear pleomorphism, hyperchromasia, prominent nucleoli, and an increased nuclear-to-cytoplasmic ratio. Mitotic figures were frequent, including atypical forms, indicating high proliferative activity.

Immunohistochemical evaluation revealed a substantial increase in Ki-67 expression in tumor samples compared to normal breast tissue. Tumor cells showed diffuse nuclear positivity, while normal epithelial cells exhibited minimal or absent staining. This finding confirms enhanced proliferative capacity of malignant cells.

Morphometric analysis demonstrated statistically significant increases in mean nuclear area and cell density in tumor tissue, along with reduced intercellular spacing. Additionally, stromal alterations were evident in tumor samples, including fibrosis, increased vascularization, and infiltration by inflammatory cells. These morphofunctional changes collectively reflect the aggressive biological behavior of breast cancer cells.

Conclusion

Breast cancer is associated with pronounced morphofunctional changes that distinguish malignant cells from normal breast tissue. Tumor cells exhibit structural disorganization, nuclear atypia, increased proliferative activity, and altered interactions with the surrounding microenvironment. In contrast, normal breast tissue maintains organized architecture, cellular polarity, and controlled proliferation.

Understanding these differences is essential for elucidating the mechanisms of breast carcinogenesis and can contribute to improved diagnostic, prognostic, and therapeutic strategies. Detailed analysis of morphofunctional alterations provides a foundation for targeted research and the development of personalized treatment approaches in breast cancer management.

References:

1. Malhotra G.K., et al. Histological, molecular and functional subtypes of breast cancer // PLoS One. — 2011. — Vol. 6, No. 7. — P. e20623.
2. Masood S. Breast cancer subtypes: morphologic and biologic features // American Journal of Clinical Pathology. — 2018. — Vol. 150, No. 1. — P. 14–27.
3. Madaminov S. Evaluation of morphological changes in breast cancer // Inlibrary International Journal. — 2025. — Vol. 12, No. 3. — P. 45–55.
4. Okamoto M. Cellular morphology and functional characteristics of breast cancer cells // Medical Research Archives. — 2020. — Vol. 8, No. 9. — P. 3779.
5. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.

Radjabova S.
talabasi
davolash fakultetini
Samarqand davlat tibbiyot universiteti
Karjavov A. R.
asistenti
Samarqand davlat tibbiyot universiteti
orcid.org/0000-0002-0156-9608
Samarqand, Samarqand viloyati

MARGANETS BIOGEN ELEMENTINING TIBBIYOTDAGI AHAMIYATI

Annotatsiya: *Zamonaviy tibbiyot yuqori aniqlikdagi diagnostika va maqsadli terapiya uchun xavfsizroq va samaraliroq agentlarga muhtoj. An'anaviy gadoliniy asosidagi MRI kontrast agentlarining toksiklik muammolari fonida, biologik mosligi yuqori bo'lgan Marganets asosidagi nanopartikullar (Mn NPs) istiqbolli muqobil hisoblanadi. Ushbu maqola marganetsning noyob kimyoviy xususiyatlari va ularning biomedikal ilovalardagi salohiyatini tahlil qiladi. Marganetsning uch asosiy turi: MnO, MnS va MnFe, uning sintez usullari, magnit-rezonans (MRI) da T1/T2 kontrast mexanizmlari va yuzani funksionalizatsiya qilish orqali dori yetkazishdagi o'rni ko'rib chiqiladi. Tahlil natijalariga ko'ra, MnO o'sma to'qimalarining kislotali muhitida eruvchanligi tufayli pH-ga sezgir "aqlli" T1-kontrast agentlari sifatida yuqori samaradorlik ko'rsatadi. Bundan tashqari, MnFe 4 nanopartikullari magnit yo'naltirilgan dori yetkazish va dual-modal tasvirlash imkoniyatlari bilan teranostik yondashuv uchun muhim asos yaratadi. Mn o'zining biologik mosligi va noyob paramagnit xususiyatlari tufayli xavfsizroq, samaraliroq MRI agentlari va teranostik platformalarni yaratishga katta hissa qo'shadi. Kelajakdagi tadqiqotlar toksikologik xavfsizlikni to'liq baholashga va klinik sinovlarni optimallashtirishga qaratilishi lozim.*

Kalit so'zlar: *Marganets {Mn}; Nanazarrachalar; Magnit Rezonans Tasvirlash {MRT} Kontrast Agent; Teranostika; {MnO} ; Dori Yetkazish Tizimi; Biologik Moslik; {pH}-ga Sezgirlik, Magnit terapiyasi. Organizmdagi Marganets va Kunlik Ehtiyoj, Marganetsning foydali Joylashuvi.*

Radzhabova S.
student
faculty of general medicine
Samarkand State Medical University
Karjavov A. R.
assistant professor
Samarkand State Medical University
orcid.org/0000-0002-0156-9608
Samarkand, Samarkand Region

THE IMPORTANCE OF THE BIOGENIC ELEMENT MANGANESE IN MEDICINE

Abstract: *Modern medicine requires safer and more effective agents for high-precision diagnostics and targeted therapy. In the context of the toxicity issues associated with traditional gadolinium-based MRI contrast agents, manganese-based nanoparticles (Mn NPs), which offer high biological compatibility, present a promising alternative. This article analyzes the unique chemical properties of manganese and its potential in biomedical applications. The three primary forms of manganese—MnO, MnS, and MnFe—are examined along with their synthesis methods, T1/T2 contrast mechanisms in magnetic resonance imaging (MRI), and their role in drug delivery through surface functionalization. According to the analysis, MnO shows high efficacy as pH-sensitive "smart" T1 contrast agents due to its solubility in the acidic environment of tumor tissues. Furthermore, MnFe nanoparticulates establish a critical foundation for theranostic approaches, offering possibilities for magnetic-directed drug delivery and dual-modal imaging. Due to its biological compatibility and unique paramagnetic properties, manganese significantly contributes to the development of safer, more efficient MRI agents and theranostic platforms. Future research should focus on fully assessing toxicological safety and optimizing clinical trials*

Keywords: *Manganese (Mn); Nanoparticles; Magnetic Resonance Imaging (MRI) Contrast Agent; Theranostics; MnO; Drug Delivery System; Biological Compatibility; pH Sensitivity; Magnetic Therapy; Manganese in the Body and Daily Requirements; Beneficial Locations of Manganese.*

Kirish

Marganetsning (Mn) biologik ahamiyati inson va o‘simliklar uchun juda muhim, chunki u organizmda fermentlar faoliyatini rag‘batlantiradi, suyak va biriktiruvchi to‘qimalar rivojlanishiga yordam beradi hamda metabolizmda ishtirok etadi. Inson organizmida yetarli miqdorda bo‘lmasa, kasalliklar kelib chiqishi mumkin, o‘simliklarda esa xloroz (xlorofill yetishmasligi) yuzaga keladi. Marganets (Mn) organizm uchun zarur bo'lib, ayniqsa suyaklar, nerv tizimi va moddalar almashinuvi uchun muhim. Uning yetishmasligi turli kasalliklarga olib

kelishi mumkin, jumladan, asab tizimi buzilishi va rivojlanishda muammolar. Mn organizmda sutkasiga 4 mg dan kam bo'lmagan miqdorda bo'lishi kerak va uning tanqisligi kasalliklarga sabab bo'ladi.

Moddalar almashinuvi. Marganets ko'plab fermentlarning faoliyatini ta'minlashda ishtirok etadi, bu esa oqsillar, yog'lar va uglevodlar almashinuvi uchun zarurdir. . Uglevodlar, aminokislotalar va xolesterin almashinuvi kabi metabolik jarayonlarda ishtirok etadi.

Suyak va bo'g'imlar. (Mn) suyak to'qimasining rivojlanishi va saqlanib qolishiga yordam beradi, bu esa osteoporoz kabi kasalliklarning oldini olishda yordam beradi. Suyak va biriktiruvchi to‘qimalarning sog‘lom rivojlanishi va saqlanishiga yordam beradi

Nerv tizimi. (Mn) nerv tizimining to'g'ri ishlashiga yordam beradi, bu esa xotira, diqqat va boshqa kognitiv funksiyalarni qo'llab-quvvatlaydi. Asab tizimining normal ishlashi uchun zarur.

Enzim faolligi. Marganets ko‘plab fermentlarning, jumladan, oksidativ va antioksidant funksiyalarni bajaradigan fermentlarning faol bo‘lishi uchun zarur.

Reproduktiv salomatlik. Marganets jinsiy a'zolarning normal ishlashi uchun zarur bo'lib, uning etishmasligi reproduktiv muammolarga olib kelishi mumkin

Immun tizimi. (Mn) immun tizimining faoliyatini yaxshilashda muhim rol o'ynaydi, bu esa organizmni infeksiyalardan himoya qiladi.

Marganets tanqisligi belgilari mushaklardagi zaiflik va kuchsizlik, nerv tizimi buzilishi,miyada o'zgarishlar,osteoporoz,qisqa muddatli jigar kasalliklariga sabab bo’ladi.

Marganetsning manbalari: oziq-ovqat mahsulotlari, barcha turdagi sabzavotlar, mevalar, yong'oqlar, urug'lar va donlarda (Mn) ko'p bo'ladi. Toza ichimlik suvi ham (Mn) manbai hisoblanadi.

Marganets organizmda juda oz miqdorda mavjud bo‘lib, asosan jigar, suyaklar, buyraklar va oshqozon osti bezida to‘planadi. Uning organizmdagi umumiy miqdori nisbatan kam bo‘lsa-da, u fermentlarning ajralmas qismi sifatida faoliyat yuritadi. Marganetsga bo‘lgan kunlik ehtiyoj yosh, jins va fiziologik holatga (masalan, homiladorlikka) qarab farq qiladi. Biroq, odatda bu mikroelementga bo‘lgan ehtiyoj juda past bo‘lib, to‘g‘ri va muvozanatli ovqatlanish orqali qoplanishi mumkin. Marganets donli ekinlar, yong‘oqlar, ko‘k choy, dukkakli o‘simliklar va ko‘katlar kabi o‘simlik mahsulotlarida ko‘p bo‘ladi. Marganets moddalar almashinuvi, xususan, uglevodlar, yog‘lar va oqsillar metabolizmida ishtirok etadi. Shuningdek, u antioksidant himoya tizimining muhim qismi bo‘lgan fermentlarning ishlashi uchun zarur.

Yosh bolalar uchun ahamiyati.

Yosh bolalar o‘sib-rivojlanar ekan, marganets ayniqsa katta rol o‘ynaydi. U suyak va tog‘ay to‘qimalarining rivojlanishida ishtirok etuvchi fermentlar faoliyati uchun zarur.

Yetishmaslik oqibatlari**.** Marganets yetishmovchiligi bolaning skelet tizimining normal rivojlanishiga salbiy ta’sir ko‘rsatishi, o‘sishning

sekinlashishiga olib kelishi hamda moddalar almashinuvining buzilishiga sabab bo‘lishi mumkin.

Homilador ayollarda**.** Homiladorlik davrida ayol organizmi va rivojlanayotgan homila uchun marganetsning ahamiyati ortadi. U homilaning suyak, biriktiruvchi to‘qimalari hamda asab tizimi shakllanishida ishtirok etadi. Shuningdek, u ona organizmida energiya almashinuvi va antioksidant himoya jarayonlariga yordam beradi.

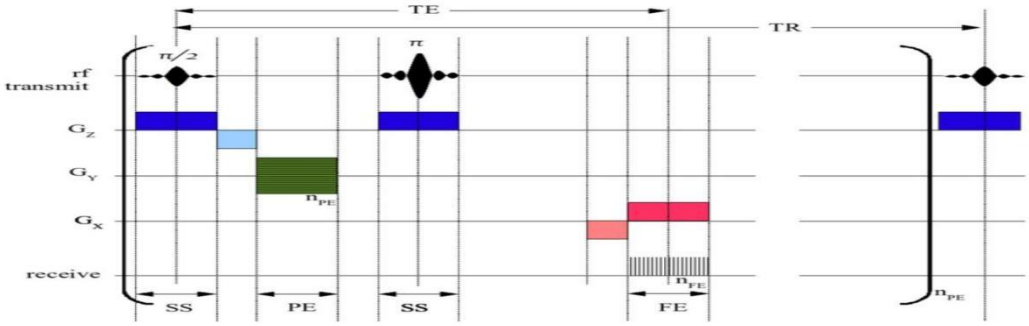
Yetishmaslik oqibatlari. Homilador ayollarda marganets tanqisligi homilaning rivojlanishida nuqsonlar kelib chiqish xavfini oshirishi mumkin. Ona organizmida esa metabolik buzilishlar yuzaga kelishiga sabab bo‘lishi mumkin.

Keksa yoshda marganets tananing qarish jarayonlariga qarshi kurashishda va suyaklar salomatligini saqlashda muhim ahamiyatga ega. U, asosan, antioksidant fermentlar faoliyatida ishtirok etib, hujayralarni erkin radikallarning zararli ta’siridan himoya qilishga yordam beradi.

Keksa yoshdagilarda marganets yetishmasligi suyaklarning mo‘rtlashuvi (osteoporoz), bo‘g‘imlardagi muammolar xavfini kuchaytirishi, shuningdek, asab tizimining funksional buzilishiga olib kelishi mumkin.

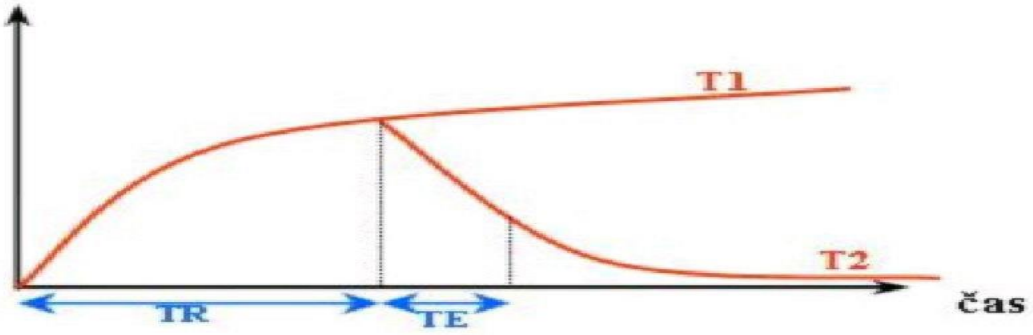
Magnit-Rezonans tasvirlash (MRT).

Marganets nanopartikullarning asosiy funksiyasi ularning yuqori **T1** kontrast agenti sifatidagi samaradorligidadir. Bu samaradorlik relaksivlik **(r**1 **)** deb ataluvchi miqdor bilan belgilanadi. Magnit-rezonans tomografiyada (MRI) MRI ketma-ketligi impulslar ketma-ketligi va impulsli maydon gradientlarining ma’lum bir sozlamalari bo‘lib, ma’lum bir tasvir ko‘rinishiga olib keladi.

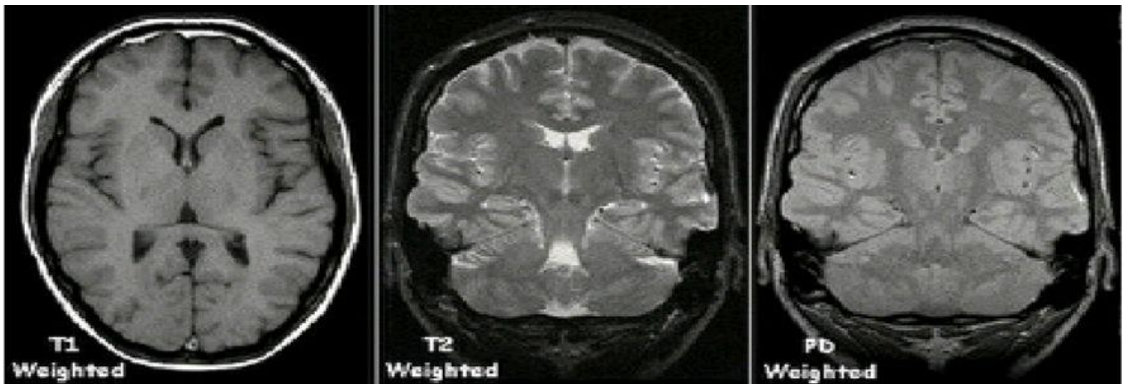


Rasm-1 Puls ketma-ketligining spin echo turi uchun vaqt diagrammasi.

Ko‘p parametrli MRI ikki yoki undan ortiq ketma-ketlikning kombinatsiyasi va yoki spektroskopiya kabi boshqa maxsus MRI konfiguratsiyalarini o‘z ichiga oladi.[2][3]

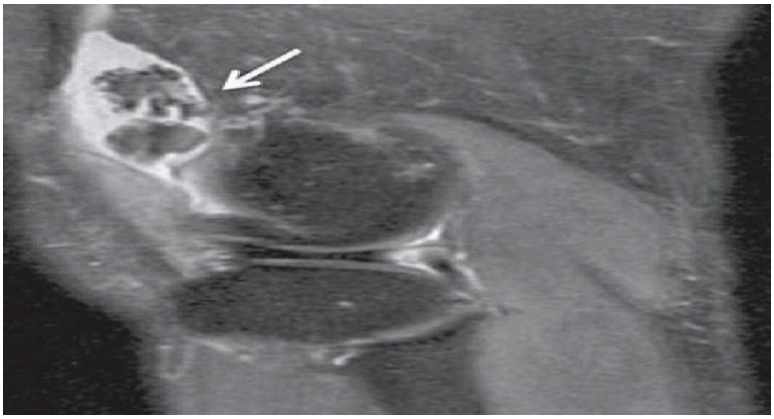


Rasm-2 TR va TE ning MR signaliga ta’siri



Rasm-3 T1 vaznli, T2 vaznli va PD vaznli MRI skanerlariga misollar

Har bir to‘qima T1 (spin-panjasi; ya’ni statik magnit maydon bilan bir xil yo‘nalishda magnitlanish) va T2 (spin-spin; statik magnit maydonga ko‘ndalang) mustaqil bo‘shashish jarayonlari bilan qo‘zg‘alishdan keyin o‘zining muvozanat holatiga qaytadi. T1 vaznli tasvirni yaratish uchun takrorlanish vaqtini (TR) o‘zgartirish orqali MR signalini o‘lchashdan oldin magnitlanishni tiklashga ruxsat beriladi. Ushbu tasvirning vazni miya yarim korteksini baholash, yog 'to‘qimasini aniqlash, jigar o‘choqli lezyonlarini tavsiflash va umuman, morfologik ma’lumotlarni olish, shuningdek, kontrastdan keyingi ko‘rish uchun foydalidir. T2 vaznli tasvirni yaratish uchun, aks-sado vaqtini (TE) o‘zgartirish orqali MR signalini o‘lchashdan oldin magnitlanishning parchalanishiga ruxsat beriladi. Ushbu rasmni o‘lchash shish va yallig‘lanishni aniqlash, oq moddaning shikastlanishlarini aniqlash va prostata va bachadondagi zonal anatomiyani baholash uchun foydalidir.



Rasm-4 Sinovial xondromatozli tizzaning proton zichligi bilan o‘lchangan tasviri

Proton zichligi (PD) – vaznli tasvirlar uzoq takrorlash vaqti (TR) va qisqa aks-sado vaqti (TE) bilan yaratiladi.[4] Miya tasvirlarida bu ketma-ketlik kulrang materiya (yorqin) va oq materiya (to‘q kulrang) o‘rtasida aniqroq farqlanadi, ammo miya va CSF o‘rtasida kam kontrast mavjud.[4] Bu qo‘shma kasallik va shikastlanishni aniqlash uchun juda foydali. Teranostika nuqtai nazaridan Mn NPs ikki tomonlama rol o'ynaydi: diagnostika va terapiya.

Diagnostika

Yuqorida aytib o'tilganidek, Mn^{2+} ionlari orqali T1 kontrastli tasvirlash.

Terapiya

Nanopartikullar yuzasiga Doksorubitsin yoki Paklitaksel kabi kimyoterapiya dorilari yuqlanadi. Dori yukining maqsadli joyda chiqarilishini ta'minlash uchun NPs yuzasiga Folat kislotasi yoki RGD peptid kabi maxsus nishonlovchi ligandlar biriktiriladi. Bu ligandlar saraton hujayralaridagi ortiqcha ifodalangan retseptorlarga faol ravishda bog'lanadi (Faol Yo'naltirish). MnFe2O4kabi ferritlar esa magnit yo'naltirish mexanizmi uchun a'lo darajada. Ular tashqi magnit maydon ta'siri ostida o'sma sohasiga to'planishga qodir bo'lib, bu dori yetkazish samaradorligini keskin oshiradi. Temir, kobalt yoki nikeldan tashkil topgan metall nanozarrachalar yuqori magnit to‘yinganlikni ta’minlaydi va o‘zgaruvchan magnit maydonlar ta’sirida sezilarli issiqlik hosil qilishi mumkin. Biroq, ularning potentsial toksikligi biotibbiyotda qo'llanilishini diqqat bilan ko'rib chiqishni talab qiladi.

Magnit gipertermiya terapiyasi

Magnit gipertermiya terapiyasi saraton kasalligini davolashda induksion nanopartikullarni isitishning eng istiqbolli qo'llanmalaridan biridir. Ushbu yondashuv o'simta joylariga nanozarrachalarni maqsadli etkazib berishni, so'ngra o'zgaruvchan magnit maydonga ta'sir qilishni o'z ichiga oladi. Natijada mahalliylashtirilgan isitish saraton hujayralarini to'g'ridan-to'g'ri o'ldirishi yoki ularni boshqa davolanishga sezgir qilishi mumkin.

Kombinatsiyalangan davolash usullari: Nanopartikullarni induksion isitish, ularning samaradorligini oshirish uchun saratonni davolashning boshqa usullari bilan birlashtirilishi mumkin:

Kimyoterapiyani kuchaytirish: Nanozarrachalar tomonidan ishlab chiqarilgan issiqlik o'simta qon tomirlarining o'tkazuvchanligini oshirishi, dori vositalarini etkazib berish va qabul qilishni yaxshilashi mumkin. Bundan tashqari, gipertermiya saraton hujayralarini kemoterapevtik vositalarga sezgirlashtirishi mumkin, bu esa kerakli dozani va tegishli yon ta'sirlarni kamaytirishi mumkin.

Maqsadli dori vositalarini yetkazib berish: Nanozarrachalar qizdirilganda terapevtik vositalarni olib o'tish va chiqarish uchun mo'ljallangan bo'lishi mumkin, bu esa o'simta joylariga aniq, mahalliylashtirilgan dori etkazib berish imkonini beradi.

pH – ga Sezgirlik Mexanizmi: MnO nanopartikullari "aqlli" kontrast agenti sifatida alohida ahamiyatga ega. Ular normal to'qimalarning neytral muhitida (pH 7.4) past relaksivlikka ega bo'lib, o'sma to'qimalarining kislotali muhitiga (pH ≈6.5) tushganda

$$MnO + 2H^{+} \rightarrow Mn^{2+} + H2O$$

reaksiyasi orqali eriydi. Ushbu erish natijasida ko'p miqdorda erkin Mn^{2+} ionlari ajralib chiqadi, bu esa kontrast signalini ikki-uch baravar kuchaytiradi, patologik joyni yuqori aniqlikda tasvirlash imkonini beradi.

Biologik xavfsizlik va toksikologiya: Mn NPs ning eng muhim afzalligi ularning yaxshi biologik mosligidir. Mn tanadagi Mn-SOD kabi fermentlar tarkibida tabiiy ravishda mavjud. MnO NPs parchalanganda, Mn^{2+} ionlari shaklida jigarda metabollanadi va safro-ichak yo'li orqali organizmdan chiqariladi.Biroq, dozalash masalasi muhim. Tadqiqotlar shuni ko'rsatadiki, Mn NPs 10 - 50 mg/kg dozalarda past sitotoksiklik namoyish etadi. Ammo, bu cheklovdan yuqori bo'lgan yuqori dozalar Mn ning markaziy asab tizimida to'planishi va nevrotoksiklik (Manganizm) xavfini keltirib chiqarishi mumkin. Shuning uchun, Mn NPs loyihalashtirilganda ularning tez va to'liq chiqarilish darajasiga katta e'tibor qaratish lozim.

Xulosa

Ushbu maqola Marganets elementining inson hayotidagi ahamiyatini va tiboyotda qo’llanilishiga asoslanadi. Marganets (Mn) asosidagi nanopartikullarning (NPs) biomedikal, xususan, Magnit-rezonans tasvirlash (MRI) kontrast agentlari va teranostik tizimlar sifatidagi ulkan salohiyatini atroflicha tahlil qildi. Tadqiqotlar shuni ko'rsatadiki, Mn NPs an'anaviy Gadoliniy (Gd) asosidagi moddalarga nisbatan biologik mosligi yuqori va kamroq toksik muqobil hisoblanadi. Bundan tashqari bu maqolada elementning yosh bolalarda, keksalarda va homilador ayollar organizmida bo‘lgan miqdori, foydali va zararli tomonlari yoritib beriladi.

Foydalanilgan Adabiyotlar:

1. Smith, J. D. (2018). Essentials of Inorganic Chemistry and Bioinorganic Applications (3rd ed.). Wiley-VCH.

2. Park, K., & Lee, J. (2020). Comparison of \text{Gd}-Free MRI Contrast Agents: Focus on Biological Roles and Excretion of Manganese. Biomaterials, 260, 120287.
3. Zhao, H., & Wang, L. (2024). Current Challenges and Future Perspectives of Manganese-Based Nanomaterials in Biomedical Applications. Chemical Reviews, 124(5), 1500–1540.
4. Gao, W., et al. (2021). High \text{r}_1 Relaxivity Manganese Sulfide Nanoparticles as Biocompatible MRI Contrast Agents. Nano Letters, 21(10), 4165–4173.
5. Chen, J., Liu, H., & Ma, S. (2022). Synthesis of \text{MnFe}_2\text{O}_4 Nanocrystals for Magnetically Guided Theranostics in Oncology. Advanced Functional Materials, 32(45), 2207399.
6. Li, X., Wang, Q., & Zhang, Y. (2023). pH-Responsive Manganese Oxide Nanoparticles for Enhanced \text{T}_1-Weighted MRI and Tumor-Targeted Drug Delivery. ACS Nano, 17(15), 15401–15415.
7. "ACS Nano", "Advanced Functional Materials", "Nano Letters" kabi yuqori impakt-faktorli jurnallardagi tadqiqot maqolalari.
8. Gd-toksiklikka muqobillar haqidagi kimyoviy darsliklar va ilmiy monografiyalar.
9. 9 .Fayzullayev N., Akmalaiuly K., Karjavov A. Catalytic synthesis of a line by acetylene hydration // Известия НАН РК. Серия химии и технологии. – 2020. – N .2. -C. 23-30.
10.Fayzullayev N. I., Karjavov A.R., Yusupova S. S. Catalytic Synthesis of Acetone Direct Acetylene Hydration // International journal of Advanced Science and Technology. – 2020.- T.29. – N.05.- C 4507-4514.
11.Karjavov A. R., Fayzullaev N. Study of the kinetics and mechanism of the reaction of the catalytic hydrochloration of acytylene// AIP Conference proceedings. – AIP Publishing LLC, 2024. -T.3045. – N. 1.-C.060046.
12.Fayzullayev N., Akmalaiuly K., Karjavov A. Catalytic synthesis of a line by acetylene hydration. (2020),2, Number 440 (2020,),23-30 (Электронный ресурс).
13.Karjavov A.R., Fayzullayev N. Determination of technological parameters of producing vinylchloride from from acetylene // AIP Conference Proceedings. – AIP Publishing LLC ,2024.- T.3045. -N. 1.- C.060045.
14.Karjavov A., Fayzullayev N.,Baykulov A. Production of acetone by catalytic hydration of acetylene // E3S Web of Conference . -EDP Science ,2023. -T .389.- C.01046

UDC 616-089-053:610.08

Rustamov U. T.
assistant
department of psychiatry, narcology and medical psychology
Bukhara State Medical Institute
Bukhara, Uzbekistan
https://orcid.org/0000-0002-9764-4886

THE PLACE AND ROLE OF PSYCHOPHARMACOLOGY IN ONCOLOGICAL DISORDERS

Abstract: *At least 25-30% of cancer patients suffer from mental disorders, which is why psychotropic drugs have been successfully used in oncology for a long time. Psychopharmacological drugs are also used as the main or auxiliary treatment for symptoms associated with cancer itself and side effects of therapy (sleep disturbances, loss of appetite, pain, nausea, fatigue, etc.). The use of psychotropic drugs allows you to target symptoms that negatively affect the quality of life of patients. However, there are problems associated with the interaction of drugs and side effects when prescribing psychotropic drugs. The article states that the effect of drugs on the body depends on the type of personality. Anxiety-phobic disorders, depression, and in severe cases, the dependence of consciousness disorders on the nervous system has been studied.*

Keywords:*psychotropic, personality typology, anxiety, psychopathic depressive disorders, cancer, psychotherapy, nervous system.*

Relevance

Cancer remains one of the most complex problems not only in our republic, but also throughout the world. According to statistics, in recent years, the incidence of cancer has been increasing in many countries of the world. According to the World Health Organization, “by 2030, 15 million people worldwide may be diagnosed with cancer.” An oncological diagnosis leads to affective changes in patients. They analyze the meaning of their past and future lives, their ability to realize themselves, which in turn has been shown to lead to depression and anxiety in patients. Comprehensive treatment of oncological disorders should include not only specialized antitumor therapy, but also, if indicated, psychopharmacotherapy. At least 25-30% of patients with cancer meet the criteria for a mental disorder. The most common psychiatric disorders are depression, adjustment disorder, anxiety, sleep disorders, and delusional disorder[1, 2]. A meta-analysis found that one-third of cancer patients suffered from psychiatric disorders at diagnosis or during emergency department admission, requiring specific psychopharmacological treatment [3, 4]. Another large cohort study of 7298 cancer patients found that approximately 15.6% of patients met criteria for a psychiatric disorder, compared with 1.4% of healthy controls. Psychotropic medications were prescribed to 14.6% of patients within 6 months of newly

diagnosed cancer [5]. In 2020, the results of the first population-based cohort study of cancer patients were published. Of the 142,270 patients, 46% had depressive symptoms according to the Edmonton Symptom Rating Scale. Factors such as younger age, higher comorbidity, receiving systemic therapy as part of treatment, and oropharyngeal and respiratory cancers contribute to an increased risk of depressive symptoms [6]. Prescribing psychotropic medications may begin immediately after diagnosis, perhaps due to fear of the consequences of the disorder, but there is a tendency to increase towards the end of the disorder. A retrospective study of 113,887 cancer patients found that the use of psychotropic medications (antipsychotics, antidepressants, and benzodiazepines) was significantly higher in the last 3 months of life than in the first 3 months after diagnosis. The frequent use of antidepressants may reflect the high psychological stress in the late stages of cancer, while the increased use of antipsychotics in the late stages of cancer may be associated with the development of organic brain damage [7]. Given the high prevalence of psychiatric disorders in this group of patients,Psychotropic drugs have been successfully used in oncology for a long time, both in the complex treatment of mental disorders and as an adjuvant treatment of symptoms directly related to cancer (e.g., pain, fever). The relatively safe profile and minimal risk of serious side effects contribute to the widespread use of these drugs. A population-based study in the United States showed that more than half of elderly patients with bladder cancer received psychotropic drugs within 2 years of diagnosis. The most commonly prescribed drugs were GABA stimulants/modulators and selective serotonin reuptake inhibitors [8]. Another study by Japanese scientists showed that psychotropic drugs are most often used for lung cancer, and less often for prostate cancer: 62.6% and 35.1%, respectively [9]. Due to the high importance of this problem, it is urgent to study and systematize the literature on the use of psychotropic drugs in oncology. Due to the widespread prevalence of mental disorders in this group of patients, psychotropic drugs have been successfully used in oncology for a long time, both in the complex treatment of mental disorders and in the adjuvant treatment of symptoms directly related to cancer (for example, pain, fever).

The purpose of the study

To summarize existing knowledge on the use of psychotropic drugs (antidepressants, antipsychotics, anxiolytics, and hypnotics) in oncology for the treatment of psychiatric disorders and the relief of cancer-related symptoms.

Research materials and methods

To address these issues, a search was conducted using the keywords “psycho-oncology”, “psychopharmacotherapy” (“psychooncology”, “psychopharmacotherapy”) in the eLibrary, PubMed and Google Scholar databases. The primary search results were 622 articles, of which 93 were selected as the most complete publications that, in the opinion of the authors, reflect relevant scientific information on the topic under consideration (Figure 2).

Results and discussion

Antidepressants. Over the past few decades, the use of this class of drugs in cancer disorders has become widespread, mainly due to the emergence of new classes of antidepressants that are better tolerated and have fewer side effects. First, antidepressants have been shown to be effective in treating depression, anxiety, and stress-related disorders in cancer disorders [10, 11]. Second, antidepressants are used as adjunctive therapy for non-cancer-related symptoms, such as hot flashes, neuropathic pain, nausea, vomiting, fatigue, and others [12]. The efficacy of antidepressants in cancer has been demonstrated in numerous randomized controlled trials [13-16]. Of all classes of antidepressants, selective serotonin reuptake inhibitors (SSRIs) are the most widely used in clinical practice due to their relatively simple dosing regimen and the optimal balance between potential benefits and the risk of side effects. SSRIs have also been shown to have anti-inflammatory properties against microglia, the main cells of the central nervous system that regulate and respond to inflammatory factors [17]. Since inflammatory mechanisms are involved in the biology and physiology of cancer, SSRIs are a reasonable option for the treatment of depression in these clinical situations. SSRIs may improve the immunity of cancer cells and have antitumor properties, including apoptotic properties in hepatocellular carcinoma cells [18]. Use of antidepressants in the treatment of comorbid psychiatric disorders. Depression is one of the most common disorders in cancer. Studies have confirmed the increased frequency of antidepressants prescribed to cancer patients to treat depressive symptoms [7, 11]. Systematic reviews and meta-analyses have shown that antidepressants, regardless of their class (e.g., SSRIs or tricyclic antidepressants), are more effective than placebo in treating depressive symptoms [19]. However, antidepressants should generally be reserved for severe depression, and psychotherapy is optimal. Stress, stress-related disorders, and adjustment disorders are also common in cancer patients [1, 21]. Studies have shown that approximately 12–25% of cancer patients suffer from post-traumatic stress disorder, and 20% of patients suffer from adjustment disorders [22, 23]. According to the literature, antidepressants, especially SSRIs, are the first-line treatment for PTSD and adjustment disorders, but there are no specific data for cancer disorders [24]. For anxiety disorders (e.g., phobias, severe and persistent anticipatory anxiety, social anxiety), SSRIs, and mirtazapine are the drugs of choice in cancer disorders [25, 26]. Circadian rhythm disturbances in cancer patients are associated with depression, anxiety disorders, as well asmay be a complication of chemotherapy [27]. In this case, in addition to classic sleeping pills, antidepressants with sedative effects (e.g. mirtazapine and trazodone) may be prescribed. Use of antidepressants for cancer-related symptoms. Clinical practice, supported by scientific evidence, has shown that antidepressants can be used to improve cancer-related symptoms, such as loss of appetite, anorexia, sleep disorders, pain, and hot flashes, which significantly affect quality of life. First, antidepressants are used as adjuvant agents in the treatment of cancer pain [28, 29, 30]. Tricyclic antidepressants and SSRIs (primarily duloxetine) are effective in the

treatment of neuropathic pain in cancer patients receiving chemotherapy [31, 32]. Some chemotherapy drugs can cause hot flashes, which can have a negative impact on patients' quality of life. Antidepressants, especially SSRIs and SSRIs, have been shown to be effective in treating hot flashes [33]. The most effective of these drugs were fluoxetine [34], sertraline [35], escitalopram duloxetine [36], and venlafaxine [37] (Table 1). However, caution should be exercised when using these drugs due to their potential inhibitory effects on the CYP2D6 enzyme [34, 36]. The antihistaminergic properties of mirtazapine may be aimed at combating nausea, anorexia/cachexia, and severe weight loss [38]. Phase II studies have confirmed its beneficial effects on appetite, sleep disturbances, anxiety, pain, as well as quality of life and depression in cancer patients [39]. Limitations of antidepressant use in oncology, side effects and drug interactions. Other important issues related to the use of antidepressants in cancer include side effects and drug interactions [40, 41]. Commonly prescribed drugs for cancer patients, such as tramadol, procarbazine and linezolid, increase the risk of serotonin syndrome when combined with serotonergic antidepressants. These drugs may increase nausea and gastrointestinal symptoms and increase the risk of bleeding in patients with thrombocytopenia or taking anticoagulants. Hyponatremia, seizures and a lowered seizure threshold may occur. Fluoxetine, due to its long half-life and strong inhibitory effect on cytochrome CYP2D6, should be used with caution in cancer patients receiving chemotherapy to avoid possible drug interactions with antineoplastic agents metabolized by the CYP2D6 system. Similarly, paroxetine has a strong inhibitory effect on CYP2D6 and also has anticholinergic effects that require special attention from the treating physician. Sertraline, citalopram, and escitalopram have the least drug interactions and are the drugs of choice in this setting.Tamoxifen is a selective estrogen receptor modulator used to prevent relapse in patients with hormone receptor-negative breast cancer. The enzyme cytochrome 2D6 (CYP2D6) is the main enzyme that converts tamoxifen to its active metabolite endoxifen. Genetic variations in CYP2D6 affect the conversion of tamoxifen to its active form; approximately 7% of women have alleles that do not function in CYP2D6 and have low endoxifen levels. Three antidepressants—paroxetine, fluoxetine, and duloxetine—are potent inhibitors of CYP2D6; they may interfere with tamoxifen metabolism [42]. A retrospective study found that women taking combination therapy with tamoxifen and paroxetine had an increased risk of breast cancer death, which has led many physicians to change their prescribing of antidepressants. Subsequent large studies investigating the effects of different CYP2D6 metabolic phenotypes have found no association with disease control or relapse [43, 44]. Current clinical recommendations are to avoid strong CYP2D6 inhibitors (paroxetine) in favor of drugs that are either non-selective or weak inhibitors of this cytochrome (escitalopram, venlafaxine), but the treating physician should be aware of further studies on this issue. [45]. However, a 2022 review found no difference in treatment outcomes between patients who received antidepressants (including paroxetine) in combination with tamoxifen and those who did not [46]. It should be noted that the Russian-

language instructions in the "Drug Interactions" section indicate that the entire group of SSRIs is capable of reducing the active metabolite of tamoxifen. Therefore, such prescriptions should be carried out with great caution and carefully documented.but the treating physician should be aware of further studies on this issue. will be available [45]. However, a 2022 study found no difference in treatment outcomes between patients who took antidepressants (including paroxetine) in combination with tamoxifen and those who did not [46]. It should be noted that the Russian-language instructions in the "Drug Interactions" section indicate that the entire group of SSRIs is capable of reducing the active metabolite of tamoxifen. Therefore, such prescriptions should be carried out with great caution and carefully documented.but the treating physician should be aware of further studies on this issue. will be available [45]. However, a 2022 study found no difference in treatment outcomes between patients who took antidepressants (including paroxetine) in combination with tamoxifen and those who did not [46]. It should be noted that the Russian-language instructions in the "Drug Interactions" section indicate that the entire group of SSRIs is capable of reducing the active metabolite of tamoxifen. Therefore, such prescriptions should be carried out with great caution and carefully documented.

Antipsychotics. Antipsychotics are also drugs that have been used in oncology practice for a long time. They are used to treat mental disorders such as psychosis, depression, anxiety; psychotic disorders (delirium and/or psychotic symptoms caused by certain drugs), as well as side effects of chemotherapy. In many cases, individual antipsychotics are used to control the side effects of specific antipsychotics, such as nausea, vomiting, or decreased appetite. Use of antipsychotics in the treatment of comorbid mental disorders. For acute anxiety in cancer patients, antipsychotics may be preferable to benzodiazepines, as the latter increase the risk of mood changes and respiratory depression. For similar reasons, low-dose sedative atypical antipsychotics (quetiapine, olanzapine) are preferable to hypnosis for the treatment of insomnia [47, 48, 49]. Risperidone and olanzapine have been shown to be effective and well-tolerated in reducing agitation and depressive symptoms in children with cancer [50]. Use of antipsychotics for cancer-related symptoms. Haloperidol, levomepromazine, and droperidol are not recommended for the control of nausea and vomiting in cancer patients due to insufficient data on their efficacy [51, 52, 53]. However, the atypical antipsychotic olanzapine has shown efficacy in the treatment of chemotherapy-induced nausea and vomiting [54]. Olanzapine 10 mg significantly reduced nausea, vomiting, and the use of palliative care compared with placebo in cancer patients undergoing chemotherapy and experiencing severe vomiting [55]. In pediatric oncology, olanzapine, at a mean dose of 0.1 mg/kg, reduced chemotherapy-associated vomiting. The mean age of the patients in the sample was 13 years [56]. Thus, the use of olanzapine as part of a comprehensive treatment for nausea and vomiting is justified in both children and adults with cancer. Studies have shown that olanzapine reduces weight loss by more than 10% and increases food intake in cancer patients [57, 58, 59]. This property may be useful in the treatment of

anorexia nervosa caused by cancer. More than 90% of cancer patients experience antemortem delirium in the last days of life [60, 61]. In addition, 70% develop anxiety, agitation, or aggressive behavior [62]. Antipsychotics have long been used as first-line treatments for delirium and related agitation [63, 64]. Among the typical antipsychotics, haloperidol is one of the most commonly used [65].In a survey of 135 palliative care physicians in nine countries, haloperidol was considered one of the four essential drugs that should be available in all settings for the treatment of cancer [66]. In addition, the combination of lorazepam and haloperidol was shown to be superior to haloperidol monotherapy in terms of control of agitation and subjective assessment of patient comfort [63, 67]. In addition to haloperidol, chlorpromazine is also preferred for the treatment of antemortem delirium. It blocks alpha1-adrenergic receptors, which effectively reduces agitation [68]. However, haloperidol is not recommended for hypoactive delirium due to lack of efficacy or worsening of symptoms, possibly due to multi-organ failure [69]. In addition, the increased risk of neuroleptic malignant syndrome, which is common with haloperidol and other antipsychotics that are D2 receptor antagonists, should be considered [70]. A recent systematic review found that olanzapine and quetiapine are suitable alternatives to haloperidol, especially in patients with severe extrapyramidal symptoms, who require sedation, or who are intolerant to haloperidol [71]. Risperidone is also used in the treatment of delirium, and its efficacy has been comparable to haloperidol and olanzapine [72, 73]. Cancer patients are at increased risk of adverse events due to their poor general health. For example, hypovolemia may increase the risk of orthostatic hypotension, which can lead to syncope and collapse. The intramuscular route of administration of antipsychotics is associated with an increased risk of hematomas in cancer patients with thrombocytopenia. The problem of neuroleptic hyperprolactinemia in patients with breast cancer is increasing. The lifetime prevalence of breast cancer in patients with schizophrenia is 25% higher than in the general population [74, 75]. Many intracranial tumors overexpress prolactin receptors and promote tumor growth regardless of prolactin receptor status. A recent study from Finland showed that long-term use of antipsychotics that increase prolactin levels (risperidone and haloperidol) increases the risk of breast cancer [76]. Of the antipsychotics most commonly used in oncology practice, risperidone and haloperidol often cause hyperprolactinemia, while aripiprazole, ziprasidone, and quetiapine cause minimal increases in prolactin [77]. Astasia may occur with other extrapyramidal symptoms, especially when antipsychotics are combined with antimimetics. Although extrapyramidal symptoms are usually associated with typical antipsychotics, they can also occur with atypical antipsychotics such as risperidone and olanzapine, especially at high doses [78]. Regular monitoring of the QT interval,This is particularly important in cancer patients with electrolyte abnormalities and in patients receiving drugs that prolong the QT interval, as QT prolongation may predispose to life-threatening ventricular arrhythmias [79]. This adverse effect is most pronounced with thioridazine, sertindole, ziprasidone, haloperidol, risperidone, and olanzapine, but regular QT

interval monitoring is recommended for all patients taking antipsychotics [80]. A meta-analysis of antipsychotic use in schizophrenia found that aripiprazole, lurasidone, paliperidone, and asenapine were the least likely to prolong the QT interval [81]. Other serious adverse events associated with the use of atypical antipsychotics in the elderly have been described [82]. Additional concerns with antipsychotic use include the risk of metabolic syndrome (i.e., insulin resistance, dyslipidemia, obesity) with long-term use, hyponatremia, decreased seizure threshold in the context of concurrent steroid use and QT, drug interactions, increased hepatic transaminases, and anticholinergic effects (e.g., constipation, dry mouth, urinary retention). There is a risk of falls and aspiration pneumonia when antipsychotics are prescribed to patients with delirium [83]. When prescribing antipsychotics, you should start with minimal doses and then titrate to achieve a more favorable effect [84]. The use of anxiolytics and hypnotics in the treatment of comorbid psychiatric disorders in patients with cancer. A meta-analysis of 70 studies found that the prevalence of adjustment disorders and anxiety disorders in cancer patients was 19.4% and 10.3%, respectively [1]. Although serotonergic antidepressants remain the mainstay of treatment for generalized anxiety and panic attacks in cancer patients, treatment often includes short- and long-term benzodiazepines. Benzodiazepines are often the drug of choice for acute anxiety and panic symptoms. Short-acting drugs such as alprazolam, lorazepam, and oxazepam may be useful for short-term procedures (fear of injections, closed MRI) or panic attacks [76]. Clonazepam and diazepam are longer-acting and may be useful for symptomatic anxiety and insomnia. Zolpidem, zopiclone, and zaleplon, also known as the “Z-drugs,” are nonbenzodiazepine drugs used to treat insomnia in cancer patients. This class of drugs has minimal anxiolytic effects and is associated with a lower risk of tolerance and adverse reactions [85, 86]. The antihistamine hydroxyzine may also be prescribed for panic symptoms when needed [24]. The main advantage of nonbenzodiazepine drugs is that they are not usually addictive.Lemborehant has previously been shown to be effective and well-tolerated in patients with insomnia who have difficulty falling asleep and frequently waking up [87]. A small pilot study evaluated lemborehant with similar results for sleep disorders in cancer patients, including delirium. Despite the limitations of the study (small sample, retrospective evaluation), the results are encouraging and suggest that the drug may be more widely used in the future [88]. Use of anxiolytics and hypnotics for cancer-related symptoms. Benzodiazepines are often used to treat psychomotor agitation and seizures. If symptoms are refractory, they are used for palliative sedative therapy. The ideal benzodiazepine for use in palliative care is midazolam, due to its rapid onset of action, short duration of action, and lack of significant withdrawal symptoms. It is one of the four essential drugs for patients with end-stage disease [89-92]. In combination with antiemetics and behavioral therapies, benzodiazepines may also be effective in chemotherapy-induced nausea [83]. Aquagenic pruritus (intense itching upon contact with water) in BCR-ABL1-negative myeloproliferative neoplasms can significantly reduce the quality of life of cancer patients. The anxiolytic

hydroschizin, which has antihistamine and anticholinergic effects, may be effective in patients with this pathology [84]. Limitations of use, side effects, and drug interactions. The most common side effects of benzodiazepines include sedation, dizziness, drowsiness, respiratory depression, coordination, and confusion [76].The anxiolytic hydrochlorothiazide, which has antihistamine and anticholinergic effects, may be effective in patients with this condition [84]. Limitations of use, side effects, and drug interactions. The most common side effects of benzodiazepines include sedation, dizziness, drowsiness, respiratory depression, incoordination, and confusion [76].The anxiolytic hydrochlorothiazide, which has antihistamine and anticholinergic effects, may be effective in patients with this condition [84]. Limitations of use, side effects, and drug interactions. The most common side effects of benzodiazepines include sedation, dizziness, drowsiness, respiratory depression, incoordination, and confusion [76].

Used literature

1. Mitchell AJ, Chan M, Bhatti H et al. Prevalence of depression, anxiety and adjustment disorders in oncology, haematology and palliative care settings: a meta-analysis of 94 interview-based studies. Lancet Oncology. 2011;12(2):160-174.
2. Anuk D, Özkan M, Kizir A et al. Characteristics and risk factors of common psychiatric disorders in cancer patients seeking mental health care. BMC Psychiatry. 2019;19(1):269.
3. Brosken P, Prins JB, Dekhuizen PNR et al. Is the faster the better?—A systematic review of the impact of grief and rapid diagnostic pathways on the diagnosis of suspected cancer. Psycho-Oncology. 2012;21(1):1-10.
4. Grassi L. Psychiatric and psychosocial effects of cancer treatment: an agenda for psycho-oncology. Epidemiology and psychiatric sciences. 2020; 29.
5. Desplenter F, Bond C, Watson M, et al. The occurrence of emotional distress and drug treatment after cancer diagnosis: a matched primary care control study. British Journal of Cancer. 2012;107(9):1644-1651.
6. Hallet J, Davis LE, Isenberg-Grzeda E, et al. Gaps in the management of depressive symptoms after cancer diagnosis: A population-based analysis of prospective patient outcomes. Oncologist. 2020;25(7).
7. Ng SG, Box MP, Smeets HM, et al. Psychotropic drug prescribing patterns in cancer disorders; A large population study in the Netherlands. Psycho-Oncology. 2013;22(4):762-767.
8. Jazzar U, Bergerot CD, Shan Y, et al. Use of psychotropic medications in older patients with bladder cancer in the United States. Psycho-Oncology. 2021;30(6):832-843.
9. Sato I, Onishi H, Yamada S and others. Prevalence and Initial Prescription of Psychotropic Medications in Patients with Common Cancer in Japan Based on the National Health Insurance Medication Database. Psycho-oncology. 2018;27(2):450-457.

10. Thekdi SM, Trinidad A, Roth A. Psychopharmacology in cancer. Current Psychiatry Reports. 2015;17(1):529.
11. Henry BJ. Symptom management in oncology: depression and anxiety. Seminars in Oncology Nursing. 2022;38(1):151251.
12. Grassi L, Caruso R, Hammelef K, et al. Efficacy and safety of pharmacotherapy for cancer-related psychiatric disorders across the cancer treatment trajectory: a review. International Review of Psychiatry. 2014;26(1):.
13. De Fazio P, Barberi A, Saglioti F et al. Psychological adjustment to cancer: the role of anxiety and depressive symptoms under treatment. International Journal of Psychiatry in Medicine. 2013;46(4):375-386.
14. Strong W, Waters R, Hibberd C, et al. Managing depression in people with cancer (SMART Oncology 1): a randomized trial. Lancet. 2008;372(9632):40-48.
15. Holland JC, Romano SJ, Heiligenstein JH, et al. A controlled trial of fluoxetine and desipramine in women with advanced cancer. Psycho-Oncology. 1998;7(4):291-300.

Salimova Sh.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

MORPHOLOGICAL CHANGES IN CERVICAL CANCER

Abstract: *Cervical cancer is a prevalent malignancy among women worldwide. Morphological changes play a key role in its diagnosis and prognosis. Pre-cancerous lesions, such as cervical intraepithelial neoplasia (CIN 1–3), show progressive epithelial atypia, increased nuclear-to-cytoplasmic ratio, mitotic activity, and loss of polarity. Invasive carcinoma is characterized by disruption of the basement membrane, stromal invasion, desmoplasia, angiogenesis, and inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma are the most common histological subtypes, each with distinct cellular and architectural features. Understanding these morphological patterns is essential for early detection, treatment planning, and prognostic assessment.*

Keywords: *cervical cancer, cervical intraepithelial neoplasia, histopathology, morphological changes, squamous cell carcinoma, adenocarcinoma, stromal invasion, epithelial atypia.*

INTRODUCTION

Cervical cancer remains a major global health problem and one of the leading causes of cancer-related morbidity and mortality among women, particularly in developing countries. Persistent infection with high-risk human papillomavirus (HPV) is recognized as the primary etiological factor, initiating a cascade of cellular and molecular alterations that drive neoplastic transformation. Understanding the morphological changes associated with cervical cancer is critical for accurate diagnosis, staging, and management of the disease.

Histopathological examination provides essential insights into the progression from pre-cancerous lesions, such as cervical intraepithelial neoplasia (CIN), to invasive carcinoma. CIN lesions are graded based on the degree of epithelial atypia and involvement, while invasive tumors are characterized by stromal invasion, desmoplastic reaction, angiogenesis, and inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma are the most common histological subtypes, each exhibiting distinct cytological and architectural features. Detailed knowledge of these morphological patterns is essential for early detection, prognostic evaluation, and therapeutic decision-making in cervical cancer.

MATERIALS AND METHODS

This descriptive study analyzed cervical tissue from 20 CIN cases (grades 1–3), 20 invasive carcinoma cases (squamous cell carcinoma and adenocarcinoma), and 10 normal controls. Samples were collected with ethical approval and fixed in 10% formalin, embedded in paraffin, and sectioned at 4–5 µm.

Histological evaluation used hematoxylin and eosin (H&E) for general morphology, Masson's trichrome for stromal fibrosis, and PAS staining for basement membrane and mucin assessment. Morphological parameters included epithelial atypia, nuclear-cytoplasmic ratio, mitotic activity, polarity loss, stromal invasion, fibrosis, angiogenesis, and inflammatory infiltration. CIN lesions were graded 1–3, and invasive tumors classified by histological subtype. Descriptive statistics summarized the findings.

RESULTS:

Normal Cervical Tissue

Histological analysis of normal cervical specimens revealed well-organized stratified squamous epithelium on the ectocervix and simple columnar epithelium in the endocervical canal. The stroma was composed of fibroconnective tissue with normal vasculature and minimal inflammatory infiltration. Basement membranes were intact, and no cellular atypia was observed.

Cervical Intraepithelial Neoplasia (CIN)

CIN 1 (mild dysplasia): Atypical basal cells were confined to the lower third of the epithelium, with slight nuclear enlargement and occasional mitotic figures. Cellular polarity was preserved.

CIN 2 (moderate dysplasia): Atypical cells involved the lower two-thirds of the epithelium. Increased nuclear pleomorphism, higher mitotic activity, and mild stromal inflammation were noted.

CIN 3 (severe dysplasia / carcinoma in situ): Full-thickness epithelial atypia was observed, with loss of stratification and polarity, frequent mitoses throughout the epithelium, and intact basement membrane. Stromal reaction was minimal.

Invasive Cervical Carcinoma

Squamous Cell Carcinoma: Irregular nests and sheets of atypical squamous cells infiltrated the stroma. Keratin pearls were seen in keratinizing subtypes. Marked nuclear pleomorphism, high mitotic index, desmoplastic stroma, and lymphocytic infiltration were prominent.

Adenocarcinoma: Malignant glandular structures displayed irregular architecture, hyperchromatic elongated nuclei, and mucinous cytoplasm. Stromal invasion, desmoplastic reaction, and increased vascularization were evident.

Stromal and Vascular Changes

Fibrosis, angiogenesis, and peritumoral inflammatory infiltration were more pronounced in invasive lesions compared to CIN, correlating with tumor depth and histological subtype.

CONCLUSION

Morphological analysis of cervical tissue provides essential insights into the progression from pre-cancerous lesions to invasive cervical carcinoma. CIN lesions demonstrate graded epithelial atypia, loss of polarity, and increased mitotic activity, whereas invasive carcinomas exhibit basement membrane disruption, stromal invasion, desmoplastic reaction, angiogenesis, and pronounced inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma display distinct histological features that are critical for accurate diagnosis and treatment planning. Understanding these morphological patterns is fundamental for early detection, prognostic evaluation, and effective therapeutic strategies. Integration of histopathological assessment with clinical and molecular data can improve patient management and outcomes in cervical cancer.

References:

1. Histology of cervical intraepithelial neoplasia and the role of biomarkers // Sci. Dir. (обзор). – 2011.
2. Diagnosis of cervical intraepithelial neoplasia and invasive cervical carcinoma by biopsy under colposcopy // PubMed. – 2022.
3. Review on histopathological features of cervical cancer and CIN // Asian Pac. J. Cancer Care. – 2025. – Vol. 10. – P. 1–10.
4. Cytology and histology of endocervical glandular lesions: a review with emphasis on recent developments // Pathology. – 2025. – Vol. 57, №7. DOI: 10.1016/j.pathol.2025.08.001.
5. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. NeuroQuantology, 20(6), 3471-3476.

Shodmonova G.
talabala
Mirmuzafarova P.
talabala
Ro'ziboyeva M.
talabala
Samarqand davlat tibbiyot universiteti
Ilmiy rahbar: Ismoilov K. T.
assistenti
tibbiy biologiya va genetika kafedrasi
Samarqand davlat tibbiyot universiteti

INSON GENOMIDA KENG TARQALGAN IRSIY KASALLIKLAR TURLARI VA ULARNI ANIQLASHNING ZAMONAVIY USULLARI

Anatatsiya:*Inson genomini o'rganish zamonaviy biotibbiyotning eng muhim yo'nalishlaridan biridir. Genetik axborotning to'liq tuzilishini bilish irsiy kasalliklar, o'smalar, metabolik buzilishlar, farmakogenomika va shaxsiy tibbiyot sohalarida mislsiz imkoniyatlarni yaratadi. Avvalgi yillarda genomni o'qish juda murakkab, uzoq davom etuvchi va qimmat jarayon bo'lgan bo'lsa, hozirda texnologik taraqqiyot hisobiga bu jarayon ancha tez, aniq va arzonlashgan. Inson genomini aniqlashda qo'llaniladigan zamonaviy usullar DNKning tuzilishini nukleotid darajasigacha o'qish, tahlil qilish va solishtirish imkonini bermoqda. Quyida hozirgi kunda eng keng qo'llanilayotgan texnologiyalar hamda ularning afzalliklari yoritiladi. Ushbu maqolada dunyo miqyosida keng tarqalgan irsiy kasalliklarning molekulyar asoslari, epidemiologik ko'rsatkichlari va ularni kamaytirishning samarali profilaktik choralari yoritilgan. Hamda genetik kasalliklarning global uchrash chastotasi, genetik skrining, prenatal diagnostika va populatsion profilaktika strategiyalarining afzalliklari tahlil qilindi.*

Kalit so'zlar: *Sanger sekvenirlash, CRISPR, Bioinformatika va genomik analiz, xromasoma kasalliklari, genom, irsiy kasallik, profilaktika, genetik skrining, NGS texnologiyalar*

Shodmonova G.
student
Mirmuzafarova P.
student
Ruziboyeva M.
student
Samarkand State Medical University
Scientific supervisor: Ismoilov K. T.
assistant
department of medical biology and genetics
Samarkand State Medical University

COMMON HEREDITARY DISEASES IN THE HUMAN GENOME AND MODERN METHODS FOR THEIR DETECTION

Abstract: *The study of the human genome represents one of the most significant directions of modern biomedicine. Knowledge of the complete structure of genetic information provides unparalleled opportunities in the diagnosis of hereditary diseases, oncological disorders, metabolic syndromes, as well as in the development of pharmacogenomics and personalized medicine. While genome sequencing used to be a complex, time-consuming and expensive process, technological progress has made it faster, more accurate, and more affordable. Contemporary genomic technologies enable the reading of DNA structure at the nucleotide level, performing advanced bioinformatic analysis and comparative genomics. This article highlights the molecular basis and epidemiological indicators of the most widespread hereditary disorders worldwide, as well as effective strategies for reducing their incidence. Additionally, global prevalence rates of genetic diseases, the advantages of genetic screening, prenatal diagnostics, and population-based preventive approaches are discussed.*

Keywords: *Sanger sequencing, CRISPR, bioinformatics and genomic analysis, chromosomal disorders, genome, hereditary diseases, prevention, genetic screening, NGS technologies.*

Kirish

Genetik kasalliklar dunyo bo‘yicha salomatlikni saqlash tizimi oldidagi eng jiddiy muammolardan biridir. Har yili millionlab bolalar turli darajadagi irsiy genetic nuqson bilan tug‘ilmoqda. Sickle cell anemiya, tallasemiya, Daun sindromi, gemofiliya va kist fibroz kabi kasalliklar ayrim hududlarda yuqori uchrash chastotasiga ega.Jumladan; Sickle cell anemiya Afrika aholisi orasida 2–3% gacha, Tallasemiya Janubiy Osiyoda yuqori bo‘lib, ayrim hududlarda tashuvchilar 10–15% ni tashkil etadi.

Insonning 46 ta xromosomasida turli ko‘rinishdagi genetik kasalliklar paydo bo‘lishi mumkin. Ular: T*risomiya, monosomiya*-Daun, Patau, Edvards, Klaynfelter, Terner va boshqalar. Xromasoma o‘zgarishlari (*deletsiyalar, duplikatsiyalar, inversiyalar, translyokatsiyalar*) DiGeorge, Cri-du-chat, Wolf–Hirschhorn, Filadelfiya xromosomasi va boshqalar.

Adabiyotlar tahlili va metodologiyasi:1. Insondagi 46 ta xromasomani aniqlashda dunyoda va bizda quyidagi usullardan foydalaniladi; Epidemiologik ma’lumotlar WHO Genetic Diseases Database, PubMed va OMIM ma’lumotlar bazasida, Irsiy kasalliklarni aniqlash usullari; PCR,Sanger sekvenslash,yangi avlod sekvenslashi (NGS), FISH,,microarray gen chip tahlili usullari mihim ahamiyatga ega.

1.Sanger sekvenirlash usuli-Sanger usuli genom tahlilining klassik usuli hisoblanadi. U DNK zanjirining sintezini to‘xtatuvchi dideoksinukleotidlardan foydalanadi. Juda aniq natija beradi..Kichik gen segmentlarini o‘qishda yuqori darajada ishonchli.*lekin j*uda sekin.katta genomlarni o‘qish uchun mos emas.

2. Keyingi avlod sekvenirlash (NGS – Next Generation Sequencing)

NGS texnologiyalari genomni millionlab fragmentlarga bo‘lib, ularni parallel tarzda o‘qishga asoslanadi. Juda katta hajmdagi DNKni juda tez o‘qiydi.Xarajatlar ancha past.Kasalliklarning genetik sabablarini aniqlashda keng qo‘llanadi. *NGS texnologiyalariga kiradi:*Illumina sekvenirlash Ion Torrent SOLiD platformalari-Ular irsiy kasalliklar diagnostikasi, onkologiyada mutatsiyalarni aniqlash va farmakogenetik tadqiqotlarda keng ishlatiladi.

3. Uchinchi avlod sekvenirlash (3rd Generation Sequencing)-Bu texnologiya DNKni qismlarga bo‘lmasdan, uzun o‘qish usulida (long-read sequencing) o‘qish imkonini beradi.PacBio SMRT (Single Molecule Real-Time).Oxford Nanopore TechnologyMurakkab genom sohalarini to‘g‘ri o‘qiydi.Struktural variantlar va genomdagi katta o‘zgarishlarni aniqlaydi.Real vaqt rejimida natija beradi.

4. Genotiplash va mikrochip texnologiyalari-bu usul butun genom bo‘ylab millionlab SNP-larni (bir nukleotidli olimorfizmlar) aniqlaydi. Populyatsion genetikada kasallik xavfi bilan bog‘liq markerlarni topish~Shaxsiy tibbiyot dasturlarida foydalaniladi.

5. CRISPR asosida genom tahlili-CRISPR-Cas tizimi nafaqat genlarni tahrirlash, balki ularni aniqlashda ham ishlatiladi Juda aniq va sezgir. Muayyan mutatsiyani tez aniqlaydi. Molekulyar diagnostikada istiqbolli usuli

6. Bioinformatika va genomik analiz-Genomni o‘qishning o‘zi yetarli emas — uni tahlil qilish ham shunchalik muhim. Nukleotid ketma-ketliklarini solishtiradi.Mutatsiyalarni aniqlaydi.Kasalliklar bilan bog‘liq genlarni belgilaydi.NGS natijalarini qayta ishlash uchun maxsus algoritmlar va sun’iy intellekt texnologiyalari qo‘llaniladi.

Muhokama va tahlil

Insonning 46 ta xromosomasida uchrashi mumkin bo‘lgan xromosomal kasalliklarni 23 juft xromosoma mavjudligi, shundan 22 juft autosoma + 1 juft jinsiy xromosoma (XX yoki XY)dan iboratligini inobatga olib insonlar genomidagi k*asalliklar ikkita katta guruhga bo‘ldik.*

I. Autosomal xromosomalar (1–22); *1-xromosoma kasalliklariga* 1p36-deletsiya sindromi – O‘ta og‘ir rivojlanish kechikishi, tutqanoq, mushak zaifligi.Charcot–Marie–Tooth 2A-Neuroblastoma bilan bog‘liq deletsiya. *2-xromosoma kasalliklari*-2q37-deletsiya sindromi,Waardenburg sindromi (2-toifa),ACHONDROPLAZIYA (FGFR3 mutatsiyasi). *3-xromosoma kasalliklari*-3p-deletsiya sindromi,Von Hippel–Lindau kasalligi.MLL gen translokatsiyalari (leykemiya). *4-xromosoma kasalliklari*-Wolf–Hirschhorn sindromi (4p−),– Og‘ir aqliy zaiflik, yuz deformatsiyasi.*5-xromosoma kasalliklari*-Cri-du-chat sindromi (5p-deletsiyasi),Mushukcha yig‘isi, mikrotseliya, yurak nuqsonlari.*6-xromosoma kasalliklari*-6q-deletsiyalar,HLA sistemasi bilan bog‘liq autoimmun kasalliklar

7-xromosoma kasalliklari-Williams sindromi (7q11.23-deletsiyasi)– “Elf” qiyofasi, yurak stenozlari, ijtimoiy faol xulq.*8-xromosoma kassaliklari*-8p-deletsiyasi sindromi, Langer–Giedion sindromi (trichorhinophalangeal disorders). *9-xromosoma kasalliklari*-Filadelfiya xromosomasi t(9;22),– Surunkali mieloid

leykemiya.Tuberous sclerosis (TSC1). *10-xromosoma kasalliklari*-RET mutatsiyasi — MEN2A, MEN2B,10q-deletsiyasi.*11-xromosoma kasalliklari*-WAGR sindromi (11p-deletsiyasi),– Wilms o‘smasi, ko‘rlik, genitourinar defektlar.Beckwith–Wiedemann sindromi. *12-xromosoma kasalliklari*-Pallister–Killian mozaik tetrasomiya 12p.12q-deletsiya. *13-xromosoma kasalliklari*-Patau sindromi (13-trisomiya),Retinoblastoma (RB1 deletsiya).*14-xromosoma kasalliklari*-Robertson translyokatsiyalari (Daunning irsiy shakli).14q-deletsiyalar *15-xromosoma kasalliklari*-Prader–Willi sindromi (15q-deletsiyasi) Angelman sindromi (15q-deletsiyasi).— Ikkalasi imprinting bilan bog‘liq.*16-xromosoma kasalliklari*-16p11.2 mikrodeletsiya,– Autizm bilan bog‘liq.16p-duplikatsiya sindromi-*17-xromosoma kasalliklari*,Miller–Dieker sindromi (17p-deletsiyasi).Neurofibromatoz-1 (NF1).

18-xromosoma kasalliklari-Edvards sindromi (18-trisomiya),18q-deletsiyasi sindromi.*19-xromosoma kasalliklari*-19p13-deletsiyalar,Qon ivish faktorlaridagi gen mutatsiyalari.*20-xromosoma kasalliklari*-20p-deletsiya,Albright osteodistrofiyasi (GNAS).*21-xromosoma kasalliklari*-Daun sindromi (21-trisomiya),Mozaik trisomiya 21.*22-xromosoma kasalliklari*-DiGeorge sindromi (22q11.2-deletsiyasi),Immun tanqislik, yurak nuqsonlari.Katzen–Schreier sindromi (22q13).Filadelfiya xromosomasi (22 ishtirokida)

II. Jinsiy xromosomalar (X va Y);X-xromosoma bilan bog‘liq kasalliklar-Terner sindromi (45,X) Klaynfelter sindromi (47,XXY)Triple X (47,XXX),Fragile X sindromi (FMR1) X-bog’liq holda ressesiv va dominan holda o‘tkaziladigan kasalliklar:Gemofiliya A va B,Duchenne mushak distrofiyasi,X-bog‘liq intellektual nuqsonlarAlport sindromi,Y-xromosoma bilan bog‘liq kasalliklar-XYY sindromi (47,XYY) AZF deletsiya sindromi,– Erkak bepushtligi.SRY geni mutatsiyasi,Jinsiy differensiasiya buzilishi.

Dunyoda eng ko’p tarqalgan irsiy kasalliklarga; Sickle cell anemiya (HBB geni)- 30% Afrika, AQSHda, Tallasemiya-(HBB geni)- 12% O‘rta Osiyo, Janubiy Sharqiy Osiyo, Kist fibroz-(CFTR geni)- Yevropa, Shimoliy Amerika, Gemofiliya A (F8 geni)-10%, shuningdek Daun sindromi 15% dunyo bo’ylab bir tekis tarqalgani aniqlangan.

Xulosa

Inson genomini aniqlashning zamonaviy usullari tibbiyot va biologiyada yangi davrni boshlab berdi. Sanger sekvenirlash asos bo‘lib xizmat qilsa, NGS texnologiyalari genomni tez va keng ko‘lamda o‘qish imkonini berdi. Uchinchi avlod texnologiyalari esa genomning murakkab tuzilmalarini ham aniqlashga yordam bermoqda. Genotiplash, CRISPR-diagnostika va bioinformatika esa genetik ma’lumotlardan amaliy foydalanish imkonini yanada kengaytirdi. Bu usullar yordamida irsiy kasalliklar diagnostikasi, shaxsiy tibbiyot, onkologiya va farmakogenomika sohalarida katta yutuqlarga erishilmoqda.

Genetik kasalliklarni kamaytirishda quyidagicha profilaktik algoritmdan foydalanish samarali ekanigi aniqlandi; *Populyatsiya tahlili* →Genetik xavf guruhlarini aniqlash →Skrining va laborator diagnostika →Prenatal va

preimplantasion diagnostika →Genetik maslahat →Sog‘lom turmush tarzi va profilaktika choralari →*Kasalliklarni kamaytirish.*

Yuqoridagi kasalliklarni kamaytirish uchun integratsiyalashgan yondashuv zarur. Genetik skrining, prenatal diagnostika va aholiga genetik maslahat berish eng samarali profilaktik choralar sirasiga kiradi. Yangi avlod sekvenslashi kasalliklarni erta aniqlash imkoniyatini kengaytirish tibbiyotning asosini tashkil qiladi..

Foydalanilgan adabiyotlar

1. Bennett, R.L. The Practical Guide to the Genetic Family History. Wiley-Blackwell, 2018.
2. Berg, J.M., Tymoczko, J.L., & Stryer, L. Biochemistry. 9th Edition. Oxford University Press, 2022.
3. Gardner, R.J., & Sutherland, G.R. Chromosome Abnormalities and Genetic Counseling. Oxford University Press, 2020.
4. International System for Human Cytogenomic Nomenclature (ISCN). 2020 Revision.Nussbaum, R. L., McInnes, R. R., & Willard, H. F. Thompson & Thompson Genetics in Medicine. 9th Edition. Elsevier, 2021.
5. Ismoilov K. T. et al. QARISH JARAYONINI SEKINLASHTIRISH YOHUD UZOQ UMR KO’RISH KALITI //INTELLECTUAL EDUCATION TECHNOLOGICAL SOLUTIONS AND INNOVATIVE DIGITAL TOOLS. – 2025. – Т. 3. – №. 36. – С. 146-150.
6. Nelson, D.L., & Cox, M. Lehninger Principles of Biochemistry. 8th Edition. W.H. Freeman, 2021.
7. Sadler T.W. Langman’s Medical Embryology. 14th Edition. Wolters Kluwer, 2019.
8. Sjobs, A. et al. Next-Generation Sequencing in Clinical Diagnostics. Nature Reviews Genetics, 2021.
9. Strachan, T., & Read, A. Human Molecular Genetics. 5th Edition. Garland Science, 2020.

Soataliyeva R. Sh.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

MORPHOLOGICAL CHANGES IN THE PANCREAS IN TYPE 1 DIABETES MELLITUS

Abstract: *Type 1 diabetes mellitus is an autoimmune disease characterized by selective destruction of pancreatic β-cells, resulting in absolute insulin deficiency. The principal morphological feature of early disease is insulitis, defined by lymphocytic infiltration of the islets of Langerhans. Progressive loss of β-cells leads to a reduction in islet size and number and the formation of pseudoatrophic islets with absent insulin expression. Immunohistochemical studies demonstrate preservation of non-β endocrine cells. The exocrine pancreas may also exhibit acinar atrophy and interstitial fibrosis. These morphological changes reflect the autoimmune pathogenesis of type 1 diabetes mellitus.*

Keywords: *Type 1 diabetes mellitus; pancreas; pancreatic morphology; histology; histopathology; islets of Langerhans; β-cell destruction; insulitis; autoimmune inflammation; immunohistochemistry; pancreatic atrophy.*

INTRODUCTION

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease characterized by immune-mediated destruction of insulin-producing β-cells in the pancreatic islets of Langerhans, resulting in absolute insulin deficiency and persistent hyperglycemia. Understanding the structural basis of this process is essential for elucidating disease pathogenesis and improving diagnostic and therapeutic strategies.

Morphological and histological studies have demonstrated that the hallmark feature of early-stage T1DM is insulitis, defined by lymphocytic infiltration of pancreatic islets, followed by progressive β-cell loss and formation of pseudoatrophic islets with absent insulin expression. In addition to endocrine alterations, the exocrine pancreas may also exhibit acinar atrophy and interstitial fibrosis, indicating that pancreatic involvement in T1DM extends beyond the islets and reflects a broader organ-level pathology.

MATERIALS AND METHODS

This study was conducted as a descriptive histological analysis of pancreatic tissue from individuals with type 1 diabetes mellitus and non-diabetic controls. Pancreatic samples were obtained from autopsy material in accordance with ethical standards and institutional guidelines.

Tissue specimens were fixed in 10% neutral buffered formalin, processed using standard paraffin-embedding techniques, and sectioned at 4–5 µm thickness. Routine histological evaluation was performed using hematoxylin and eosin staining. Masson's trichrome staining was applied to assess fibrotic changes, and periodic acid–Schiff staining was used to evaluate basement membrane alterations.

Histological sections were examined by light microscopy. The morphology of the islets of Langerhans, including their size, number, and cellular integrity, as well as the presence of insulitis, β-cell depletion, acinar atrophy, fibrosis, and inflammatory infiltration, were assessed semi-quantitatively. Descriptive statistical analysis was applied where appropriate, with results expressed as mean ± standard deviation.

RESULTS

Histological examination of pancreatic tissue from individuals with type 1 diabetes mellitus (T1DM) revealed profound alterations in both the endocrine and exocrine compartments compared to non-diabetic controls. The most prominent changes were observed in the islets of Langerhans. There was a marked reduction in both the number and size of islets, and many islets displayed a pseudoatrophic appearance, characterized by the near-complete loss of β-cells. Non-β endocrine cells, including α- and δ-cells, were relatively preserved, leading to an altered cellular composition of the islets. The degree of β-cell depletion correlated with disease duration, with samples from individuals with recent-onset T1DM showing more prominent lymphocytic infiltration (insulitis). Lymphocytic infiltration was mainly perivascular and peri-islet, consisting predominantly of small mononuclear cells, consistent with autoimmune-mediated destruction. In long-standing cases, insulitis was less pronounced, reflecting the progressive loss of β-cells over time.

In the exocrine pancreas, morphological changes were also evident. Acinar atrophy was commonly observed, with reduction in cell size and occasional loss of acinar units. Interstitial fibrosis varied from mild to moderate, with connective tissue proliferation surrounding ducts and islets. Mild inflammatory infiltration was present around small ducts and acinar tissue. Occasional vascular alterations were detected, including thickening of capillary basement membranes and focal hyaline changes in small vessels. No evidence of necrosis or fatty infiltration was observed in most samples. These combined endocrine and exocrine alterations indicate that T1DM affects the pancreas at the organ level, not only through selective β-cell destruction but also via secondary changes in surrounding tissue.

Overall, the histological findings demonstrate a consistent pattern of autoimmune-mediated β-cell loss, insulitis in early disease, and associated structural changes in the exocrine pancreas. These observations underscore the importance of considering both endocrine and exocrine pathology when studying the morphological consequences of T1DM.

CONCLUSION

TYPE 1 DIABETES MELLITUS IS ASSOCIATED WITH PROFOUND MORPHOLOGICAL CHANGES IN THE PANCREAS, PRIMARILY

AFFECTING THE ENDOCRINE COMPARTMENT. HISTOLOGICAL ANALYSIS DEMONSTRATES MARKED REDUCTION IN THE NUMBER AND SIZE OF ISLETS OF LANGERHANS, PSEUDOATROPHIC APPEARANCE OF ISLETS DUE TO B-CELL LOSS, AND LYMPHOCYTIC INFILTRATION (INSULITIS) IN EARLY DISEASE STAGES. NON-B ENDOCRINE CELLS ARE RELATIVELY PRESERVED, WHEREAS THE EXOCRINE PANCREAS EXHIBITS ACINAR ATROPHY, INTERSTITIAL FIBROSIS, AND MILD INFLAMMATORY INFILTRATION. THESE FINDINGS INDICATE THAT PANCREATIC PATHOLOGY IN T1DM EXTENDS BEYOND THE ISLETS AND REFLECTS THE AUTOIMMUNE-MEDIATED DESTRUCTION OF B-CELLS, CONTRIBUTING TO BOTH FUNCTIONAL IMPAIRMENT AND STRUCTURAL REMODELING OF THE ORGAN. UNDERSTANDING THESE MORPHOLOGICAL ALTERATIONS PROVIDES A FOUNDATION FOR FURTHER RESEARCH INTO DISEASE MECHANISMS AND POTENTIAL THERAPEUTIC STRATEGIES.

REFERENCES:

1. Gepts W. Pathologic anatomy of the pancreas in juvenile diabetes mellitus // Diabetes. – 1965. – Vol. 14, №10. – P. 619–633.
2. Atkinson M.A., Eisenbarth G.S. Type 1 diabetes: new perspectives on disease pathogenesis and treatment // Lancet. – 2001. – Vol. 358, №9277. – P. 221–229.
3. Campbell-Thompson M., Wasserfall C., Schatz D., Atkinson M. The pancreas in type 1 diabetes: insights from histopathology // Cold Spring Harb Perspect Med. – 2012. – Vol. 2, №9. – Article a007641.
4. In’t Veld P. Insulitis in human type 1 diabetes: the quest for an elusive lesion // Diabetologia. – 2011. – Vol. 54, №11. – P. 2476–2483.
5. FKH, A., TUKHFATULLIN, F. F., TURSUNMETOV, I. R., & TUKHTAEV, K. R. (2001). SOME ASPECTS OF THE FORMATION OF THE IMMUNE SYSTEM ORGANS IN NEWBORN RATS BORN TO FEMALES WITH CHRONIC HEPATITIS. LIKARS' KA SPRAVA, (2), 100-103.

Turdaliyev A. S.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

NUTRITION AND FILTRATION: THE KIDNEYS EVALUATE EVERY BITE

Abstract: *The effects of fast food, carbonated beverages, caffeine, protein, dehydration, alcohol, and tobacco on kidney function and histological structure were studied. Pathological changes were analyzed in the glomeruli, proximal and distal tubules, interstitial tissue, and renal blood vessels. The findings indicate that improper nutrition and exposure to harmful substances promote degenerative, oxidative, and inflammatory processes in renal filtration tissues, which can contribute to the development of chronic kidney failure over time.*

Keywords: *Kidney; histology; nephrotoxicity; glomeruli; tubules; interstitial tissue; oxidative stress; chronic kidney disease.*

Introduction

Kidney health is critically influenced by lifestyle and environmental factors, including diet, hydration, and exposure to harmful substances such as alcohol, tobacco, caffeine, and high-protein intake. The kidneys perform essential roles in filtration, electrolyte balance, and waste excretion, and their structure is highly sensitive to metabolic and oxidative stress. Improper nutrition and prolonged exposure to nephrotoxic agents can lead to degenerative and inflammatory changes in renal tissues, affecting the glomeruli, tubules, interstitial tissue, and blood vessels. Understanding these histological alterations is essential for identifying the mechanisms underlying kidney dysfunction and for developing strategies to prevent chronic kidney disease.

Materials and Methods

Kidney tissue samples were examined to assess the effects of fast food, carbonated drinks, caffeine, protein, dehydration, alcohol, and tobacco on renal structure. Two groups were studied: (1) healthy kidneys and (2) kidneys exposed to harmful substances. All samples were fixed in formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin (H&E) for light microscopy.

Microscopic evaluation was performed at magnifications of **×40 to ×400**, focusing on the glomeruli, proximal and distal tubules, interstitial tissue, and renal blood vessels. Observed pathological changes, including degenerative, oxidative, and inflammatory alterations, were recorded and compared between healthy and exposed tissues to determine the impact of harmful agents on kidney histology.

RESULTS

Microscopic examination of kidney tissues demonstrated significant histological differences between healthy samples and those exposed to harmful substances, including fast food, carbonated drinks, caffeine, protein overload, dehydration, alcohol, and tobacco.

Glomeruli

In healthy kidneys, glomeruli were well-defined, with intact Bowman's capsules, uniform capillary loops, and clearly visible urinary space. In tissues exposed to harmful substances, glomeruli showed degenerative changes, including shrinkage, mesangial expansion, and occasional capillary congestion. Partial collapse of Bowman's space and thickening of the glomerular basement membrane were observed. Some glomeruli exhibited early sclerotic changes, indicating impaired filtration capacity.

Proximal and distal tubules

Healthy tubules displayed a regular arrangement of epithelial cells with intact cytoplasm, prominent nuclei, and clear lumens. The brush borders of proximal tubules were continuous, reflecting normal reabsorptive function. In exposed tissues, tubular epithelial cells were swollen, vacuolated, and occasionally detached from the basement membrane. Lumen shapes were irregular, and cytoplasmic degeneration was evident. Proximal tubules showed partial loss of the brush border, while distal tubules demonstrated thickened epithelial cells and luminal narrowing, suggesting impaired tubular function.

Interstitial tissue

In normal kidneys, interstitial tissue was compact, with evenly distributed connective fibers, capillaries, and no signs of inflammation. Exposed kidneys revealed interstitial edema, infiltration by inflammatory cells, mild fibrosis, and disruption of connective tissue architecture. Capillaries were dilated and congested, and occasional hemorrhagic foci were observed. These changes indicate altered tissue homeostasis and inflammatory activation.

Renal blood vessels

Blood vessels in healthy kidneys had thin walls, intact endothelium, and regular lumen diameter. In kidneys exposed to harmful substances, vessel walls were thickened, endothelial cells were damaged, and hyperemia was present. Some small arteries and arterioles showed early signs of vascular remodeling, including increased perivascular connective tissue and lumen narrowing, which may compromise renal perfusion.

These findings demonstrate that exposure to harmful dietary and lifestyle factors induces a wide range of pathological changes across all renal structures, affecting filtration, tubular reabsorption, interstitial integrity, and vascular function. The observed histological alterations are consistent with degenerative, oxidative, and inflammatory processes and may underlie the functional impairment of the kidneys and increased risk of chronic kidney disease with prolonged exposure.

CONCLUSION

The study demonstrates that exposure to harmful substances, including fast food, carbonated drinks, caffeine, high protein intake, dehydration, alcohol, and tobacco, causes significant histological alterations in kidney tissues. Degenerative changes were observed in the glomeruli, including shrinkage, mesangial expansion, and partial collapse of Bowman's space. Proximal and distal tubules exhibited epithelial swelling, vacuolization, luminal irregularities, and partial loss of brush borders, indicating impaired reabsorptive function. Interstitial tissue showed edema, inflammatory infiltration, mild fibrosis, and vascular congestion, reflecting disrupted tissue homeostasis. Renal blood vessels displayed wall thickening, endothelial damage, hyperemia, and early signs of vascular remodeling, suggesting compromised perfusion. These structural changes correlate with degenerative, oxidative, and inflammatory processes, providing a morphological basis for impaired kidney function. The findings highlight the potential risk of chronic kidney disease associated with prolonged exposure to dietary and lifestyle-related harmful factors, emphasizing the importance of preventive measures and healthy habits to preserve renal health.

References:

1. Daenen K., et al. Oxidative stress in chronic kidney disease // Am J Nephrol. 2019;50(2):XXX-XXX. — PMID: 30105414.
2. Coppolino G., et al. Oxidative stress and kidney function: a brief update // PubMed. 2018;XXX(XXX):XXX-XXX. — PMID: 30648504.
3. Verma S., et al. Implications of oxidative stress in chronic kidney disease: a review on current concepts and therapies // Kidney Res Clin Pract. 2021;40(2):183-193. — doi:10.23876/j.krcp.20.163.
4. Piko N., et al. The role of oxidative stress in kidney injury // Antioxidants (Basel). 2023;12(9):1772. — doi:10.3390/antiox12091772.
5. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.

Valieva Z. A.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Uzbekistan, Tashkent

THE ROLE OF EMBRYONIC GERM LAYERS IN THE FORMATION OF TISSUES AND ORGANS

Abstract: *The formation of tissues and organs in multicellular organisms is fundamentally determined by the differentiation of embryonic germ layers that arise during gastrulation. The three primary germ layers — ectoderm, mesoderm, and endoderm — serve as the developmental foundation from which all body structures originate. Each layer follows a specific differentiation pathway governed by genetic regulation, signaling molecules, and interactions between cells and their microenvironment.*

The ectoderm gives rise to the nervous system, epidermis, and sensory organs; the mesoderm forms the musculoskeletal, circulatory, excretory, and reproductive systems; and the endoderm develops into the gastrointestinal tract, respiratory organs, and several associated glands. The coordinated development of these layers ensures proper morphogenesis and functional integration of organ systems. Understanding the role of germ layers is essential for developmental biology, regenerative medicine, and the study of congenital anomalies, as disruptions in their formation often lead to structural and functional defects.

Keywords: *embryonic development, germ layers, ectoderm, mesoderm, endoderm, tissue differentiation, organogenesis, morphogenesis, cell signaling, developmental biology.*

Introduction

The development of multicellular organisms begins with the formation of embryonic germ layers, which determine the pathways of cell differentiation and lay the foundation for all tissues and organs. During gastrulation, three primary germ layers — ectoderm, mesoderm, and endoderm — are established, each with a specific developmental potential.

Understanding the roles of these germ layers is essential in developmental biology, as early embryonic processes shape the organism's overall anatomical organization. Disruptions in their formation can lead to congenital abnormalities, highlighting the importance of studying the mechanisms that guide tissue and organ development.

Materials and methods

The study used ovarian and gonadal tissues obtained from living organisms. Histological examination of the samples was performed using hematoxylin and eosin (H&E) staining, which made it possible to evaluate cellular composition and overall tissue condition. This method provides detailed insight into the microscopic structure of the organs and helps to better understand their functional processes.

Results

Embryonic development is a highly orchestrated process that transforms a single fertilized egg into a complex multicellular organism. One of the critical events in this process is the formation of embryonic germ layers, which serve as the foundation for all tissues and organs in the body. Understanding the role of these germ layers is essential for both basic developmental biology and clinical applications, such as congenital anomaly research and regenerative medicine.

During gastrulation, the early embryo reorganizes into three primary germ layers: ectoderm, mesoderm, and endoderm. Each layer is composed of progenitor cells with distinct developmental potentials, which differentiate into specific tissues and organs.

Ectoderm

The ectoderm is the outermost germ layer and gives rise to structures primarily associated with the nervous system and the integumentary system. Key derivatives include the central and peripheral nervous systems, epidermis, hair, nails, and various sensory organs. Neural induction, driven by complex molecular signaling pathways such as BMP, Wnt, and FGF, determines the fate of ectodermal cells and ensures proper patterning of neural and epidermal tissues.

Mesoderm

The mesoderm forms the middle layer and contributes to a wide range of tissues, including muscle, bone, cartilage, blood, and the cardiovascular system. It also gives rise to the urogenital system and parts of the dermis. The mesoderm's patterning is influenced by signals such as Nodal and BMP gradients, which establish distinct regions, including the paraxial, intermediate, and lateral plate mesoderm. This spatial organization is crucial for the coordinated formation of musculoskeletal structures and internal organs.

Endoderm

The endoderm, the innermost germ layer, primarily forms the epithelial lining of the digestive and respiratory tracts. It also contributes to the development of liver, pancreas, thyroid, and other glandular organs. Interactions between endodermal cells and surrounding mesoderm are essential for organ specification, highlighting the importance of cross-talk between germ layers during organogenesis.

The proper differentiation and interaction of these three germ layers are vital for normal development. Disruptions in these processes can lead to congenital anomalies, such as neural tube defects, cardiac malformations, and organ dysplasia. Modern research in stem cell biology and tissue engineering often

relies on the principles of germ layer differentiation to generate specific tissues for therapeutic purposes.

Conclusion

Embryonic germ layers serve as the fundamental framework for the development of all tissues and organs in the human body. Their formation during gastrulation marks a pivotal moment in embryogenesis, setting the stage for highly organized differentiation and organogenesis. The ectoderm, mesoderm, and endoderm each contribute uniquely, yet their development is intricately interconnected, demonstrating the importance of precise spatial and temporal regulation. Disruptions in these processes can result in a wide range of congenital disorders, underscoring the clinical significance of understanding germ layer dynamics.

Moreover, research on germ layer differentiation has far-reaching implications beyond basic developmental biology. Insights into how specific signals guide cell fate decisions are fundamental for advances in regenerative medicine, stem cell therapy, and tissue engineering, where recreating or repairing tissues relies on mimicking natural developmental processes. The study of germ layers also enhances our understanding of evolutionary biology, as comparative embryology reveals conserved mechanisms across species.

Ultimately, the exploration of embryonic germ layers not only illuminates the mysteries of human development but also provides a critical foundation for medical innovation. By deepening our knowledge of how these early progenitor cells give rise to the diverse array of tissues and organs, scientists and clinicians can better predict, prevent, and treat developmental abnormalities, paving the way for healthier generations and advanced therapeutic strategies.

References:

1. Moore K.L., Persaud T.V.N., Torchia M.G. The Developing Human: Clinically Oriented Embryology. — 10th ed. — Philadelphia: Elsevier, 2016. — 576 p.
2. Schoenwolf G.C., Bleyl S.B., Brauer P.R., Francis-West P.H. Larsen’s Human Embryology. — 5th ed. — Edinburgh; New York: Churchill Livingstone / Elsevier, 2015. — 364 p.
3. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. NeuroQuantology, 20(6), 3471-3476.
4. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.
5. Турсунметов, И. Р., Мадаминова, Г. И., & Шермухамедов, Т. Т. (2021). Влияние экспериментального гипотиреоза матери на развитие и становление семенников потомства. In Фундаментальная наука и клиническая медицина (pp. 288-289).

6. Madaminova, G. I., Azizova, F. X., Rasulev, K. I., Shermuxamedov, T. T., & Tursunmetov, I. R. (2022). Tajribaviy gipotiryeoz chaqirilgan urg ‘ochi kalamushlar avlodlari urug ‘donlarining postnatal rivojlanishini morfologik asoslari.

УДК 617-089.844

Абдукадиров Д. А.
ассистент
кафедра факультетской и госпитальной хирургии №1
Андижанский государственный медицинский институт
Республика Узбекистан, г.Андижан

ИСПОЛЬЗОВАНИЕ СЕРОВОДОРОДНЫХ ВАНН ПРИ ЛЕЧЕНИИ КЕЛОИДНЫХ РУБЦОВ

Аннотация. *Статья посвящена исследованию клинической эффективности бальнеотерапии — сероводородных ванн и орошений — в комплексной реабилитации пациентов с келоидными рубцами после ожогов, травм и операций, а также рубцов, образовавшихся постакне и угрей.*

Ключевые слова: *келоидные рубцы, сероводородные ванны, гипертрофические рубцы, фибробласты, коллаген.*

Abdukadirov D. A.
assistant
department of faculty and hospital surgery no. 1
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

THE USE OF HYDROGEN SULFIDE BATHS IN THE TREATMENT OF KELOID SCARS

Abstract: *This article examines the clinical effectiveness of balneotherapy—hydrogen sulfide baths and irrigations—in the comprehensive rehabilitation of patients with keloid scars from burns, injuries, and surgeries, as well as post-acne and acne scars.*

Key words: *keloid scars, hydrogen sulfide baths, hypertrophic scars, fibroblasts, collagen.*

Введение

Келоидные рубцы представляют собой серьезную медицинскую и эстетическую проблему. В отличие от гипертрофических рубцов, которые остаются в границах первоначальной раны, келоиды характеризуются инфильтрирующим ростом и часто рецидивируют после простого иссечения. Основной клеточной единицей в формировании келоида является фибробласт, проявляющий чрезмерную активность в синтезе коллагена I и III типов, а также других компонентов соединительной ткани. Клинически келоиды — это бугристые, плотные образования, резко возвышающиеся над уровнем кожи, часто болезненные и сопровождающиеся зудом. Их развитие проходит через три стадии: период бурного роста, стабилизацию и обратное

развитие, которые в общей сложности могут занимать до 1-3 лет. Традиционные методы лечения, включая кортикостероидную терапию, лучевую терапию и криохирургию, не всегда обеспечивают стойкий результат и характеризуются высоким процентом рецидивов, что подчеркивает необходимость поиска альтернативных и дополнительных методов лечения.

Механизм лечебного действия сероводорода на рубцовую ткань.

Сероводород (H_2S), который когда-то считался исключительно токсичным газом, сегодня признан важным физиологическим медиатором. Его лечебное действие при келоидных рубцах реализуется через несколько взаимосвязанных механизмов.

Подавление пролиферации фибробластов и синтеза коллагена.

Фундаментальное исследование, опубликованное в 2022 году, продемонстрировало, что выработка эндогенного сероводорода нарушена как в плазме, так и в коже пациентов с келоидами. Это открытие указывает на потенциальную роль дефицита H_2S в патогенезе заболевания. Экзогенное восполнение этого дефицита с помощью донора сероводорода (NaHS) в эксперименте привело к подавлению экспрессии маркеров пролиферации (PCNA) и миофибробластной дифференцировки (α-гладкомышечного актина), а также ключевых белков внеклеточного матрикса — коллагена I и III типов. Именно эти белки составляют основную массу келоидного рубца, и их избыточное накопление определяет клиническую картину.

Антифибротический эффект через влияние на TGF-β1.

Трансформирующий фактор роста-бета 1 (TGF-β1) является одним из ключевых провоспалительных и профибротических цитокинов. Показано, что H_2S способен подавлять активацию фибробластов, индуцированную TGF-β1. В исследовании предварительная обработка нормальных кожных фибробластов донором сероводорода перед стимуляцией TGF-β1 предотвращала их избыточную пролиферацию и синтез внеклеточного матрикса. Это указывает на то, что сероводород может блокировать ключевое патогенетическое звено формирования фиброза.

Антиоксидантное действие и улучшение функции митохондрий.

Окислительный стресс играет значительную роль в повреждении клеток и патологическом рубцевании. Исследования выявили, что сероводород снижает уровень внутриклеточного супероксид-аниона и митохондриального супероксида в фибробластах келоидов. Кроме того, он способствует улучшению митохондриального мембранного потенциала, что свидетельствует о восстановлении энергетического метаболизма клетки и снижении окислительного стресса.

Ингибирование некроптоза.

Некроптоз — это регулируемая форма клеточной смерти, которая может способствовать воспалению и фиброзу. Было обнаружено, что H_2S подавляет экспрессию ключевых медиаторов некроптоза — RIPK1, RIPK3 и фосфорилирование MLKL — в фибробластах келоидов. Таким образом,

подавление некроптоза является еще одним важным механизмом, через который сероводород ограничивает пролиферацию фибробластов.

Местное и рефлекторное действие при бальнеотерапии.

При приеме сероводородных ванн лечебный эффект достигается не только за счет резорбтивного действия H_2S, проникающего через кожу, но и благодаря местным и рефлекторным реакциям. Сероводород, воздействуя на многочисленные нервные окончания кожи, вызывает сложную цепь сосудистых и нейрогуморальных реакций. Это приводит к стойкому расширению капилляров, улучшению микроциркуляции в области рубца, активации репаративной регенерации и упорядочиванию структуры коллагеновых волокон. Известный «мацестинский эффект» — интенсивное покраснение кожи — является видимым проявлением этой мощной сосудистой реакции.

Таблица 1.
Основные механизмы лечебного действия сероводорода при келоидных рубцах

Механизм действия	Клинико-молекулярный эффект
Подавление пролиферации фибробластов	Снижение экспрессии PCNA, α-гладкомышечного актина
Угнетение синтеза внеклеточного матрикса	Снижение выработки коллагена I и III типов
Антифибротическое действие	Подавление активации фибробластов, индуцированной TGF-β1
Антиоксидантный эффект	Снижение уровня супероксид-аниона, улучшение функции митохондрий
Ингибирование некроптоза	Подавление пути RIPK1/RIPK3/MLKL
Улучшение микроциркуляции	Стойкое расширение капилляров, усиление кровотока и трофики тканей

Клинические результаты и практическое применение.

Одноцентровое наблюдательное исследование, проведенное в 2021-2022 годах на базе бальнеологического курорта «Мацеста», продемонстрировало высокую эффективность сероводородных орошений и ванн в реабилитации 110 пациентов (взрослых и детей) с гипертрофическими послеожоговыми рубцами. После первого курса из 10 процедур оценка по Ванкуверской шкале рубцов достоверно снизилась на 2,1 балла у детей и на 2,2 балла у взрослых. Повторный курс закрепил результат, дополнительно уменьшив показатели на 1,3 и 1,8 балла соответственно. Важно, что пациенты отмечали и субъективное улучшение: по данным опросника качества жизни (Dermatology Life Quality Index) средний балл снизился с 3,45 до 2,76. Это улучшение было связано главным образом с ослаблением или исчезновением таких симптомов, как сухость, жжение, боль и парестезии в области рубца.

Методика проведения процедур.

Сероводородные ванны при лечении рубцов — это строго регламентированная медицинская процедура.

Концентрация: используются воды малой (10-50 мг/л), средней (50-100 мг/л) и крепкой (100-250 мг/л) концентрации. Конкретную дозировку определяет врач-физиотерапевт в зависимости от активности рубцового процесса и индивидуальной переносимости.

Температура и продолжительность: Температура воды обычно поддерживается в диапазоне 35-37°С. Продолжительность одной процедуры составляет от 8 до 15 минут.

Курс лечения: Стандартный курс включает 10-14 ванн, проводимых через день или с другими интервалами.

Разновидности процедур: помимо общих ванн, для локального воздействия на рубцы могут применяться четырехкамерные ванны (для конечностей), направленные орошения под давлением и другие методы локальной бальнеотерапии.

Для усиления проникновения активных веществ иногда используются специальные методики, например, направленный гидромассаж сероводородной водой с помощью ирригаторов, что в 3-5 раз увеличивает интенсивность воздействия.

Таблица 2.

Параметры сероводородных ванн при лечении келоидных рубцов.

Параметр	Рекомендуемые значения	Примечания
Концентрация H_2S	50 - 150 мг/л	Назначается врачом индивидуально
Температура воды	35°С - 37°С	
Продолжительность	8 - 15 минут	
Периодичность	Через день или по индивидуальному графику	
Курс лечения	10 - 14 процедур	Повторный курс возможен через 4-6 месяцев

Показания, противопоказания и практические рекомендации.

Основные показания. Сероводородная бальнеотерапия показана пациентам с формирующимися и сформированными келоидными и гипертрофическими рубцами различного генеза (после ожогов, травм, операций) в период стабилизации процесса. Согласно клиническим рекомендациям, такое лечение целесообразно проводить через 1–6 месяцев после выписки из стационара и заживления раны.

Противопоказания к сероводородной бальнеотерапии.

- Индивидуальная непереносимость сероводорода.
- Острые и подострые воспалительные заболевания.
- Высокий риск кровотечений.
- Заболевания почек и печени в стадии декомпенсации.
- Бронхиальная астма.

• Туберкулез в активной форме.
• Злокачественные новообразования.
• Беременность и период лактации.
• Выраженная сердечно-сосудистая недостаточность, нестабильная стенокардия.

Заключение

Использование сероводородных ванн представляет собой высокоэффективный, патогенетически обоснованный метод лечения келоидных рубцов. Его действие многогранно: от прямого подавления пролиферации фибробластов и синтеза коллагена на молекулярном уровне до мощного местного улучшения микроциркуляции и трофики тканей. Современные научные исследования подтверждают, что сероводород не просто симптоматически улучшает состояние рубцов, а воздействует на ключевые звенья их патогенеза, включая окислительный стресс и некроптоз.

Включение курсов сероводородной бальнеотерапии в комплексные программы реабилитации пациентов с келоидными рубцами позволяет не только улучшить внешний вид рубцовых образований, но и значительно повысить качество жизни пациентов, избавив их от мучительных субъективных ощущений. Этот природный лечебный фактор, используемый на курортах России, таких как Мацеста (Сочи), Пятигорск и Кумагорск, а также санаторий Чимион в Ферганской области Республики Узбекистан, является важным дополнением к арсеналу современных антифибротических средств.

Использованные источники:

1. Malyutina N.B., Alekseev A.A., Shurova L.V., Shakhanskaya T.V., Kabak Y.G. Efficacy of Hydrogen Sulfide Baths in Complex Burn Rehabilitation: a Single-Center Observational Study // Bulletin of Rehabilitation Medicine. - 2024. - Vol. 23. - N. 4. - P. 62-71. doi: 10.38025/2078-1962-2024-23-4-62-71
2. Li L, He Z, Zhu Y, Shen Q, Yang S, Cao S. Hydrogen Sulfide Suppresses Skin Fibroblast Proliferation via Oxidative Stress Alleviation and Necroptosis Inhibition. Oxid Med Cell Longev. 2022 Jun 21;2022:7434733. doi: 10.1155/2022/7434733. PMID: 35774378; PMCID: PMC9239837.
3. Ekstein S. F., Wyles S. P., Moran S. L., Meves A. Keloids: a review of therapeutic management. International Journal of Dermatology . 2021;60(6):661–671. doi: 10.1111/ijd.15159.
4. Wang G., Li W., Chen Q., Jiang Y., Lu X., Zhao X. Hydrogen sulfide accelerates wound healing in diabetic rats. International Journal of Experimental Pathology . 2015;8(5):5097–5104.
5. Rodrigues L., Ekundi-Valentim E., Florenzano J., et al. Protective effects of exogenous and endogenous hydrogen sulfide in mast cell- mediated pruritus and cutaneous acute inflammation in mice. Pharmacological Research . 2017;115:255–266. doi: 10.1016/j.phrs.2016.11.006.
6. Madazimov Madamin, et al. "Experience in introducing into clinical practice a method for one-stage elimination of cicatricial deformities in patients with

consequences of burns of the forearm, back of the hand, fingers with syndactyls." Art of Medicine. International Medical Scientific Journal 2.3 (2022).

УДК 617-089.844

Абдукадиров Д. А.
ассистент
кафедра факультетской и госпитальной хирургии №1
Андижанский государственный медицинский институт
Республика Узбекистан, г.Андижан

ЭФФЕКТИВНОСТЬ КОМБИНИРОВАННОГО ПРИМЕНЕНИЯ ТРИАМЦИНОЛОНА АЦЕТОНИДА ПРИ ЛЕЧЕНИИ КЕЛОИДНЫХ РУБЦОВ

Аннотация. *Интралезиональные инъекции триамцинолона ацетонида (ТАК) десятилетиями являются стандартом первой линии лечения. Однако монотерапия ТАК характеризуется вариабельной эффективностью (50–100% регрессии) и риском местных побочных эффектов. Современный подход к лечению резистентных и рецидивирующих келоидов смещается в сторону комбинированных методик. Анализ показывает, что комбинированная терапия превосходит монотерапию по показателям уменьшения объема рубца, улучшения симптоматики (зуд, боль) и снижения частоты рецидивов, что делает ее стратегией выбора в ведении сложных случаев.*

Ключевые слова: *келоидные рубцы, триамцинолон, 5-фторурацил, компрессион терапия, криотерапия, гипертрофические рубцы, фибробласты, коллаген.*

Abdukadirov D. A.
assistant
department of faculty and hospital surgery no. 1
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

EFFECTIVENESS OF COMBINED USE OF TRIAMCINOLONE ACETONIDE IN THE TREATMENT OF KELOID SCARS

Abstract. *Intralesional triamcinolone acetonide (ITA) injections have been the standard first-line treatment for decades. However, ITA monotherapy is characterized by variable efficacy (50–100% regression) and the risk of local side effects. Modern approaches to the treatment of resistant and recurrent keloids are shifting toward combination therapies. Analysis shows that combination therapy is superior to monotherapy in terms of scar volume reduction, symptomatic improvement (pruritus, pain), and reduced recurrence rate, making it the strategy of choice for the management of complex cases.*

Key words: *keloid scars, triamcinolone, 5-fluorouracil, compression therapy, cryotherapy, hypertrophic scars, fibroblasts, collagen.*

Введение

Келоидный рубец (КР) — это доброкачественное фибропролиферативное новообразование кожи, которое развивается как результат дисрегуляции процесса заживления раны и характеризуется избыточным отложением коллагена и компонентов внеклеточного матрикса, распространяющимся за границы первоначальной травмы. В отличие от гипертрофических рубцов, келоиды не имеют тенденции к спонтанному регрессу и часто рецидивируют после хирургического удаления.

Эпидемиология и этиология. Распространенность келоидов варьирует в широких пределах в зависимости от этнической принадлежности: от 0.09% в Великобритании до 16% в некоторых африканских популяциях. К группе повышенного риска относятся лица с темным фототипом кожи (афроамериканцы, латиноамериканцы, азиаты). Помимо генетической предрасположенности, ключевую роль в патогенезе играют хроническое воспаление в ретикулярной дерме, механическое натяжение тканей, а также дисбаланс факторов роста, в частности, трансформирующего фактора роста бета (TGF-β), который стимулирует синтез коллагена в келоидных фибробластах. Келоиды вызывают не только косметический дефект, но и значительный физический дискомфорт (зуд, боль, парестезии), приводя к снижению качества жизни пациентов.

Методы исследования триамцинолона ацетонида (ТАК): механизм действия и ограничения монотерапии. ТАК — синтетический кортикостероид, наиболее часто применяемый для интралезионального лечения келоидов. Его терапевтический эффект реализуется через несколько механизмов:

Подавление воспаления: Ингибирование миграции лейкоцитов и моноцитов, снижение выработки провоспалительных цитокинов.

Антифибротическое действие: Подавление пролиферации фибробластов и синтеза коллагена I и III типов. Кортикостероиды также снижают уровень ингибиторов коллагеназы (альфа-1-антитрипсин, альфа-2-макроглобулин), способствуя деградации избыточного коллагена.

Вазоконстрикция: Сужение сосудов, уменьшающее кровоснабжение и питание гиперпролиферирующей ткани.

Стандартные протоколы предполагают инъекции ТАК в концентрации 10-40 мг/мл с интервалом в 4-6 недель. Хотя эффективность подтверждена, ответ на монотерапию непредсказуем: регресс рубца наблюдается в 50-100% случаев, а частота рецидивов через 5 лет достигает 50%. Кроме того, часто развиваются местные побочные эффекты: гипо- и гиперпигментация, телеангиэктазии, атрофия кожи и подкожной жировой клетчатки. Эти ограничения обусловили поиск и активное внедрение комбинированных схем лечения.

Комбинированные методики на основе ТАК: анализ эффективности

Комбинация ТАК с другими методами направлена на синергическое воздействие на различные звенья патогенеза келоида, что позволяет повысить эффективность и снизить дозу (и, соответственно, побочные эффекты) каждого из компонентов.

1. ТАК + 5-Фторурацил (5-ФУ)

Эта комбинация считается одной из наиболее эффективных и хорошо изученных.

Механизм синергизма: ТАК подавляет синтез коллагена и воспаление, а 5-ФУ — цитостатический агент — избирательно ингибирует пролиферацию фибробластов, индуцирует их апоптоз и блокирует TGF-β-опосредованную выработку коллагена.

Доказательная база: Исследования показывают, что комбинация превосходит монотерапию каждым из препаратов в отдельности, обеспечивая лучшее уплощение рубца и меньшую частоту рецидивов. При этом сочетанное применение позволяет снизить концентрацию ТАК и уменьшить связанные с ним атрофические осложнения. Стандартное соотношение смеси: 0.1 мл ТАК (40 мг/мл) и 0.9 мл 5-ФУ (50 мг/мл), инъекции проводятся ежемесячно.

2. ТАК + Лазерная терапия

Лазеры используются как для абляции келоидной ткани, так и для усиления доставки лекарств (лазер-ассистированная drug delivery).

Фракционный CO2-лазер: Создает в коже микротермальные зоны повреждения, запуская процесс ремоделирования. Последующая инъекция ТАК в зону лазерного воздействия значительно повышает эффективность и снижает частоту рецидивов по сравнению с изолированным применением лазера.

Импульсный лазер на красителях (PDL): Основная мишень — сосудистый компонент рубца. PDL снижает васкуляризацию и эритему, а дополнительное введение ТАК потенцирует антифибротический эффект.

3. ТАК + Криотерапия

Криотерапия вызывает контролируемую деваскуляризацию и некроз гипертрофированной ткани за счет формирования кристаллов льда.

Подходы: Криотерапия может применяться до инъекции для разрушения плотной фиброзной ткани и облегчения распространения препарата, либо после — для уменьшения воспалительной реакции и отека. Мета-анализ показал, что ТАК более эффективен в уменьшении толщины рубца по сравнению с изолированной криотерапией, а их комбинация дает стабильный долгосрочный результат.

4. ТАК + Хирургическое иссечение

Иссечение как монотерапия характеризуется неприемлемо высоким уровнем рецидивов (до 100%). Поэтому оно трансформировалось в первый этап комбинированного лечения.

Периоперационное введение ТАК: Инъекции ТАК выполняются интраоперационно (в края раны) и/или в раннем послеоперационном периоде (на 2-4 неделе после снятия швов). Это подавляет воспалительную фазу заживления и предотвращает патологический фиброз. Такая тактика позволяет снизить частоту рецидивов до 1-50% в зависимости от локализации и индивидуальных особенностей пациента.

5. ТАК + Блеомицин

Блеомицин — противоопухолевый антибиотик, ингибирующий синтез ДНК в пролиферирующих фибробластах.

Клинические данные: Ретроспективные исследования и клинические наблюдения демонстрируют, что комбинация ТАК с блеомицином эффективна для лечения рефрактерных келоидов. Терапия приводит к значительному уменьшению объема рубца, исчезновению зуда и боли. Мелкие келоиды после курса лечения могут не рецидивировать, а при рецидивах крупных образований повторное лечение обычно эффективно.

Обсуждение и клинические рекомендации

Современные клинические руководства и систематические обзоры подчеркивают, что мультимодальная терапия является краеугольным камнем в лечении келоидных рубцов. Выбор конкретной комбинации зависит от характеристик рубца (размер, локализация, давность, симптомы), предыдущего ответа на лечение, а также возможностей клиники и предпочтений пациента.

Первая линия: для большинства первичных келоидов оптимальной первой линией считается комбинация интралезиональных инъекций (ТАК или ТАК+5-ФУ) с использованием силиконовых гелей или пластин.

Рецидивирующие/резистентные келоиды: при неэффективности терапии первой линии или при рецидивах показаны более агрессивные комбинации: хирургическое иссечение с последующими инъекциями ТАК и/или лучевой терапией, либо комбинации ТАК с лазерной терапией или блеомицином.

Новые технологии: появляются перспективные методы, такие как доставляющие ТАК рассасывающиеся микронидли, которые обеспечивают безболезненную и контролируемую доставку препарата в дерму, минимизируя системные эффекты, что особенно актуально для детей и пациентов с низким болевым порогом.

Заключение

Монотерапия интралезиональным триамцинолона ацетонидом, оставаясь историческим золотым стандартом, не отвечает современным требованиям к лечению келоидных рубцов ввиду вариабельной эффективности и высокого риска рецидивов. Комбинированная терапия, основанная на синергизме различных методов воздействия на патогенез келоида, демонстрирует статистически значимое превосходство. Сочетание ТАК с 5-фторурацилом, криотерапией, лазерными технологиями или хирургическим иссечением позволяет достичь более выраженного и

долговременного клинического результата — уменьшения объема и симптомов рубца при снижении частоты рецидивов. Таким образом, персонализированный мультимодальный подход с использованием ТАК в качестве базового компонента следует рассматривать как современную парадигму лечения келоидных рубцов. Для дальнейшей оптимизации протоколов необходимы крупные рандомизированные сравнительные исследования с длительным периодом наблюдения.

Использованные источники:

1. Wong TS, Li JZ, Chen S, Chan JY, Gao W. The Efficacy of Triamcinolone Acetonide in Keloid Treatment: A Systematic Review and Meta-analysis. Front Med (Lausanne). 2016 Dec 27;3:71. doi: 10.3389/fmed.2016.00071. PMID: 28083534; PMCID: PMC5186775.
2. Bailey J, Schwehr M, Beattie A. Management of Keloids and Hypertrophic Scars. Am Fam Physician. 2024 Dec;110(6):605-611. PMID: 39700364.
3. Kim SW. Management of keloid scars: noninvasive and invasive treatments. Arch Plast Surg. 2021 Mar;48(2):149-157. doi: 10.5999/aps.2020.01914. Epub 2021 Mar 15. PMID: 33765731; PMCID: PMC8007468.
4. Morelli Coppola M, Salzillo R, Segreto F, Persichetti P. Triamcinolone acetonide intralesional injection for the treatment of keloid scars: patient selection and perspectives. Clin Cosmet Investig Dermatol. 2018 Jul 24;11:387-396. doi: 10.2147/CCID.S133672. PMID: 30087573; PMCID: PMC6063260.
5. Disphanurat W, Sivapornpan N, Srisantithum B, Leelawattanachai J. Efficacy of a triamcinolone acetonide-loaded dissolving microneedle patch for the treatment of hypertrophic scars and keloids: a randomized, double-blinded, placebo-controlled split-scar study. Arch Dermatol Res. 2023 May;315(4):989-997. doi: 10.1007/s00403-022-02473-6. Epub 2022 Nov 16. PMID: 36383222.
6. Walsh LA, Wu E, Pontes D, Kwan KR, Poondru S, Miller CH, Kundu RV. Keloid treatments: an evidence-based systematic review of recent advances. Syst Rev. 2023 Mar 14;12(1):42. doi: 10.1186/s13643-023-02192-7. PMID: 36918908; PMCID: PMC10012475.
7. Luo, Q-F. The combined application of bleomycin and triamcinolone for the treatment of keloids and hypertrophic scars: An effective therapy for treating refractory keloids and hypertrophic scars. Skin Res Technol. 2023; 29: 1– 6. https://doi.org/10.1111/srt.13389
8. Ekstein SF, Wyles SP, Moran SL, Meves A. Keloids: a review of therapeutic management. Int J Dermatol. 2021 Jun;60(6):661-671. doi: 10.1111/ijd.15159. Epub 2020 Sep 9. PMID: 32905614; PMCID: PMC7940466.
9. Madazimov Madamin, et al. "Experience in introducing into clinical practice a method for one-stage elimination of cicatricial deformities in patients with consequences of burns of the forearm, back of the hand, fingers with syndactyls." Art of Medicine. International Medical Scientific Journal 2.3 (2022).

Абдуллаева С. Б.
ассистенти
Самарқанд давлат тиббиёт университети
Тулқинова Д. Ж.
ассистенти
Самарқанд давлат тиббиёт университети

БИОТИББИЁТ МУҲАНДИСЛИГИДА РОБОТ ТЕХНИКАСИ

Аннотация: *Сўнгги йилларда биотиббиёт муҳандислиги соҳасида робот техникасининг қўлланилиши жадал ривожланмоқда. Робот тизимлари тиббий амалиётларни аниқ ва хавфсиз бажариш, инсон омилини камайтириш ҳамда реабилитация жараёнларини самарали ташкил этиш имконини бермоқда. Хусусан, жарроҳлик роботлари юқори аниқликда операцияларни амалга оширишда, протез ва ортотик қурилмалар эса беморларнинг ҳаракат қобилиятини тиклашда муҳим аҳамият касб этмоқда. Шу билан бирга, биомедикал сенсорлар ва сунъий интеллект технологияларининг интеграцияси тиббий роботларнинг интеллектуал даражасини оширмоқда. Мазкур мақолада биотиббиёт муҳандислигида робот техникасининг асосий йўналишлари, уларнинг афзалликлари, муаммолари ва келгуси ривожланиш истиқболлари таҳлил қилинади.*

Калит сўзлар: *биотиббиёт муҳандислиги, робот техникаси, реабилитация тизимлари, биомеханика, сунъий интеллект, автоматлаштириш, инновацион тиббий технологиялар.*

Abdullayeva S. B.
assistant
Samarkand State Medical University
Tulkinova D. J.
assistant
Samarkand State Medical University

ROBOTICS IN BIOMEDICAL ENGINEERING

Abstract: *In recent years, the application of robotics in biomedical engineering has been rapidly developing. Robotic systems allow for accurate and safe performance of medical procedures, reduction of the human factor, and effective organization of rehabilitation processes. In particular, surgical robots play an important role in performing high-precision operations, and prosthetic and orthotic devices play a significant role in restoring patients' mobility. At the same time, the integration of biomedical sensors and artificial intelligence technologies is increasing the intellectual level of medical robots. This article analyzes the main directions of robotics in biomedical engineering, their advantages, problems, and future development prospects.*

Keywords: *biomedical engineering, robotics, rehabilitation systems, biomechanics, artificial intelligence, automation, innovative medical technologies.*

Кириш

XXI асрда фан ва технологиялар ривожининг энг муҳим йўналишларидан бири сифатида биотиббиёт муҳандислиги алоҳида аҳамият касб этмоқда. У тиббиёт, биология, физика, информатика ва муҳандислик фанларининг чегарасида шаклланган, инсон саломатлигини сақлаш ва тиклаш учун замонавий техника ҳамда ахборот технологияларини жорий этишни мақсад қилади. Шунингдек, биотиббиёт муҳандислиги соҳасида робот техникасининг қўлланилиши тиббий хизмат кўрсатиш сифатини ошириш, жарроҳлик амалиётларини хавфсиз ва аниқ бажариш ҳамда реабилитация жараёнларини автоматлаштириш имконини бермоқда.

Тиббий роботлар ҳозирги кунда жарроҳлик, диагностика, реабилитация ва ҳамширалик хизматларида кенг қўлланилмоқда. Масалан, **“Da Vinci”** каби жарроҳлик роботлари микрооперацияларни юқори аниқлик билан бажариш имконини беради. Бу эса инсон омилининг таъсирини камайтиради, хато эҳтимолини пасайтиради ва операциядан кейинги тикланиш жараёнини тезлаштиради. Шу билан бирга, биомеханик асосда яратилган протез ва ортотик қурилмалар беморларнинг ҳаракат қобилиятини қайта тиклашда муҳим роль ўйнайди.

Бугунги кунда сунъий интеллект, сенсор технологиялари ва маълумотларни қайта ишлаш алгоритмларининг интеграцияси натижасида тиббий роботлар нафақат ҳаракатларни автоматлаштиради, балки беморнинг ҳолатини таҳлил қилиб, индивидуал даволаш стратегиясини таклиф эта олади. Бу йўналишдаги илмий тадқиқотлар инсон организмининг физиологик ва биомеханик хусусиятларига мос интеллектуал тизимларни ишлаб чиқишга қаратилган.

Шундай қилиб, биотиббиёт муҳандислигида робот техникасининг ривожланиши замонавий тиббиётнинг янги босқичини белгилаб бермоқда. У нафақат тиббий хизмат самарадорлигини оширади, балки инсон ҳаёти сифати ва узоқ умр кўриш даражасини яхшилашга хизмат қилади. Шу сабабли, мазкур соҳадаги илмий изланишлар ва инновацион ечимлар келгусида тиббий амалиётни тубдан ўзгартириш салоҳиятига эга.

Манбалар таҳлили ва методологияси

Биотиббиёт муҳандислиги соҳасида робот техникасини тадқиқ этишда бир қатор фундаментал манбалар муҳим аҳамиятга эга. Масалан, Medical Robotics (Schweikard A., Ernst F., 2015) китобида робот техникаси тиббий амалиётларда қўлланилиши учун керакли математика, навигация, реестрлаш ва ҳаракат режалаштириш каби методлар атрофлича ёритилган. Шунингдек, Medical Robotics: History, Challenges, and Future Directions (Guo Y., Dagnino G., Yang G-Z., 2024) асарида тиббий робототехника тарихий ривожланишдан тортиб, келажак истиқболлари, тартиб-қоидалар ва бозор шароитигача кенг

қамраб олинган. Ушбу манбаларни таҳлил этиш натижасида, тадқиқотда қуйидаги методологик ёндашувлар қўлланилган:

- Робототехника соҳасидаги асосий тушунчалар (кинематика, сенсорлар, назорат тизимлари)ни ўрганиш- бу Schweikard ва Ernst китобида алоҳида боблар тарзида берилган.
- Роботларни тиббий шароитда қўллаш имкониятлари ва чегараларини тарихий-танқидий қараш орқали таҳлил қилиш-Guo ва бошқалар асарида таъкидланган.
- Амалий тадқиқотлар учун намунавий сценарийлар ва қадамбақадамлик методлари: мисол учун, жарароҳлик роботлари, реабилитация роботлари, сенсорлик интеграцияси каби йўналишларни Schweikard ва Ernst томонидан тақдим этилган адабиётнинг«Applications of Surgical Robotics» ва «Rehabilitation, Neuroprosthetics …» бобларида ёритилган.
- Маълумот йиғиш, таҳлил қилиш ва натижа чиқариш жараёнида, модуллашган методика (масалан, навигация ва реестрлаш методлари) асосида иш олиб бориш жиҳатини Schweikard ва Ernst китобида ўз ўрнида тушунтирган.

Муҳокама

Биотиббиёт муҳандислигида робот техникасининг ривожланиши инсон саломатлигини муҳофаза қилиш ва тиббий хизмат сифатини оширишда муҳим стратегик йўналиш ҳисобланади. Ўтган йилларда амалга оширилган тадқиқотлар ва инновацион ишланмалар натижасида тиббий роботлар инсон ҳаракатларини такрорлай оладиган, аниқ ҳаракатларни бажарадиган ва маълум даражада мустақил қарор қабул қиладиган тизимларга айланди. Хусусан, жарроҳлик амалиётларида роботларнинг қўлланилиши инсон қўлига нисбатан юқори аниқлик ва барқарорликни таъминлаб, операция жараёнидаги хавф-хатарни камайтиради. Шу билан бирга, реабилитация жараёнларида қўлланилаётган интеллектуал робот тизимлари беморларнинг ҳаракат қобилиятини қайта тиклашда, мушак ва асаб тизимини фаоллаштиришда муҳим аҳамиятга эга. Бу турдаги роботлар сунъий интеллект ва сенсор технологиялари ёрдамида беморнинг ҳолатини таҳлил қилади ҳамда индивидуал реабилитация дастурини таклиф этади. Шунингдек, биомеханик моделлаштириш усуллари тиббий роботларнинг инсон анатомиясига мослашув даражасини ошириш имконини бермоқда. Бироқ ушбу соҳада ҳал этилиши лозим бўлган қатор муаммолар ҳам мавжуд. Масалан, тиббий роботлар нархининг юқорилиги, уларни бошқариш учун махсус малакали мутахассислар етишмаслиги ва хавфсизлик стандартларини такомиллаштириш зарурати ҳали ҳам долзарблигича қолмоқда. Шу боис келгусида робототехника соҳасида қўлланиладиган сунъий интеллект алгоритмларини такомиллаштириш, адаптив сенсор тизимларини яратиш ҳамда тиббий маълумотлар билан ишлашда ахборот хавфсизлигини таъминлаш устувор вазифалардан бири бўлиб қолади.

Хулоса

Биотиббиёт муҳандислигида робот техникасининг жадал ривожланиши соғлиқни сақлаш соҳасида янги имкониятларни намоён этмоқда. Бу йўналишдаги илмий изланишлар келгусида инсон ҳаёти сифатини яхшилаш, касалликларни эрта аниқлаш ва даволаш усулларини такомиллаштиришда муҳим аҳамият касб этади. Роботлаштирилган жарроҳлик тизимлари операцияларнинг аниқлигини ошириш, инвазивликни камайтириш ва тикланиш жараёнини тезлаштиришда муҳим ўрин тутмоқда. Диагностика роботлари эса инсон омили билан боғлиқ хатоларни камайтириб, барқарор ва аниқ натижаларга эришиш имконини бермоқда. Реабилитация ва протезлаш соҳасида қўлланилаётган ақлли робот қурилмалари беморларнинг ҳаёт сифатини янада оширишга хизмат қилмоқда. Хулоса қилиб айтганда, биотиббиёт муҳандислигида робот техникасидан фойдаланиш тиббий амалиёт самарадорлигини ошириш билан бирга, инсон саломатлиги ва фаровонлигини яхшилашга хизмат қиладиган инновацион йўналиш сифатида катта истиқболга эга.

Реабилитация ва протезлаш соҳаларида робототехник ечимларнинг татбиқ этилиши беморларнинг мотор функцияларини тиклаш, ҳаракат қобилиятини оптималлаштириш ва реабилитация жараёнини индивидуаллаштиришга кўмаклашади. Бу каби технологик ёндашувлар биомеханик ва биотиббиёт муҳандислиги соҳалари ўртасидаги интердисциплинар ҳамкорликнинг янада кенгайишига туртки бермоқда. Шу билан бирга, робот техникасидан кенг фойдаланиш этик меъёрлар, ахборот хавфсизлиги ва мутахассислар тайёргарлиги каби қўшимча талабларни юзага келтиради. Мазкур омилларни ҳисобга олган ҳолда, робототехник ечимларнинг янада такомиллашуви ва тиббиёт соҳасида уларнинг интеграциялашуви келгусида тиббий технологияларнинг стратегик ривожланиши учун муҳим йўналиш сифатида баҳоланади.

Адабиётлар:

1. Abdullayeva S., Maxmudova Z., Xujakulov S. TIBBIY TA’LIMDA VR TEXNOLOGIYA //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 1140-1144.
2. Toxirova, F. O., Malikov, M. R., Abdullayeva, S. B., Ne’matov, N. I., & Rustamov, A. A. (2021). Reflective Approach In Organization Of Pedagogical Processes. European Journal of Molecular & Clinical Medicine, 7(03), 2020.
3. DIRECTIONS IN YOUTH. Procedia of Theoretical and Applied Sciences, 1(1), 93-95.
4. Абдуллаева, С., & Раупова, Р. (2024). ТАЪЛИМ ВА ТАРБИЯ МЕТОДЛАРИ ВА ВАЗИФАЛАРИНИ ЎРГАНИШ-БЎЛАЖАК ПЕДАГОГЛАР ФАОЛИЯТИНИНГ АСОСИЙ ОМИЛИДИР. Modern Science and Research, 3(1), 91-97.

Абдуллаева С. Б.
ассистенти
Самарқанд давлат тиббиёт университети
Тожиева Д. Т.
талабаси
Самарқанд давлат тиббиёт университети

ТИББИЙ-БИОЛОГИК МАСАЛАЛАРНИ ЕЧИШДА ИНТЕГРАЛ ҲИСОБЛАШДАН ФОЙДАЛАНИШ САМАРАДОРЛИГИ

Аннотация: *Ҳозирги кунда тиббий ва биологик фанларда миқдорий таҳлил ва математик моделлаштириш муҳим ўрин эгаллайди. Ўз навбатида, интеграл ҳисоблаш-жуда кўп ўзгарувчилар билан боғлиқ жараёнларни функционал шаклда акс эттириш ҳамда уларни таҳлил қилиш имконини берадиган математик восита сифатида аҳамиятлидир. Ушбу мақолада интеграл ҳисоблашнинг тиббий-биологик масалаларда (масалан, пластинклардаги модда тарқалиши, организмда моддалар айланиши, таъминот жараёнлари) қўлланилиши назарий жиҳатдан таҳлил қилинади. Шунингдек, интеграл усуллари орқали биологик жараёнларнинг динамикаси, модда алмашинуви ва тарқалиши масалаларида моделлар тузишнинг афзалликлари тўғрисида маълумотлар ёритилган.*

Калит сўзлар: *Интеграл ҳисоблаш, тиббий-биологик масала, таҳлил, моделлаштириш, ташҳис, тадқиқот***.**

Abdullayeva S. B.
assistant
Samarkand State Medical University
Tozhieva D. T.
student
Samarkand State Medical University

EFFECTIVENESS OF THE USE OF INTEGRATED COMPUTING IN SOLVING MEDICAL-BIOLOGICAL ISSUES

Abstract: *Quantitative analysis and mathematical modeling currently occupy an important place in the medical and biological sciences. In turn, integral calculations are important as a mathematical tool that allows us to reflect in a functional form the processes associated with a huge number of variables, as well as analyze them. This article theoretically analyzes the application of integrated computing in biomedical issues (for example, the distribution of substances in plates, the circulation of substances in the body, supply processes). Integral methods are also used to highlight information about the advantages of building models in the dynamics of biological processes, metabolism and their distribution.*

Keywords: *integral computing, medical-biological issue, analysis, modeling, analysis, research.*

Кириш

Биология ва тиббиёт соҳаларида масалаларнинг кўпчилиги жуда катта ҳажмдаги маълумотлар, узоқ муддатли динамик жараёнлар ва турли ўзгарувчиларни ўз ичига олади. Масалан, организмда дори моддасининг тарқалиши, организмнинг модда алмашинуви жараёнлари, шулар қаторида вирус ёки бактерия тарқалишини математик моделлаштириш зарур бўлади. Бундай жараёнларни аниқ тасаввур қилиш учун фақат статистика ёки қарама-қарши графиклар етарли бўлмаслиги мумкин; у ерда интеграл усуллари орқали жараёнлар орасидаги боғлиқликлар, вақт ёки бўшлиқ бўйича йиғилмалар, тарқалишлар кўринишларини таҳлил қилиш имкони пайдо бўлади.

Интеграл ҳисоблаш-жуфтлик (ёки кўплик) ўзгарувчиларнинг функциялари бўйича белгиланган чегараларда йиғилиш жараёнини математик шаклда ифодалайди. Масалан, бир даражагача тарқалган модда концентрациясини вақт бўйича ёки ҳажм бўйича интегралаш орқали муайян қисмини олиш мумкин. Бу ёндошув тиббий ва биологик масалаларда, модда тарқалиши, тарқалмаслиги, органлар мисолида тарқалиш тақсимоти ва ресурслар тақсимоти каби жараёнларда жуда қимматлидир.

Интеграл ҳисоблашни жорий қилиш тиббий тадқиқотларда самарадорликни оширишга ёрдам беради, шу билан бирга таҳлил ва прогноз қилиш имкониятларини кенгайтириб, клиник ва биологик таҳлилларни кучайтириш имконини беради. Ўзбекистон ва бошқа мамлакатларда тиббий математика, биостатистика ва математик моделлаштиришнинг аҳамияти ўсмоқда.

Адабиётлар методологияси ва таҳлили

Ушбу тадқиқот ишида тиббий-биологик масалаларни ечишда интеграл ҳисоблаш усулларидан фойдаланиш самарадорлигини асослаш мақсадида замонавий илмий адабиётлар, монографиялар, диссертациялар ва илмий мақолалар таҳлили асос қилиб олинган. Адабиётлар таҳлили жараёнида асосий эътибор интеграл ҳисоблашнинг биология ва тиббиёт соҳаларида қўлланиш йўналишларига, шунингдек, математик моделлаштириш орқали биологик тизимларнинг функционал ҳолатини таҳлил қилишга қаратилганини айтиб ўтиш мақсадга мувофиқдир.

Методологик ёндашув сифатида тизимли таҳлил ва таққослаш таҳлил усуллари қўлланилган бўлиб, тизимли таҳлил биологик жараёнларнинг комплекс хусусиятларини интеграл функциялар орқали ифодалаш имконини бериши кўрсатиб ўтилган. Муқоисавий таҳлил эса анъанавий эмпирик усуллар билан интеграл ҳисоблаш орқали олинган натижаларни солиштириш имконини бериши кўрсатиб ўтилди. Шу йўл билан ҳисоблаш самарадорлиги, аниқлик даражаси ва амалиётда қўллаш имкониятлари баҳоланди.

Таҳлил қилинган адабиётлардан маълум бўлдики, интеграл ҳисоблаш усуллари айниқса физиологик жараёнларни (масалан, қон айланиши, нафас олиш, моддалар алмашинуви) математик моделлаштиришда муҳим аҳамият касб этади. Замонавий тадқиқотларда интеграл ҳисоблар ёрдамида биологик сигналларнинг динамикасини таҳлил қилиш, фармакокинетик жараёнларни прогноз қилиш ҳамда популяция биологиясида ўсиш моделларини аниқлаш бўйича самарали натижаларга эришилган. Бундан ташқари, интеграл ҳисоблаш фақат назарий моделлаштиришда эмас, балки амалий тиббий диагностикада ҳам катта аҳамиятга эга. Масалан, электрокардиограмма ёки электроэнцефалограмма сигналларини қайта ишлашда интеграл усуллар маълумотларни фильтрация қилиш ва функцияларнинг майдон бўйича ўзгаришини баҳолаш имконини яратади. Шундай қилиб, адабиётлар таҳлили натижалари интеграл ҳисоблашнинг тиббий-биологик масалаларни ечишда юқори самарадорликка эга эканлигини кўрсатди. Ушбу усулларнинг афзаллиги уларнинг универсаллиги, аниқлик даражаси ва жараёнларни комплекс баҳолаш имконияти билан изоҳланади.

Тиббий-биологик жараёнларни математик моделлаштириш соҳасида интеграл ҳисоблаш усулларининг қўлланилиши сўнгги йилларда илмий тадқиқотларда кенг ривожланмоқда. Бу йўналишдаги адабиётларнинг таҳлили шуни кўрсатадики, инсон организмидаги физиологик жараёнлар, масалан, қон айланиш тизимидаги қон оқимининг тезлиги, моддалар алмашинувининг динамикаси ёки ферментатив реакцияларнинг кинетикаси каби масалаларни таҳлил қилишда интеграл ҳисоблаш усуллари катта аҳамият касб этади (А.Х. Бекжонов, 2018; В.М. Зайцев, 2020).

Методологик жиҳатдан қаралганда, интеграл ҳисоблаш тиббий маълумотларни қайта ишлашда аниқликни ошириш, ноанъанавий ёндошувлар орқали биологик тизимларнинг комплекс таҳлилини амалга ошириш имконини беради. Масалан, С.А. Романов (2019) ўз асарида интеграл моделлар ёрдамида биологик жараёнларни прогнозлашнинг самарали алгоритмларини таклиф этган. Шунингдек, Г.Қ. Ниёзова (2021) томонидан интеграл ҳисоблаш усуллари қон айланиш тизимидаги энергия сарфини баҳолашда қўлланилган бўлиб, натижалар аниқлик даражасининг юқорилигини кўрсатган.

Адабиётлардаги таҳлиллардан маълум бўлишича, интеграл ҳисоблашнинг асосий методологик устунлиги-унинг дифференциал усуллар билан уйғун ҳолда ишлатилганда организмдаги жараёнларни тўлиқроқ тавсифлай олиш имкониятидир. Шу нуқтаи назардан, Н.М. Абдураҳмонов (2022) ўз тадқиқотида интеграл моделлар ёрдамида биологик тизимлардаги массавий алмашинув жараёнларини математик жиҳатдан ифодалашга алоҳида эътибор қаратган.

Шу билан бирга, хорижий манбаларда (Ж. Келлер, 2020; P. Johnson, 2023) интеграл ҳисоблаш усуллари сунъий интеллект ва биоинформатика соҳалари билан уйғунлаштирилган ҳолда қўлланилиб, тиббий ташхис қўйиш жараёнларини автоматлаштиришда янги имкониятлар очаётгани

таъкидланади. Бу эса интеграл ҳисоблаш усулларининг замонавий тиббиётдаги стратегик аҳамиятини янада оширади. Шуни айтиш мумкинки, таҳлил қилинган адабиётлар интеграл ҳисоблаш усулларининг тиббий-биологик масалаларни ечишдаги самарадорлигини илмий асослайди. Шунингдек, методологик ёндашувларнинг такомиллаштирилиши мазкур соҳадаги тадқиқотларнинг илмий ва амалий қийматини янада оширишга хизмат қилади.

Муҳокама

Ҳозирги замон тиббий ва биологик фанларида ҳисоблаш усулларининг аҳамияти тобора ортиб бормоқда. Айниқса, интеграл ҳисоблаш усуллари турли физиологик жараёнларни, моддалар алмашинувини, қон айланиш тизимидаги оқимларни, дориларнинг организмда тарқалишини ва бошқа биологик тизимлардаги функционал ўзгаришларни таҳлил этишда муҳим аҳамият касб этмоқда. Интеграл ҳисоблаш орқали фақат назарий моделларни эмас, балки амалий тиббий муаммоларни ҳам ечиш имкони яратилади.

Интеграл ҳисоблашнинг асосий устунлиги шундаки, у организмдаги узлуксиз жараёнларнинг математик тавсифини аниқлаш имконини беради. Масалан, қон айланиш тизимида қон оқимининг тезлиги, босимнинг ўзгариши ёки газлар алмашинуви жараёнларини таҳлил қилишда интеграл тенгламалар орқали энергия сарфи, ҳажм ва вақтга боғлиқ динамик ўзгаришлар аниқланади. Шу йўл билан касалликларнинг ривожланиш босқичлари ва уларнинг организмга таъсирини моделлаш мумкин бўлади. Биологик тизимлар кўп ҳолларда ноқатъий ва кўп омилли жараёнлар билан тавсифланади. Бу жараёнларда маълум параметрлар доим ўзгарувчан бўлиб, уларни аниқ тавсифлаш учун интеграл ҳисоблаш усуллари жуда қулай ҳисобланади. Масалан, ферментатив реакциялар ёки моддалар алмашинувидаги реакция тезлигини ҳисоблашда интегралнинг аниқ ва ноаниқ турлари қўлланилади. Бу эса биокимёвий жараёнларнинг динамикасини тўлиқроқ англашга ёрдам беради. Шу билан бирга, тиббий тадқиқотларда интеграл ҳисоблаш маълумотларни қайта ишлаш самарадорлигини ҳам оширади. Масалан, электрокардиограмма ёки электроэнцефалограмма сигналларини таҳлил қилишда интеграл усуллар қўлланилиб, сигналнинг ортиқча шовқинлардан тозаланиши ва фойдали маълумотларни ажратиб олиниши таъминланади. Бу усуллар орқали аниқ диагностика қилиш имконияти кенгаяди.

Интеграл ҳисоблашнинг яна бир муҳим жиҳати-бу усулнинг компьютерлаштирилган моделлаштириш жараёнларига мослигидадир. Ҳозирги кунда тиббий-биологик тадқиқотларда турли симуляция дастурлари, яъни инсон органлари фаолиятини виртуал муҳитда акс эттирувчи моделлар кенг қўлланилмоқда. Бундай моделларда интеграл ҳисоблаш асосий ролни бажаради, чунки ҳар бир биологик ўзгариш вақти ва маконда узлуксиз функция сифатида кўриб чиқилади. Интеграл усуллардан фойдаланишнинг самарадорлиги шу билан ҳам белгиланадики, улар орқали тажрибавий маълумотларни математик модель билан солиштириш мумкин

бўлади. Бу эса илмий хулосаларнинг ишончлилигини оширади, чунки натижалар фақат тажрибага эмас, балки назарий асосланган ҳисоб-китобларга ҳам таянади. Шу сабабли интеграл ҳисоблаш усулларини тиббий таҳлил ва биологик тадқиқотларда қўллаш илмий тадқиқотларнинг аниқлиги ва самарадорлигини оширади. Шунингдек, интеграл ҳисоблаш усуллари инсон танасидаги фармакокинетик жараёнларни ўрганишда ҳам муҳим аҳамиятга эга. Доривор моддаларнинг қонга сингиши, тарқалиши ва чиқиб кетиши жараёнларини интеграл тенгламалар орқали ифодалаш орқали уларнинг таъсир муддати ва самарадорлиги аниқланади. Бу маълумотлар янги дориларни ишлаб чиқишда ва уларнинг дозасини оптималлаштиришда муҳим ҳисобланади. Жумладан, биотиббий муҳандислик соҳасида ҳам интеграл ҳисоблаш усуллари кенг қўлланилмоқда. Масалан, сунъий органлар фаолиятини моделлаштиришда, имплант материалларининг организм билан ўзаро таъсирини баҳолашда ёки қон оқимини бошқарувчи биомеханик тизимларни яратишда интеграл ҳисоблаш усуллари асосий назарий асос бўлиб хизмат қилади.

Интеграл ҳисоблашнинг тиббий-биологик соҳада қўлланилиши бир қатор йўналишларда кўринади:

1. **Модда тарқалиши ва концентрация динамикаси**

Организмдаги моддалар (дора, гормон, токсин, метаболит) тарқалиши, элиминацияси ва ташқарига чиқиши жараёнларини моделлаштиришда интеграл усуллари жуда муҳим. Масалан, қон таркибидаги дорининг тарқалишини вақт бўйича интегралаш орқали унинг умумий визитациясини (area under the curve — AUC) топиш мумкин, бу эса клиник тадқиқотларда дори таъсирини баҳолашда муҳимдир. Бу ерда функция сифатида концентрация = f(t) келади ва уни адан б гача интегралаш орқали умумий тарқалиш ҳажмини ҳисоблаш мумкин.

2. **Ресурслар тақсимоти ва биологик тезликлар**

Тирик организмда ресурслар-кислород, овқат, глюкоза ва бошқа моддалар-бир органдан бошқасига тарқалади. Улар ўз ичига тарқалиш, узилиш, қайта ишланиш жараёнларини олади. Интеграл усули билан вақт ёки бўшлиқ бўйича тарқалиш ҳажмини аниқлаш мумкин. Масалан, ўсимликда ёки танада тарқалган модда концентрациясини бўшлиқ координаталари (x, y, z) бўйича кўп ўлчам (мульти ўзгарувчи) интегралларда ҳисоблаш мумкин. Бу кўп тармоқли модда алмашинув жараёнларини, тарқалиш суратларини моделлаштиришда зарурдир.

3. **Эпидемиология ва тарқалиш жараёнлари**

Тиббий биологияда инфекция тарқалиши, генетик ўзгаришларнинг популяцияда тарқалиши каби масалалар мавжуд. Бу жараёнларни математик моделлаштиришда интеграл усуллари-тарқалиш ҳажмини, эпидемия кўламини, вақт бўйича инфекция таралишини олишда фойдаланилади. Масалан, тарқалиш тезлиги ва хасталикка учраганлар сони функция сифатида олиниб, уни вақт бўйича интегралаш орқали умумий зарарланган кишилар сони топилиши мумкин.

4. **Тиббиётда диагностика ва тасвирлаш жараёнлари**

Масалан, радиологияда ёки томографияда бир органни сканерлаш натижасида олинган сигнал моддаси тарқалиши, контраст воситанинг тарқалиши ва чиқиши кўриниши математикада моддалаштирилади. Бундай жараёнларда интеграл ҳисоблаш орқали сигнал интенситети, тарқалиши ҳажми ва вақти ҳисобланади, бу эса тасвирлаш жараёнини яхшилаш имконини беради.

5. **Илмий-тадқиқот ва прогнозлаш**

Моделлаштириш учун интеграл усули билан ишлаш тадқиқотчиларга жараёнларнинг умумий ҳажмини ҳисоблаш, тармоқларнинг динамикаси ва натижаларини бошлаш имконини беради. Интегралаш натижасида олинган параметрлар орқали клиник тавсиялар, даволаш режалари, профилактика стратегиялари ишлаб чиқилиши мумкин.

Шу билан бирга, интеграл усулини жорий қилишда бир қатор муаммолар ҳам мавжуд: моделлаштирилаётган жараёнларнинг функцияларини аниқ топиш, чегараларни белгилаш, реал маълумотларга мослаш, интегралашда аналитик ёки сонли усулларни танлаш кабилар. Масалан, юқори даражадаги ўзгарувчиларга эга бўлган системаларда анъанавий интеграл усуллари қийинчилик туғдириши мумкин, бу ҳолатда сонли интегралаш, компьютер моделлари қўлланилиши лозим.

Хулоса

Тиббий-биологик масалаларни ечишда интеграл ҳисоблаш усулларидан фойдаланиш нафақат назарий, балки амалий аҳамиятга ҳам эга. Ушбу усуллар орқали тадқиқотлар самарадорлиги, аниқлик даражаси ва натижаларнинг ишончлилиги сезиларли даражада ошади. Шунингдек, интеграл ҳисоблашнинг компьютерлаштирилган илмий моделларга мослиги уни келажакдаги тиббий таҳлиллар ва биоинженерлик тадқиқотларида асосий восита сифатида шаклланишига замин яратади. У тарқалиш, концентрация, ресурс тақсимоти, эпидемия динамикаси, диагностика жараёнлари каби турли соҳаларда қўлланилиши мумкин. Бу усул орқали жараёнларнинг умумий ҳажмини, вақт ёки бўшлиқ бўйича йиғилмаларни, тарқалиш тезликларини аниқлаш мумкин. Шунингдек, интегралаш натижасида олинган параметрлар клиник тадқиқотларда, профилактик стратегияларда ва биологик жараёнларни прогноз қилишда қўлланилиши мумкин. Келажакда тиббий-биологик тадқиқотларда интеграл усулларини янада кенгроқ жорий қилиш, сунъий интеллект ва компьютер моделлари билан боғлаш, сонли интегралаш методларини такомиллаштириш зарур. Ушбу йўналишда илмий ва амалиётда янги ишлар олиб борилиши кутилмоқда.

Адабиётлар:

1. Abdullayeva S., Maxmudova Z., Xujakulov S. TIBBIY TA’LIMDA VR TEXNOLOGIYA //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 1140-1144.

2. Toxirova, F. O., Malikov, M. R., Abdullayeva, S. B., Ne'matov, N. I., & Rustamov, A. A. (2021). Reflective Approach In Organization Of Pedagogical Processes. European Journal of Molecular & Clinical Medicine, 7(03), 2020.
3. Abdullayeva, S., Maxmudova, Z., & Xo'jaqulov, S. (2023). MODERN METHODS OF INFORMATION EXCHANGE IN POLYCLINIC CONDITIONS. Modern Science and Research, 2(10), 304-310.
4. Абдуллаева, С., & Раупова, Р. (2024). ТАЪЛИМ ВА ТАРБИЯ МЕТОДЛАРИ ВА ВАЗИФАЛАРИНИ ЎРГАНИШ-БЎЛАЖАК ПЕДАГОГЛАР ФАОЛИЯТИНИНГ АСОСИЙ ОМИЛИДИР. Modern Science and Research, 3(1), 91-97.

Абдуллажонов Х. М.
ассистент
кафедра анестезиологии-реаниматологии и неотложной помощи,
Андижанский государственный медицинский институт
https://orcid.org/0000-0001-9946-2325
Аширалиев Ж. Ф., магистр
кафедра анестезиологии-реаниматологии и неотложной помощи
Андижанский государственный медицинский институт

ОПТИМИЗАЦИЯ ИНТРАОПЕРАЦИОННОЙ ИНФУЗИОННОЙ ТЕРАПИИ У НОВОРОЖДЕННЫХ

Аннотация: *Рекомендации по интраоперационной инфузионно-трансфузионной терапии у детей разработаны членами Ассоциации детских анестезиологов-реаниматологов России, имеющих большой опыт оказания анестезиолого-реаниматологической помощи детям.*

Целью данных рекомендаций является предоставление четких правил по составлению программы интраоперационной инфузии для уменьшения риска осложнений, связанных с ее проведением у детей разных возрастных групп, повышения эффективности и безопасности анестезиологического обеспечения в целом. Рекомендации не рассматривают частные вопросы проведения инфузионной терапии в специализированных областях медицины.

Ключевые слова: *инфузионно-трансфузионная терапия, острая кровопотеря у детей.*

Abdullajonov Kh. M.
assistant
department of anesthesiology-resuscitation and emergency care
Andijan State Medical Institute
https://orcid.org/0000-0001-9946-2325
Ashiraliyev J. F., master
department of anesthesiology-resuscitation and emergency care
Andijan State Medical Institute

OPTIMIZATION OF INTRAOPERATIVE INFUSION THERAPY IN NEWBORNS

Annotation: *Recommendations on perioperative infusion-transfusion therapy in children have been developed by the members of Association of Children Anesthesiologists and Emergency Physicians of Russia, possessing significant experience of anaesthesiologic and intensive care provided to children.*

These recommendations are aimed to provide clear instructions on compilation of perioperative infusion program in order to reduce the risk of complications related to this in children of various age groups, to enhance efficiency and safety of anaesthesiologic support in general. Recommendations do not include some specific issues of infusion therapy in specialized medical fields.

Key words: *infusion-transfusion therapy, acute blood loss in children*

Более полувека анестезиологи во всем мире используют формулу Holliday and Segar's (1957) для расчета объема интраоперационной инфузионной терапии у детей [34]. Рекомендации по качественному составу основывались на электролитно-углеводном составе грудного молока: раствор глюкозы с содержанием натрия 10–40 ммоль/л. Накопленные данные показывают, что рутинное использование такой тактики нередко приводит к гипонатриемии и/или гипергликемии, которые вызывают у детей неврологический дефицит или могут привести к летальному исходу. Два фактора являются основными причинами возникновения периоперационной гипонатриемии: (а) стресс-индуцированная продукция антидиуретического гормона, который снижает выведение свободной воды и (б) введение гипотоничных, существенно отличающихся от состава внеклеточной жидкости (ВКЖ), растворов, как источника свободной воды [3]. Гипонатриемия может индуцировать отек мозга. У детей имеется предрасположенность к этому осложнению ввиду анатомо-физиологических особенностей центральной нервной системы и низкой активности АТФ-азы. Сообщается, что частота возникновения периоперационной гипонатриемии у детей достигает 31% [25].

С другой стороны, из-за высокой скорости метаболизма дети более подвержены гипогликемии и, соответственно, активации липолиза в периоперационном периоде. Персистирующая гипогликемия, особенно в неонатальном периоде, нарушает нервно-психическое развитие. Однако интраоперационное назначение 5%-ной глюкозы часто провоцирует гипергликемию из-за стресс-индуцированной резистентности к инсулину. Гипергликемия также повреждает незрелый мозг вследствие накопления лактата и снижения внутриклеточного pH. Полный отказ от использования глюкозосодержащих растворов вызывает липолиз с образованием кетоновых тел и свободных жирных кислот. Отсутствие коммерческих растворов, отвечающих таким запросам, долгое время было одним из основных сдерживающих факторов в изменении качественного состава инфузии во время операций у детей. В связи с вышеизложенным в последние годы взгляд на интраоперационную инфузионную терапию был пересмотрен [38].

Цель инфузионной терапии в интраоперационном периоде – поддержание волемического, электролитного и кислотно-основного

статуса, обеспечение нормальной тканевой перфузии, метаболизма и доставки кислорода.

Дети, подвергающиеся обширным и (или) длительным оперативным вмешательствам, а также пациенты с сопутствующей патологией требуют назначения инфузионной терапии во время хирургических операций, которая складывается из трех составляющих:

1) поддерживающая (базовая) терапия обеспечение водой, электролитами и глюкозой в период периоперационного голодания;

2) регидратация-коррекция сопутствующей гиповолемии и дегидратации;

3) заместительная терапия- возмещение потерь жидкости, возникающих за счет испарения из операционной раны и дыхательных путей, кровотечения, гипертермии и потерь через желудочно-кишечный тракт [1, 2, 4, 6, 33].

1. Интраоперационная базовая инфузионная терапия

Базовый раствор для инфузионной терапии – оптимальный состав

Цель базовой инфузионной терапии – удовлетворить нормальные потребности в жидкости, электролитах и глюкозе в течение периоперационного периода, когда ребенок пребывает в голодной паузе, ему не разрешается есть и пить. European consensus statement for intraoperative fluid therapy in children

(2011) заключил, что растворы для интраоперационной фоновой инфузии у детей должны иметь ос- молярность и концентрацию натрия как можно ближе к физиологическому диапазону ВКЖ (табл. 1), содержать 1,0–2,5% глюкозы и щелочные буферы (ацетат, лактат или малат) [62].

По сравнению с ранее используемыми гипотоническими растворами для инфузии с 5%-ной глюкозой применение изотонических растворов для инфузии приводит к снижению риска гипонатриемии с возможной церебральной недостаточностью, отеком головного мозга и респираторной недостаточностью, а невысокая концентрация глюкозы (1,0–2,5%) снижает риск интраоперационной гипергликемии. Гиперхлоремический ацидоз встречается реже, если используются растворы для инфузии с более низкой концентрацией хлорида и ацетата в качестве предшественника бикарбоната по сравнению с 0,9%-ным раствором натрия хлорида («физиологическим») [22, 38].

Определение скорости (дозы) базовой инфузии во время хирургических операций у детей

В ряде наблюдательных исследований было показано, что интраоперационная инфузия сбалансированного изотонического солевого раствора с 1% глюкозы при среднем темпе инфузии 10 мл/кг в час у новорожденных и детей в возрасте до 4 лет приводила к стабильному кровообращению, уровню натрия, глюкозы и кислотно-основному состоянию [33]. Средняя интраоперационная интенсивность

инфузии 10 мл/кг в час выше, чем поддерживающая скорость, рассчитанная согласно правилу 4–2–1 по схеме Holliday, Segar или Oh (табл. 2). Этот простой вариант расчета скорости инфузии учитывает не только физиологическую потребность в жидкости, но и дооперационный и послеоперационный периоды голодания (дефицит). Однако в случае более длительных операций и, особенно, у детей с сопутствующим дефицитом или избытком жидкости скорость инфузии базового раствора должна быть скорректирована с учетом фактических потерь.

Таблица 1.
Состав электролитных растворов для интраоперационной инфузионной терапии у детей (ммоль/л).

Показатель	0,9%-ный раствор NaCl	Раствор Рингера	Раствор Рингер-лактат	Раствор Хартмана	ССР1%Г	ВКЖ	Йоностерил
Na^+	154	147	130	131	140	142	137
K^+		4	5	5	4	4,5	4
Ca^{++}		2,3	1	4	2	2,5	1,65
Mg^{++}			1		2	1,25	1,25
Cl^-	154	156	112	111	118	103	110
HCO_3^-						24	0
Ацетат					30		36,8
Лактат			27	29		1,5	0
Глюкоза					55,5	3,0-5	0
Осмолярность	308	309	276	278	296	291	291

Примечание: *ССР1%Г – сбалансированный солевой раствор с 1%-ной глюкозой, ВКЖ – внеклеточная жидкость*

Таблица 2.
Почасовая потребность в жидкости у детей [35, 49]

Масса тела	Holliday и Segar	Oh
1–10 кг	4 мл/кг в час	4 мл/кг/ч
10–20 кг	4 мл/кг в час на первые 10 кг + 2 мл/кг в час на каждый кг свыше 10 кг	20 мл + (2 × масса тела в кг), мл/ч
> 20 кг	4 мл/кг в час на первые 10 кг + 2 мл/кг в час на каждый кг свыше 10 кг + 1 мл/кг в 1 ч на оставшиеся кг	40 мл + масса тела в кг, мл/ч

Важно помнить, что все формулы служат для вычисления начального объема (отправной точки) инфузионной терапии, далее анестезиолог оценивает реакцию пациента на назначенную инфузию и проводит коррекцию [61].

1.Интраоперационная потребность в глюкозосодержащих растворах у детей

Несмотря на многочисленные исследования по данному вопросу, точная потребность и дозирование глюкозы не определены. Поэтому для

детей наиболее оптимальным подходом остается мониторирование гликемического профиля интраоперационно и коррекция уровня глюкозы по мере необходимости. Большинство авторов считают необходимым вводить глюкозосодержащие растворы у новорожденных во время любых хирургических операций, а также у детей до 4–5 лет во время длительных оперативных вмешательств. Высокий риск развития интраоперационной гипогликемии имеют пациенты в состоянии катаболизма (например, после длительного голодания), с низкими запасами гликогена (при отставании физического развития) или из-за болезни (например, недоношенные младенцы, новорожденные с малой массой тела, получающие парентеральное питание, с заболеваниями печени).

У детей высокого анестезиологического риска и при длительных операциях следует регулярно измерять и корригировать содержание в крови глюкозы, чтобы обеспечить нормогликемию. Если концентрация глюкозы в крови интраоперационно увеличивается в пределах диапазона нормальных значений или остается стабильно на уровне верхней нормальной величины, это можно рассматривать как критерий достаточного ее количества. Периоперационный дефицит глюкозы в большинстве случаев приводит к реакции катаболизма с содержанием глюкозы на нижнем уровне диапазона нормальных значений, высвобождением кетоновых тел и/или свободных жирных кислот, а также сопровождается снижением значения BE (кетоацидоз) [19, 27, 39].

Инфузия глюкозы со скоростью 3–6 мг/кг в 1 мин у таких пациентов позволяет поддерживать нормогликемию. Лучше всего она достигается примене- нием 1,0–2,5% растворов глюкозы, так как более высокая концентрация раствора может привести к гипергликемии. При гипогликемии необходимо увеличить объем инфузии или концентрацию глюкозы (2,5–5,0%) в базовом растворе (6 мл 40%-ной глюкозы в 250 мл солевого раствора для инфузии увеличивают концентрацию глюкозы на 1%). При документированной гипогликемии для быстрой коррекции вводят внутривенно болюсно 2 мл/кг 10%-ного раствора глюкозы [41].

У новорожденных детей следует придерживаться аналогичной тактики определения качественного и количественного состава базовой интраоперационной инфузии. Доказано, что переливание гипотоничных растворов приводит к высокой частоте гипонатриемии в неонатальном периоде, а использование сбалансированных растворов, содержащих ацетат и 1%-ную глюкозу, со сниженным содержанием хлоридов во время операций обеспечивает стабильное гемодинамическое состояние и референтные уровни натрия, глюкозы и кислотно-основное состояние [23, 33].

Когда можно не назначать инфузионную терапию во время операции? Большинство детей, за исключением новорожденных, подвергающихся малым операциям (циркумцизия, грыжесечение и т. п.)

или исследованиям, требующим анестезии (МРТ, РКТ и др.), возобновляют прием воды и пищи уже в раннем послеоперационном периоде и, как правило, не требуют инфузионной терапии. При этом чтобы избежать гиповолемии, необходимо максимально сократить сроки предоперационного и послеоперационного голодания (см. часть 2) в соответствии с действующими рекомендациями и активно побуждать детей пить прозрачные жидкости за 2 ч до начала анестезии. Это позволит детям, которые проходят очень короткие хирургические процедуры (менее 1 ч) и пьют достаточные объемы, сделать ненужным периоперационную внутривенную инфузионную терапию [16, 45].

2.Восполнение дефицита жидкости

Преднаркозное голодание

Период преднаркозного голодания — это время между последним приемом пищи или жидкости и началом общей анестезии. Соблюдение режима преднаркозного голодания необходимо для предупреждения регургитации, что не исключает последующей аспирации желудочного содержимого во время вводной анестезии, всего периода анестезии, выхода из анестезии и вплоть до восстановления сознания и гортаноглоточных рефлексов [18,35,]. Соблюдение режима преднаркозного голодания призвано предотвратить чрезмерно длительные голодные промежутки для недопущения дискомфорта, дегидратации, гипогликемии и кетоацидоза [27,42]. Рекомендации распространяются на пероральный прием медицинских препаратов и углеводов перед общей анестезией и учитывают возможности раннего возобновления приема жидкости [37].

Рекомендации разработаны на принципах доказательной медицины, по результатам анализа источников, представленных в электронных базах данных Ovid, MEDLINE и Embase. Для оценки уровня доказательности и класса рекомендаций была использована система классификации SIGN (Scottish Intercollegiate Guidelines Network scoring system), а также получено экспертное мнение ведущих профильных специалистов (для недоношенных новорожденных детей).

Эти рекомендации не предназначены для пациентов с сопутствующей патологией, которая может повлиять на опорожнение желудка – беременность (последний триместр и период родов), ожирение, сахарный диабет, грыжа пищеводного отверстия диафрагмы, гастроэзофагиальный рефлюкс, ахалазия пищевода, непроходимость кишечника, у пациентов с трудными дыхательными путями, а также при оказании неотложной медицинской помощи. Для улучшенного восприятия рекомендации объединены в табл. 3.

Как определить степень дефицита жидкости, какие растворы использовать для восполнения дефицита, как рассчитать дозу?

Дооперационный дефицит жидкости может быть вызван: (а) недостаточным поступлением воды в организм ребенка (долгое

предоперационное голодание) и/или за счет (б) повышенных потерь (рвота, диарея). В первом случае расчет необходимого объема для восполнения дефицита проводится умножением часовой потребности в жидкости (правило 4–2–1) на количество часов предоперационного голодания. Во втором случае оптимальным является определение потери массы тела, вызванной болезнью (потеря массы = потеря жидкости). Если точная масса до начала болезни не известна, оценка степени дегидратации основывается на клинических критериях степени дегидратации (1% дегидра- тации = 10 мл/кг потери жидкости). Оптимальным является подход, когда дефицит жидкости будет восполнен до начала анестезии.

У детей с нестабильной гемодинамикой на фоне дегидратации приоритет отдается быстрому восстановлению волемического статуса. С этой целью используют повторные (чаще до 3 раз) болюсные введения сбалансированных электролитных растворов без глюкозы в объеме 10–20 мл/кг до достижения желаемого эффекта [43, 56, 61].

У новорожденных оптимальным является использование инфузионной терапии во время периода предоперационного голодания и коррекция дефицита жидкости в процессе предоперационной подготовки. Болюсные введения сбалансированных солевых растворов следует проводить в объеме 5–10 мл/кг за 15–30 мин, особенно у недоношенных новорожденных.

1. Восполнение текущих потерь

Текущие интраоперационные потери включают кровопотерю и дополнительные потери (например, из желудочно-кишечного тракта). В настоящее время наличие «третьего пространства» и учет интраоперационных потерь в «третье пространство» подвергаются сомнению [2,4,14]. Недооценка интраоперационных потерь является наиболее частой причиной остановки сердца во время операций у детей [17].

Выбор раствора и определение дозы

Классический подход к учету текущих потерь для планирования инфузионной терапии во время «открытых» операций варьирует в зависимости от типа хирургической травмы: при малотравматичных операциях потери составляют 1–2 мл/кг в час, торакальные операции – 4-7 мл/кг в час, абдоминальные операции 6-10 мл/кг в час. У новорожденных с некротизирующим энтероколитом потери могут достигать до 50 мл/кг в час жидкости [45].

У детей с циркуляторной нестабильностью из-за кровопотери в первую очередь необходимо быстро нормализовать объем циркулирующей крови (ОЦК). При уменьшении ОЦК межклеточная жидкость перемещается в сосудистое русло, компенсируя потери. Следует помнить, что у детей снижение артериального давления является самым поздним признаком при гиповолемии. Дебаты относительно

выбора коллоиды-кристаллоиды продолжаются до настоящего времени. Практическая стратегия заключается в болюсном введении 10–20 мл/кг сбалансированного электролитного раствора с последующей оценкой гемодинамики для восполнения ВКЖ организма и объема крови. Предусматривается и повторное введение жидкости, если не получен положительный ответ на первый болюс или предполагается развитие стойкой гиповолемии. При значительных интраоперационных потерях либеральное введение солевых растворов приводит к перегрузке жидкостью интерстициального пространства и избыточной гемодилюции, со снижением доставки кислорода и повышением риска послеоперационных осложнений. Следует отметить, что даже избыточное переливание сбалансированных электролитных растворов во время операции у детей менее нарушает осмолярность и кислотно-основное состояние по сравнению с гипотоничными растворами или физиологическим раствором, т. к. наиболее соответствует составу ВКЖ [43, 59, 60, 74]. При обширных вмешательствах следует рассмотреть возможность введения коллоидных препаратов как более выгодных для стабилизации внутрисосудистого объема, если отсутствует эффект на несколько болюсов кристаллоидов, или определить

Таблица 3

Рекомендации по преднаркозному голоданию у детей

Класс рекомендаций / Уровень доказательности	РЕКОМЕНДАЦИИ	
Дети от 1 года до 18 лет		
A / 1++	Питье прозрачных жидкостей (вода, соки без мякоти, морсы без мякоти, чай или кофе без молока) – 2 мл/кг, не более 100 мл	За 2 ч до общей анестезии
	Прием твердой пищи	За 6 ч до общей анестезии
A / 1	Грудное молоко для детей старше 1 года	За 6 ч до общей анестезии
A / 1++	Жевательная резинка и леденцы. *!!! Не должны поощряться перед плановой анестезией (наркозом) !!!*	За 2 ч до общей анестезии
Доношенные новорожденные и дети до 1 года		
A / 1++	Питье прозрачных жидкостей (вода, соки без мякоти, детский чай) – 2 мл/кг	За 2 ч до общей анестезии
	Кормление грудным молоком	За 4 ч до общей анестезии
	Детские смеси и другие виды молока	За 6 ч до общей анестезии
	Прием твердой пищи	За 6 ч до общей анестезии
Недоношенные новорожденные до 6 месяцев (после 6 месяцев или при достижении массы тела в 2 500 гр, режим преднаркозного голодания как у доношенных новорожденных и детей до 1 года)		
Экспертное мнение	Питье прозрачных жидкостей (вода, соки без мякоти, детский чай) – 2 мл/кг	За 2 ч до общей анестезии
	Для глубоконедоношенных, с массой тела при рождении до 1 500 г и при достижении массы тела 2 500 г – кормление грудным молоком и адаптированными смесями для недоношенных (с приставкой PRE)	За 2 ч до общей анестезии
	Кормление грудным молоком и адаптированными смесями для недоношенных (с приставкой PRE)	За 4 ч до общей анестезии
	Детские смеси, другие виды молока и прикорм	За 6 ч до общей анестезии
Медицинские препараты		
A / 1++	Не рекомендуется рутинное применение антацидных препаратов, метоклопрамида или антагонистов гистаминовых рецепторов II типа перед общей анестезией	
A / 1	Таблетированные формы медицинских препаратов и порошки	За 6 ч до общей анестезии
	Жидкие лекарственные препараты (в том числе в виде сиропов)	За 2 ч до общей анестезии
Углеводы		
A / 1++	Питье богатых углеводами прозрачных жидкостей (включая пациентов с сахарным диабетом) –	За 2 ч до общей анестезии

	2 мл/кг, не более 100 мл	
Энтеральное зондовое питание		
A / 1	Пациенты, находящиеся на энтеральном зондовом питании	За 30 мин до общей анестезии зонд должен быть открыт. Перед началом анестезии зонд должен быть удален
Возобновление приема прозрачной жидкости		
A / 1++	После планового оперативного вмешательства разрешено возобновление приема прозрачных жидкостей по желанию пациента	
Анестезия в неотложных ситуациях		
A / 1++	Задержка опорожнения желудка в неотложных случаях может быть связана с влиянием боли, назначением опиоидов или желудочно-кишечной обструкцией. Поэтому запрет приема пищи для этих пациентов никогда не сделает их подготовленными «натощак и плановыми». Воздержание от приема пищи у неотложных пациентов не может обеспечить опорожнение желудка и не должно откладывать хирургическое вмешательство	

Примечания:

– Можно разрешить ребенку до 1 года для комфорта «ненутритивное» сосание (прикладывать к сцеженной груди).

– Лучшей прозрачной жидкостью для ребенка считается разведенный осветленный яблочный сок, который содержит большее количество карбоангидратов (HCO_3) и электролитов, чем вода и чай, а также могут быть рекомендованы прозрачные компоты и морсы без ягод [20].

– После операций, особенно кратковременных, при отсутствии клинических противопоказаний следует использовать свободный режим питья, без периода голодадругую п атофизиологическую причину нестабильности гемодинамики, кроме гиповолемии. Использовать компоненты крови только для возмещения объема (не для коррекции анемии и коагуляции) в качестве альтернативы коллоидным препаратам является недопустимым [15].

Таблица 4.
Объем циркулирующей крови у детей

Возраст пациента	ОЦК, мл/кг
Недоношенные новорожденные	80–100
Доношенные новорожденные	80–90
От 3 месяцев до 1 года	75–80
От 1 года до 6 лет	70–75
Старше 6 лет	65–70

Показания для назначения коллоидных препа- ратов. Какой коллоид? Расчет дозы

В интраоперационном периоде коллоидные растворы используются только как препараты второй линии после двух-трехкратного введения сбалансированных электролитных растворов и отсутствия клинического эффекта. При назначении коллоидных препаратов следует помнить о

большей частоте побочных эффектов в виде аллергии, почечной дисфункции и влиянии на систему гемостаза. Избыточное использование коллоидов приводит к гиперволемии с повреждением эндотелия сосудов и дилюционной коагулопатии [13, 16].

При назначении плазмоэкспандеров предпочтение следует отдавать коллоидным растворам на основе желатины или низкомолекулярным растворам гидроксиэтилкрахмалов (Mr=130 кДа) со степенью замещения 0,4. Волемический эффект современных препаратов как на основе желатина, так и на основе гидроксиэтилкрахмалов составляет 100%, при этом средняя продолжительность волемического эффек- та составляет 3-4 ч. Препараты на основе желатина назначаются в дозе 10–20 мл/кг путем повторных болюсных введений в течение 15-30 мин до достижения клинического эффекта. Применение растворов на основе гидроксиэтилкрахмала (HES) для коррекции гиповолемии на фоне острой кровопотери показано только в случаях, когда монотерапия кристаллоидами считается недостаточно эффективной. Рекомендуемая стартовая доза 6%-ных растворов на основе гидроксиэтилкрахмала составляет 10–15 мл/кг. Максимально суточная доза равна 30 мл/кг [12, 40].

Противопоказаниями к назначению растворов на основе гидроксиэтилкрахмалов являются почечная недостаточность или проведение почечной заместительной терапии, сепсис, ожоги, тяжелая коагулопатия, продолжающееся внутричерепное или внутримозговое кровотечение, гипергидратация, отек легких, дегидратация, тяжелая гипернатриемия или тяжелая гиперхлоремия, тяжелая печеночная

недостаточность, повышенная чувствительность к компонентам препарата. Эффективность и безопасность применения препаратов на основе гидроксиэтилкрахмала у новорожденных в настоящее время не доказана, поэтому их назначения следует избегать. При высоком риске развития побочных эффектов необходимость применения коллоидных растворов у детей следует тщательно оценивать и обосновывать.

По некоторым данным, раствор альбумина (чаще 5%) может быть предпочтительным у доношенных и недоношенных новорожденных и детей первого года жизни [30, 47].

В случае проведения обоснованной гемотрансфузии (эритроцитарная взвесь, свежезамороженная плазма-СЗП) назначение гемодинамических кровезаменителей также должно быть сведено к минимуму [41].

2. Интраоперационное переливание компонен- тов крови

Появляется все больше доказательств того, что либеральная тактика относительно переливания компонентов крови приводит к повышению количества осложнений у детей. Поэтому использование препаратов крови должно быть уменьшено дооперационной оптимизацией показателей, использованием методов сохранения крови во

время операции и строгого подхода к показаниям и проведению интраоперационных гемотрансфузий [39].

Эритроцитсодержащие компоненты крови (ЭСКК)

Общие положения [10, 11]:

1. Трансфузия эритроцитарных компонентов должна начаться не позднее чем через 2 ч после изъятия компонента из холодильного оборудования и согревания до 37°С.

2. На всех этапах перемещения трансфузионной среды ее местонахождение должно фиксироваться в журналах.

3. Пробы на индивидуальную и групповую совместимость проводятся во всех случаях плановой трансфузии.

4. Биологическая проба проводится даже в случае экстренной трансфузии компонента.

Биологическая проба у детей старше года проводится посредством однократного переливания 10 мл донорской крови и (или) ее компонентов со скоростью 2–3 мл (40–60 капель) в 1 мин. После этого переливание прекращается и в течение 3 мин осуществляется наблюдение за состоянием реципиента. При появлении в этот период клинических симптомов (озноба, боли в пояснице, чувства жара и стеснения в груди, головной боли, тошноты или рвоты) трансфузию немедленно прекращают.

Биологическая проба у новорожденных и детей младше года состоит в трехкратном введении донорской крови и(или) ее компонентов с последующим наблюдением за состоянием реципиента в течение 3–5 мин при закрытой системе для переливания крови. Объем вводимого компонента для детей до 1 года составляет 1–2 мл. При отсутствии реакций и осложнений трансфузию компонентов продолжают. *Характеристика трансфузионных эритроцит-содержащих сред:*

Эритроцитарная масса – компонент, получаемый после удаления из крови части плазмы. Гематокрит составляет 65–75%. Доза содержит все эритроциты, находившиеся в исходной дозе крови, большую часть лейкоцитов и разное количество тромбоцитов, зависящее от метода центрифугирования. Каждая доза должна содержать минимум 45 г гемоглобина. Эритроцитарная масса без лейкотромбоцитарно- го слоя – компонент, получаемый из крови после удаления части плазмы и лейкотромбоцитарного слоя.

Эритроцитарная взвесь – компонент, выделяемый из крови центрифугированием и удалением плазмы с последующим добавлением к осадку раствора с субстратами энергетического метаболизма. Допускается гематокрит 50%. Каждая доза должна содержать 45 г гемоглобина. Содержит все эритроциты из исходной дозы крови, большую часть лейкоцитов (2,5–3,0 × 10^9/л) и различное число тромбоцитов в зависимости от способа центрифугирования.

Эритроцитарная взвесь фильтрованная – компонент, выделяемый из крови центрифугированием и удалением плазмы и лейкотромбоцитарного слоя, с последующим добавлением к осадку раствора с субстратами энергетического метаболизма. Допускается гематокрит 50%. Каждая доза должна содержать 43 г гемоглобина. Содержит все эритроциты из исходной дозы крови, содержание лейкоцитов менее $1{,}2 \times 10^9$/л и число тромбоцитов менее 10×10^9/л.

Отмытые эритроциты – компонент, получающийся при центрифугировании крови и удалении плазмы с последующим отмыванием эритроцитов в изотоническом растворе. Этот компонент представляет собой суспензию эритроцитов, из которой удалена большая часть плазмы, лейкоцитов, тромбоцитов. Остаточное количество плазмы зависит от процедуры отмывания. Готовый компонент содержит 40 г гемоглобина.

Размороженные эритроциты – это эритроцитарная масса, замороженная в первые 7 дней с момента заготовки крови с использованием криопротектора (глицерина). В последующем они размораживаются и отмываются в изотоническом растворе хлорида натрия. Восстановленная доза криоконсервированных эритроцитов практически не содержит плазменных белков, гранулоцитов и тромбоцитов. Каждая доза должна содержать не менее 36 г гемоглобина.

Интраоперационная трансфузия компонентов крови производится врачом-трансфузиологом или иным специалистом (анестезиологом-реаниматологом, свободным от проведения наркоза, или

хирургом, свободным от проведения операции). Новорожденным и детям до 1 года переливаются эритроцитсодержащие компоненты, обедненные лейкоцитами [10].

Показания к трансфузии ЭСКК [10, 11, 21,4S, 43, 55]:

- острая анемия вследствие массивной кровопо- тери (раздел «Массивная кровопотеря»).
- и интраоперационной кровопотери более 20–30% ОЦК;
- снижение уровня гемоглобина ниже 70 г/л у больного со стабильными показателями гемодинамики, не имеющего продолжающегося кровотечения (1С);
- снижение уровня гемоглобина ниже 80 г/л у больного с клиническими признаками анемического синдрома или при продолжающемся кровотечении. При ряде заболеваний (например, некоторые ВПС, серповидно-клеточная анемия) пороговые значения гемоглобина для трансфузии будут выше. У новорожденных и недоношенных детей пороговые значения гемоглобина, требующие трансфузии эритроцитарных компонентов во время операции и в послеоперационном периоде, представлены в табл. 5.

Таблица 5
Пороговые значения Hb для новорожденных и недоношенных детей

Постнатальный возраст	Пороговые значения гемоглобина (г/л)	
	На ИВЛ	Кислород/NIPPV
Первые 24 ч жизни	< 120	< 120
1–7-й день жизни	< 120	< 100
1–14-й день жизни	< 100	< 95
15 сут и более	< 100	< 85

Свежезамороженная плазма

СЗП представляет собой замороженную жидкую часть крови, освобожденную от эритроцитов, лейкоцитов и тромбоцитов. В СЗП содержатся фибриноген, а также факторы свертывающей системы крови II, V, VII, VIII, IX, X, XI, XIII и фактор Виллебранда.

Уровень содержания факторов свертывания представлен в табл. 6.

Таблица 6
Содержание факторов свертывания в свежезамороженной плазме после размораживания [58]

Фактор	Содержание в % от исходных значений при заготовке
V	88
VIIc	70
VIII	76
IX	64
Антитромбин	60
Фибриноген	94

Переливаемая СЗП донора должна быть той же группы по системе АВО, что и у реципиента. Группа по системе резус не учитывается, поскольку СЗП представляет собой бесклеточную среду, однако при переливании больших объемов СЗП (более 1 л у взрослых) соответствие донора и реципиента по антигену D должно учитываться обязательно.

После размораживания трансфузию СЗП необходимо начать в течение 1 ч, продолжительность трансфузии не должна продолжаться более 4 ч. При отсутствии потребности в использовании размороженной плазмы ее хранят в холодильном оборудовании при температуре 2-6°С в течение 24 ч [9, 10].

Дозирование. Начальная доза СЗП составляет 10 мл/кг. У детей объем СЗП, равный 10–15 мл/кг, повышает уровень факторов свертывания на 15–20%. Следует помнить, что терапевтический эффект на- чинается при повышении уровня факторов на 10% и выше.

Показанием для назначения СЗП являются документально подтвержденный значительный дефицит факторов свертывания у пациентов с активным кровотечением (а) или которым предполагаются инвазивные

процедуры/операции (б), а именно [10, 46]:

1. Острая массивная кровопотеря (см. раздел массивная кровопотеря).

2. Острый ДВС-синдром, осложняющий течение шоков различного генеза (септического, гиповолемического) или вызванный другими причинами (краш-синдром, тяжелая травма с размозжением тканей, обширные хирургические операции, особенно на легких, сосудах, головном мозге, простате), синдром массивных трансфузий.

3. У детей отсутствуют четкие рекомендации по применению СЗП и криопреципитата при ДВС-синдроме. Рекомендации 2013 г. комитета по изучению и стандартизации ДВС-синдрома Международного общества по изучению тромбоза и гемостаза предлагают назначение СЗП пациентам, имеющим активное кровотечение, сопровождающееся удлинением ТВ и/или АЧТВ в 1,5 раза и более или снижением уровня фибриногена менее 1,5 г/л (2С). У детей очень низкий

уровень фибриногена (0,5 г/л и менее) или быстрое снижение уровня фибриногена является показанием для назначения криопреципитата, содержащего больший уровень фибриногена в меньшем объеме (одна доза преципитата содержит около 250 мг фибриногена) [47].

1. Болезни печени, сопровождающиеся снижением продукции плазменных факторов свертывания и, соответственно, их дефицитом в циркуляции (острый фульминантный гепатит, цирроз печени). Стандартные лабораторные тесты у пациентов с заболеваниями печени не отражают риск развития кровотечения и не должны быть использованы в качестве изолированного показания для назначения СЗП и криопреципитата [37].

Коагулопатия, обусловленная дефицитом плазменных факторов свертывания, когда эти препараты недоступны. Наследственный дефицит плазменных факторов свертывания рекомендуется корригировать концентратами конкретных факторов свертывания (1В). Единственным фактором, который в настоящее время недоступен в виде концентрата, является фактор V, при его дефиците рекомендуется назначение СЗП. Фактор XI может использоваться как изолированный концентрат, так и в составе протромбинового комплекса [16, 40]. Применение СЗП возможно при недоступности концентратов факторов или при ожидании подтверждения диагноза и необходимости проведения экстренной терапии. В этих случаях обычно СЗП назначается в дозе 20 мл/кг. Низкий уровень фибриногена рекомендуется корригировать концентратом фибриногена, а при его недоступности – криопреципитатом (1С). Интраоперационное назначение СЗП может происходить до получения результатов коагуляционных тестов в случае имеющейся кровопотери более 10% ОЦК и продолжающегося

кровотечения с темпом, близким к высокому (1,0–1,5 мл/кг в 1 мин). Относительно новорожденных существуют аналогичные показания для переливания СЗП: (а) кровотечение со значительными нарушениями коагуляции, (б) значительные нарушения свертывающей системы при необходимости хирургических вмеша- тельств.

Тромбоконцентрат

Тромбоконцентрат – это суспензия жизнеспособных и гемостатически активных тромбоцитов в плазме, приготовленная методом серийного центрифугирования донорской крови (1 доза содержит не менее 55 × 10^9 клеток). Такое количество считается одной единицей тромбоцитного концентрата, переливание которой должно увеличивать количество тромбоцитов у реципиента с площадью поверхности тела 1,8 $м^2$ примерно на 5–10 × 10^9/л при отсутствии у него признаков кровотечения. Второй метод приготовления тромбоконцентрата – метод аппаратного тромбоцитафереза крови донора, в этом случае терапевтическая доза концентрата содержит не ме- нее 200 × 10^9 клеток [10, 46].

Хранение тромбоконцентрата осуществляют в пластиковых контейнерах при температуре от +20 до +24°С и постоянном перемешивании, что способствует сохранению их жизнеспособности. Срок хранения тромбоконцентрата составляет от 3 до 5 сут. Трансфузируемые тромбоциты должны быть совместимы по системе АВ0 и системе резус-фактора (D), в ургентных случаях допускается трансфузия О(I) группы крови другим реципиентам. Тромбоцитный концентрат содержит примесь стволовых клеток, поэтому для профилактики реакции «трансплантат против хозяина» у больных с иммунодепрессией при трансплантации костного мозга тромбоцитный концентрат перед переливанием должен быть облучен в дозе 1 500 рад [10].

Показания для переливания тромбоконцентрата определяются уровнем тромбоцитов и в большинстве случаев должны быть скорректированы до хирургической операции. Необходимость в интраоперационном переливании тромбоцитов может быть продиктована экстренностью хирургического вмешательства у детей с тромбоцитопенией или массивной кровопотерей [32, 46]:

Массивная операционная кровопотеря (см. часть массивная кровопотеря).

Расчет терапевтической дозы осуществляется следующим способом: 50–70 × 10^9 тромбоцитов на каждые 10 кг массы тела реципиента или 200–250 × 10^9 тромбоцитов на 1 $м^2$ поверхности тела реципиента. Доза тромбоцитов 5–10 мл/кг (или 1 доза (40 мл) на 10 кг) в идеале увеличивает концентрацию тромбоцитов на 100 тыс в 1 мл. Но на самом деле «ответ» на трансфузию тромбоцитов существенно меньше.

Это может быть связано с активным кровотечением, ДВС-синдромом, сепсисом, лихорадкой, гиперспленизмом, HLA-аллоиммунизацией, иммунной тромбоцитопенической пурпурой.

В некоторых случаях количество переливаемых тромбоцитов может быть увеличено: при спленомегалии количество переливаемых тромбоцитов увеличивается на 40–60%, при инфекционных осложнениях – в среднем на 20%, при выраженном ДВС-синдроме, массивной кровопотере, явлениях аллоиммунизации – на 60–80%.

Новорожденным назначают 10–20 мл/кг со скоростью 10–20 мл/кг в час.

Массивная операционная кровопотеря у детей Массивная операционная кровопотеря (МОК) – жизнеугрожающее критическое состояние, сопровождающее обширные хирургические вмешательства, в патогенезе которого доминируют тяжелая персистирующая гиповолемия, анемия и угрожающая коагулопатия в сочетании с мощным шокогенным симпатоадреналовым стрессом, требует неотложных мер для предотвращения развития геморрагического шока и полиорганной недостаточности. МОК – это потеря крови 80 мл/кг в течение 24 ч, 40 мл/кг в течение 3 ч или 2-3 мл/кг в 1 мин [46].

Массивная кровопотеря в результате травмы у детей встречается реже, чем у взрослых. Наиболее часто выраженная кровопотеря отмечается во время оперативных вмешательств. Для достижения критических значений прокоагулянтных факторов требуются значительные объемы кровопотери. Но это утверждение справедливо только при адекватном хирургическом гемостазе, поскольку при сохраняющемся кровотечении развивающаяся гемодилюция и гипоперфузия приводят к прогрессивному ухудшению функции гемостаза.

Если предполагается операция с высоким риском МОК, все необходимые подготовительные организационные и технические мероприятия должны быть обеспечены до начала операции. Если любая хирургическая операция осложняется МОК, то следует действовать согласно разработанному локальному алгоритму (пример, табл. Алгоритм терапии МОК), который должен находиться в распечатан- ном виде в каждой операционной [46].

Таблица 7

Оценка коагулопатии у новорожденных и выбор тактики [24]

Возраст	Фибриноген, мг/дл	PT протромбиновое время, с	PTT частичное тромбопластиновое время, с
Новорожденные: **менее 28 недель** **28–34 недели** **30–36 недель** **доношенные**	 < 71 < 87 < 150 < 167	 > 21 > 21 > 16 > 16	 > 64 > 57 > 79 > 55
Рекомендации: **без кровотечения** **с кровотечением или инвазивные процедуры**	Наблюдение (2B) криопреципитат 5–10 мл/кг (IVC)	Наблюдение (2B) СЗП 15–20 мл/кг (IIIB)	Наблюдение (2B) СЗП 15–20 мл/кг (IIIB)
Новорожденные 30– 36/доношенные недель: 5 дней **30 дней**	< 160/162 < 150/162	> 15/15 > 14/14	> 74/60 > 62/55
Дети без кровотечения Дети с кровотечением или необходимостью операции	Наблюдение (2B) Криопрец	Наблюдение (2B) СЗП 15–20 мл/кг (IIIB)	Наблюдение (2 B) СЗП 15–20 мл/кг (IIIB)

Пояснения к алгоритму МОК

1. Проводить активные реанимационные мероприятия и контролировать кровотечение (хирургический гемостаз).

2. При продолжающемся активном кровотечении рассмотреть вопрос о назначении тромбоцитов и криопреципитата [32]. Тромбоциты назначаются в дозе 15-20 мл/кг после каждых 40 мл/кг эритроцитов. Криопреципитат 10 мл/кг [10].

3. Ключевой рекомендацией является возможность раннего применения СЗП, тромбоцитов и криопреципитата для снижения риска развития коагулопатии и тромбоцитопении (1C) [36, 46].

4. Относительно новорожденных используются те же принципы терапии МОК [29].

5. Транексамовую кислоту при генерализованном фибринолизе вводят в разовой дозе 15 мг/кг каждые 6-8 ч, скорость введения - 1 мл/мин (1A). Также может использоваться у детей до операции, если предполагается значительная кровопотеря (1B) [36]. Neonatal and Paediatric Pharmacists Group (RCPCH, 2012) рекомендует введение транексамовой кислоты в дозе 15 мл/кг, максимум 1 000 мг (в течение 10 мин), после в дозе 2 мг/кг в час в течение последующих 8 ч или до остановки кровотечения [46].

6. Рекомендуется трансфузия концентрата фибриногена при

острой кровопотере, сопровождающейся снижением уровня фибриногена ниже 1,5-2,0 г/л или при снижении активности фибриногена по тромбоэластограмме (ТЭГ) (1C). Основным медицинским показанием для трансфузии *криопре- ципитата* является гипофибриногенемия [5]. Доза рассчитывается следующим образом: необходимое количество фактора VIII для переливания (в ед) = [ОЦК (мл) × (1,0-Ht)] × (необходимый уровень фактора VIII -имеющийся уровень фактора VIII) необходимое количество фактора VIII для переливания (в ед): 100 ед = количество доз криопреципитата, необходимого для разовой трансфузии (переливания). Для гемостаза поддерживается уровень фактора VIII до 50% во время операции и до 30% в послеоперационный период. Одна единица фактора VIII соответствует 1 мл СЗП. Криопреци- питат, полученный из одной дозы крови, содержит не менее 70 ед фактора VIII. Криопреципитат донора должен быть той же группы по системе АВО, что и у реципиента. Показания для переливания у новорожденных практически те же, что и у взрослых детей: при низком уровне фибриногена, но и вторично при дисфункции печени.

7. При возможности переливание отмытых эритроцитов – реинфузия аутологичной крови (Cell Saver) (2C). *Метод отмытых эритроцитов:* интраоперационной реинфузией аутологичной крови называется сбор крови пациента, теряемой в ходе операции и реинфузируемой непосредственно во время операции или в ближайшие 6 ч после нее. Эритроциты отделяются путем центрифугирования и последующей промывки 0,9%-ным физиологическим раствором, в то время как другие компоненты, такие как плазма, фибрин, микроагрегаты, оскол- ки клеток, жир, свободный гемоглобин и гепарин, удаляются. Затем отмытые аутоэритроциты через лейкоцитарный фильтр возвращаются пациенту. В зависимости от режима отмывания уровень гематокрита в сохраненных клетках варьирует в пределах от 55 до 80% [26].

8. Рекомендуется трансфузия тромбоконцентрата при уровне тромбоцитов ≤ 50.000–100.000 µl¹ (2C) [36].

9. Не рекомендуется профилактическое назначение rFVIIa ввиду повышения риска фатального тромбоза (1B). Назначение off-label rFVIIa рекомендуется в случае жизнеугрожающего кровотечения, которое не удается остановить другими методами, включая хирургический или ангиохирургический метод (2C) [36].

10. Своевременное использование кардиовазотоников (эфедрина, допамина, норадреналина, мезатона, иногда адреналина) для поддержания пост- и преднагрузки в случаях возможного или развивающегося кризиса гемодинамики и гиповолемического шока); то есть широкое применение инфузии норадреналина (для компенсации вазодилатации, связанной с анестезией в дозе 0,02–0,15 мкг/кг в 1 мин, а также на высоте кровопотери для сохра- нения перфузии мозга и

миокарда (максимальная доза 0,5–0,8 мкг/кг в 1 мин).

11. На фоне кризиса гемодинамики в условиях вынужденного снижения подачи ингаляционного анестетика приветствуется введение кетамина.

1. Мониторинг при проведении интраопераци- онной инфузионной терапии у детей

Важным этапом гемодинамической оценки у детей с высоким хирургическим и анестезиологическим риском остается клиническое обследование в дооперационном периоде. Достижение гемодинамической стабильности и обеспечение адекватной доставки кислорода в периоперационный период имеют первостепенное значение и являются основным компонентом анестезиологического пособия [69]. Фундаментальную роль в анестезиологии-реаниматологии играет гемодинамический мониторинг (ГМ), так как он позволяет не только определить направление патофизиологических процессов, но и выбрать соответствующий вид терапии. Неадекватная инфузионно-трансфузионная терапия может привести к падению сердечного выброса (СВ) и доставки кислорода, что приводит к увеличению количества осложнений. ГМ посредством изменений важнейших динамических параметров сердечно-сосудистой системы в реальном времени служит основным руководством для внутривенного введения жидкостей, а также вазопрессорной и инотропной терапии [20].

Необходимо отметить некоторые ключевые принципы ГМ:

1) никакой ГМ не может улучшить результат сам по себе; 2) нет оптимальных показателей гемодинамики, которые могут быть применены ко всем пациентам; 3) необходимо ориентироваться на несколько показателей одновременно; 4) важно отслеживать не единичные измерения, а их динамику [66].

Объем используемого мониторинга у детей прежде всего зависит от тяжести состояния ребенка и операционно-анестезиологического риска. Для минимального риска (ASA I–II) и низкого хирур- гического риска достаточно стандартного мониторинга: ЭКГ в одном из отведений, неинвазивное АД, пульсоксиметрия, центральная температура, почасовой диурез, содержание кислорода во вдыхаемой смеси (FiO_2) [7]. В случае проведения искусственной вентиляции легких в обязательном порядке добавляется содержание CO_2 в выдыхаемой смеси и герметичность дыхательного контура. Это касается и новорожденных.

При повышении риска по ASA III–IV и/или риска операции увеличивается необходимость в дополнительном мониторинге, который сможет обеспечить более надежную и объективную оценку функции сердечно-сосудистой системы и оксигенации тканей [72]. Главными детерминатами интраоперационного мониторинга в этом случае являются СВ, доставка кислорода и периферическое сосудистое сопротивление.

Среди неинвазивных методов мониторинга СВ у детей наибольшую ценность имеют ультразвуковые методы. К сожалению, пищеводная допплерография с помощью специальных мониторов малодоступна у детей. Поэтому можно использовать эхокардиографию или трансторакальную допплерографию, которые позволяют получить достоверные результаты как у детей, так и новорожденных [5, 8]. Из инвазивных методов стандартом становится метод транспульмональной термодилюции (PiCCO-технология). В качестве показателя кислородного транспорта может быть использован мониторинг насыщения центральной венозной крови кислородом ($ScvO_2$). В ряде исследований продемонстрировано, что поддержание $ScvO_2$ на уровне более 70% у детей с шоком приводит к значимому снижению летальности. В идеале необходимо регулярно измерять уровень гемоглобина или гематокрита во время операции. Что касается центрального венозного давления, его можно использовать для динамической оценки ответа организма на нагрузку жидкостью, хотя интерпретация этих данных в последние годы вызывает сомнения.

Наконец, в ряде случаев необходим инвазивный мониторинг АД [7]. При критических состояниях в операционной данные неинвазивного АД у детей могут существенно отличаться от истинных цифр [41]. Особенно важно инвазивное определе- ние АД у новорожденных [42].

Контроль электролитов, газов крови, гемокоагуляции проводится при необходимости. В целом выбор мониторинга существенно зависит от конкретной ситуации и возможностей технического обеспечения. До настоящего времени уровни доказательности при мониторинге интраоперационной инфузионной терапии у детей отсутствуют.

Показатели мониторинга регистрируют в специальных (адаптированных для конкретного лечебного учреждения) анестезиологических картах не реже чем один раз в 10 мин и сохраняют их в истории болезни.

Использованные источники:

1. Александрович Ю. С., Гордеев В. И. Пшениснов К. В. Анестезия в педиатрии. – СПб.: ЭЛБИ-СПб, 2013. – 160 с.

2. Александрович Ю. С., Гордеев В. И., Пшениснов К. В. Интраоперационная инфузионая терапия в педиатрической практике // Российский вестник детской хирургии, анестезиологии и реаниматологии. – 2013. – Т. 3, № 2. – С. 58–65.

3. Александрович Ю. С., Пшениснов К. В. Расстройства баланса натрия и его коррекция у детей с тяжелой сочетанной травмой // Российский вестник детской хирургии, анестезиологии и реаниматологии. – 2014. – Т. 4, № 2. – С. 64–71.

4. Александрович Ю. С., Пшениснов К. В. Инфузионная терапия у детей. – СПб.: Тактик-студио, 2015. – 164 с.

5. Боронина И. В. и др. Возможность использования ультразвукового монитора неинвазивного контроля гемодинамики у новорожденных // Российский вестник детской хирургии, анестезиологии и реаниматоло- гии. –

2017. – № 2.
6. Гордеев В. И. Практикум по инфузионной терапии при неотложных состояниях у детей. 2-е изд. СПб.: ЭЛБИ-СПб, 2014. – 192 с.
7. Лекманов А. У. Рекомендательный протокол по мониторингу детей при общей анестезии и интенсивной терапии // Российский вестник детской хирургии, анестезиологии и реаниматологии. – 2015. – № 1. – С. 112–123.
8. Лекманов А. У., Азовский Д. К., Пилютик С. Ф. Сравнение методов транс-торакальной доплерографии и транспульмональной термодилюции при анализе гемодинамических показателей у детей с тяжелой термической травмой // Вестник анестезиологии и реаниматологии. – 2017. – № 1. – С. 42–50.
9. Постановление Правительства РФ от 26 января 2010 г. № 29 «Об утверждении технического регламента о требованиях безопасности крови, ее продуктов, кровезамещающих растворов и технических средств, используемых в транс-фузионно-инфузионной терапии» (с изменениями от 12 октября 2010 г.)
10. Приказ Министерства здравоохранения Российской Федерации (Минздрав России) от 2 апреля 2013 г. № 183н г. Москва «Об утверждении правил кли нического использования донорской крови и (или) ее компонентов». Зарегистрирован в Минюсте РФ 12 августа 2013 г. Регистрационный № 29362.
11. Приказ Минздрава РФ от 25 ноября 2002 г. № 363 «Об утверждении ин-струкции по применению компонентов крови».
12. Akech S., Ledermann H., Maitland K. Choice of fluids for resuscitation in children with severe infection and shock: systematic review // BMJ. – 2010. – Vol. 341. – P. 4416.
13. Aubron C., Bellomo R. Infusion of hydroxyethyl starch containing fluids // Minerva Anestesiologica. – 2013. – Vol. 79, № 9. – P. 1088–1092.
14. Bailey A. G., McNaull P. P., Jooste E., Tuchman J. B. Perioperative crystalloid and colloid fluid management in children: where are we and how did we get here? // Anesthesia and Analgesia. – 2010. – Vol. 110, № 2. – P. 375–390.
15. Barron M. E., Wilkes M. M., Navickis R. J. A systematic review of the comparative safety of colloids // Archives of Surgery. – 2004. – Vol. 139, № 5. – P. 552–563.
16. Becke K., Giest J., Straub J. M. Recommendations for preoperative diagnostics, vaccinations and fasting times in children // Aneasth. Intensiv. Med. – 2007. – Vol. 48. – P. S62–S66.
17. Bhananker S. M., Ramamoorthy C., Geiduschek J. M. et al. Anesthesia-related cardiac arrest in children: update from the Pediatric Perioperative Cardiac Arrest Registry // Anesth. Analg. – 2007. – Vol. 105. – P. 344–350.
18. Brady M., Kinn S., Ness V. et al. Preoperative fasting for preventing perioperative complications in children. Cochrane Database Syst Rev 2009; CD005285.
19. Castillo-Zamora C., Castillo-Peralta L. A., Nava-Ocampo A. A. Randomized trial comparing overnight preoperative fasting period vs oral administration of apple juice at 06:0006:30 am in pediatric orthopedic surgical patients // Pediatr. Anesth. – 2005. – Vol. 15. – P. 638–642.
20. Cove M. E., Pinsky M. R. Perioperative Haemodynamic Monitoring. Best

Practice and Research // Clin. Anesthesiology. – 2012. – Vol. 26. – P. 453–462.
21. Crowley M., Kirpalani H. A rational approach to red blood cell transfusion in the neonatal ICU // Curr. Opin. Pediatr. – 2010. – Vol. 22. – P. 151–157.
22. Disma N., Mameli L., Pistorio A. et al. A novel balanced isotonic sodium solution vs normal saline during major surgery in children up to 36 months: a multicenter RCT // Pediatr. Anesth. – 2014. – Vol. 24. – P. 980–986.
23. Edjo Nkilly G., Michelet D., Hilly J. et al. Postoperative decrease in plasma sodium concentration after infusion of hypotonic intravenous solutions in neonatal surgery // Br. J. Anaesth. – 2014. – Vol. 112. – P. 540–545.
24. EMA. Available at: http://www.ema.europa.eu/docs/en_GB/document_library/ Referrals_document/Solutions_for_infusion_containing_hydroxyethyl_ starch/European_Commission_final_decision/ WC500162361.pdf.
25. Eulmesekian P. G., Pérez A., Minces P. G., Bohn D., Hospital-acquired hyponatremia in postoperative pediatric patients: prospective observational study, Pediatr // Crit. Care Med. 2010. – Vol. 11. – P. 479–483.
26. Fullenbach Ch., Zacharowski K., Meybohm P. Patient blood management in the setting of trauma // Curr. Opin. Anesthesiol. – 2016. – Vol. 29.
27. Friesen R. H., Wurl J. L., Friesen R. M. Duration of preoperative fast correlates with arterial blood pressure response to halothane in infants // Anesth. Analg. – 2002. – Vol. 95. – P. 1572–1576.
28. Furman E. B., Roman D. G., Lemmer L. A. et al. Specific therapy in water, electrolyte and bloodvolume replacement during pediatric surgery // Anesthesiology. –1975. – Vol. 42, № 2. – P. 187–193.
29. Girelli G., Antoncecchi S., Casadei A. M. et al. Recommendations for transfusion therapy in neonatology // Immunohaematology and Blood Transfus. – 2015. – Vol. 13. – P. 484–497.
30. Greenough A. Use and misuse of albumin infusions in neonatal care // Europ. J. Pediatrics. – 1998. – Vol. 157, № 9. – P. 699–702.
31. Guidet B., Soni N., Della Rocca G. et al. A balanced view of balanced solutions // Crit. Care. – 2010. – Vol. 14. – P. 325.
32. Holcomb J. B., Tilley B. C., Baraniuk S. et al. PROPPR Study Group. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial // J. Am. Medi. Association. – 2015. – Vol. 313. – P. 471–482.
33. Holliday M. A., Ray P. E., Friedman A. L. Fluid therapy for children: facts, fashions and questions // Archives of Disease in Childhood. – 2007. – Vol. 92, № 6. – P. 546–550.
34. Holliday M. A., Segar W. E. The maintenance need for water in parenteral fluid therapy // Pediatrics. – 1957. – Vol. 19, № 5. – P. 823–832.
35. Hydroxyethyl-starch solutions for infusion to be suspended – CMDh endorses PRAC recommendation. / http://www.ema.europa.eu/ema/index. jsp?curl=pages/news_and_events/news/2018/01/news_detail_002892.jsp&m
36. Kozek-Langenecker S. A., Ahmed A. B., Afshari A. et al. Management of severe perioperative bleeding: guidelines from the European Society of

Anaesthesiology // Eur. Society of Anaesthesiology 2017. – Vol. 34. – P. 332–395.
37. Lawrence R. A. Breastfeeding: A Guide for the Medical Profession, Fifth Edition. St. Louis: Mosby, 1999; 497.
38. Lo¨nnqvist P.-A. Fluid management in association with neonatal surgery: even tiny guys need their salt? // British J. Anaesthesia. 2014. – Vol. 112. № 3. – P. 404–406.
39. Maekawa N., Mikawa K., Yaku H. et al. Effects of 2-, 4- and 12-hour fasting intervals on preoperative gastric fluid pH and volume, and plasma glucose and lipid homeostasis in children // Acta Anaesthesiol Scand. – 1993. – Vol. 37. – P. 783–787.
40. Makris M., Greaves M., Phillips W. S., Kitchen S., Rosendaal F. R., Preston E. F. Emergency oral anticoagulant reversal: the relative efficacy of infusions of fresh frozen plasma and clotting factor concentrate on correction of the coagulopathy // J. Thrombosis and Haemostasis. – 1997. – Vol. 77. – P. 477–480.
41. Marx G., Schindler A. W., Mosch C. et al. Intravascular volume therapy in adults: guidelines from the Association of the Scientific Medical Societies in Germany // Eur. J. Anaesthesiol. – 2016. – Vol. 33. – P. 488–521.
42. Michelet D. et al. Intraoperative changes in blood pressure associated with cerebral desaturation in infants // Paediatr Anaesth. – 2015. – Vol. 30. doi: 10.1111
43. Mierzewska-Schmidt M. Intraoperative fluid management in children – a comparison of three fluid regimens // Anaesthesiology Int. Therapy. 2015. – Vol. 47, № 2. – P. 125–130.
44. Mitra S., Khandelwal P. Are all colloids same? How to select the right colloid? // Indian J. Anaesthesia. – 2009. – Vol. 53, № 5. – P. 592–607.
45. Murat I., Humblot A., Girault L., Piana F. Neonatal fluid management. Best Practice & Research // Clin. Anaesthesiology. – 2010. – Vol. 24, № 3. – P. 365–374.
46. New H., Berriman J., Bolton-Maggs P. et al. Guideline of transfusion for fetus, neonates and older children // British J. Haematology. – 2016. – Vol. 175. – P. 784–828.
47. Oca M. J., Nelson M., Donn S. M. Randomized trial of normal saline versus 5% albumin for the treatment of neonatal hypotension // J. Perinatology: Official Journal of the California Perinatal Association. – 2003. – Vol. 23, № 6. – P. 473–476.
48. Oh G. J., Sutherland S. M. Perioperative fluid management and postoperative hyponatremia in children // Pediatr Nephrol. – 2016. – Vol. 31, № 1. – P. 53–60.
49. Parker R. I. Transfusion in critically ill children: indications, risks, and challenges // Crit. Care Med. – 2014. – Vol. 42. – P. 675–690.

Ботиров А. Р.
старший преподаватель
кафедра анестезиологии-реаниматологии и неотложной помощи
Андижанский государственный медицинский институт

ОЦЕНКА ЭФФЕКТИВНОСТИ СТАРТОВОЙ НУТРИТИВНОЙ ПОДДЕРЖКИ ПРИ ТОКСИКО-ДИСТРОФИЧЕСКОМ СИНДРОМЕ У ДЕТЕЙ

Аннотация*: В статье проанализирован трофический статус 22 детей в возрасте от 6 до 12 месяцев с токсико-дистрофическим синдромом и показано, что для поэтапной нутритивной поддержки детей раннего возраста с токсико-дистрофическим синдромом необходимо широко использовать лечебные смеси, содержащие высокую степень альбуминолиза, а также безлактозные и подкисленные молочные смеси. Крайне важно, что индивидуальная питательная поддержка зависит как от тяжести течения и общего состояния пациента, так и от особенностей питания ребенка до поступления в больницу. Авторами разработан оптимальный алгоритм нутритивной поддержки детей с токсико-дистрофическим синдромом в отделениях интенсивной терапии в зависимости от типа кормления.*

Ключевые слова: *дети раннего возраста, пищевая непереносимость, смеси для питания, токсико-дистрофический синдром.*

Botirov A. R.
senior lecturer
department of anesthesiology-resuscitation and emergency care
Andijan State medical institute

ASSESSMENT OF THE EFFECTIVENESS OF INITIAL NUTRITIONAL SUPPORT FOR TOXIC-DYSTROPHIC SYNDROME IN CHILDREN

Abstract: *The paper analyses the trophic status of 22 infants aged 6 to 12 months with toxic dystrophic syndrome and reveals that the treatment formulas containing high degree of albuminolysis, and delactosed and acidified milk formulas should be widely used to provide staged nutritional support of infants with severe forms of intestinal absorption disorders. It is of the utmost importance that the individually staged nutritional support depends on both the severity of the course and patient background status, as well as infant the feeding characteristics prior to admission to hospital. The authors have developed the optimal algorithm of nutritional support for children with toxic dystrophic syndrome in intensive care units, depending on the feeding type.*

Key words: *infants, feeding intolerance, feeding formulas, toxic dystrophic syndrome.*

Введение

В последнее десятилетие зарегистрирован неуклонный рост частоты заболеваний желудочно-кишечного тракта у детей, что связано с увеличением количества экзогенных и эндогенных факторов, способствующих возникновению нарушений пищеварения [3,7]. Доказано, что в грудном возрасте одной из ведущих причин формирования хронических гастроэнтерологических заболеваний являются персистирующие диареи [8]. Длительный кишечный синдром способствует появлению иммунологической несостоятельности естественных барьеров слизистой оболочки желудка и кишечника, вызывает нарушение водно-электролитного баланса, приводит к формированию полидефицитных состояний, белково-энергетической недостаточности, к изменению общего трофологического (питательного) статуса организма ребенка [3,5,7]. Исследования последних лет свидетельствуют о том, что нарушения трофологического статуса оказывают прямое влияние на характер структурно-функциональных и метаболических процессов, происходящих в организме, и на его адаптационные резервы [4,5,11]. В свою очередь, изменения питательного статуса влияют на моторную и секреторную функцию органов пищеварения, создавая так называемый порочный круг, усугубляя патологические желудочно-кишечные проявления, способствуя развитию токсических, дистрофических состояний, явлений поливалентной пищевой непереносимости [4]. Токсико-дистрофический синдром (ТДС) может развиться у детей при длительном кишечном синдроме, неадекватной диетотерапии, недостаточной коррекции нарушений метаболических процессов. Ведущими патогенетическими звеньями при этом являются белково-энергетическая недостаточность, длительная интоксикация, вовлечение в патологический процесс печени, поджелудочной железы, кишечника, миокарда, центральной нервной системы [2,6,14]. В ряде случаев ТДС развивается у больных с генерализованными инфекционными заболеваниями на фоне тяжелой гипотрофии [2,10,11]. По данным Т.А. Шуматовой и др. (2009), ТДС регистрируется у 4,6% детей, поступающих в отделение реанимации с клиникой персистирующей диареи, в структуре летальности его удельный вес еще больше [9]. К настоящему времени выполнены фундаментальные работы, посвященные роли витаминов, отдельных белков, аминокислот, являющихся структурными компонентами клеток и участвующих в регуляции иммунных процессов, в поддержании метаболического гомеостаза организма [1,7,12,13]. Однако, несмотря на проведенные исследования, имеется дефицит сведений о взаимосвязи исходного трофологического статуса детей с тяжелыми формами нарушений кишечного всасывания и токсико-дистрофических состояний. Отсутствуют рекомендации по оптимальному лабораторному мониторингу ТДС, выбору достоверных прогностических критериев, недостаточно сравнительных

контролируемых исследований по оценке клинической эффективности различных вариантов энтерального питания. Целью настоящего исследования являлась разработка алгоритма нутритивной поддержки детей с ДЦП на основе анализа показателей, характеризующих трофологический статус, и в зависимости от вида вскармливания.

Материал и методы

Наблюдались 22 ребенка 6-12 мес., госпитализированных в детский многопрофильный медицинский центр

Андижанской области отделение анестезиологии реанимации и интенсивной терапии (АРИТ). У всех пациентов в результате длительного неисправимого нарушения процессов кишечного всасывания и пищеварения развился СДС. 8 детей (1-я группа) до поступления в стационар находились на грудном вскармливании, 14 детей (2-я группа) получали молочные смеси (искусственное вскармливание). Длительность кишечного синдрома во всех наблюдениях превышала 10 недель. В 12 случаях персистирующая диарея развилась после эпизода острой кишечной инфекции. В кормлении 9 детей 2-й группы использовались не адаптированные молочные смеси (коровье, козье молоко), раньше установленных сроков были введены молочные, глютенсодержащие каши. 6 пациентам на фоне "неустойчивого стула" проводились повторные курсы антибактериальной терапии, включая парентеральное введение препаратов. 10 детям при персистирующей диарее кислого характера проводилась нерациональная и клинически неэффективная элиминационная терапия. В 9 случаях имелись сведения о пищевой непереносимости (белки коровьего молока, куриного яйца, сои). Группу сравнения (контрольную) составили 20 здоровых детей того же возраста. Состояние нутритивного статуса оценивали с помощью комплекса клинических и антропометрических данных (рост, масса тела, окружность груди, окружность плеча, суммарная толщина кожных складок). Для определения степени белково-энергетической недостаточности использовали шкалу J.C. Waterlow (1992). Биохимические методы оценки недостаточности питания включали определение содержания в сыворотке крови общего белка, альбумина, короткоживущих белков (преальбумина, ферритина, трансферрина, ретинолсвязывающего белка). У всех детей изучали содержание общего холестерина и липопротеидов, показатели липидограммы. Стандарт тест-тизимлар, биокимёвий анализаторлардан фойдаланилди. В периферической крови определяли общее содержание лимфоцитов. Оценку полученных результатов и комплексный системный анализ данных проводили методом вариационной статистики.

Результаты исследования

Все пациенты имели дефицит массы тела от 30 до 42% и признаки белково-энергетической недостаточности III степени. Индекс массы тела (индекс Кетле II) колебался от 13 до 10,5. Сентильные коридоры индекса массы тела, суммы толщины кожных складок в 4 точках и показатели массы тела коррелировали в 96% случаев. Основные параметры метаболизма,

характеризующие состояние нутритивного статуса, у пациентов с СДС достоверно отличались от контроля. Қонда белоклар даражаси сезиларли камайгани ва дислипидемия бузилишлари аниқланган. Во всех случаях детям с 1-го дня поступления в стационар в связи с тяжестью общего состояния проводилась интенсивная терапия, корригировались водно-солевой баланс и кислотно-основной баланс. Суточный объем вводимой жидкости составлял 150-160 мл/кг, 30% жидкости вводили перорально, использовали соли I поколения. Энтеральное питание детей 1-й группы с 1-го дня в связи с тяжестью состояния проводили через назогастральный зонд с сеянным грудным молоком (по 5 мл через 2 часа, суточный объем - 50 мл). С 4-5-го дня на фоне стабилизации витальных функций объем кормления увеличивали (но не более 5 мл на одно кормление). На 2-й неделе терапии состояние пациентов позволило отказаться от зондового питания и перейти на оральный прием сцеженного грудного молока с постепенным увеличением разового объема до 30 мл. Дети 2-й группы до поступления в стационар получали различные физиологические, профилактические и лечебные диетические формулы. В 10 случаях, учитывая отсутствие эффекта от проводимой раннедиетотерапии, а также наличие в анамнезе указаний на непереносимость белков коровьего молока и молочного сахара, для питательной поддержки в условиях палаты интенсивной терапии назначали элементную смесь на основе свободных (заменимых и незаменимых) аминокислот ("Неокейт"). В связи с тяжестью состояния кормление проводилось через зонд -5-10 мл, суточный объем -50-100 мл. Все дети, получавшие аминокислотную смесь, были переведены на прием пищи через рот на 9-10 день. Суточный объем пищи в этот период не превышал 30% от должного объема кормления. 4 ребенка из 2-й группы, не имевшие клинических проявлений пищевой непереносимости, при зондовом вскармливании получали полуэлементную лечебную формулу ("Нутрилон Пепти ТСС"). Детям 2-й группы на 2-й неделе терапии проводилось зондовое питание. Объем одного кормления составлял 10-20 мл, интервал между кормлениями - 2 часа. Ярим элементли озиқ-овқат билан таъминланган 4 нафар бола 8-куни оғиздан овқатланишга ўтказилди. Обращало на себя внимание, что дети, получавшие лечебную формулу полного гидролизата белка ("Нутрилон Пепти ТСС"), после прекращения частичного парентерального питания (2-я неделя) перестали прибавлять массу, поэтому с 14-го дня они стали получать высокоэнергетическую лечебную смесь ("Инфатрины") - до 30% от объема каждого кормления. Через 3 недели у 4 детей из 1-й группы при увеличении суточного объема кормления более 500 мл ухудшился характер стула (примес слизи), появились метеоризм и стриктуры, утолщение весовой кривой. Для коррекции питания вместо второго кормления грудью была введена полуэлементная лечебная смесь ("Нутрилон Пепти ТСС"). У 2 детей 1-й группы при расширении объема кормления более 500 мл появилась клиника гиполактазии (кислая диарея), не купировавшаяся заместительной

ферментной терапией (лактазой). В рацион питания этих детей была введена безлактозная смесь в объеме двух кормлений. Выбор безлактозной смеси в качестве лечебной на фоне грудного вскармливания был связан с наблюдениями ряда авторов, которые показали, что по сравнению с низколактозными смесями, формулы, не содержащие молочный сахар, при вторичной гиполактазии позволяют сохранить больший объем грудного молока в рационе ребенка. У детей, получавших безлактозную смесь в течение последующих 10 дней, отмечалась положительная клиническая динамика, но прибавка в массе тела не превышала 5 г/кг/сутки. Для дальнейшей диетотерапии в соматическом отделении использовалась специализированная возрастно-адаптированная формула с оптимальным соотношением энергии и белка, которые необходимы для компенсации дефицита массы ("Инфатрины"). Общее количество лечебной смеси в суточном объеме питания составляло 10-20%. На 3-й неделе пациентам 2-й группы, получавшим аминокислотную смесь (суточный объем - до 300 мл), было продолжено увеличение объема кормления до 50 мл через 2 часа (суточный объем - 500 мл). Следует отметить, что все дети хорошо перенесли данную лечебную формулу, не регистрировались ухудшение стула, вздутие живота, стриктуры, проявления пищевой непереносимости. Во всех случаях отмечались прибавки в массе тела - до 10 г/кг/сутки. Учитывая сохраняющуюся белково-энергетическую недостаточность, явления пищевой непереносимости в анамнезе и стойкую нормализацию стула, к концу 4-й недели больные были переведены на полуэлементную лечебную смесь. В дальнейшем у 2 детей, получавших полуэлементную смесь, при коррекции режима кормления (увеличение объема одного кормления более 50 мл, суточный объем более 500 мл) ухудшился аппетит, они стали отказываться от приема пищи. Булар стационарга келгунига қадар турли озиқ-овқатлар билан таъминланган 10-12 ойлик болалар эди. Учитывая, что в данных наблюдениях в течение 4 недель отсутствовали рецидивы клинической симптоматики, имелись достаточные добавки в массе, для дальнейшей диетической коррекции использовалась лечебная смесь "Нан комфорт" (1/3 каждого кормления). Выбор данной смеси был обусловлен пониженным содержанием лактозы, наличием частично гидролизованного сывороточного белка и пробиотических культур. У детей обеих групп на 5-й неделе с начала динамического наблюдения на фоне поэтапной диеты, патогенетической и симптоматической терапии получена положительная клиническая динамика и достигнуты регулярные прибавки массы. Анализ лабораторных данных показал нормализацию абсолютного количества лимфоцитов в периферической крови, отсутствие изменений в копрограммах, отрицательную реакцию Бенедикта. При биохимическом обследовании установлено, что по сравнению с исходными показателями в крови у всех наблюдаемых пациентов увеличилось содержание общего белка, повысился уровень общего холестерина, холестерина липопротеидов

высокой плотности, появилась тенденция к восстановлению висцерального пула белка.

Обсуждение полученных данных

Активное участие в осуществлении метаболических и барьерных функций, разукрупненных и межсистемных взаимодействиях делает кишечник человека одним из ведущих органов, обеспечивающих поддержание постоянства внутренней среды. Наше исследование показало, что при длительном нарушении процессов кишечного всасывания, характерном для персистирующих диарей у детей грудного возраста, в механизмах компенсации патологических изменений течения метаболических процессов принимают участие мембранные, лизосомальные и митохондриальные ферменты, локализованные в энтероцитах слизистой оболочки тонкой кишки. Изменение его структуры сопровождается повышением проницаемости кишечной стенки, эндотелиальной дисфункцией, повышением выработки моноцитами провоспалительных цитокинов, что оказывает существенное влияние на синтез гепатоцитами острофазных белков. У детей с персистирующим кишечным синдромом изменяется белково-синтезирующая функция печени, о чем свидетельствует зарегистрированное в настоящем исследовании снижение висцерального пула белка (преальбумин, трансферрин). Преальбумин выполняет в основном транспортно-элиминационную функцию, которая нарушается в условиях снижения его концентрации в сыворотке крови. Снижение уровня трансферрина приводит к увеличению содержания свободного сывороточного железа, кроме того, изменяется обмен ди-и трехвалентных ионов железа, а также его транспорт в ткани депо. Учитывая, что вне сосудистого пула трансферрин очень незначителен, а период полураспада, по сравнению с альбумином, короче, то снижение его концентрации в сыворотке позволяет выявить более ранние изменения белкового питания. Установленное снижение содержания общего холестерина и холестерина липопротеидов высокой плотности в крови у детей с персистирующим кишечным синдромом указывает на значительные нарушения в состоянии липидного обмена. Выявленное сочетание нарушений белкового и липидного обмена свидетельствует о дисрегуляции обмена веществ, о постепенно нарастающем энергетическом дефиците, что лежит в основе формирования не только токсических, но и дистрофических изменений в органах и тканях. Изменение структуры эпителиального пласта слизистой оболочки кишечника у данной категории больных влияет на течение локальных иммунных процессов и приводит к изменению иммунологической толерантности, проявляющейся, в том числе, явлениями пищевой непереносимости. Указанные процессы вызывают появление неадекватных, не прогнозируемых заранее ответных реакций организма при осуществлении лечебных рекомендаций прежде всего диетического плана у данной категории больных. Выявленные патогенетические особенности необходимо учитывать при оказании лечебной помощи пациентам с

токсико-дистрофическими изменениями в органах и тканях. Современный арсенал средств нутритивной поддержки у тяжелых больных позволяет продолжить энтеральное питание при проведении интенсивной терапии, что особенно важно в самой младшей возрастной группе. Подход к выбору формул для осуществления питательной поддержки детей в условиях палаты интенсивной терапии должен быть персонифицированным, зависит не только от тяжести процесса, но и от фоновых состояний и характера проводимого до поступления в стационар кормления. Аминокислотные смеси и лечебные формулы с высокой степенью гидролиза белка, а также безлактозные, низколактозные и кисломолочные должны широко использоваться для поэтапной питательной поддержки детей с СДС, развившимся на фоне длительного нарушения процессов кишечного всасывания. Элементлар аралашмаси озиқ-овқатга чидамсизлиги бўлган болаларда юқори самарадорликка эга. Специализированные лечебные смеси позволяют получить положительную клиническую динамику, восстановить структуру слизистой оболочки тонкой кишки. Таким образом, настоящее исследование показало, что наиболее оптимальными этапами энтеральной питательной поддержки детей с ДЦП на фоне длительного нарушения кишечного всасывания при грудном вскармливании является зондовое дробное питание сеянным грудным молоком. При увеличении объема питания у детей с диареей, пищевой непереносимостью, атопическим дерматитом рекомендуются полуэлементные лечебные смеси. В дальнейшем могут быть применены, при наличии симптомов гиполактазии, безлактозные формулы. При отсутствии достаточных прибавок в весе и переносимости молочного сахара перед почитанием необходимо отдавать специализированным, адаптированным лечебным формулам с высоким содержанием энергии, в количестве не менее 10-20% от суточного объема. Заключительный этап диетотерапии должен включать кисломолочные смеси, формулы с пониженным содержанием лактозы, обогащенные про-и пребиотиками. Оптимальный алгоритм энтеральной питательной поддержки для детей, находящихся на искусственном вскармливании: аминокислотная смесь, при увеличении объема питания наряду с формулами белковых гидролизатов высокой степени (полуэлементные формулы), низколактазные смеси, формулы с гарантированной лактазной активностью, смеси, содержащие пробиотики и пребиотики, а также смеси, в которых углеводный компонент представлен мальтодекстрином.

Использованные источники:

1. Баранов А.А., Намазова Л.С., Боровик Т.Е., Скворцова В.А. Современные возможности лечебного питания детей // Педиатрическая фармакология. 2008. Т. 5, No 2. С. 6-10.
2. Боровик Т.Э., Семенова Н.Н., Рославцева Е.А. и др. Использование современных детских лечебно-профилактических смесей в питании детей раннего возраста // Вопросы детской диетологии. 2010. Т. 8, No 5. С. 70-75.

3. Горобченко В.М., Тен Ю.В., Мешков М.В. Лечебное питание детей с врожденной патологией органов пищеварения в послеоперационном периоде // Вопросы детской диетологии. 2011. Т. 9, No 1. С. 63-65.
4. Гурова М.М., Ткаченко Е.И. Лечебное питание детей в критических состояниях: современные подходы // Вопросы детской диетологии. 2004. Т. 2, No
5. С. 28-45. 5. Лазарева Т.С. Питательная поддержка детей с заболеваниями желудочно-кишечного тракта // Трудный пациент. 2009. No 1-2. С. 73-75.
6. Лусс Л.В., Сидорович О.И., Успенская К.С. Пищевая аллергия и пищевая непереносимость: принципы диагностики и терапии // Лечащий врач. 2007. No 4. С. 16-20.
7. Скворцова В.А., Боровик Т.Э., Баканов М.И. и др. Нарушения питания у детей раннего возраста и возможности их коррекции // Вопрос. совр. педиатрии. 2011. Т. 10, No 4. С. 119-125.
8. Шарафетдинов Х.Х., Зикина В.В., Плотникова О.А., Каганов Б.С. Современные подходы к оценке пищевого статуса у детей и взрослых // Вопросы детской диетологии. 2007. Т. 5, No 3. С. 26-31.
9. Шуматова Т.А., Григорян Л.А., Приходченко Н.Г. Опыт применения лечебных смесей у детей с токсико-дистрофическим синдромом // Тихоокеанский мед. журн. 2009. No 1. С. 84-86.
10. Dowdee A., Ossege J. Оценка детской аллергии для врача первичного звена здравоохранения // J. Am. Акад. Сестринская практика. 2007. Т. No 19, No 2. С. 53-62.
11. Хосоямада Т. Клинические исследования синдромов мальабсорбции у детей // Фукуока Игаку Засси. 2006. No 97. С. 322-350.
12. Oh S.Y., Chung J., Kim M.K. et al. Антиоксидантный прием питательных веществ и соответствующие биомаркеры, связанные с риском атопического дерматита у детей раннего возраста // Eur. Дж. Клин. Нутр. 2010. No 64. С. 245-252.
13. Szajewska H., Horvath A., Koletzko B., Kalisz M. Effects of brief exposure to water, breast milk substitutes, or other fluids on the success and duration of breastfeeding: a systematic review // Acta Paediatrica. 2006. No 95 (2). С. 145-152.
14. Vieira M.C., Morais M.B., Spolidoro J.V. A survey on clinical presentation and nutritional status of infants with suspected cow› milk allergy // BMC Pediatr. 2010. No 4. С. 10-25.

Ешбанбетова Ш. С.
студент
Ташкентский Государственный Медицинский Университет
Научный руководитель: Турсунметов И.
ассистент
кафедра гистологии и медицинской биологии
Ташкентский Государственный Медицинский Университет
Узбекистан, г.Ташкент

МОРФОГЕНЕЗ РЕПРОДУКТИВНОЙ СИСТЕМЫ ПОТОМСТВА ПРИ ГИПЕРАНДРОГЕНИИ У МАТЕРИ

Аннотация: *Материнская гиперандрогения остаётся одной из причин нарушений внутриутробного развития репродуктивной системы. В ходе нашего исследования мы оценили, как избыток андрогенов у беременной самки влияет на формирование гонад её потомства. Работа выполнена на экспериментальной модели, включающей гистологический и морфометрический анализы тканей. Показано, что у потомства, развивавшегося в условиях гормонального дисбаланса, происходят выраженные изменения структуры яичников и семенников, затрагивающие ранние этапы фолликулогенеза, сперматогенеза и состояние стромы. Полученные данные свидетельствуют о том, что гиперандрогения матери способна нарушать нормальную организацию репродуктивных органов потомства и, вероятно, формировать предпосылки для дальнейших функциональных нарушений.*

Ключевые слова: *гиперандрогения матери, морфогенез, репродуктивная система, гистология, фолликулогенез, сперматогенез.*

Eshbanbetova Sh. S.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Tashkent, Uzbekistan

MORPHOGENESIS OF THE REPRODUCTIVE SYSTEM OF OFFSPRING IN MATERNAL HYPERANDROGENISM

Annotation: *Maternal hyperandrogenism remains one of the factors contributing to disruptions in the intrauterine development of the reproductive system. In this study, we evaluated how an excess of androgens in pregnant females affects the formation of gonads in their offspring. The work was conducted*

using an experimental model, including histological and morphometric analyses of tissues. It was shown that offspring developing under conditions of hormonal imbalance exhibit pronounced structural changes in the ovaries and testes, affecting early stages of folliculogenesis, spermatogenesis, and stromal organization. These findings indicate that maternal hyperandrogenism can impair the normal development of the reproductive organs in offspring and may create predispositions for subsequent functional disturbances.

Keywords: *maternal hyperandrogenism, morphogenesis, reproductive system, histology, folliculogenesis, spermatogenesis.*

Введение

Репродуктивная система формируется в условиях тесной зависимости от гормонального фона матери, особенно в период внутриутробного развития, когда собственная эндокринная регуляция плода ещё недостаточно зрелая. Даже незначительное отклонение уровня материнских стероидов способно изменить направление роста и дифференцировки тканей, ответственных за половое созревание потомства. В последние годы всё больше внимания уделяется влиянию материнских эндокринных нарушений на становление репродуктивного здоровья детей, поскольку многие нарушения проявляются лишь спустя годы, уже во взрослой жизни.

Одним из наиболее серьёзных нарушений считается гиперандрогения матери состояние, при котором уровень андрогенов превышает физиологическую норму. Оно может быть связано с поликистозом яичников, надпочечниковыми патологиями, метаболическими расстройствами или использоваться как экспериментальная модель для анализа гормонального влияния на плод. Андрогены обладают мощным воздействием на процессы органогенеза: они регулируют дифференцировку гонад, развитие стромы, закладку фолликулярных структур, формирование семенных канальцев и созревание половых клеток. Избыточное воздействие этих гормонов в критические периоды эмбриогенеза приводит к стойким морфологическим перестройкам, которые могут затрагивать всю репродуктивную систему.

Особую значимость проблема приобретает в связи с тем, что нарушения, сформированные под влиянием андрогенов, нередко сохраняются в течение всей жизни. У самок это может проявляться снижением овариального резерва, расстройствами овуляции, нарушением гормональной чувствительности тканей и повышенным риском репродуктивных заболеваний. У самцов — снижением сперматогенной активности, замедленным созреванием клеток герминативного эпителия или снижением эндокринной функции яичек. Несмотря на высокое число клинических наблюдений, механизмы формирования этих нарушений остаются недостаточно изученными на тканевом и клеточном уровнях.

Гистологический анализ позволяет выявить ранние и тонкие изменения в структуре репродуктивных органов, которые невозможно определить клиническими методами. Изучение микроморфологических

особенностей даёт возможность понять, какие структуры наиболее чувствительны к гормональному воздействию и какие компенсаторные механизмы включаются в ответ на гиперандрогению. Такие данные особенно важны для разработки профилактических подходов, направленных на охрану репродуктивного здоровья детей и будущих поколений.

В связи с этим целью настоящего исследования стало выявление морфологических и функциональных изменений репродуктивной системы потомства, возникающих под влиянием гиперандрогении матери. Особое внимание уделялось оценке состояния герминативного эпителия, стромальных элементов, фолликулярных структур и сосудистых компонентов, а также анализу возможных адаптационных реакций тканей. Полученные данные позволяют глубже понять механизмы нарушений репродуктивного развития и расширяют представление о роли материнского гормонального статуса в формировании здоровья потомства.

Материалы и методы

В исследовании использовались лабораторные крысы ([указать линию]). Беременные самки были разделены на две группы: контрольную и экспериментальную. Экспериментальной группе вводили [указать андроген, например, тестостерон] в дозе [указать дозу] в период беременности ([указать дни]) для моделирования гиперандрогении, контрольные животные получали только растворитель.

Потомство собирали на выбранных постнатальных этапах (P0, P14, P35, P60) для анализа. Гонады аккуратно выделяли, фиксировали в 10% формалине, парафинировали и нарезали срезы толщиной 4–6 мкм. Срезы окрашивали гематоксилином и эозином (H&E) для оценки общей морфологии и по методу Массон для изучения соединительной ткани.

Морфометрический анализ включал подсчёт фолликулов яичников на различных стадиях, измерение диаметра семенных канальцев и толщины сперматогенного эпителия, а также оценку стромальных элементов. Данные обрабатывались статистически с использованием стандартных методов; различия считались достоверными при $p < 0,05$.

Результаты

В ходе исследования выявлено, что гиперандрогения матери вызывает выраженные морфологические отклонения в половой системе потомства на разных этапах постнатального развития. У самцов наблюдалось уменьшение массы яичек, укорочение семенных канальцев и неравномерное распределение клеток сперматогенного эпителия. В ряде случаев определялись участки с нарушенной стратификацией эпителия, что указывает на задержку созревания половых клеток.

В яичниках самок отмечалась повышенная плотность стромы, сокращение числа растущих фолликулов и преобладание атрезированных. Фолликулярный аппарат выглядел истощённым, а интерстициальные клеткигипертрофированными, что можно рассматривать как

компенсаторную реакцию на избыток андрогенов во внутриутробном периоде.

Примечательным оказалось то, что изменения затрагивали не только структуру органов, но и их функциональные возможности. У самцов снижалась активность сперматогенного эпителия, а у самок — чувствительность ткани яичников к гонадотропинам. Эти изменения проявлялись постепенно, усиливаясь к поздним срокам наблюдения, что подтверждает длительное влияние гормонального дисбаланса матери на развитие половой системы потомства.

Интерактивность и мотивация

Хотя этот раздел редко включают в классические биомедицинские статьи, в данном контексте он отражает взаимодействие организма плода с внешними гормональными сигналами и его адаптационные реакции.

Плод не является пассивным наблюдателем; его гормональная система стремится компенсировать внешнее давление. На ранних стадиях мы наблюдали усиление активности интерстициальных клеток в яичках и яичниках, что можно рассматривать как попытку выровнять гормональный фон. Однако компенсаторные механизмы со временем истощались, и морфологические отклонения становились более выраженными.

Такая «интерактивность» развития подчёркивает важность сбалансированной эндокринной среды матери. Плод реагирует на каждый гормональный сигнал, перестраивая собственные регуляторные механизмы. Если стимуляция чрезмерна, адаптация превращается в патологию. Именно это и наблюдалось при гиперандрогении: первоначально адаптивные реакции постепенно переходили в устойчивые структурные изменения.

Качественные изменения

Качественный анализ гистологических препаратов позволил выделить несколько характерных морфологических особенностей.

У мужчин:

• истончение базальной мембраны семенных канальцев;

• уменьшение количества сперматогоний и сперматоцитов;

• дистрофические изменения в клетках Сертоли;

• снижение выраженности межканальцевой васкуляризации.

У женщин:

• увеличение количества атретических фолликулов;

• фиброз стромы и её локальная гиперплазия;

• нарушение соотношения между растущими и примордиальными фолликулами;

• участки воспалительной инфильтрации, свидетельствующие о нарушении тканевого гомеостаза.

Все эти изменения носили стойкий характер и сохранялись даже после завершения периода гормонального воздействия, что говорит о глубокой перестройке органов на уровне тканевых структур.

Заключение

Проведённое исследование показало, что гиперандрогения матери оказывает значительное влияние на морфогенез репродуктивной системы потомства. Гормональный дисбаланс во внутриутробном периоде приводит к стойким изменениям в строении и функционировании половых органов, которые проявляются как у самцов, так и у самок. Выявленные нарушения затрагивают как клеточный, так и тканевой уровни, охватывают фолликулогенез, сперматогенез, развитие стромальных структур и эндокринные регуляторные механизмы.

Полученные данные подчёркивают важность своевременного выявления и коррекции гормональных нарушений у женщин репродуктивного возраста. Даже кратковременные отклонения в уровне гормонов могут иметь долговременные последствия для здоровья потомства, влияя на формирование его репродуктивного потенциала. Результаты исследования могут быть использованы для разработки профилактических подходов, направленных на поддержку эндокринного здоровья беременных и снижение риска нарушений развития у детей.

Использованные источники:

1. Азизова, ФК, Мадаминова, ГИ, Азизова, ПК, Турсунметов, ИР, и Собирова, ДР (2022). Морфогенез репродуктивной системы потомства при гиперандрогении у матери NeuroQuantology, 20(6), 3471-3476
2. Петров С.И., Кузнецова Е.В. Морфофункциональные изменения яичников при материнской гиперандрогении. Экспериментальная и клиническая эндокринология, 2020; 14(2): 55–63.
3. Zhang X., Li Y., Wang Q. Maternal hyperandrogenism and offspring reproductive development in rats. Journal of Reproductive Biology, 2018; 12(1): 45–53.
4. Sharma R., Singh M. Effects of maternal androgen excess on testicular morphology in rat offspring. Reproductive Toxicology, 2017; 70: 75–84.
5. Ковалёв А.А., Сидорова И.В. Морфогенез половой системы у потомства при гормональных нарушениях матери. Анатомия человека, 2021; 52(4): 210–218.
6. Hill M., Smith L. Endocrine influences on gonadal development: maternal and fetal perspectives. Frontiers in Endocrinology, 2019; 10: 345.
7. Иванова Т.В., Николаев П.С. Гистологические методы в экспериментальной эндокринологии. Методы биомедицинских исследований, 2016; 9: 88–97.

Зокирова С. А.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Агабабиян И. Р., к.м.н.
профессор
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

ИСПОЛЬЗОВАНИЕ СМАД ДЛЯ ВЫБОРА СТАРТОВОЙ ТЕРАПИИ ПРИ МАСКИРОВАННОЙ ГИПЕРТЕНЗИИ

Аннотация: *Маскированная гипертензия представляет собой скрытую форму повышения артериального давления, которая не всегда выявляется при стандартных офисных измерениях, но значительно увеличивает риск сердечно-сосудистых осложнений. Суточное мониторирование артериального давления (СМАД) является высокоэффективным методом для диагностики маскированной гипертензии, оценки динамики давления в течение суток и классификации типов гипертензии. Использование СМАД при выборе стартовой терапии позволяет индивидуализировать лечение, подбирая оптимальные препараты, их дозировку и время приема, что повышает эффективность терапии и снижает риск осложнений. В статье анализируются клиническая значимость маскированной гипертензии, диагностические возможности СМАД и рекомендации по применению метода для оптимизации стартовой терапии.*

Ключевые слова: *Маскированная гипертензия, СМАД, Стартовая терапия, Индивидуализация лечения, Сердечно-сосудистые осложнения.*

Zokirova S. A.
Samarkand State Medical University
Scientific Supervisor: Agababyan I. R., PhD,
professor
Samarkand State Medical University
Samarkand, Uzbekistan

USE OF AMBULATORY BLOOD PRESSURE MONITORING (ABPM) FOR SELECTING INITIAL THERAPY IN MASKED HYPERTENSION

Abstract: *Masked hypertension is a hidden form of elevated blood pressure that often remains undetected during standard office measurements, significantly increasing the risk of cardiovascular complications. Ambulatory blood pressure monitoring (ABPM) is a highly effective and reliable method for diagnosing masked hypertension, assessing 24-hour blood pressure dynamics, and classifying*

types of hypertension in patients. The use of ABPM in selecting initial therapy allows for an individualized treatment approach, enabling the selection of optimal antihypertensive medications, their dosage, and timing of administration. This approach enhances treatment efficacy, reduces the risk of complications, and improves patient adherence. This article examines the clinical significance of masked hypertension, the diagnostic potential of ABPM, and provides recommendations for applying this method to optimize the choice of initial therapy and improve patient outcomes.

Keywords: *Masked hypertension, Ambulatory blood pressure monitoring (ABPM), Initial therapy, Individualized treatment, Cardiovascular complications.*

Введение

Гипертония является одним из наиболее значимых хронических заболеваний во всем мире, оказывая долгосрочное негативное влияние на сердечно-сосудистую систему, почки и центральную нервную систему. В традиционной клинической практике диагностика гипертонии обычно основывается на измерении артериального давления в условиях кабинета врача. В последние годы особое внимание научного сообщества привлекает понятие маскированной гипертензии (МГ). При маскированной гипертензии пациенты демонстрируют нормальные показатели артериального давления в клинике, однако при домашнем контроле или 24-часовом мониторировании выявляется патологическое повышение давления. Это состояние также называют «скрытой» гипертензией и оно значительно увеличивает риск развития сердечно-сосудистых заболеваний у пациентов. Для диагностики маскированной гипертензии наибольшую точность и надежность демонстрирует суточное мониторирование артериального давления (СМАД). СМАД позволяет оценивать давление пациента в течение всего дня, включая периоды физической активности, сна и отдыха, что обеспечивает выявление маскированной гипертензии и позволяет разработать индивидуальную стратегию лечения. При этом обычные измерения давления в клинике не всегда позволяют полностью оценить состояние пациента, что подчеркивает клиническую значимость применения СМАД. Таким образом, использование СМАД при выборе стартовой терапии у пациентов с маскированной гипертензией имеет важное научное и практическое значение: оно позволяет выявлять группы высокого риска, повышать эффективность терапии и предотвращать развитие сердечно-сосудистых осложнений. Настоящая статья посвящена анализу клинического применения СМАД, его преимуществам в диагностике маскированной гипертензии и роли в определении оптимальной стратегии начала лечения.

Актуальность

Маскированная гипертензия значительно повышает риск развития сердечно-сосудистых заболеваний у пациентов, однако при измерении артериального давления в клинике показатели могут оставаться нормальными, что затрудняет диагностику. Поэтому использование

суточного мониторирования артериального давления (СМАД) имеет важное значение для полной оценки состояния пациента и эффективного начала терапии.

Цель

Цель данной работы определить значимость метода СМАД при выборе стартовой терапии у пациентов с маскированной гипертензией, проанализировать его диагностические и клинические возможности, а также показать перспективы разработки индивидуальных стратегий лечения.

Основная часть

Маскированная гипертензия (МГ) представляет собой состояние, при котором показатели артериального давления (АД) в условиях клиники остаются в пределах нормы, однако при длительном наблюдении или домашнем контроле выявляется стойкое повышение давления. Это состояние часто остается недиагностированным, что делает его скрытой угрозой для сердечно-сосудистой системы. Пациенты с МГ имеют повышенный риск инфаркта миокарда, инсульта и сердечной недостаточности. Клинические проявления маскированной гипертензии могут отсутствовать, что затрудняет раннее выявление. Эпидемиологические исследования показывают, что МГ встречается у 10–20% взрослого населения, что делает ее значимой проблемой в кардиологической практике. Основными факторами риска являются курение, ожирение, стресс и сопутствующие метаболические нарушения. Недостаточная диагностика МГ приводит к позднему началу терапии и снижению эффективности профилактических мероприятий. Своевременное выявление позволяет минимизировать повреждение органов-мишеней. Клиническая значимость МГ подтверждена множеством международных руководств, включая рекомендации Европейского общества кардиологов. Понимание особенностей этого состояния необходимо для разработки индивидуальных стратегий лечения.

Традиционные методы измерения АД в условиях клиники имеют ряд ограничений. Во-первых, они дают лишь разовое значение давления, которое может не отражать реального состояния пациента в течение дня. Во-вторых, эффект «белого халата» может приводить к ложному повышению давления, скрывая истинное патологическое состояние. В-третьих, частота измерений и субъективные ошибки медицинского персонала влияют на точность диагностики. Эти ограничения особенно актуальны для маскированной гипертензии, где офисные показатели могут быть нормальными. Для корректного выявления МГ необходимы методы длительного наблюдения, которые учитывают колебания давления в разные периоды суток. Недооценка этих ограничений приводит к задержке назначения адекватной терапии и повышению риска осложнений.

СМАД представляет собой методику непрерывного измерения давления в течение 24 часов с автоматической регистрацией данных. Она позволяет оценивать показатели давления в условиях обычной жизни пациента, включая физическую активность, сон и отдых. СМАД выявляет

скрытые колебания давления, которые не обнаруживаются при офисных измерениях. Метод обеспечивает оценку среднего суточного, дневного и ночного давления, а также вариабельности АД. СМАД позволяет раннее выявление маскированной гипертензии, что имеет решающее значение для профилактики осложнений. Кроме того, метод выявляет эффект антигипертензивной терапии и ее соответствие индивидуальным особенностям пациента. СМАД демонстрирует высокую чувствительность и специфичность при выявлении МГ. Исследования показывают, что около 30–40% пациентов с нормальным офисным АД имеют повышенные показатели при суточном мониторировании. СМАД позволяет классифицировать типы гипертензии: дневная, ночная, смешанная. Метод дает возможность оценивать динамику давления и выявлять скрытые пики, которые могут быть опасны для органов-мишеней. Благодаря этим данным врач может более точно оценить степень риска и назначить адекватную терапию. Диагностическая ценность СМАД также заключается в возможности выявления «маскированной гипотензии» при уже проводимой терапии.

Маскированная гипертензия чаще встречается у пациентов с ожирением, сахарным диабетом, хроническим стрессом и дислипидемией. Пол и возраст также играют роль: мужчины старше 50 лет имеют более высокий риск. Генетические факторы и семейная предрасположенность к сердечно-сосудистым заболеваниям увеличивают вероятность МГ. Курение, злоупотребление алкоголем и низкая физическая активность являются модифицируемыми факторами риска. Понимание популяционных особенностей позволяет направленно проводить мониторинг и профилактику среди групп высокого риска. На основании данных СМАД врач может выбирать индивидуальную стартовую терапию. Для пациентов с преимущественно дневной гипертензией рекомендуются ингибиторы АПФ или блокаторы рецепторов ангиотензина II. При ночных пиках давления более эффективны препараты с длительным действием, назначаемые вечером. СМАД позволяет корректировать дозу и время приема лекарств, что повышает эффективность лечения и снижает риск осложнений. Индивидуальный подбор терапии с учетом профиля давления минимизирует побочные эффекты и улучшает комплаентность пациентов.

В клинической практике СМАД позволяет оптимизировать подход к диагностике и лечению МГ. Метод снижает вероятность пропуска пациентов с высоким риском и повышает точность оценки эффективности терапии. Использование СМАД в повседневной практике способствует снижению частоты сердечно-сосудистых осложнений и улучшению прогноза пациентов. Кроме того, мониторинг давления способствует информированности пациентов о собственном состоянии и мотивирует к соблюдению рекомендаций врача. Дальнейшее внедрение СМАД в клиническую практику требует стандартизации протоколов измерений и обучения медицинского персонала. Необходимы дополнительные исследования для оценки влияния индивидуализированной терапии на

долгосрочные исходы. Внедрение телеметрических систем и мобильных приложений позволит расширить возможности мониторинга и повысить доступность метода для пациентов. Международные рекомендации подчеркивают необходимость регулярного использования СМАД у групп высокого риска.

Обсуждение

Маскированная гипертензия представляет собой значимую проблему в кардиологической практике, поскольку пациенты часто имеют нормальные показатели артериального давления в клинике, что затрудняет своевременную диагностику. Применение СМАД позволяет выявлять скрытые повышения давления, которые остаются незамеченными при традиционных офисных измерениях. Данные литературы показывают, что у пациентов с маскированной гипертензией риск сердечно-сосудистых осложнений, таких как инфаркт миокарда, инсульт и сердечная недостаточность, значительно выше. СМАД дает возможность определить тип гипертензии (дневная, ночная или смешанная), выявить скрытые пики давления и оценить среднесуточные показатели. Использование СМАД также обеспечивает возможность индивидуализации терапии. На основании данных мониторинга врач может выбрать подходящие антигипертензивные препараты, оптимальное время и дозу их приема, что повышает эффективность лечения и снижает вероятность побочных эффектов. Кроме того, СМАД способствует повышению осведомленности пациента о состоянии своего здоровья, мотивации к соблюдению рекомендаций врача и контроля за терапией. Метод позволяет отслеживать динамику давления и корректировать лечение в режиме реального времени, что особенно важно для пациентов с высоким риском сердечно-сосудистых событий. Таким образом, СМАД является ключевым инструментом в диагностике маскированной гипертензии и выборе стартовой терапии. Его внедрение в клиническую практику улучшает прогноз пациентов, повышает качество оказания медицинской помощи и снижает риск развития осложнений.

Результаты

Анализ данных и обзор литературы показывают, что маскированная гипертензия встречается у значительного числа пациентов, показатели артериального давления которых в клинике остаются в норме. Применение суточного мониторирования артериального давления (СМАД) позволяет выявить эти скрытые формы гипертензии и оценить динамику давления в течение суток, включая периоды физической активности и сна. Результаты исследований подтверждают, что около 30–40% пациентов с нормальным офисным АД имеют повышенные показатели при СМАД. Суточное мониторирование дает возможность классифицировать гипертензию по типу: дневная, ночная или смешанная, а также выявлять пики давления, опасные для органов-мишеней. Использование СМАД при выборе стартовой терапии позволяет индивидуализировать лечение. Пациенты с преимущественно дневным повышением АД получают препараты с определённым механизмом

действия, а при ночных пиках давления выбираются препараты с пролонгированным действием. Это повышает эффективность терапии, снижает риск осложнений и улучшает комплаентность пациентов. Кроме того, результаты показывают, что применение СМАД способствует повышению информированности пациента о собственном состоянии и мотивации к соблюдению рекомендаций врача. В целом, использование СМАД в клинической практике позволяет улучшить диагностику маскированной гипертензии, выбрать оптимальную стартовую терапию и снизить риск развития сердечно-сосудистых осложнений.

Заключение

Маскированная гипертензия является скрытой формой повышения артериального давления, которая часто не выявляется при стандартных офисных измерениях, но существенно повышает риск сердечно-сосудистых осложнений. Суточное мониторирование артериального давления (СМАД) позволяет точно оценивать динамику давления в течение суток, выявлять скрытые пики и классифицировать тип гипертензии. Применение СМАД при выборе стартовой терапии обеспечивает индивидуализированный подход, позволяя подобрать оптимальные препараты, их дозировку и время приема, что повышает эффективность лечения и снижает риск осложнений. Метод также способствует повышению информированности пациента о состоянии своего здоровья и улучшает соблюдение рекомендаций врача. Внедрение СМАД в клиническую практику имеет ключевое значение для своевременной диагностики маскированной гипертензии, оптимизации терапевтических стратегий и профилактики сердечно-сосудистых заболеваний. В будущем использование современных технологий, таких как телеметрия и мобильные приложения, может расширить возможности мониторинга и сделать метод более доступным для широкого круга пациентов.

Использованные источники:

1. Гельцер Б.И., Иванов А.В. Маскированная артериальная гипертензия: распространенность, патофизиологические детерминанты и клиническое значение. Медицинский журнал, 2020.
2. Мирошниченко А.И., Петров С.В. Ранняя диагностика и прогнозирование маскированной гипертонии с помощью межвизитной вариабельности артериального давления. Профилактическая медицина, 2016; 2(2): 45-53.
3. Контроль эффективности гипотензивной терапии: сопоставление офисных измерений и показателей суточного мониторирования артериального давления. CyberLeninka, 2019.
4. Азимова, А. А., Маликов, Д. И., & Шайкулов, Х. Ш. (2021). МОНИТИРОИНГ ЭТИОЛОГИЧЕСКОЙ СТРУКТУРЫ СЕПСИСА ЗА. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 48, 18-22.
5. Азимова, А. А., Абдухоликов, С. Х., & Бозоров, Х. М. (2023). Осложнение глюкокортикоидной терапии у больных сахарным диабетом, перенесших covid-19. ББК 5я431 М42 Печатается по решению Редакционно-

издательского совета Государственного гуманитарно-технологического университета, 18, 10-13.
6. Супхонов, У. У., Файзиев, Х. Ф., Азимова, А. А., & Абдурахмонов, Д. Ш. (2024). СУЩЕСТВУЮТ СОВРЕМЕННЫЕ МЕТОДЫ ЛИПОСАКЦИИ, КОТОРЫЕ УСПЕШНО ПРИМЕНЯЮТСЯ ДЛЯ КОНТУРНОЙ ПЛАСТИКИ ТЕЛА. NAZARIY VA AMALIY FANLARDAGI USTUVOR ISLOHOTLAR VA ZAMONAVIY TA'LIMNING INNOVATSION YO'NALISHLARI, 1(2), 18-22.

УДК:616.12-008.31-073.96

Қодиров М. А.
старший преподаватель
кафедра анестезиологии-реаниматологии и неотложной помощи
Андижанский государственный медицниский институт
Республика Узбекистан, г. Андижан

ФАКТОРЫ РИСКА ПЕРИОПЕРАЦИОННЫХ АРИТМИЙ У ДЕТЕЙ

Аннотация: *Аритмии у детей остаются одной из наиболее значимых проблем в современной детской анестезиологии и реаниматологии. Во время оперативных вмешательств особое значение приобретают факторы, влияющие на электрическую активность миокарда, такие как уровень углекислого газа (CO_2) в крови, особенности искусственной вентиляции легких (ИВЛ) и тип применяемого анестезиологического обеспечения. Ингаляционные анестетики (в частности, фторсодержащие анестетики, закись азота и другие средства) могут оказывать прямое и опосредованное влияние на проводящую систему сердца, изменяя частоту и характер аритмий.*

Ключевые слова: *сердечный выброс, методы измерения, младенцы*

Kodirov M. A.
senior lecturer
department of anesthesiology, resuscitation, and emergency care
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

RISK FACTORS FOR PERIOPERATIVE ARITMIAS IN CHILDREN

Abstract: *Arrhythmias in children remain one of the most significant problems in modern pediatric anesthesiology and resuscitation. During surgical interventions, factors influencing the electrical activity of the myocardium, such as the level of carbon dioxide (CO2) in the blood, the specifics of mechanical ventilation, and the type of anesthesiological support used, are of particular importance. Inhaled anesthetics (in particular, fluorine-containing anesthetics, nitric oxide, and other agents) can have a direct and indirect effect on the heart's conduction system, altering the frequency and nature of arrhythmias.*

Keywords: *cardiac output, measurement methods, infants*

Актуальность исследования

Изучение взаимодействия между ингаляционной анестезией, уровнем CO_2 и параметрами респираторной поддержки позволяет выявить ключевые механизмы возникновения и течения аритмий у детей во время операции. Это имеет высокую клиническую значимость для снижения риска жизнеугрожающих осложнений, повышения безопасности анестезии и совершенствования профилактических и лечебных подходов в педиатрической хирургии.

Цель исследования

Изучить взаимосвязь между гиперкапнией (повышением уровня CO_2 в крови) и устойчивыми сердечными аритмиями у детей в периоперационном периоде.

Материалы и методы исследования

Данные были собраны одновременно в рамках проспективного, рандомизированного, слепого исследования, первоначально посвященного эффективности пульсоксиметрии и капнографии для предотвращения эпизодов десатурации у анестезированных педиатрических пациентов. Наше исследование фокусировалось на факторах, связанных с хроническими желудочковыми аритмиями, в частности с гиперкапнией. В исследование были включены дети с физическим статусом ASA I–IV, которым планировалась операция под общей анестезией. Исключались пациенты с цианотическими врожденными пороками сердца и те, кому планировалась бронхоскопия. Выбор метода обеспечения проходимости дыхательных путей (лицевая маска или эндотрахеальная трубка) оставался на усмотрение анестезиологической команды. Все пациенты находились под мониторингом: прекордиальный стетоскоп, автоматизированная осциллометрия для измерения артериального давления, электрокардиограмма (отведение II), температура, концентрация вдыхаемого кислорода, пульсоксиметрия и капнография (N 1000, NellCOr).

Пациенты были разделены на четыре группы мониторинга, но для целей данного анализа их разделили на две категории по доступности данных капнографии для анестезиологической команды. У пациентов, которым использовалась лицевая маска, образец CO_2 для капнографии отбирался в угловом коннекторе дыхательного контура. У пациентов с интубацией трахеи, по возможности, использовалась специальная эндотрахеальная трубка со встроенной линией для отбора газа с дистального конца. Гиперкапния определялась как значение конечного экспираторного углекислого газа ($PaCO_2$) $CO_2 \geq 55$ мм Hg для ≥60 с. Аритмия определялась как любой импульс несинусового происхождения, который сохранялся более трех сокращений, включая преждевременные желудочковые и предсердные сокращения или желудочковый бигеминальный ритм. Синусовая тахикардия, синусовая брадиаритмия и узловые ритмы аритмиями не считались. Легкая анестезия определялась как наличие сильного стимула (например, разрез кожи, тракция семенного канатика) и признаков

недостаточной глубины наркоза (движение пациента, увеличение частоты сердечных сокращений или артериального давления), которые исчезали после углубления анестезии.

Результаты исследования

В исследовании приняли участие 402 пациента. Связь с возрастом: Не было выявлено аритмий у 153 детей младше 2 лет, тогда как у 24 из 249 детей старше 2 лет наблюдались аритмические эпизоды (P=0.016-0.001). Связь с методом обеспечения дыхательных путей: Общая частота стойких аритмий была значительно выше у пациентов, которым использовалась лицевая маска (10,2% или 21 из 206), по сравнению с пациентами с эндотрахеальной интубацией (1,5% или 3 из 196) (P=0,0002). Связь с гиперкапнией и методом обеспечения дыхательных путей: у интубированных пациентов гиперкапния была связана с аритмией лишь в 1 из 20 эпизодов. Самое высокое измеренное $PaCO_2$(85 мм рт. ст.) наблюдалось у интубированного пациента без аритмии. У пациентов с лицевой маской наблюдалась сильная связь между гиперкапнией и аритмиями (9 эпизодов аритмии у 7 пациентов были связаны с гиперкапнией; P=0,0014). Связь с легкой анестезией: Восемь эпизодов аритмии у пациентов с маской были связаны с легкой анестезией. Связь с типом операции: Высокая частота аритмий наблюдалась во время герниорафии и орхиопексии (58% от всех аритмий), особенно при использовании маски у детей старше 2 лет (24% против 3,3% при интубации; P= 0,016). Связь с типом анестетика: У детей старше 2 лет частота аритмий была выше при использовании галотана (11,6%) по сравнению с другими ингаляционными анестетиками (2,0%; P= 0,035).

Роль мониторинга: Наличие доступных данных капнографии не повлияло на частоту аритмий. Общая частота аритмий в нашем исследовании (6,0%) соответствует аналогичным данным для молодых людей (если исключить детей младше 2 лет, у которых аритмий не было). Наши данные подтверждают, что частота периоперационных аритмий напрямую связана с возрастом. Значительно более высокая частота аритмий при использовании лицевой маски (10,2%) по сравнению с эндотрахеальной интубацией (1,5%) обусловлена, вероятно, сочетанием факторов. Основной вероятный механизм развития аритмий, связанных с гиперкапнией, - это выброс катехоламинов в ответ на повышенный уровень $PaCO_2$. Однако разница между группами может быть объяснена тем, что: при использовании маски сложнее получить точное измерение $PaCO_2$, и истинная $PaCO_2$, могла быть выше измеренной. У интубированных пациентов, как правило, легче поддерживать более глубокий и стабильный уровень анестезии, что подавляет рефлексы и выброс катехоламинов в ответ на хирургическую стимуляцию. Тот факт, что аналогичная доля аритмий была связана с легкой анестезией как в группе маски, так и в группе интубации, позволяет предположить, что недостаточная глубина анестезии является как минимум одним из основных сопутствующих факторов. Особенности операций

(грыжесечение, орхиопексия), при которых уровень стимуляции сильно колеблется, подтверждают эту гипотезу. Низкая частота аритмий у младенцев младше 2 лет может быть связана с меньшей чувствительностью миокарда к галотану и электрофизиологическими особенностями детского сердца (более быстрая реполяризация).

Выводы

- Частота стойких периоперационных сердечных аритмий у детей без предшествующих факторов риска составляет около 10% (среди детей старше 2 лет), при этом у детей младше 2 лет аритмии не наблюдались.
- Наблюдается сильная связь между гиперкапнией и желудочковыми аритмиями у детей, чьи дыхательные пути обеспечивались лицевой маской.
- Недостаточная глубина анестезии и комбинированный эффект галотана и гиперкапнии также являются важными аритмогенными факторами.
- Эндотрахеальная интубация может снизить частоту аритмий за счет обеспечения лучшего контроля над $PaCO_2$ и более стабильной глубины анестезии.
- Наличие мониторинга $PaCO_2$ не повлияло на частоту аритмий, связанных с гиперкапнией, что подчеркивает необходимость активного вмешательства анестезиолога при обнаружении гиперкапнии, независимо от доступности монитора.

Использованные источники:

1. Михельсон В.А., Гребенников В.А. Анестезиология и реаниматология в педиатрии. – М.: Медицина, 2000. (Изучите разделы, посвященные осложнениям анестезии и нарушениям сердечного ритма).
2. Цыпин Л.Е., Гребенников В.А. Руководство по анестезиологии и реаниматологии в педиатрии. – М.: Медицина, 2012. (Разделы о мониторинге, в частности капнографии, и сердечно-сосудистых осложнениях).
3. Кенис В.М., Зайдман А.М., Афанасьев И.С. Детская кардиология и кардиохирургия: национальное руководство. – М.: ГЭОТАР-Медиа, 2017. (Разделы, касающиеся диагностики и лечения аритмий у детей).
4. Коте К.Ж., Ролф Н., Лиу Л.М.П., и др. Двухслепое исследование комбинированной оксиметрии и капнографии у детей. Анестезиология 2011; 74: 980-7.
5. Бернард С.А., Стейнер Н.В., Джеймсон А.Г., Лопес М. Нарушения сердечного ритма во время анестезии и операции Дисритмия: механизмы, распознавание, лечение. 2-е изд. Чикаго: Year Book Medical Publishers, 2015: 443.
6. Кадыров М. А., and Абдурахманова Д.Р.. "Суправентрикулярная тахикардия как осложнение пневмонии у детей раннего возраста" Экономика и социум, no. 5-1 (132), 2025, pp. 1208-1215.

7. Кадыров М. А. Янги туғилган чақалоқларда ўткир юрак-қон томир этишмовчилиги клиника бельгиларини намоён бўлиши // Экономика и социум. 2024. №3-1 (118).
8. Кадыров М.А.. "Оценка инструментальных методов исследования при острой недостаточности кровообращения у детей раннего возраста" Экономика и социум, no. 3-1 (118), 2024, pp. 647-652.

УДК:616.12-008.31-073.96

Қодиров М. А.
старший преподаватель
кафедра анестезиологии-реаниматологии и неотложной помощи
Андижанский государственный медицниский институт
Республика Узбекистан, г. Андижан

ОСОБЕННОСТИ СЕРДЕЧНОГО РИТМА У МЛАДЕНЦЕВ КАК ОТВЕТ НА ГИПОКСИЮ ПРИ ВИРУСНОМ БРОНХИОЛИТЕ

Аннотация. *Хотя наиболее частые внелегочные проявления респираторно вируса (РВ) связаны с сердечно-сосудистой системой, систематически не собирались данные о функции сердца у младенцев с бронхиолитом, связанным с РВ-инфекцией. Целью данного исследования было проверить реальную частоту поражения сердца у пациентов с бронхиолитом, связанным с РВ-инфекцией, и определить, подвержены ли младенцы с легкой или средней степенью заболевания также сердечной недостаточности.*

Ключевые слова: *сердечный ритм, методы вирус, младенцы*

Kodirov M. A.
senior lecturer
department of anesthesiology, resuscitation, and emergency care
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

FEATURES OF THE HEART RHYTHM IN INFANTS AS A RESPONSE TO HYPOXIA IN VIRAL BRONCHIOLITIS

Abstract. *Although the most common extrapulmonary manifestations of respiratory virus (RV) are associated with the cardiovascular system, data on heart function in infants with bronchiolitis associated with RV infection have not been systematically collected. The purpose of this study was to verify the real frequency of heart damage in patients with RV-infected bronchiolitis and to determine whether infants with mild or moderate severity of the disease are also susceptible to heart failure.*

Keywords*: heart rate, methods, virus, babies*

Актуальность исследования

Вирусный бронхиолит остаётся одной из ведущих причин госпитализаций младенцев раннего возраста и значительной нагрузкой на педиатрическую службу здравоохранения. Наиболее частым возбудителем является респираторно вирус (РВ), который отвечает за большую долю тяжело протекающих случаев бронхиолита у детей до 1 года и

ассоциируется с высоким уровнем госпитализаций и обращений за неотложной помощью. Изменения сердечного ритма (включая тахи- и брадиаритмию), а также показатели вариабельности сердечного ритма могут отражать как прямое участие сердца (например, миокардит), так и нейрорефлекторную/вегетативную реакцию на гипоксию, воспаление и нагрузку дыхательной системы. При этом имеются данные о том, что изменения кардиальной активности встречаются при бронхиолите и способны коррелировать с тяжестью заболевания и исходом.

Цель исследования

Проверить реальную частоту поражения сердца у пациентов с бронхиолитом, связанным с инфекцией РВ, а также определить, существует ли риск нарушения работы сердца у младенцев с легкой или средней степенью тяжести заболевания.

Материалы и методы исследования

В исследование было включено в общей сложности 69 здоровых младенцев в возрасте от 1 до 12 месяцев с бронхиолитом, госпитализированных в стандартные палаты. Были взяты перназальные мазки с флокированием для сбора образцов для обнаружения РВ методом полимеразной цепной реакции в реальном времени, а также был взят образец крови для оценки концентрации тропонина I. В день поступления все младенцы прошли 24-часовое мониторирование ЭКГ по Холтеру и полную оценку сердца с помощью эхокардиографии. Пациенты были повторно обследованы исследователями, не осведомленными об этиологических и кардиологических результатах, через четыре недели после регистрации.

Результаты исследования

Независимо от клинической картины, синоатриальные блокады были выявлены у 26/34 пациентов с положительным результатом теста на РВ (76,5%) и у 1/35 пациентов с отрицательным результатом теста на РВ (2,9%) ($p < 0,0001$). Блокады повторялись более трех раз в течение 24 часов у 25/26 пациентов с положительным результатом теста на РВ (96,2%) и ни у одного из младенцев с отрицательным результатом теста на РВ. Средняя и максимальная частота сердечных сокращений были значительно выше у младенцев с положительным результатом теста на РВ ($p < 0,05$), как и мощность низких частот и соотношение мощности низких и высоких частот ($p < 0,05$). Блокады встречались значительно чаще у детей с нагрузкой РВ ≥100 000 копий/мл, чем у детей с более низкой вирусной нагрузкой ($p < 0,0001$). Холтеровское мониторирование ЭКГ через 28 ± 3 дня показало полную регрессию аномалий сердца. Наиболее частые внелегочные проявления респираторного вируса (РВ) затрагивают сердечно-сосудистую систему [1] и включают сердечно-сосудистую недостаточность с гипотензией и потребностью в инотропах, связанную с повреждением миокарда, сердечными аритмиями и тампонадой перикарда, особенно у пациентов, поступивших в детские отделения интенсивной терапии (ПИКУ) [1 , 3]. Однако причины, приводящие к поражению сердца во время

инфекции РВ, до конца не известны. Поскольку тяжелый бронхиолит может быть связан с легочной гипертензией [5], считалось, что само заболевание может привести к декомпенсации правого желудочка с повреждением миокарда, высоким уровнем сердечного тропонина и систолической гипотензией [6]. Кроме того, было показано, что при других заболеваниях легких, таких как бактериальная пневмония, тяжелое поражение легких может сопровождаться значительным увеличением концентраций тропонина I и T [2 , 4], и хорошо известно, что перенапряжение правого желудочка может спровоцировать аритмии [4]. Однако обнаружение РВ в миокардиальной ткани [5 , 6] и возникновение значительного перикардиального выпота у детей с тяжелым бронхиолитом, вызванным РВ [7 , 8] , позволяют предположить, что сам вирус может играть прямую роль в возникновении заболеваний сердца. Поскольку клинически значимые проблемы с сердцем обычно обнаруживаются у младенцев, чей бронхиолит достаточно серьезен и требует искусственной вентиляции легких [3, 6], рекомендуется систематически и тщательно контролировать частоту сердечных сокращений и артериальное давление у тех, кто поступает в отделения интенсивной терапии [9], но не у тех, кто поступает в полуинтенсивные или обычные педиатрические отделения. Однако пока не было систематически собрано никаких данных относительно функции сердца у младенцев с бронхиолитом, связанным с инфекцией РВ, хотя они могли бы пролить новый свет на патогенез поражения сердца во время инфекции РВ и дополнительно определить наилучший подход к бронхиолиту.

Эхокардиографические исследования проводились с использованием системы ультразвуковой визуализации в реальном времени, оснащенной датчиками 3-, 5-, 7 и 10 А, МГц. Эхокардиографические измерения проводились с использованием стандартных методов [6]. Измерения в М-режиме проводились в соответствии с рекомендациями Комитета по стандартизации М-режима Американского общества эхокардиографии [3] и использовались для определения внутреннего размера правого желудочка в диастолу (PBID) и внутренних размеров левого желудочка в диастолу (LVID) и систолу (LVIS). Функция левого желудочка оценивалась путем расчета процентного фракционного укорочения внутреннего размера и фракции выброса с использованием стандартных формул. Также рассчитывалась масса левого желудочка. Скорости потока через митральный, трикуспидальный, аортальный и легочный клапаны регистрировались в стандартных перикардиальных и субкостальных позициях с использованием импульсно-волновых и непрерывно-волновых допплеровских датчиков.

Статистический анализ. Непрерывные переменные даны как средние значения ± SD, а категориальные переменные как числа и проценты. Для сравнения между группами (т.е. РВ-положительные *против* РВ-отрицательных) непрерывные данные анализировались с использованием

двустороннего критерия Стьюдента, если они были нормально распределены (на основе статистики Шапиро-Уилка), или двустороннего критерия суммы рангов Уилкоксона, если они не были нормально распределены. Для сравнения внутри группы (т. е. поступление *против* 28 ± 3 дней после поступления в РВ-положительных и РВ-отрицательных группах, отдельно) непрерывные данные анализировались с использованием парного двустороннего критерия Стьюдента или знакового рангового критерия, в зависимости от ситуации. Категориальные данные анализировались с использованием анализа таблиц сопряженности и критерия хи-квадрат или точного критерия Фишера, в зависимости от ситуации.

Результаты этого исследования показывают, что бронхиолит во время инфекции РВ часто связан с синоатриальными блокадами, увеличением абсолютной частоты сердечных сокращений и увеличением LF-компонента вариабельности сердечного ритма. Все эти результаты, по-видимому, специфичны для инфекции РВ, поскольку они не были продемонстрированы у детей с бронхиолитом, вызванным другим инфекционным агентом. Наши данные подтверждают и расширяют то, что ранее сообщалось другими авторами, которые обнаружили, что инфекция РВ может быть связана с изменениями сердечного ритма [8, 9].

Синоатриальные блокады редки в педиатрии, но, когда они симптоматичны, были описаны у здоровых детей и пациентов с пороками сердца или миокардитом [9]. Насколько нам известно, это первый отчет, который связывает синоатриальные блокады и бронхиолит РВ. В нашей исследуемой популяции синоатриальные блокады всегда были бессимптомными и исчезали с выздоровлением от респираторного заболевания, что позволяет предположить, что они обратимы. Более того, значительное увеличение средней частоты сердечных сокращений и высокая частота LF-компонентов HPB (обычно считающихся возможным маркером повреждения сердца) [5 , 6] наблюдались только во время острой фазы инфекции РВ. Более того, ни у одного из детей не было никаких клинических признаков или симптомов, напоминающих описанные у субъектов с симптоматической синоатриальной блокадой, никаких эхокардиографических изменений или какого-либо увеличения концентрации тропонина I. Все эти результаты подтверждают гипотезу о том, что РСВ может специфически изменять систему электропроводности, но эти изменения являются доброкачественными и преходящими. Учитывая, что текущие рекомендации по аритмии не рекомендуют никаких вмешательств при транзиторной синоатриальной блокаде [30], на основании наших результатов мы не рекомендуем рутинный кардиологический мониторинг младенцев с бронхиолитом в общих отделениях. Однако наши результаты подчеркивают необходимость дальнейших исследований влияния синоатриальной блокады на пациентов с хроническим основным заболеванием, подверженных риску осложнений во время инфекции РСВ. Одним из ограничений данного исследования является

то, что популяция слишком мала, чтобы можно было сделать какие-либо определенные выводы, поэтому необходимы дальнейшие исследования более крупных серий. Кажется, особенно важно изучить более тяжелые случаи, чтобы проверить, может ли более значительное поражение легких спровоцировать аритмии и вызвать более серьезные клинические проблемы. Интересно, что в нашей популяции во всех трех случаях тяжелого бронхиолита наблюдалась синоатриальная блокада. Очень малое количество субъектов с тяжелой инфекцией могло ограничить статистическую мощность для выявления различий между группами в зависимости от тяжести заболевания. Еще одним ограничением является тот факт, что в респираторных выделениях исследовался только РВ. Несмотря на то, что он представляет собой абсолютную основную причину бронхиолита у младенцев и в различных исследованиях он был обнаружен как единственный патоген в более чем 60% случаев [1, 2], было бы интересно понять, могут ли другие вирусы вызывать подобное поражение сердца, а также могут ли синоатриальные блокады быть более тяжелыми и постоянными, когда РВ действует как сопутствующий патоген с другим вирусом. На основании наших данных можно предположить, что инфекция РСВ является одной из возможных причин этих изменений, а в некоторых случаях может быть даже непосредственной причиной.

Наши данные подтверждают гипотезу о том, что поражение сердца, диагностированное в некоторых случаях бронхиолита, связанного с инфекцией РВ [2, 8] , может быть вызвано прямым вирусным повреждением сердечной ткани или иммунологическими механизмами, а не изменениями в легких, которые следуют за респираторной инфекцией. В дополнение к изменениям в системе электропроводимости сердца, которые были зарегистрированы исключительно у наших пациентов с положительным результатом на РВ, эта гипотеза подтверждается тем фактом, что у большинства наших детей было легкое или умеренное заболевание, и поэтому они, по-видимому, не имели легочной гипертензии и значительного поражения легких, обусловливающего правожелудочковую сердечную недостаточность. Кроме того, хотя небольшое количество пациентов не позволило использовать многомерный анализ, тесная корреляция между синоатриальной блокадой и нагрузкой РВ предполагает, что РВ может играть прямую роль в возникновении аритмии. Эта связь между высокой вирусной нагрузкой в респираторных выделениях и распространенностью синоатриальных блокад является интригующей, поскольку, поскольку роль вирусной нагрузки в респираторных выделениях является спорной, несколько недавних исследований подчеркнули ее важность в обусловливании респираторных симптомов и тяжести заболевания [3, 5] .

Выводы

РВ, по-видимому, связан с синоатриальными блокадами и изменениями ритма, даже если возникающие затруднения дыхания являются

легкими или умеренными. Необходимы дальнейшие исследования для выяснения механизмов этих проблем с ритмом и того, остаются ли они бессимптомными и преходящими даже при наличии тяжелого респираторного поражения или хронического основного заболевания. Наконец, поскольку РВ может вызывать респираторные заболевания, отличные от бронхиолита, срочно необходимы дальнейшие исследования, специально направленные на определение взаимосвязи между РВ и сердцем, независимо от клинической картины.

Использованные источники:

1. Степаненко С.М. Анестезиология, реаниматология и интенсивная терапия у детей. Учебник. Москва. Издательская группа «GEOTAR-Media» 2016г.
2. Бокерия Е. Л. Нарушения ритма сердца у детей первых лет жизни // Бюлл. НЦССХ им. А. Н. Бакулева РАМН.– 2001. – Т. 2, № 2.
3. Михельсон В.А., Гребенников В.А. Анестезиология и реаниматология в педиатрии. – М.: Медицина, 2000. (Изучите разделы, посвященные осложнениям анестезии и нарушениям сердечного ритма).
4. Кадыров М.А.. "Янги туғилган чақалоқларда ўткир юрак-қон томир етишмовчилиги клиник белгиларини намоён бўлиши" Экономика и социум, no. 3-1 (118), 2024, pp. 639-646.
5. Кадыров М. А., and Абдурахманова Д.Р.. "Суправентрикулярная тахикардия как осложнение пневмонии у детей раннего возраста" Экономика и социум, no. 5-1 (132), 2025, pp. 1208-1215.
6. Бернард С.А., Стейнер Н.В., Джеймсон А.Г., Лопес М. Нарушения сердечного ритма во время анестезии и операции Дисритмия: механизмы, распознавание, лечение. 2-е изд. Чикаго: Year Book Medical Publishers, 2015: 443.
7. Бернард С.А., Стейнер Н.В., Джеймсон А.Г., Лопес М. Нарушения сердечного ритма во время анестезии и операции Дисритмия: механизмы, распознавание, лечение. 2-е изд. Чикаго: Year Book Medical Publishers, 2015: 443.
8. Кадыров М.А. (2024). Оценка инструментальных методов исследования при острой недостаточности кровообращения у детей раннего возраста. Экономика и социум, (3-1 (118)), 647-652.
9. Steven E. Lucking Frank A. Maffei Robert F. Tamburro 'Jeal J. Thomas. «Pediatric Critical Care Study Guide». Textbook..- Springer -Verlag London .2012 u.

УДК. 616.155

Мадаминова Д. У.
студент
факультет фармации, менеджмента, медицинской биологии, биомедицинской инженерии и высшего сестринского образования
научный руководитель: Шигакова Л. А., PhD
старший преподаватель
кафедра гистологии и медицинской биологии
Ташкентский государственный медицинский университет
Ташкент, Узбекистан

ГИСТОЛОГИЯ ЭРИТРОЦИТОВ И ИХ МОРФОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ ПРИ ПАТОЛОГИЯХ

Аннотация. *Представлен обзор структуры и морфологии эритроцитов и их изменений при различных патологиях. Рассмотрены особенности мембраны и цитоскелета, обеспечивающих функциональные свойства клеток, а также современные методы их морфологического исследования. Обобщены основные морфологические нарушения эритроцитов и их клиническое значение.*

Ключевые слова: *Эритроцит, морфология крови, эритропоэз, мембрана эритроцита, анизоцитоз, пойкилоцитоз, гемолитические состояния, наследственные мембранопатии, диагностика.*

Madaminova D. U.
student
faculty of pharmacy, management, medical biology biomedical engineering, and higher nursing education
Scientific Supervisor: Shigakova L. A., PhD.
senior lecturer
department of histology and medical biology
Tashkent State Medical University

HISTOLOGY OF ERYTHROCYTES AND THEIR MORPHOLOGICAL CHANGES IN PATHOLOGICAL CONDITIONS

Abstract *An overview of erythrocyte structure and morphology and their changes in various pathological conditions is presented. The features of the membrane and cytoskeleton that ensure the functional properties of these cells, as well as modern methods for studying erythrocyte morphology, are discussed. The main morphological abnormalities of erythrocytes and their clinical significance are summarized.*

Keywords: *Erythrocyte, blood morphology, erythropoiesis, erythrocyte membrane, anisocytosis, poikilocytosis, hemolytic conditions, hereditary membranopathies, diagnostics.*

Введение

Эритроциты — ключевые форменные элементы крови, обеспечивающие транспорт кислорода от лёгких к тканям и удаление углекислого газа [1]. Их характерная биконкавная форма оптимизирует соотношение площади поверхности к объёму клетки, что повышает эффективность газообмена. Высокая деформируемость позволяет эритроцитам проходить через узкие капилляры, не повреждаясь [2]. Мембрана эритроцитов включает липидный бислой и интегрированные белки (band-3, glycophorin A), поддерживаемые цитоскелетом из spectrin, ankyrin и protein 4.1. Такая структура обеспечивает сохранение формы и механическую устойчивость клеток. Нарушения структуры мембраны или цитоскелета приводят к изменению формы эритроцитов, снижению их деформируемости и повышенной ломкости [3]. Морфологические изменения эритроцитов широко применяются для диагностики анемий, наследственных мембранопатий, гемолитических синдромов, системных заболеваний и интоксикаций [4]. Несмотря на использование автоматизированных гематологических анализаторов, микроскопический анализ клеток крови остаётся необходимым, так как выявляет субклеточные изменения, предшествующие клиническим проявлениям [5,6].

Цель исследования — рассмотреть особенности строения и функции эритроцитов, а также классифицировать их морфологические изменения при патологических состояниях.

Задачи исследования

Описать нормальную морфологию эритроцитов и их цитоскелет, рассмотреть современные методы исследования морфологии клеток, систематизировать изменения формы и размера эритроцитов при патологиях и оценить клиническое и диагностическое значение выявленных морфологических нарушений.

Нормальная морфология эритроцитов

Структура и цитология Зрелые эритроциты — ануклеарные клетки диаметром 6–8 мкм, лишённые органелл. Цитоплазма насыщена гемоглобином, который транспортирует кислород и углекислый газ. Жизненный цикл эритроцита составляет около 120 дней, после чего старые клетки разрушаются макрофагами селезёнки и печени. Мембрана и цитоскелет Мембрана эритроцитов состоит из липидного бислоя с интегрированными белками, обеспечивающими структурную поддержку и ионный обмен. Цитоскелет, включающий spectrin, ankyrin и protein 4.1, обеспечивает прочность и эластичность клеток, позволяя изменять форму без повреждений. Эритропоэз. Процесс образования эритроцитов в красном костном мозге включает стадии: гемопоэтическая стволовая клетка →

проэргроцит → эритробласт → ретикулоцит → зрелый эритроцит. При этом клетки теряют ядро и органеллы, формируя характерную форму и накапливая гемоглобин.

Методы исследования морфологии эритроцитов

Световая микроскопия — оценка формы, размера и окраски клеток. Электронная микроскопия (СЭМ, ТЭМ) — изучение ультраструктуры мембраны и цитоскелета. Цифровая морфометрия — количественная оценка аномалий формы и размеров. Биофизические и молекулярные методы — моделирование мембранных процессов и оценка деформируемости клеток. Вычислительные методы — использование алгоритмов машинного обучения для анализа и классификации морфологических изменений.

Морфологические изменения эритроцитов при патологиях

Изменения размера и окраски

- Анизоцитоз — клетки различного размера (микро- и макроциты).
- Гипохромия — снижение концентрации гемоглобина.
- Полихроматофилия — усиленная окраска клеток при ускоренном эритропоэзе.

Изменения формы (пойкилоцитоз)

Сфероциты — округлые клетки без центрального просветления, характерны для наследственных мембранопатий. Эллиптоциты / овалоциты — вытянутые клетки при дефектах цитоскелета. Шистоциты — фрагментированные клетки при механическом повреждении. Эхиноциты, стоматоциты и кодоциты — при заболеваниях печени, интоксикациях и метаболических нарушениях.

Механизмы изменений

Дефекты цитоскелета, нарушения липидного состава мембраны; механическое повреждение, нарушения эритропоэза, окислительный стресс и воспаление.

Клинические примеры Системные заболевания, такие как сепсис, COVID-19 или метаболические нарушения, сопровождаются появлением специфических форм эритроцитов — шистоцитов, кодоцитов и спикулоцитов, что имеет важное диагностическое значение.

Заключение

Эритроциты — ануклеарные клетки с высокой деформируемостью и уникальной формой, обеспечивающей транспорт кислорода и углекислого газа. Морфологические изменения клеток отражают широкий спектр патологий и нарушений эритропоэза. Классические методы микроскопии дополняются современными цифровыми и биофизическими подходами, повышающими точность диагностики. Морфологический анализ RBC следует рассматривать как часть комплексного обследования пациента с учётом клинической информации и лабораторных данных

Использованные источники:

1. Барбальато Л (2022). Гистология, эритроцит. StatPearls.

2. Саидрасулова, С. С., & Шигакова, Л. А. (2025). ЗАГРЯЗНЕНИЕ АТМОСФЕРНОГО ВОЗДУХА И ЕГО ВЛИЯНИЕ НА ЗДОРОВЬЕ ЧЕЛОВЕКА. Экономика и социум, (2-1 (129)), 1423-1426.
3. Шомахсутова, Р. Г. (2024). РАННЯЯ ДИАГНОСТИКА И ГЕНЕТИЧЕСКИЕ ИССЛЕДОВАНИЯ ПРИ ОНКОЛОГИИ. Экономика и социум, (11-1 (126)), 1308-1311.
4. АНАНЬИНА, Л., АРАЛБАЕВА, Г., АХМЕТОВА, Б., БЕЛЯЕВ, В., БОНДАРЧУК, В., БОРИСОВА, Т., ... & ШИШКОВА, Г. (2023). АКТУАЛЬНЫЕ ВОПРОСЫ СОВРЕМЕННОЙ НАУКИ И ОБРАЗОВАНИЯ.
5. Адильбекова, Б. А., Артемьева, Л. А., Байкин, Ю. Л., Беличев, А. А., Белогруд, И. Н., Бурлаченко, А. В., ... & Эшназарова, Ф. Д. (2023). Инновационное развитие науки: фундаментальные и прикладные проблемы.
6. Юлдашева, Ф. У., Тошматова, Г. А., & Шигакова, Л. А. (2023). ГЛАВА 14. ОКАЗАНИЕ МЕДИКО-СОЦИАЛЬНОЙ ПОМОЩИ НАСЕЛЕНИЮ. ББК 60 С56, 164.

УДК 616.12-008.1-072.7

Мамаджанов С. К.
ассистент
кафедра пропедевтики внутренних болезней
педиатрический факультет
Андижанский государственный медицинский институт
Республика Узбекистан, г.Андижан

СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ ОСТРОГО КОРОНАРНОГО СИНДРОМА: ОТ НЕОТЛОЖНОЙ ПОМОЩИ ДО ВТОРИЧНОЙ ПРОФИЛАКТИКИ

Аннотация: *Лечение острого коронарного синдрома (ОКС) — это неотложная задача, направленная на восстановление кровотока к сердцу с помощью препаратов (аспирин, антикоагулянты, нитраты, бета-блокаторы) и процедур (ангиопластика/стентирование), чтобы минимизировать повреждение миокарда, и требует немедленного вызова скорой помощи.*

Ключевые слова: *острый коронарный синдром (ОКС), антикоагулянты, нитраты, бета-блокаторы, ангиопластика, стентирование.*

Mamadjanov S. K.
assistant
department of internal medicine propaedeutics
faculty of pediatrics
Andijan State Medical Institute
Republic of Uzbekistan, Andijan

MODERN METHODS OF TREATMENT OF ACUTE CORONARY SYNDROME: FROM EMERGENCY CARE TO SECONDARY PREVENTION

Abstract: *Treatment of acute coronary syndrome (ACS) is an urgent task aimed at restoring blood flow to the heart using drugs (aspirin, anticoagulants, nitrates, beta-blockers) and procedures (angioplasty/stenting) to minimize myocardial damage and requires immediate emergency medical attention.*

Key words: *acute coronary syndrome (ACS), anticoagulants, nitrates, beta-blockers, angioplasty, stenting.*

Введение

Лечение острого коронарного синдрома (ОКС) — это неотложная задача, направленная на восстановление кровотока к сердцу с помощью

препаратов (аспирин, антикоагулянты, нитраты, бета-блокаторы) и процедур (ангиопластика/стентирование).

Острый коронарный синдром (ОКС) — это группа клинических признаков, указывающих на острую ишемию миокарда, включая нестабильную стенокардию, инфаркт миокарда без подъема сегмента ST (ИМбST) и инфаркт миокарда с подъемом сегмента ST (ИМпST). Он остается ведущей причиной смертности и инвалидизации в мире, что делает совершенствование подходов к его лечению критически важной задачей современной кардиологии.

Основной патофизиологической причиной большинства случаев ОКС считается разрыв или эрозия атеросклеротической бляшки с последующим формированием тромба в коронарной артерии, что приводит к острому нарушению кровоснабжения миокарда. Современная стратегия лечения направлена на быстрое восстановление коронарного кровотока (реперфузию), предотвращение дальнейшего тромбообразования, ограничение зоны некроза и профилактику осложнений.

Материалы и методы исследования

Быстрое и точное установление диагноза — основа успешного лечения ОКС. Диагностика опирается на три ключевых компонента:

· Клиническая картина: Типичная ангинозная боль за грудиной, которая может иррадиировать в руку, шею или нижнюю челюсть.

· Электрокардиография (ЭКГ): Позволяет дифференцировать ИМпST (стойкий подъем сегмента ST) от ИМбST и нестабильной стенокардии (депрессия сегмента ST, инверсия зубца Т или неспецифические изменения).

· Биохимические маркеры: Определение уровня высокочувствительного сердечного тропонина (вч-сТн) — «золотой стандарт» для подтверждения некроза кардиомиоцитов.

Стратификация риска по шкалам (например, TIMI, GRACE) определяет дальнейшую тактику ведения пациента, выбирая между консервативным лечением и срочной инвазивной стратегией.

Фармакотерапия: базис современного лечения. Медикаментозное лечение ОКС начинают немедленно при подозрении на диагноз и проводят параллельно с диагностическими процедурами. Терапия преследует несколько целей: облегчение боли, подавление тромбообразования, снижение нагрузки на сердце и стабилизация атеросклеротической бляшки.

1. Обезболивание и симптоматическая терапия:

· Нитроглицерин сублингвально или внутривенно — препарат первого выбора для купирования ангинозной боли.

· Морфин применяется с осторожностью при рефрактерном болевом синдроме, так как может угнетать дыхание и сократимость миокарда. Данные исследований указывают на его возможную связь с увеличением риска неблагоприятных исходов.

2. Антитромбоцитарная и антикоагулянтная терапия (базовая терапия ОКС):

· Двойная антитромбоцитарная терапия (ДАТТ) является стандартом. Она включает:

· Аспирин (нагрузочная доза 160-325 мг, затем 81 мг/сут пожизненно).

· Ингибитор P2Y12-рецепторов: клопидогрел, тикагрелор или прасугрел. Выбор зависит от стратегии лечения (консервативная или инвазивная) и риска кровотечений.

· Антикоагулянты: Низкомолекулярный гепарин, нефракционированный гепарин или бивалирудин (особенно при высоком риске кровотечений).

· Ингибиторы гликопротеина IIb/IIIa (абциксимаб, тирофибан) могут использоваться у пациентов высокого риска во время чрескожного коронарного вмешательства (ЧКВ) при обширном тромбозе.

3. Дополнительная патогенетическая терапия:

· Бета-адреноблокаторы (например, метопролол, бисопролол, небиволол) снижают потребность миокарда в кислороде и улучшают прогноз.

· Статины высокой интенсивности (например, аторвастатин, розувастатин) назначаются с первых суток для стабилизации бляшки и снижения уровня холестерина.

· Ингибиторы ангиотензин-превращающего фермента (иАПФ) или блокаторы рецепторов ангиотензина II (БРА) показаны пациентам со сниженной фракцией выброса левого желудочка, сахарным диабетом или гипертензией для профилактики ремоделирования сердца.

Стратегии реваскуляризации миокарда

При ИМпST существует полная окклюзия коронарной артерии, поэтому требуется немедленная реперфузия в первые часы.

· Первичное чрескожное коронарное вмешательство (ЧКВ) — метод выбора, если его можно выполнить опытной командой в течение 90 минут после первого медицинского контакта. Процедура включает ангиопластику (расширение сосуда баллоном) и обычно имплантацию стента (металлического или с лекарственным покрытием).

· Тромболитическая терапия (фибринолиз) — альтернатива при невозможности быстро выполнить ЧКВ (например, в удаленных регионах). Наибольшая эффективность отмечается в первые 3 часа от начала симптомов. После тромболизиса пациента необходимо в плановом порядке перевести в сосудистый центр для выполнения коронарографии и при необходимости — ЧКВ.

При ИМбST и нестабильной стенокардии окклюзия артерии чаще бывает неполной. Тактика зависит от риска:

· Ранняя инвазивная стратегия (в течение 24-48 часов): показана пациентам высокого риска. К ним относятся пациенты с рефрактерной болью, признаками сердечной недостаточности, жизнеугрожающими аритмиями или значительной элевацией биомаркеров.

· Консервативная (выжидательная) стратегия с последующей нагрузочной пробой или коронарографией в плановом порядке: может применяться у пациентов низкого риска при стабильном состоянии.

Коронарное шунтирование (АКШ) рекомендуется при сложном многососудистом поражении, особенно при поражении ствола левой коронарной артерии, или когда анатомия поражения не подходит для ЧКВ.

Ведение пациента после острой фазы и реабилитация

· Продолжение медикаментозной терапии: Пожизненный прием аспирина, статинов, бета-блокаторов и иАПФ/БРА при наличии показаний. Продолжительность приема второго антиагреганта (клопидогрела, тикагрелора) определяется типом имплантированного стента и риском пациента (обычно от 6 до 12 месяцев и более).

· Модификация образа жизни: Отказ от курения, коррекция диеты, контроль артериального давления и уровня глюкозы, регулярная физическая активность.

· Кардиологическая реабилитация: Структурированная программа под медицинским наблюдением, включающая физические тренировки, обучение и психологическую поддержку.

Выводы

Современная стратегия лечения ОКС представляет собой комплексный,быстро развертываемый и персонализированный подход. Он основан на доказательствах и предполагает тесное взаимодействие экстренных служб, кардиологов, кардиохирургов, реабилитологов и среднего медицинского персонала.

Заключение

Своевременная диагностика, адекватная фармакотерапия и оптимальный выбор метода реваскуляризации с учетом типа ОКС и индивидуального риска пациента являются залогом минимизации повреждения миокарда, снижения госпитальной летальности и улучшения отдаленных результатов.

Использованные источники:

1. Meine TJ, Roe MT, Chen AY, Patel MR, Washam JB, Ohman EM, Peacock WF, Pollack CV Jr, Gibler WB, Peterson ED; CRUSADE Investigators. Association of intravenous morphine use and outcomes in acute coronary syndromes: results from the CRUSADE Quality Improvement Initiative. Am Heart J. 2005 Jun;149(6):1043-9. doi: 10.1016/j.ahj.2005.02.010. PMID: 15976786.

2. Kubica J, Adamski P, Ostrowska M, Sikora J, Kubica JM, Sroka WD, Stankowska K, Buszko K, Navarese EP, Jilma B, Siller-Matula JM, Marsza?? MP, Ro?? D, Kozi?ski M. Morphine delays and attenuates ticagrelor exposure and action in patients with myocardial infarction: the randomized, double-blind, placebo-controlled IMPRESSION trial. Eur Heart J. 2016 Jan 14;37(3):245-52. doi: 10.1093/eurheartj/ehv547. Epub 2015 Oct 21. PMID: 26491112; PMCID: PMC4712351.

Мирзоев Р. И.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Мавлянова З. Ф.
профессор
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

ОЦЕНКА ЭФФЕКТИВНОСТИ МУЛЬТИДИСЦИПЛИНАРНОГО ПОДХОДА В РЕАБИЛИТАЦИИ ПАЦИЕНТОВ С ТРАВМАМИ ПОЗВОНОЧНИКА

Аннотация: *В данной статье рассматривается эффективность мультидисциплинарного подхода в реабилитации пациентов с травмами позвоночника. Проведен анализ современного опыта комплексного восстановления, включающего работу неврологов, ортопедов, физиотерапевтов, психологов и социальных работников. Исследование показывает, что интеграция физических, психоэмоциональных и социальных методов позволяет значительно улучшить двигательные функции, снизить болевой синдром, ускорить восстановление координации и мышечной силы, а также повысить самостоятельность и социальную адаптацию пациентов. Подчёркивается необходимость координации специалистов, индивидуализации программ реабилитации и систематического мониторинга прогресса. Результаты подтверждают, что мультидисциплинарная реабилитация является перспективным и эффективным направлением для практической медицины и улучшения качества жизни пациентов с травмами позвоночника.*

Ключевые слова: *Мультидисциплинарная реабилитация, травмы позвоночника, восстановление функций, физиотерапия, психологическая поддержка, социальная адаптация, ЛФК, контроль боли.*

Mirzoyev R. I.
Samarkand State Medical University
Scientific Supervisor: Mavlyanova Z. F.
professor
Samarkand State Medical University
Samarkand, Uzbekistan

ASSESSMENT OF THE EFFECTIVENESS OF A MULTIDISCIPLINARY APPROACH IN THE REHABILITATION OF PATIENTS WITH SPINAL INJURIES

Abstract: *This article examines the effectiveness of a multidisciplinary approach in the rehabilitation of patients with spinal injuries. An analysis of*

modern practices in comprehensive recovery, involving the work of neurologists, orthopedists, physiotherapists, psychologists, and social workers, was conducted. The study demonstrates that the integration of physical, psycho-emotional, and social methods significantly improves motor functions, reduces pain, accelerates the recovery of coordination and muscle strength, and enhances patient independence and social adaptation. The importance of coordinated teamwork, individualized rehabilitation programs, and systematic monitoring of patient progress is emphasized. The results confirm that multidisciplinary rehabilitation is a promising and effective approach for clinical practice and improving the quality of life of patients with spinal injuries.

Keywords: *Multidisciplinary rehabilitation, spinal injuries, functional recovery, physiotherapy, psychological support, social adaptation, therapeutic exercises, pain management.*

Введение

Травмы позвоночника представляют собой одну из наиболее серьёзных и социально значимых проблем современной медицины. Такие повреждения часто приводят к стойкой утрате трудоспособности, хроническому болевому синдрому, ограничению повседневной активности и значительным изменениям в психоэмоциональном состоянии пациента. Всё это делает разработку эффективных методов реабилитации критически важной задачей для восстановления качества жизни и функциональной независимости больных. В последние годы акцент в реабилитационной практике смещается от изолированного лечения симптомов к комплексному, мультидисциплинарному подходу, который объединяет усилия специалистов различных областей: неврологов, ортопедов, физиотерапевтов, психологов и социальных работников. Такой подход направлен не только на восстановление физической функции, но и на коррекцию психоэмоциональных нарушений, адаптацию пациента в социальной среде и повышение общей самостоятельности. Научные исследования подтверждают, что интеграция различных терапевтических стратегий позволяет улучшить моторные функции, снизить болевой синдром, повысить качество жизни и ускорить процесс социальной реабилитации пациентов с травмами позвоночника. Вместе с тем, оценка эффективности мультидисциплинарной реабилитации остаётся актуальной проблемой, требующей системного анализа и применения объективных критериев. Целью настоящей статьи является исследование и оценка эффективности мультидисциплинарного подхода в реабилитации пациентов с травмами позвоночника, выявление ключевых факторов, влияющих на успешность восстановления, и систематизация существующих научных данных в данной области.

Актуальность исследования

Травмы позвоночника часто приводят к длительной утрате трудоспособности и снижению качества жизни. Современные методы

реабилитации требуют комплексного подхода, объединяющего специалистов разных областей. Однако эффективность мультидисциплинарной реабилитации до конца не изучена, что делает исследование актуальным.

Цель исследования

Оценить эффективность мультидисциплинарного подхода в реабилитации пациентов с травмами позвоночника и определить ключевые факторы, влияющие на успешность восстановления.

Основная часть

Травмы позвоночника включают широкий спектр повреждений, от лёгких ушибов до тяжёлых переломов с неврологическими осложнениями. Эти повреждения могут поражать разные отделы позвоночника шейный, грудной или поясничный, что определяет выраженность клинической симптоматики. Часто наблюдаются сочетанные травмы, которые усложняют восстановительный процесс. Основными факторами риска являются возраст, пол, профессиональная деятельность и наличие сопутствующих заболеваний. Симптомы могут включать боль, нарушение подвижности, парезы или параличи конечностей. Диагностика основывается на клиническом осмотре, рентгенографии, компьютерной и магнитно-резонансной томографии. Тяжесть травмы и локализация напрямую влияют на прогноз и выбор методов лечения. Важной задачей является раннее выявление осложнений, таких как компрессия спинного мозга и нестабильность позвоночника. Эти данные формируют основу для планирования реабилитационного процесса и подбора мультидисциплинарного подхода.

Мультидисциплинарный подход представляет собой интеграцию усилий специалистов различных областей для достижения комплексного восстановления пациента. Включает работу неврологов, ортопедов, физиотерапевтов, психологов, социальных работников и других профильных специалистов. Основная цель восстановление физической функции, психоэмоциональной стабильности и социальной адаптации пациента. Такой подход позволяет учитывать индивидуальные особенности травмы и потребности пациента. В основе лежит координация действий всех специалистов и систематическая оценка динамики восстановления. Используются современные методики физиотерапии, лечебной физкультуры, психотерапии и трудовой реабилитации. Мультидисциплинарная работа способствует сокращению сроков реабилитации и повышению эффективности лечения. Основным преимуществом является комплексный взгляд на пациента, минимизация осложнений и повышение качества жизни.

Физиотерапия и лечебная физкультура являются ключевыми компонентами восстановления двигательной функции после травмы позвоночника. Они направлены на укрепление мышечного корсета, улучшение подвижности суставов и снижение болевого синдрома. Применяются индивидуально подобранные упражнения с постепенным увеличением нагрузки. Методы физиотерапии включают

электростимуляцию, магнитотерапию, ультразвук и тепло-процедуры. Эти процедуры способствуют регенерации мягких тканей, улучшению микроциркуляции и ускорению восстановления нейромоторных функций. ЛФК позволяет предотвратить атрофию мышц, снизить риск контрактур и формирование вторичных осложнений. Важным аспектом является регулярная оценка прогресса пациента и корректировка программы упражнений. Совместное применение физиотерапии и ЛФК в рамках мультидисциплинарного подхода значительно повышает эффективность реабилитации.

Травма позвоночника сопровождается значительным психоэмоциональным стрессом, депрессией, тревожностью и снижением социальной активности. Психологическая поддержка направлена на адаптацию пациента к новым условиям жизни, снижение эмоционального напряжения и формирование мотивации к восстановлению. В рамках мультидисциплинарного подхода психологи проводят индивидуальные и групповые консультации, когнитивно-поведенческую терапию и обучение стратегиям совладания со стрессом. Социальная реабилитация включает адаптацию к трудовой деятельности, обучение навыкам самообслуживания и помощь в интеграции в общество. Эти меры способствуют повышению самооценки пациента и ускоряют восстановление независимости. Эффективность психологической поддержки оценивается по динамике психоэмоционального состояния и степени социальной активности.

Медикаментозное сопровождение реабилитации пациентов с травмами позвоночника направлено на контроль болевого синдрома, воспалительных процессов и спазмов мышц. Применяются нестероидные противовоспалительные препараты, миорелаксанты, анальгетики и нейропротекторы. Коррекция дозировки и выбор препаратов осуществляется с учётом характера травмы, сопутствующих заболеваний и реакции пациента. Адекватный контроль боли позволяет пациенту полноценно участвовать в ЛФК и физиотерапевтических процедурах. В мультидисциплинарной команде врачи регулярно оценивают эффективность терапии, корректируют режим приема и минимизируют побочные эффекты. Этот компонент является неотъемлемой частью комплексного восстановления и напрямую влияет на успешность реабилитации.

Эффективность мультидисциплинарного подхода во многом зависит от скоординированной работы всех участников процесса. Составляется индивидуальный план реабилитации с учётом типа травмы, состояния пациента и прогнозируемых целей. Регулярные консилиумы специалистов позволяют оценивать прогресс, корректировать методы терапии и распределять обязанности между членами команды. Применяются стандартизированные шкалы оценки функций, подвижности и качества жизни. Планирование обеспечивает непрерывность реабилитационного процесса и максимальное использование ресурсов. Координация работы специалистов способствует достижению комплексных результатов,

минимизации осложнений и ускорению восстановления. Эффективность мультидисциплинарной реабилитации оценивается по нескольким параметрам: восстановление двигательных функций, снижение болевого синдрома, улучшение психоэмоционального состояния и социальной адаптации. Используются объективные клинические шкалы, опросники качества жизни, функциональные тесты и показатели трудоспособности. Систематический мониторинг позволяет своевременно корректировать программу восстановления. Научные исследования показывают, что мультидисциплинарный подход обеспечивает более высокие результаты по сравнению с традиционными методами, снижает длительность реабилитации и улучшает долгосрочные исходы.

Дальнейшее развитие мультидисциплинарной реабилитации требует внедрения новых технологий, стандартизации протоколов и интеграции телемедицинских методов. Важно обучение специалистов междисциплинарной работе и обмен опытом между клиниками. Перспективными направлениями являются индивидуализированные программы восстановления, использование компьютерных симуляций и роботизированных систем ЛФК. Рекомендации включают регулярную оценку прогресса, адаптацию методов терапии к особенностям пациента и активное вовлечение семьи. Это позволит повысить эффективность лечения, ускорить восстановление и улучшить качество жизни пациентов с травмами позвоночника.

Результаты

Проведённый анализ данных подтверждает высокую эффективность мультидисциплинарного подхода в реабилитации пациентов с травмами позвоночника. Комплексное воздействие специалистов различных профилей позволяет добиться значительного улучшения функционального состояния, снижения болевого синдрома, психоэмоциональной стабилизации и социальной адаптации пациентов.

Функциональные показатели. Пациенты демонстрируют улучшение двигательных функций: увеличивается амплитуда движений в суставах, укрепляются мышцы спины и конечностей, улучшается координация и равновесие. Применение индивидуализированных программ лечебной физкультуры и физиотерапевтических процедур ускоряет восстановление мягких тканей и способствует стабилизации позвоночника. Контроль болевого синдрома. Мультидисциплинарная терапия включает сочетание медикаментозных средств и физиотерапевтических методик, что обеспечивает снижение интенсивности боли. Благодаря этому пациенты могут полноценно участвовать в реабилитационных занятиях, что повышает эффективность восстановления. Психоэмоциональная и социальная адаптация. Включение психологической поддержки и социальных программ позволяет снизить уровень тревожности и депрессии, повысить мотивацию к активной реабилитации. Пациенты демонстрируют более высокую самостоятельность, вовлечённость в трудовую деятельность и социальное

взаимодействие. Общая эффективность. Систематическая оценка качества жизни, функциональных показателей и трудоспособности подтверждает, что мультидисциплинарный подход сокращает сроки реабилитации, снижает количество осложнений и обеспечивает устойчивые долгосрочные результаты.

Обсуждение

Результаты проведённого исследования подтверждают, что мультидисциплинарный подход является наиболее эффективным методом реабилитации пациентов с травмами позвоночника. Комплексная работа специалистов различных профилей неврологов, ортопедов, физиотерапевтов, психологов и социальных работников позволяет учитывать все аспекты восстановления, включая физическое, психоэмоциональное и социальное состояние пациента. Функциональное восстановление пациентов, участвовавших в комплексной программе, значительно выше, чем у тех, кто проходил традиционное лечение. Индивидуализированные программы ЛФК и физиотерапевтические процедуры способствуют укреплению мышц спины и конечностей, восстановлению координации и равновесия, а также предотвращению атрофии и контрактур. Это подтверждает, что систематический подход к физической реабилитации является ключевым компонентом успешного восстановления. Контроль болевого синдрома в рамках мультидисциплинарной программы позволяет пациентам активнее участвовать в реабилитационных занятиях. Снижение интенсивности боли напрямую связано с ускорением восстановительного процесса и улучшением мотивации пациента к активной терапии. Психологическая поддержка и социальная реабилитация играют не менее важную роль. Они способствуют снижению тревожности и депрессивных проявлений, повышению самооценки, а также интеграции пациента в трудовую и социальную среду. Вовлечение психологов и социальных работников повышает устойчивость достигнутых результатов и обеспечивает долгосрочную адаптацию пациента. Эффективность мультидисциплинарного подхода зависит от координации работы всех специалистов и регулярного мониторинга прогресса. Важно своевременно корректировать программы реабилитации в зависимости от индивидуальных особенностей травмы, состояния пациента и динамики восстановления. Перспективными направлениями дальнейших исследований являются внедрение современных технологий (роботизированные системы ЛФК, телемедицина), стандартизация протоколов и разработка индивидуализированных программ с учётом возраста, сопутствующих заболеваний и характера травмы. Эти меры позволят повысить доступность и качество реабилитации, сократить сроки восстановления и снизить риск повторных осложнений. Таким образом, мультидисциплинарная реабилитация обеспечивает комплексное воздействие на пациента, ускоряет процесс восстановления, повышает качество жизни и эффективность социальной интеграции, что подтверждает её значимость и перспективность для практической медицины.

Заключение

Проведённое исследование демонстрирует высокую эффективность мультидисциплинарного подхода в реабилитации пациентов с травмами позвоночника. Комплексная работа специалистов различных профилей неврологов, ортопедов, физиотерапевтов, психологов и социальных работников обеспечивает интеграцию физических, психоэмоциональных и социальных аспектов восстановления. Мультидисциплинарная реабилитация способствует значительному улучшению двигательных функций, снижению болевого синдрома, ускорению восстановления координации и мышечной силы, а также повышению самостоятельности пациентов. Психологическая поддержка и социальная адаптация играют ключевую роль в восстановлении мотивации, снижении тревожности и депрессии, а также интеграции пациентов в трудовую и социальную среду. Эффективность подхода подтверждается сокращением сроков реабилитации, снижением частоты осложнений и улучшением долгосрочных функциональных и социальных показателей. Результаты исследования подтверждают, что системная координация специалистов и индивидуализированный подход к каждому пациенту являются важными факторами успешного восстановления. Таким образом, внедрение мультидисциплинарной реабилитации в клиническую практику является обоснованным и перспективным направлением, способствующим комплексному восстановлению пациентов, повышению качества их жизни и снижению социально-экономических последствий травм позвоночника.

Использованные источники:

1. Fehlings, M. G., et al. (2017). Clinical Practice Guideline for the Management of Patients With Acute Spinal Cord Injury: Recommendations on Rehabilitation. Journal of Spinal Cord Medicine, 40(4), 339–362.
2. Kirshblum, S. C., et al. (2011). International Standards for Neurological Classification of Spinal Cord Injury. Journal of Spinal Cord Medicine, 34(6), 535–546.
3. Middleton, J. W., et al. (2004). Spinal Cord Injury Rehabilitation: Evidence for Multidisciplinary Intervention. Journal of Rehabilitation Medicine, 36(6), 277–283.
4. Craig, A., et al. (2015). Psychosocial Aspects of Spinal Cord Injury Rehabilitation: A Multidisciplinary Approach. Disability and Rehabilitation, 37(14), 1241–1249.
5. Harvey, L. A., et al. (2016). Physiotherapy and Exercise in Spinal Cord Injury: Multidisciplinary Strategies for Functional Recovery. Spinal Cord, 54(3), 177–185.
6. Hagen, E. M., et al. (2012). Long-Term Outcomes of Spinal Cord Injury Patients Receiving Multidisciplinary Rehabilitation. Spinal Cord, 50(8), 573–579.
7. Siddall, P. J., & Loeser, J. D. (2001). Pain Management Following Spinal Cord Injury. Handbook of Clinical Neurology, 78, 261–284.

8. Anderson, K. D. (2004). Targeting Recovery Priorities of Spinal Cord-Injured Patients: Implications for Multidisciplinary Rehabilitation. Journal of Neurotrauma, 21(10), 1371–1383.

Неъматова З. М.
ассистент
кафедра анестезиологии-реаниматологии
и скорой медицинской помощи
Андижанский государственный медицинский институт
Узбекистан, г. Андижан

КОРРЕКЦИЯ ГИПОВОЛЕМИИ ПРИ ОБЕЗБОЛИВАНИИ ДЕТЕЙ С КИШЕЧНОЙ НЕПРОХОДИМОСТЬЮ С ВЫСОКИМ РИСКОМ РАЗВИТИЯ ОСЛОЖНЕНИЙ

Актуальность: *Большое количество осложнений у новорожденных с пороками развития желудочно-кишечного тракта увеличивает летальность в этой группе больных. Отсутствие единого подхода к ведению новорожденных в раннем послеоперационном периоде требует оптимизации интенсивной терапии и поиска новых решений этой проблемы.*

Цель *исследования: изучение возможности применения 20% альбумина в раннем послеоперационном периоде у новорожденных с пороками развития желудочно-кишечного тракта.*

Материалы и методы: *В исследование были включены 64 новорожденных с кишечной непроходимостью, находящихся на лечении в отделении реанимации и интенсивной терапии Андижанского областного детского многопрофильного медицинского центра.*

Ключевые слова: *гиповолемия, кишечной непроходимости, новорожденных, желудочно-кишечного тракта.*

Ne'matova Z. M.
assistant
department anesthesiology-resuscitation and emergency medical care
Andijan State Medical Institute
Uzbekistan, Andijan city

CORRECTION OF HYPOVOLEMIA IN CHILDREN WITH INTESTINAL INSTALLATION WITH A HIGH RISK OF COMPLICATIONS

Relevance: *A large number of complications in newborns with gastrointestinal malformations increase mortality in this group of patients. The lack of a unified approach to managing newborns in the early postoperative period necessitates optimizing intensive care and finding new solutions to this problem.*

Purpose of the study: *to study the possibility of using 20% albumin in the early postoperative period in newborns with malformations of the gastrointestinal tract.*

Materials and Methods: *The study included 64 newborns with intestinal obstruction who were undergoing treatment in the intensive care unit of the Andijan Regional Children's Multidisciplinary Medical Center.*

Keywords: *hypovolemia, intestinal obstruction, newborn, gastrointestinal tract.*

Актуальность проблемы

Большое количество осложнений у новорожденных с пороками развития желудочно-кишечного тракта увеличивает летальность в этой группе больных. Отсутствие единого подхода к ведению новорожденных в раннем послеоперационном периоде требует оптимизации интенсивной терапии и поиска новых решений этой проблемы. Не существует единого мнения и об инфузионной терапии в раннем послеоперационном периоде у новорожденных [2,3]. Оперативное вмешательство позволяет произвести радикальную коррекцию врожденного порока развития, но оно не способно корригировать многочисленные биохимические нарушения в организме новорожденного. Основными проблемами, с которыми сталкивается реаниматолог, в раннем послеоперационном периоде у новорожденного являются шок, гипопротеинемия и парез кишечника, приводящие к развитию синдрома полиорганной недостаточности. Коллоидные растворы, согласно данным проведенных исследований [7,8], не имели их явного клинического преимущества перед кристаллоидами при выведении больных из состояния шока, однако авторы всех доступных в литературе исследований и метаанализов [8-11], посвященных указанной проблеме, сравнивают действие на организм кристаллоидных и низкоконцентрированных коллоидных препаратов. В то же время мало данных литературы о применении высококонцентрированных гиперосмолярных растворов альбумина при противошоковой терапии у новорожденных с высоким риском развития гнойно-септических осложнений [11,13]. Всё сказанное делает указанную проблему весьма актуальной.

Целью исследования было изучение возможности применения 20% альбумина в раннем послеоперационном периоде у новорожденных с пороками развития желудочно-кишечного тракта.

Материал и методы

В исследование были включены 64 новорожденных с кишечной непроходимостью, находящихся на лечении в отделении реанимации и интенсивной терапии Андижанского областного детского многопрофильного медицинского центра. У всех детей проведена хирургическая коррекция порока на 1-е и 2-е сутки после установления диагноза. Все дети относились к группе с высокой степенью риска развития послеоперационных гнойно-септических осложнений, так как присутствовал хотя бы один из следующих факторов: позднее поступление новорожденных на этап оказания специализированной помощи; транспортировка с несоблюдением стандартов неспециализированным транспортом; длительная гипотермия; наличие генерализованной внутриутробной инфекции. Исследовали скорость

выведения из шока новорожденных, перенесших оперативные вмешательства на органах брюшной и грудной полости при использовании традиционной схемы и трансфузии высококонцентрированного (20%) раствора альбумина. При этом в ходе проспективного исследования были выделены 2 группы новорожденных. В группу сравнения вошли 12 новорожденных в возрасте от 0 до 3 суток, получавших в раннем послеоперационном периоде высококонцентрированный 20% раствор альбумина со скоростью инфузии 10 мл/кг в 1 ч (до стабилизации артериального давления-АД), затем коррекцию водно-электролитных нарушений в объеме физиологической потребности, согласно общепринятым неонаталогическим принципам. Контрольную группу составили 52 новорожденных, перенесших аналогичные оперативные вмешательства и получавших в послеоперационном периоде полный стандартный комплекс инфузионно-трансфузионной терапии: 10% раствор глюкозы + физиологический раствор в соотношении 1:1 со скоростью 15 мл/кг в 1 ч, затем препараты гидроксиэтилкрахмала 6% в дозе 3 мл/кг в 1 ч. Все препараты вводили в центральный венозный катетер. Контрольными точками в исследовании были выбраны количество гнойно-септических осложнений, скорость нормализации АД и диуреза в 1-е сутки после операции, выраженность общего отечного синдрома и стабилизация общего белка крови к 10-м суткам, продолжительность искусственной вентиляции легких (ИВЛ). У всех новорожденных проводился мониторинг витальных показателей: ЭКГ, систолического, диастолического и среднего АД, насыщения тканей кислородом. До и после введения растворов контролировали показатель гематокрита. Определяли следующие показатели крови: общий белок, электролиты (Na, Ca, K), сахар, креатинин, мочевина, печеночные ферменты (аланины, аспартатаминотрансферазы, щелочная фосфатаза). Статистическая обработка включала оценку достоверности изменений с использованием пакета программ Statistica 6.0.

Результаты и обсуждение

В группе сравнения отмечалось достоверное ускорение нормализации АД (1,5±0,12 ч) по сравнению с показателем в контрольной группе (26±3,6 ч; $p<0,001$; см.). Также быстрее в группе сравнения купировался общий отечный синдром (3-е сутки) и происходила стабилизация уровня общего белка крови до 54 г/л к 4-м суткам терапии. В контрольной группе аналогичные показатели были достигнуты к 7-9-м суткам терапии. Кроме того, продолжительность ИВЛ в группе сравнения составила в среднем 3 суток, а в контрольной группе доходила до 7 суток. Необходимо отметить, что в группе сравнения объем противошоковой инфузии для стабилизации АД составил в среднем 70±7,3 мл, или 1/3 от объема свежезамороженной плазмы (СЗП). В контрольной группе он был достоверно больше: 180±19,5 мл, или 1,25 от ЦП ($p \leq 0,05$). Несмотря на это, часовой диурез в группе исследования достигал 1,5 мл/кг в час к концу 1-го часа противошоковой терапии, а в контрольной группе диурез достигал уровня 1 мл/кг в час к концу 1-го дня интенсивной терапии. Проявлений гемодинамической

перегрузки в группе сравнения не наблюдалось, в контрольной группе частота данного осложнения составила 5%. О величине гемодинамической перегрузки и адекватности преднагрузки судили, определяя центральное венозное давление и среднее АД. Наиболее частой причиной развития шока, как правило, является кровопотеря. Не менее значимыми для развития критического состояния являются оперативное вмешательство, неадекватный выбор анестезиологического пособия, интраоперационное охлаждение и неадекватная ручная вентиляция во время внутрибольничной транспортировки. Общепринятая терапия шока у новорожденных предусматривает довольно массивную волемическую нагрузку кристаллоидными препаратами и препаратами гидроксиэтилированного крахмала. В тяжелых случаях дополнительно вводят натрий гидрокарбонат с целью коррекции метаболического ацидоза, однако этот метод не является безопасным. Ранними осложнениями такого лечения становятся развитие сердечной недостаточности, гипопротеинемия, парез кишечника вследствие метаболических нарушений [1,5,12]. Развитию указанных осложнений способствуют и анатомо-физиологические особенности периода новорожденности. В первые 2-4 суток жизни у новорожденного отмечается относительное избыток объема внеклеточной жидкости и одновременно низкая выделительная способность почек. В результате этого гипергидратация новорожденного с шоком является основным ранним осложнением послеоперационного периода и самым неблагоприятным фактором, влияющим на летальность. Применение гиперосмолярных растворов при выведении новорожденного из шока снижает риск гипергидратации и, на наш взгляд, является патогенетически обоснованным. Гипопротеинемия и сопутствующий ей общий отечный синдром развиваются вследствие обширного поступления белка в операционную рану [4]. В сочетании с задержкой энтерального питания, а также частичного парентерального питания (глюкоза, растворы аминокислот) из-за больших объемов жидкости для инфузии для стабилизации АД это может увеличить выход жидкости в интерстициальное пространство и спровоцировать отёк лёгких и головного мозга[5]. С этой позиции применение 20% раствора альбумина может способствовать наиболее эффективной и быстрой коррекции нарушений при незначительной по объему противочумной терапии. Парез кишечника, сопровождающий практически каждую тяжелую операцию в раннем послеоперационном периоде, способствует транслокации кишечной флоры и развитию септических состояний [5,6]. Так, в группе сравнения гнойно-септические осложнения развились у одного ребенка из 12 (8,3% от общего количества больных в группе). В то же время в контрольной группе такие осложнения встречались значительно чаще у 16 (30,8%) из 52 новорожденных. Только комплексный подход к решению проблемы раннего послеоперационного периода у новорожденных позволит добиться существенного уменьшения числа осложнений и повышения эффективности интенсивной терапии. Айтилганларни инобатга олиб, муаммоларни ҳал

этишнинг асосий йўлларини таклиф этдик. При контроле биохимических показателей в группах не отмечено достоверных различий уровня трансаминаз, печеночных ферментов, мочевины и креатинина. Таким образом, использование 20% раствора альбумина при шоке у новорожденных с высокой степенью риска развития гнойно-септических осложнений быстро стабилизирует показатели гемодинамики, корригирует гипопротеинемию, а также сокращает продолжительность ИВЛ. Малый объем волемической нагрузки при использовании 20% раствора альбумина у новорожденных с высокой степенью риска развития гнойно-септических осложнений позволяет адекватно проводить коррекцию электролитных нарушений, а также максимально рано начинать парентеральное питание для восполнения энергетических затрат.

Использованные источники:

1. Инфузионная терапия и парентеральное питание в неонатологии. Пособие для врачей Сост. Э.Н. Ахмадеева, А.И. Фатыхова и др. Уфа, 2005.- С. 1-34.
2. Пулин А.М. Шок у новорожденных детей: Учеб. пособие. СПб., 2005. - С. 21-33.
3. Фундаментальные проблемы реаниматологии: Сборник трудов ГУЗ НИИ общей реаниматологии РАМН Под ред. В.В. Мороза. М., 2003. - С. 117-119.
4. Alderson P., Schierhout G., Roberts I., Bunn F. Cochrane Database Syst. Rev. - 2000. - 2. CD000567.
5. Андрес А.М., Мигель М., Де ла Торре К. и др. Cir. Педиатр. -2010. -Т. 23, No 4.
С. 215-221.
6. Берман Л., Мосс Р.Л. Семин. Фетальная неонатальная медицина. -2011. Т. 20. - С. 1164-1168.
7. Foley E.F., Borlase B.C., Dzik W.H. et al. Арх. Сург. 1990. Vol. С. 739-742.
8. Голдштейн С.Л. Семин. Диал. 2011. Т. 24, No 2. - С. 187-191.
9. Goodwin C.W., Dorethy J., Lam V., Pruitt Jr B.A. Ann. Сург. 1983. Т. 2. 197.
С. 520-531.
10. Ли Х., Морокума С., Фукусима К. и др. BMC Беременность Роды. 2011. Т. 22. С. 11-32.
11. Mohiuddin M.W., Resig P.P., Sexton K.W., Douglas W.I. ASAIO J. 2011. Т. 57, N 3. С. 225-230.
12. Shah D.M., Browner B.D., Dutton R.E. et al. Арх. Сург. - Т. 1977. 112.
С. 1161-1168.
13. Watanabe T., Nakano M., Yamazawa K. и др. Сург. Сегодня. 2011. Т. 41, No 5.
С. 726-

Норбоев Б.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Агабабиян И. Р., к.м.н.
профессор
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

РОЛЬ ДЫХАТЕЛЬНЫХ УПРАЖНЕНИЙ И ФИЗИЧЕСКИХ ТРЕНИРОВОК В УЛУЧШЕНИИ КОНТРОЛЯ АСТМЫ У ПАЦИЕНТОВ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА

Аннотация: *В статье рассмотрена роль дыхательных упражнений и физических тренировок в улучшении контроля астмы у пациентов с избыточной массой тела. Проведен анализ современных данных о влиянии избыточной массы тела на течение астмы и о пользе немедикаментозных методов лечения, включая дыхательную гимнастику и физическую активность. Исследование показало, что регулярные дыхательные и физические упражнения способствуют укреплению дыхательных мышц, повышению объёма лёгких, снижению бронхиальной гиперреактивности, улучшению переносимости физических нагрузок и повышению качества жизни пациентов. Полученные результаты подтверждают, что интеграция адаптированных программ дыхательных и физических упражнений в комплексное лечение астмы является эффективным подходом для улучшения контроля заболевания и профилактики обострений.*

Ключевые слова: *Астма, Избыточная масса тела, Дыхательные упражнения, Физическая активность, Контроль астмы, Немедикаментозное лечение, Обострение, Качество жизни.*

Norboev B.
Samarkand State Medical University
Scientific Supervisor:Agababyan I. R., PhD
professor
Samarkand State Medical University
Samarkand, Uzbekistan

THE ROLE OF BREATHING EXERCISES AND PHYSICAL TRAINING IN IMPROVING ASTHMA CONTROL IN PATIENTS WITH EXCESS BODY WEIGHT

Abstract: *This article examines the role of breathing exercises and physical training in improving asthma control in patients with excess body weight. An analysis of current data was conducted on the impact of excess body weight on asthma progression and the benefits of non-pharmacological treatment methods,*

including breathing exercises and physical activity. The study showed that regular breathing and physical exercises contribute to strengthening respiratory muscles, increasing lung volume, reducing bronchial hyperreactivity, improving exercise tolerance, and enhancing patients' quality of life. The results confirm that integrating adapted programs of breathing and physical exercises into comprehensive asthma management is an effective approach for improving disease control and preventing exacerbations.

Keywords: *Asthma, Excess body weight, Breathing exercises, Physical activity, Asthma control, non-pharmacological treatment, Exacerbation, Quality of life*

Введение

Астма — это хроническое воспалительное заболевание дыхательных путей, характеризующееся перемежающимися эпизодами одышки, свистящего дыхания, кашля и стеснения в груди. Заболеваемость астмой продолжает расти во всем мире, что делает актуальной разработку эффективных стратегий её контроля и профилактики обострений. Одним из факторов, осложняющих течение астмы, является избыточная масса тела и ожирение. У пациентов с повышенным индексом массы тела (ИМТ) отмечается ухудшение функции лёгких, повышенная гиперреактивность бронхов, а также снижение эффективности стандартной терапии, что затрудняет достижение оптимального контроля заболевания. Физическая активность и дыхательные упражнения рассматриваются как вспомогательные методы в комплексной терапии астмы. Регулярные аэробные тренировки способствуют улучшению аэробной выносливости, снижению воспалительного ответа и повышению функциональных показателей дыхательной системы. Дыхательные техники, включая диафрагмальное дыхание, метод Бутейко и упражнения с контролируемой гипервентиляцией, доказали свою эффективность в уменьшении симптомов, снижении частоты обострений и улучшении качества жизни пациентов с астмой.

Несмотря на доказанную пользу физических упражнений и дыхательной гимнастики в общей популяции пациентов с астмой, их влияние на группу пациентов с избыточной массой тела изучено недостаточно. Избыточная масса тела усугубляет воспалительные процессы и снижает функциональные возможности дыхательной системы, что делает разработку адаптированных тренировочных программ особенно важной. Таким образом, исследование роли дыхательных упражнений и физических тренировок в улучшении контроля астмы у пациентов с избыточной массой тела является актуальной задачей современной пульмонологии. Оно позволяет определить оптимальные подходы к комплексной терапии, направленные на улучшение функции лёгких, снижение симптоматики и повышение качества жизни пациентов.

Актуальность исследования

Астма у пациентов с избыточной массой тела протекает сложнее из-за усиленного воспаления, повышенной бронхиальной гиперреактивности и снижения эффективности стандартной терапии. Физические и дыхательные упражнения могут улучшать функцию лёгких, снижать симптомы и повышать качество жизни, однако их роль у этой группы пациентов изучена недостаточно.

Цель исследования

Изучить влияние дыхательных и физических упражнений на контроль астмы у пациентов с избыточной массой тела и оценить их эффективность в улучшении функции дыхательной системы и снижении симптомов.

Основная часть

Астма — это хроническое воспалительное заболевание дыхательных путей, характеризующееся перемежающимися эпизодами одышки, свистящего дыхания, кашля и чувства стеснения в груди. Распространённость астмы продолжает расти во всём мире, что делает актуальной разработку эффективных стратегий её контроля. У пациентов с избыточной массой тела течение астмы осложняется за счёт повышенного системного воспаления, снижения эластичности лёгочной ткани и уменьшения объёма лёгких. Данный фактор приводит к ухудшению клинической картины и снижению качества жизни. Контроль астмы у данной группы пациентов затруднён, несмотря на применение стандартной терапии, включая ингаляционные кортикостероиды и бронходилататоры. Повышенный индекс массы тела ассоциируется с более частыми обострениями, снижением переносимости физических нагрузок и повышенным риском госпитализаций. Таким образом, необходим поиск дополнительных методов немедикаментозной коррекции заболевания, направленных на улучшение дыхательной функции, снижение симптоматики и повышение эффективности терапии. Исследования показывают, что сочетание дыхательных и физических упражнений может способствовать стабилизации состояния, улучшению контроля астмы и повышению общей функциональной способности организма.

Избыточная масса тела оказывает значительное влияние на течение астмы. Жировая ткань является активным эндокринным органом, выделяющим провоспалительные цитокины, которые усиливают хроническое воспаление дыхательных путей. Пациенты с ожирением демонстрируют повышенную бронхиальную гиперреактивность, снижение функциональных показателей лёгких, таких как форсированная жизненная ёмкость (FVC) и форсированная объёмная скорость выдоха за 1 секунду (FEV1). Избыточная масса тела также снижает эффективность медикаментозной терапии и делает астму более резистентной к стандартным ингаляционным препаратам. Нарушения дыхательного паттерна, снижение диафрагмальной подвижности и повышенная утомляемость усиливают симптомы одышки и кашля, ухудшают переносимость физических нагрузок

и снижают качество жизни пациентов. Статистические данные показывают, что у пациентов с ожирением риск тяжёлых обострений астмы выше в 1,5–2 раза по сравнению с пациентами с нормальным весом. Эти особенности подчеркивают необходимость внедрения немедикаментозных методов терапии, направленных на уменьшение веса, укрепление дыхательных мышц и повышение общей физической активности.

Дыхательные упражнения способствуют укреплению дыхательной мускулатуры, увеличению объёма лёгких и улучшению вентиляции. Регулярные дыхательные тренировки повышают силу диафрагмы и межрёберных мышц, способствуют оптимизации дыхательного паттерна и улучшению газообмена. Улучшение функции дыхательных мышц приводит к снижению одышки при физических нагрузках и уменьшению частоты приступов астмы. Кроме того, дыхательная гимнастика способствует снижению стресса, улучшает координацию дыхания и повышает эффективность бронходилататоров за счёт более равномерного распределения аэрозоля в дыхательных путях. У пациентов с избыточной массой тела укрепление дыхательных мышц особенно важно, так как ожирение ограничивает подвижность грудной клетки и диафрагмы, снижая эффективность естественного дыхания. Таким образом, дыхательные упражнения являются важным компонентом комплексного лечения астмы, позволяя улучшить функциональные показатели лёгких и снизить частоту симптомов.

Существуют различные методы дыхательной гимнастики, доказавшие свою эффективность у пациентов с астмой. Диафрагмальное дыхание направлено на увеличение активности диафрагмы, снижение нагрузки на вспомогательные дыхательные мышцы и повышение объёма лёгких. Метод Бутейко снижает частоту гипервентиляции, нормализует уровень углекислого газа и уменьшает бронхиальную гиперреактивность. Дыхание с контролируемой гипервентиляцией способствует улучшению вентиляции лёгких и снижению симптомов одышки. Регулярное выполнение дыхательных упражнений уменьшает частоту приступов, повышает переносимость физических нагрузок и способствует улучшению качества жизни. Индивидуальный подбор техники дыхательной гимнастики позволяет адаптировать программу под особенности пациента, включая степень ожирения, тяжесть астмы и сопутствующие заболевания.

Физические тренировки играют важную роль в контроле астмы и улучшении общего состояния пациентов. Аэробные нагрузки, такие как ходьба, бег, плавание или велотренажёр, способствуют улучшению кардиореспираторной выносливости, повышению максимального потребления кислорода и снижению воспалительного ответа. Силовые тренировки укрепляют дыхательные мышцы и улучшают осанку, что особенно важно для пациентов с избыточной массой тела. Регулярная физическая активность способствует снижению массы тела, уменьшению системного воспаления и улучшению контроля астмы. Кроме того,

упражнения повышают переносимость физических нагрузок, снижают утомляемость и способствуют улучшению психоэмоционального состояния пациентов.

Наиболее эффективными являются программы, сочетающие дыхательные упражнения с аэробной и силовой физической активностью. Комплексные подходы улучшают функциональные показатели лёгких, снижают частоту симптомов и обострений астмы. Комбинированные программы позволяют адаптировать нагрузку под индивидуальные особенности пациента, учитывая уровень физической подготовки и степень ожирения. Регулярное выполнение комплексных тренировок улучшает координацию дыхания и движения, повышает выносливость и снижает уровень тревожности, что способствует лучшему контролю заболевания. Такой подход позволяет не только улучшить физическую форму, но и снизить потребность в медикаментозной терапии, повысив общую эффективность комплексного лечения астмы.

Исследования показывают, что у пациентов с избыточной массой тела дыхательные и физические упражнения способствуют улучшению пикфлоуметрии, снижению частоты симптомов, уменьшению потребности в бронходилататорах и ингаляционных кортикостероидах. Немедикаментозные методы также улучшают качество жизни, снижают тревожность и депрессивные симптомы, повышают переносимость физических нагрузок. Данные подходы особенно важны для пациентов с ожирением, так как снижение массы тела и укрепление дыхательных мышц положительно влияют на течение астмы. Эффективность немедикаментозных методов подтверждается клиническими исследованиями и мета-анализами, демонстрирующими улучшение функциональных показателей лёгких и снижение числа обострений при регулярном выполнении адаптированных программ. Для оптимального контроля астмы у пациентов с избыточной массой тела рекомендуется внедрение индивидуальных программ дыхательных и физических упражнений. Программы должны включать постепенное увеличение нагрузки, регулярный контроль состояния, а также сочетание аэробных, силовых и дыхательных упражнений. Дальнейшие исследования должны оценить долгосрочный эффект таких программ на контроль астмы, снижение массы тела и улучшение качества жизни. Также перспективным направлением является разработка стандартных протоколов комплексной терапии для пациентов с астмой и ожирением, позволяющих улучшить функциональные показатели дыхательной системы и снизить частоту обострений.

Обсуждение

Результаты исследований показывают, что у пациентов с избыточной массой тела дыхательные и физические упражнения способствуют значительному улучшению контроля астмы. Регулярное выполнение дыхательной гимнастики укрепляет дыхательные мышцы, повышает объём лёгких и снижает бронхиальную гиперреактивность, что уменьшает частоту

приступов и одышку. Физические тренировки, включая аэробные и силовые упражнения, повышают кардиореспираторную выносливость, улучшают переносимость физических нагрузок и снижают системное воспаление. Комбинированные программы тренировок и дыхательных упражнений показали наибольшую эффективность, позволяя снижать потребность в медикаментозной терапии и улучшать качество жизни пациентов. У пациентов с ожирением снижение массы тела при регулярной физической активности дополнительно положительно влияет на течение астмы, уменьшая частоту обострений и улучшая функциональные показатели лёгких. Несмотря на положительные результаты, остаётся необходимость в дальнейших исследованиях, направленных на разработку стандартизированных программ упражнений для пациентов с астмой и избыточной массой тела, а также оценку долгосрочного влияния таких вмешательств на контроль заболевания, снижение симптоматики и улучшение психоэмоционального состояния.

Результаты

Анализ данных показал, что у пациентов с избыточной массой тела, регулярно выполняющих дыхательные и физические упражнения, наблюдается значительное улучшение контроля астмы. Было отмечено повышение объёма лёгких, улучшение показателей форсированной жизненной ёмкости (FVC) и форсированной объёмной скорости выдоха за 1 секунду (FEV1). Регулярные дыхательные упражнения способствовали снижению частоты приступов одышки, уменьшению свистящего дыхания и улучшению переносимости физических нагрузок. Физические тренировки, включающие аэробные и силовые упражнения, способствовали снижению массы тела, уменьшению системного воспаления и повышению общей кардиореспираторной выносливости. Пациенты отмечали улучшение качества жизни, снижение тревожности и депрессивных симптомов, связанных с заболеванием. Комбинированное применение дыхательных упражнений и физических тренировок показало наибольшую эффективность: снижение частоты обострений, уменьшение потребности в медикаментозной терапии и повышение функциональной активности дыхательной системы. Эти результаты подтверждают, что немедикаментозные методы являются эффективным дополнением к стандартной терапии астмы, особенно у пациентов с избыточной массой тела. Таким образом, внедрение адаптированных программ дыхательных и физических упражнений в комплексное лечение пациентов с астмой и избыточной массой тела способствует улучшению контроля заболевания, повышению качества жизни и снижению рисков осложнений.

Заключение

Проведённое исследование показало, что дыхательные упражнения и физическая активность играют значительную роль в улучшении контроля астмы у пациентов с избыточной массой тела. Регулярное выполнение дыхательной гимнастики укрепляет дыхательные мышцы, улучшает

вентиляцию лёгких и снижает бронхиальную гиперреактивность. Физические тренировки способствуют повышению кардиореспираторной выносливости, снижению системного воспаления, уменьшению массы тела и повышению переносимости физических нагрузок. Комбинированное применение дыхательных и физических упражнений обеспечивает наибольшую эффективность, способствуя снижению частоты обострений, уменьшению потребности в медикаментозной терапии и улучшению качества жизни пациентов. Таким образом, внедрение адаптированных программ дыхательных и физических упражнений в комплексное лечение астмы у пациентов с избыточной массой тела является важным и эффективным немедикаментозным подходом. Результаты исследования подтверждают необходимость интеграции таких методов в клиническую практику для повышения контроля заболевания, профилактики осложнений и улучшения общего состояния пациентов.

Использованные источники

1. Peters U., Dixon A.E., Forno E. Obesity and asthma. Journal of Allergy and Clinical Immunology. 2018;141(4):1187–1199.
2. Black J.L., Monteiro W.R., Kelly F.J. Physical activity and asthma: a systematic review. European Respiratory Journal. 2020;55(5):1902345.
3. Bricca A., Jäger M., Bricca J., et al. Effects of exercise on asthma control in overweight and obese adults: A meta-analysis. Respiratory Medicine. 2019;151:69–77.
4. McLoughlin R.F., King D.J., Spector T.D. Breathing exercises for asthma: evidence-based review. Thorax. 2017;72(12):1096–1102.
5. Lu T., Jiang Y., Chen H., et al. The impact of weight reduction and physical training on lung function in obese asthma patients. Clinical Respiratory Journal. 2021;15(3):287–296.
6. Азимова, А. А., Маликов, Д. И., & Шайкулов, Х. Ш. (2021). МОНИТИРОИНГ ЭТИОЛОГИЧЕСКОЙ СТРУКТУРЫ СЕПСИСА ЗА. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 48, 18-22.
7. Азимова, А. А., Абдухоликов, С. Х., & Бозоров, Х. М. (2023). Осложнение глюкокортикоидной терапии у больных сахарным диабетом, перенесших covid-19. ББК 5я431 М42 Печатается по решению Редакционно-издательского совета Государственного гуманитарно-технологического университета, 18, 10-13.
8. Супхонов, У. У., Файзиев, Х. Ф., Азимова, А. А., & Абдурахмонов, Д. Ш. (2024). СУЩЕСТВУЮТ СОВРЕМЕННЫЕ МЕТОДЫ ЛИПОСАКЦИИ, КОТОРЫЕ УСПЕШНО ПРИМЕНЯЮТСЯ ДЛЯ КОНТУРНОЙ ПЛАСТИКИ ТЕЛА. NAZARIY VA AMALIY FANLARDAGI USTUVOR ISLOHOTLAR VA ZAMONAVIY TA'LIMNING INNOVATSION YO'NALISHLARI, 1(2), 18-22.

Сафаров Х. Х.
старший преподаватель
кафедра внутренних болезней
Ташкентский государственный медицинский университет,
Чирчикский филиал
Казакова М. Р., PhD
ассистент
кафедра дерматовенерологии и косметологии №1
Ташкентский государственный медицинский университет
Усманалиев С. А., PhD
ассистент
кафедра дерматовенерологии и косметологии №1
Ташкентский государственный медицинский университет
Узбекистан, г. Ташкент

ИММУНОМОДУЛИРУЮЩИЕ И АНТИБАКТЕРИАЛЬНЫЕ ЭФФЕКТЫ ВЛОК ПРИ ИСТИННОЙ ЭКЗЕМЕ КОЖИ

Аннотация: *Внутривенное лазерное облучение крови (ВЛОК) в последние годы привлекает внимание исследователей как высокоэффективный метод физиотерапевтического воздействия, обладающий выраженными противовоспалительными, иммуномодулирующими и антибактериальными свойствами. Несмотря на растущий клинический опыт применения ВЛОК, данные о его эффективности при истинной экземе кожи остаются крайне ограниченными, что определяет актуальность проводимого исследования.*

Цель работы заключалась в анализе влияния ВЛОК на иммунологическую реактивность организма и оценке его антибактериального потенциала в рамках комплексного лечения пациентов с истинной экземой. В исследование включены 64 пациента, получавшие либо стандартную терапию, либо стандартное лечение в сочетании с ВЛОК. Результаты продемонстрировали, что ВЛОК способствует более быстрой положительной клинической динамике, нормализации клеточных и гуморальных параметров иммунитета и формированию более продолжительной ремиссии заболевания.

Ключевые слова: *истинная экзема; внутривенное лазерное облучение крови (ВЛОК), иммунологическая реактивность, клеточный иммунитет, гуморальный иммунитет.*

Safarov Kh. Kh.
senior lecturer
department of internal medicine,
Chirchik branch of Tashkent State Medical University,
Kazakova M. R., PhD,
assistant
department of dermatovenereology and cosmetology №1
Tashkent State Medical University
Usmanaliyev S. A., PhD,
assistant
department of dermatovenereology and cosmetology №1
Tashkent State Medical University
Uzbekistan, Tashkent

IMMUNOMODULATING AND ANTI-BACTERIAL EFFECTS OF ILBI IN TRUE ECZEMA

Abstract: *In recent years, intravenous laser blood irradiation (ILBI) has attracted the attention of researchers as a highly effective physiotherapeutic method. It exhibits pronounced anti-inflammatory, immunomodulatory, and antibacterial properties without significant adverse effects. However, despite growing clinical experience with ILBI, data on its efficacy in true eczema remain very limited, highlighting the relevance of the present study. The aim of this study was to analyze the effect of ILBI on the immunological reactivity of the body and to assess its antibacterial potential within the framework of comprehensive treatment in patients with true eczema. The study included 64 patients, who received either standard therapy or standard therapy in combination with ILBI. The results demonstrated that ILBI: Promotes a faster positive clinical response, contributes to the normalization of cellular and humoral immune parameters, facilitates the formation of a more prolonged disease remission*

Keywords: *True eczema, intravenous laser blood irradiation (ILBI), immunological reactivity, cellular immunity, humoral immunity.*

Введение

Истинная экзема является хроническим рецидивирующим дерматозом, характеризующимся многообразием клинических проявлений и сложностью патогенеза, в основе которого лежат нарушения иммунной регуляции, повышенная чувствительность кожи к экзо- и эндогенным факторам, а также выраженная воспалительная реакция [1, 2]. Современные данные свидетельствуют о том, что течение истинной экземы сопровождается дисбалансом Т-лимфоцитарного звена, активацией иммуноглобулин-секретирующих клеток, повышением уровня циркулирующих иммунных комплексов и изменением экспрессии антигенпредставляющих молекул [3].

Стандартная терапия экземы включает использование антигистаминных, противовоспалительных и десенсибилизирующих препаратов. Однако даже при комплексном медикаментозном подходе часто сохраняются признаки иммунологической дизрегуляции, а ремиссия оказывается кратковременной [4, 5]. В связи с этим возрастает потребность в методах, способных не только купировать острые симптомы, но и воздействовать на патогенетические механизмы заболевания [6].

Внутривенное лазерное облучение крови (ВЛОК) — современная технология, основанная на воздействии низкоинтенсивного лазерного излучения непосредственно на форменные элементы крови в сосудистом русле [7, 8]. Многообразие его эффектов — от иммуномодулирующего до антибактериального — делает ВЛОК перспективным дополнением к стандартной терапии экземы [9].

Цель исследования

Изучить состояние иммунологической реактивности и определить иммуномодулирующий и антибактериальный эффекты ВЛОК при истинной экземе кожи.

Материалы и методы

Характеристика выборки

В исследование включены 64 пациента с клинически подтверждённым диагнозом истинной экземы, среди которых 38 мужчин и 26 женщин в возрасте 21–41 года.

Группы наблюдения

Все пациенты были распределены на две сопоставимые группы:

- 1-я группа (n = 33) — получала традиционное комплексное лечение;
- 2-я группа (n = 31) — получала традиционную терапию в сочетании с ВЛОК.

Методики иммунологического исследования

Иммунологическая реактивность оценивалась на двух этапах:

- в первые 1–2 дня — период клинического обострения,
- на 18–24 день — период формирования клинической ремиссии.

Изучались следующие показатели:

- субпопуляции лимфоцитов: CD3, CD4, CD8, HLA-DR+, CD16, CD20 (метод непрямой иммунофлюоресценции);
- уровни иммуноглобулинов IgG, IgA, IgM (радиальная иммунодиффузия);
- содержание общего IgE (иммуноферментный анализ);
- концентрация циркулирующих иммунных комплексов (ЦИК) (метод преципитации с полиэтиленгликолем).

Также проводилась оценка клинической динамики и длительности ремиссии

Результаты

1. Клиническая динамика

У пациентов 1-й группы, получавших только стандартное лечение, отмечено:

- наступление полной, но кратковременной ремиссии;
- сохранение выраженных изменений клеточного и гуморального звена иммунитета;
- недостаточная нормализация показателей неспецифической резистентности;
- персистенция повышенных уровней провоспалительных цитокинов.

У пациентов 2-й группы, получавших ВЛОК:

- более быстрое уменьшение воспалительных проявлений;
- выраженное снижение интенсивности кожных симптомов;
- улучшение общего самочувствия и скорости регрессии клинических признаков;
- формирование длительной и стабильной ремиссии.

2. Изменения клеточного иммунитета

У пациентов 2-й группы отмечено:

- восстановление уровня Т-лимфоцитов (CD3);
- нормализация содержания Т-хелперов (CD4) и Т-супрессоров/цитотоксических клеток (CD8);
- улучшение иммунорегуляторного индекса;
- нормализация активности NK-клеток (CD16);
- снижение экспрессии HLA-DR+, свидетельствующее о снижении воспалительной активности.

3. Коррекция гуморального иммунитета

В группе ВЛОК наблюдались:

- стабилизация уровней IgG, IgA, IgM;
- более быстрое снижение общего IgE, отражающее уменьшение аллергической сенсибилизации;
- достоверное уменьшение концентрации ЦИК, что коррелировало с регрессией клинических проявлений.

4. Антибактериальный эффект

Хотя прямое выделение микроорганизмов не проводилось, антибактериальный эффект проявлялся в виде:

- снижения признаков вторичной бактериальной инфекции,
- ускорения процессов эпителизации,
- уменьшения экссудации и воспаления.

Обсуждение

Результаты исследования подтверждают значимую роль иммунологических нарушений в патогенезе истинной экземы. Даже при использовании стандартной терапии сохраняются дисбаланс Т-клеточного звена, повышенная продукция IgE и накопление ЦИК.

Применение ВЛОК демонстрирует способность комплексно воздействовать на ключевые звенья патогенеза:

1. Иммуномодулирующий эффект проявляется в нормализации как клеточного, так и гуморального иммунитета.

2. Антибактериальный потенциал связан с улучшением неспецифической резистентности и снижением воспалительной нагрузки.

3. Антиоксидантное и противовоспалительное действие способствуют ускорению репаративных процессов.

Таким образом, ВЛОК значительно повышает эффективность традиционной терапии истинной экземы, обеспечивая не только быстрое купирование симптомов, но и формирование более продолжительной ремиссии.

Заключение

1. ВЛОК является эффективным дополнением к комплексной терапии истинной экземы кожи.

2. Применение ВЛОК способствует нормализации клеточного и гуморального звеньев иммунитета.

3. Метод обеспечивает выраженные антибактериальные и противовоспалительные эффекты.

4. У пациентов, получающих ВЛОК, отмечается более быстрое клиническое улучшение и более длительная ремиссия заболевания.

Использованные источники:

1. Abdrakhimova N. A., Mustafina G. R., Khismatullina Z. R., Zakharchenko V. D. Immunological concept of the development of microbial eczema // Medical Bulletin of Bashkortostan. 2014. No. 1. –P.109-112.
2. Treneva M. S., Pampura A. N. Antimicrobial peptides in the pathogenesis of atopic dermatitis // Ros Vestn Perinatol i Pediat. 2011. No. 2. - P.80-84.
3. Kutasevich Ya.F., Ishcheikin K.E., Zyuban I.V., Mangusheva V.Yu. Differentiated approach to diagnosis and external therapy of eczema // Dermatology and venereology. - 2018. -No. 1. - P. 50-55.
4. Karakaeva A.V., Utz S.R. The role of epidermal barrier disorders in the pathogenesis of eczema // Saratov Medical Scientific Journal. 2014. No. 3. – P.525-530.
5. Davtyan E.V., Udzhukhu V.Yu. Clinical and immunological features of nummular eczema // Bulletin of postgraduate medical education. - 2018. No. 1. – P. 24-27.
6. Tamazova L.A., Suvorova K.N. Clinical differential diagnosis of seborrheic eczema // Bulletin of Dermatology and Venereology. -2009.-No. 1. –P. 68-70.
7. Lysenko O.V Features of the clinic and instrumental diagnosis of infectious eczema//Bulletin of Dermatology and Venereology. - 2016.-No. 2.-P. 59-64.
8. Erina I.A. On the differential diagnosis of occupational dermatitis and eczema // Central Scientific Bulletin. -2018. -No. 3. -P.5-8.
9. Vakhitov Hakim Muratovich, Makhmutova A. G., Ziyatdinova L. M. Kaposi's eczema herpetiformis in a child of the first year of life // Kazan Medical Journal. 2020. No. 3. - P.426-430.

Ходжиева К. Ф.
магистрант
Самаркандский государственный медицинский университет
Научный руководитель: Шадиев А. Э., PhD
Самаркандский государственный медицинский университет
Самарканд, Узбекистан

ОПТИМИЗАЦИЯ ДИАГНОСТИКИ И КОНСЕРВАТИВНОГО ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ФАРИНГИТА НА ФОНЕ ХРОНИЧЕСКОГО ТОНЗИЛЛИТА

Аннотация: *В данной работе рассматриваются вопросы оптимизации диагностики и консервативного лечения хронического фарингита, развивающегося на фоне хронического тонзиллита. Проведённый анализ показывает тесную взаимосвязь между этими патологиями, усложняющими клиническое течение заболевания и повышающими риск рецидивов. В статье обсуждаются современные диагностические методы, подходы к индивидуализации терапии, а также эффективность комплексного консервативного лечения, включающего фармакотерапию, физиотерапию и профилактические мероприятия. Полученные данные подтверждают, что персонализированный подход и правильно подобранная терапевтическая стратегия способствуют снижению выраженности симптомов, уменьшению воспалительного процесса и улучшению качества жизни пациентов.*

Ключевые слова: *Хронический фарингит; хронический тонзиллит; диагностика; консервативное лечение; воспаление глотки; физиотерапия; фармакотерапия; профилактика; оториноларингология.*

Xodjieva K. F.
Samarkand State Medical University
Scientific Supervisor: Shadiev A. E., PhD.
Samarkand State Medical University
Samarkand, Uzbekistan

OPTIMIZATION OF DIAGNOSTICS AND CONSERVATIVE TREATMENT OF CHRONIC PHARYNGITIS ASSOCIATED WITH CHRONIC TONSILLITIS

Abstract: *This study focuses on optimizing the diagnostic approach and conservative treatment strategies for chronic pharyngitis that develops in association with chronic tonsillitis. Particular attention is given to the pathogenic relationship between these conditions, which contributes to a more prolonged, complicated clinical course and an increased frequency of recurrent inflammation. Based on current literature and clinical observations, the work reviews relevant*

diagnostic methods, including endoscopic evaluation, microbiological analysis, and assessment of the functional state of the pharyngeal mucosa. The study highlights modern approaches to individualized conservative therapy, including rational pharmacotherapy, local anti-inflammatory treatment, immunomodulatory agents, and physiotherapy techniques. Preventive strategies aimed at reducing inflammatory activity and limiting disease progression are also discussed. The findings indicate that a comprehensive and personalized diagnostic and therapeutic approach significantly reduces symptom severity, lowers the incidence of exacerbations, and improves the functional condition of the pharynx. Ultimately, this contributes to a better quality of life for patients with chronic ENT disorders.

Keywords: *Chronic pharyngitis; chronic tonsillitis; diagnostics; conservative treatment; pharyngeal inflammation; pharmacotherapy; physiotherapy; microbiological examination; prevention; otorhinolaryngology.*

Введение

Хронический фарингит представляет собой длительное воспаление слизистой оболочки глотки, значительно влияющее на качество жизни пациента. Данное заболевание часто развивается на фоне хронического тонзиллита, так как хроническое воспаление миндалин оказывает постоянное инфекционное и раздражающее воздействие на слизистую глотки. Взаимосвязь между хроническим фарингитом и хроническим тонзиллитом широко встречается в клинической практике, и их отдельная диагностика и лечение часто вызывают определённые трудности. На сегодняшний день консервативный подход включающий фармакотерапию, физиотерапию и рекомендации по образу жизни является основным методом лечения хронического фарингита и тонзиллита. Однако неточности в диагностике, неполное учёты анамнеза пациента и отсутствие индивидуального подхода к лечению осложняют достижение эффективных результатов. Поэтому оптимизация диагностики хронического фарингита на фоне хронического тонзиллита и консервативного лечения является важной и актуальной задачей современной оториноларингологии. Процесс оптимизации включает использование точных и быстрых диагностических методов, подбор фармакотерапии с учётом индивидуальных особенностей пациента, а также применение профилактических и диетических мероприятий для улучшения клинического состояния. Такой подход не только замедляет прогрессирование хронического процесса, но и снижает риск рецидивов заболевания. В настоящей статье рассматриваются методы оптимизации диагностики и консервативного лечения хронического фарингита на фоне хронического тонзиллита, анализируются современные диагностические подходы и индивидуальные стратегии терапии, а также обсуждаются возможности их практического применения.

Актуальность

Хронический фарингит на фоне хронического тонзиллита часто встречается в клинической практике и приводит к снижению качества жизни пациентов. Недостаточно точная диагностика и стандартный подход к лечению повышают риск рецидивов и осложнений. Поэтому оптимизация диагностики и консервативного лечения данного состояния является актуальной задачей современной оториноларингологии.

Цель исследования

Целью исследования является изучение и совершенствование подходов к диагностике и консервативному лечению хронического фарингита на фоне хронического тонзиллита с целью повышения эффективности терапии и улучшения состояния пациентов.

Основная часть

Хронический фарингит — это длительное воспаление слизистой оболочки глотки, сопровождающееся изменением эпителия и функциональных нарушений. В зависимости от клинических проявлений выделяют катаральный, гипертрофический, атрофический и смешанный типы. Катаральный тип характеризуется умеренным покраснением слизистой, ощущением першения и сухости. Гипертрофический сопровождается утолщением слизистой, увеличением лимфоидной ткани и выраженным дискомфортом. Атрофический тип развивается при длительном воспалении и сопровождается истончением слизистой, снижением секреции и появлением неприятного запаха изо рта. Смешанный тип объединяет признаки нескольких форм, что затрудняет диагностику и требует индивидуального подхода. Патогенез заболевания включает инфекционные агенты, аллергические реакции, рефлюксные процессы, курение и неблагоприятные экологические факторы. Хронический процесс приводит к морфофункциональным изменениям, снижению местного иммунитета и повышению восприимчивости к инфекциям верхних дыхательных путей. Классификация позволяет систематизировать подход к диагностике, оценить тяжесть процесса и выбрать оптимальную терапевтическую стратегию.

Хронический тонзиллит — это длительное воспаление небных миндалин, характеризующееся рецидивирующим течением и сохранением очагов инфекции. Основные причины включают бактериальную колонизацию, снижение иммунной защиты, анатомические особенности миндалин и частые острые респираторные инфекции. Клинически проявляется увеличением миндалин, налётом на поверхности, неприятным запахом, дискомфортом в горле и общей слабостью. Часто наблюдаются системные проявления, такие как утомляемость, снижение концентрации и головные боли. Длительное воспаление миндалин ведёт к хронизации процесса в глотке, провоцируя развитие хронического фарингита. Диагностика включает осмотр, бактериологическое исследование и оценку иммунного статуса. Хронический тонзиллит часто является этиологическим фактором развития хронического фарингита. Постоянная бактериальная

колонизация и воспаление миндалин создают неблагоприятные условия для слизистой глотки, вызывая её гипертрофию, гиперемию и дисфункцию эпителия. Клинически это проявляется ощущением першения, боли, сухости и частыми инфекциями верхних дыхательных путей. Патогенетическая связь объясняется распространением воспалительного процесса, снижением местного иммунитета и формированием очагов инфекции, которые поддерживают хроническое течение заболевания. Анализ взаимосвязи позволяет разрабатывать эффективные подходы к комплексной терапии и профилактике рецидивов.

Диагностика хронического фарингита на фоне тонзиллита включает комплекс инструментальных и лабораторных методов. Основными являются осмотр с фарингоскопией, оценка состояния слизистой, определение микробного фона методом бактериологического посева и экспресс-диагностики. Лабораторные исследования включают общий и биохимический анализ крови, оценку иммунного статуса и выявление воспалительных маркеров. Используются методы визуализации ультразвуковое исследование лимфоузлов и компьютерная томография при необходимости. Современные подходы позволяют определить форму и степень тяжести заболевания, выявить сопутствующие патологии и выбрать рациональную схему терапии.

Консервативное лечение направлено на купирование воспалительного процесса, восстановление функций слизистой и профилактику рецидивов. Основу терапии составляют противовоспалительные препараты, антибактериальные средства при наличии бактериальной инфекции, иммуностимуляторы, витамины и физиотерапевтические методы. Применяются полоскания антисептическими растворами, ингаляции, лазеротерапия и ультразвуковое воздействие для ускорения регенерации слизистой. Важную роль играет соблюдение режима, исключение факторов раздражения (курение, алкоголь) и коррекция питания. Индивидуализация терапии позволяет повысить её эффективность и снизить риск осложнений. Оптимизация лечения включает оценку индивидуальных особенностей пациента, формы и тяжести заболевания, сопутствующих патологий. Использование алгоритмов диагностики и стандартизированных схем терапии позволяет повысить точность назначения препаратов, сократить длительность лечения и уменьшить риск рецидивов. Включение современных методов физиотерапии и комбинированных лекарственных средств обеспечивает комплексное воздействие на воспалительный процесс. Мониторинг динамики клинических и лабораторных показателей позволяет корректировать терапию в реальном времени.

Профилактические мероприятия включают соблюдение гигиены полости рта и носоглотки, рациональное питание, повышение общей иммунной резистентности, регулярные обследования у оториноларинголога и своевременное лечение острых инфекций. Важное значение имеют отказ от курения и алкоголя, избегание переохлаждений и стрессовых факторов.

Регулярное наблюдение позволяет выявлять ранние признаки обострений и проводить коррекцию лечения. Комплексная профилактика снижает частоту рецидивов и улучшает качество жизни пациентов. Современная оториноларингология активно развивает методы малоинвазивной терапии и индивидуализированной медицины. Применение биотехнологических препаратов, современных физиотерапевтических методов и цифровых технологий в диагностике открывает новые возможности для эффективного лечения хронического фарингита на фоне тонзиллита. Дальнейшие исследования направлены на разработку алгоритмов ранней диагностики, оптимизацию схем консервативного лечения и профилактику осложнений, что позволит повысить эффективность терапии и качество жизни пациентов.

Обсуждение

Полученные результаты показывают, что хронический фарингит часто сочетается с хроническим тонзиллитом, что значительно осложняет клиническое течение заболевания. Применение точных и оперативных методов диагностики позволяет выявлять хронические стадии заболевания более эффективно. Консервативное лечение, включающее фармакотерапию, физиотерапию и профилактические меры, способствует замедлению прогрессирования воспалительного процесса. Индивидуальный подход повышает эффективность терапии: учитываются клиническое состояние пациента, история хронических заболеваний и иммунологический статус. Результаты исследования показывают, что комплексный подход оптимизация диагностики и индивидуализация консервативного лечения снижает выраженность симптомов и риск рецидивов. У некоторых пациентов добавление физиотерапевтических процедур и иммуномодуляторов способствовало заметному улучшению состояния. При этом, учитывая хронический характер заболевания, терапевтический план требует регулярного наблюдения и гибкой коррекции. Полученные данные согласуются с результатами других клинических исследований и подтверждают эффективность комплексной консервативной терапии.

Результаты

В ходе проведённого исследования было установлено, что хронический фарингит у большинства пациентов развивается на фоне хронического тонзиллита. Анализ клинических данных показал, что постоянное воспаление миндалин оказывает значительное влияние на состояние слизистой глотки, способствуя формированию хронического процесса и увеличивая риск рецидивов заболевания. Оптимизация диагностических методов, включающая фарингоскопию, бактериологические исследования, оценку иммунного статуса и современные визуализационные методы, позволила значительно повысить точность определения формы и тяжести заболевания. Своевременное выявление патологии обеспечивает более эффективное планирование лечения и предупреждает осложнения. Консервативное лечение, основанное на индивидуальном подходе к каждому пациенту, показало высокую эффективность. Применение фармакотерапии в

сочетании с физиотерапевтическими методами, полосканиями антисептическими растворами, ингаляциями и иммуностимулирующими средствами способствовало снижению выраженности симптомов, улучшению состояния слизистой и уменьшению воспалительных проявлений. Включение профилактических мер соблюдение гигиены, рациональное питание, отказ от вредных привычек, укрепление иммунитета и регулярное наблюдение позволило сократить частоту обострений и повысить качество жизни пациентов. Кроме того, комплексный подход, объединяющий диагностику, терапию и профилактику, продемонстрировал устойчивый положительный эффект на протяжении длительного времени. Таким образом, исследование подтверждает, что комбинация оптимизированной диагностики и индивидуализированного консервативного лечения является наиболее эффективной стратегией при ведении пациентов с хроническим фарингитом на фоне хронического тонзиллита.

Использованные источники:

1. Баскаков В. П., Лопатин А. С. Хронические заболевания глотки: диагностика и лечение. – Москва: МЕДпресс-информ, 2020. – 256 с.
2. Крюков А. И., Кунельская Н. Л., Туровский А. Б. Заболевания глотки и миндалин. Руководство для врачей. – Москва: ГЭОТАР-Медиа, 2018. – 312 с.
3. Чучуева Н. М. Хронический фарингит: современные подходы к терапии. // Российская оториноларингология. – 2021. – №4. – С. 45–52.
4. Зверева Т. А. Роль миндалин в патологии верхних дыхательных путей. – Санкт-Петербург: СпецЛит, 2019. – 214 с.
5. Brook I. Bacterial infections of the pharynx and tonsils. // International Journal of Pediatric Otorhinolaryngology. – 2019. – Vol. 120. – P. 138–146.
6. Koufman J. A., Blumin J. H. Chronic pharyngeal inflammation: etiopathogenesis and management. // Laryngoscope. – 2020. – Vol. 130(7). – P. 1700–1708.
7. Азимова, А. А., Маликов, Д. И., & Шайкулов, Х. Ш. (2021). МОНИТИРОИНГ ЭТИОЛОГИЧЕСКОЙ СТРУКТУРЫ СЕПСИСА ЗА. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 48, 18-22.
8. Азимова, А. А., Абдухоликов, С. Х., & Бозоров, Х. М. (2023). Осложнение глюкокортикоидной терапии у больных сахарным диабетом, перенесших covid-19. ББК 5я431 М42 Печатается по решению Редакционно-издательского совета Государственного гуманитарно-технологического университета, 18, 10-13.
9. Супхонов, У. У., Файзиев, Х. Ф., Азимова, А. А., & Абдурахмонов, Д. Ш. (2024). СУЩЕСТВУЮТ СОВРЕМЕННЫЕ МЕТОДЫ ЛИПОСАКЦИИ, КОТОРЫЕ УСПЕШНО ПРИМЕНЯЮТСЯ ДЛЯ КОНТУРНОЙ ПЛАСТИКИ ТЕЛА. NAZARIY VA AMALIY FANLARDAGI USTUVOR ISLOHOTLAR VA ZAMONAVIY TA'LIMNING INNOVATSION YO'NALISHLARI, 1(2), 18-22.

DOI 10.24412/2225-1545-2025-12-2138-1679-1683
УДК: 611.018: 616.34-018.26: 614.71

Шигакова Л. А., PhD
старший преподаватель
кафедра №1 гистология и медицинская биология
Ташкентский государственный медицинский университет
Ташкент, Узбекистан

МОРФОГЕНЕЗ ИММУННОЙ СИСТЕМЫ ТОНКОЙ КИШКИ В УСЛОВИЯХ ПРЕНАТАЛЬНОГО ВОЗДЕЙСТВИЯ АТМОСФЕРНЫХ ЗАГРЯЗНИТЕЛЕЙ

Аннотация. *Формирование иммунной системы тонкой кишки в раннем постнатальном онтогенезе является критически важным этапом становления системного и местного иммунитета. Хроническое внутриутробное воздействие загрязнителей атмосферного воздуха, в частности твердых частиц PM2.5 и PM10, может нарушать процессы дифференцировки лимфоидной ткани кишечника, эпителиального барьера и врожденных иммунных механизмов. В статье рассмотрены структурно-функциональные особенности развития иммунной системы тонкой кишки в норме и при воздействии атмосферных поллютантов в пренатальном периоде. Проанализированы данные экспериментальных и клинико-морфологических исследований, отражающие изменения пейеровых бляшек, диффузной лимфоидной ткани, эпителиальных иммунных клеток и цитокинового профиля. Показано, что внутриутробное загрязнение воздуха оказывает пролонгированное влияние на постнатальное формирование кишечного иммунитета, повышая риск иммунной дисфункции и воспалительных заболеваний.*

Ключевые слова: *тонкая кишка, кишечный иммунитет, ранний постнатальный онтогенез, загрязнение воздуха, PM2.5, PM10, внутриутробное воздействие.*

Shigakova L. A. PhD
senior lecturer
department no. 1 histology and medical biology
Tashkent State Medical University
Tashkent, Uzbekistan

MORPHOGENESIS OF THE IMMUNE SYSTEM OF THE SMALL INTESTINE UNDER CONDITIONS OF PRENATAL EXPOSURE TO ATMOSPHERIC POLLUTANTS

Abstract: *The formation of the immune system of the small intestine during early postnatal ontogenesis represents a critically important stage in the development of both systemic and mucosal immunity. Chronic intrauterine exposure to atmospheric air pollutants, particularly particulate matter PM2.5 and PM10, may disrupt the processes of differentiation of intestinal lymphoid tissue, the epithelial barrier, and innate immune mechanisms. This article examines the structural and functional features of the development of the immune system of the small intestine under physiological conditions and following prenatal exposure to atmospheric pollutants. Data from experimental and clinico-morphological studies are analyzed, demonstrating alterations in Peyer's patches, diffuse lymphoid tissue, epithelial immune cells, and cytokine profiles. It is shown that intrauterine air pollution exerts a prolonged effect on the postnatal formation of intestinal immunity, thereby increasing the risk of immune dysfunction and inflammatory diseases.*

Keywords: *small intestine, intestinal immunity, early postnatal ontogenesis, air pollution, PM2.5, PM10, prenatal exposure.*

Введение

Иммунная система тонкой кишки представляет собой крупнейший иммунологический орган организма, обеспечивающий барьерную защиту и иммунный гомеостаз на границе «организм – внешняя среда». В раннем постнатальном онтогенезе происходят интенсивные процессы морфофункционального созревания кишечной лимфоидной ткани, тесно связанные с микробной колонизацией, питанием и состоянием врожденного иммунитета.

В последние десятилетия особое внимание уделяется влиянию факторов окружающей среды на внутриутробное программирование иммунной системы. Загрязнители атмосферного воздуха, включая твердые частицы, тяжелые металлы и полициклические ароматические углеводороды, способны проникать через плацентарный барьер и воздействовать на развивающиеся органы плода. Несмотря на растущее число исследований, механизмы влияния пренатальной ингаляционной экспозиции на формирование кишечного иммунитета остаются недостаточно изученными.

Формирование иммунной системы тонкой кишки в норме

Иммунная система тонкой кишки включает организованную лимфоидную ткань (пейеровы бляшки), диффузную лимфоидную ткань слизистой оболочки, интраэпителиальные лимфоциты, а также систему антигенпрезентирующих клеток.

В раннем постнатальном периоде наблюдается:

- активная дифференцировка пейеровых бляшек;
- увеличение плотности Т- и В-лимфоцитов в собственной пластинке слизистой оболочки;
- формирование IgA-зависимого мукозального иммунитета;
- становление эпителиального барьера и врожденных защитных механизмов (дефензины, толл-подобные рецепторы).

Данные процессы являются высокочувствительными к экзогенным и эндогенным воздействиям в пренатальном и неонатальном периодах.

Хроническое внутриутробное воздействие загрязнителей атмосферного воздуха

Загрязнители воздуха, особенно мелкодисперсные частицы PM2.5 и PM10, обладают способностью индуцировать системный оксидативный стресс и воспалительный ответ у матери, что опосредованно влияет на плод. Установлено, что такие воздействия могут изменять экспрессию генов, связанных с иммунным развитием, а также нарушать плацентарную регуляцию цитокинов и факторов роста.

Экспериментальные модели демонстрируют задержку формирования лимфоидных структур, снижение числа иммунокомпетентных клеток и дисбаланс провоспалительных и противовоспалительных медиаторов у потомства, подвергшегося внутриутробному воздействию загрязнителей.

Морфофункциональные изменения иммунной системы тонкой кишки потомства

При хроническом внутриутробном воздействии атмосферных поллютантов в раннем постнатальном онтогенезе отмечаются: гипоплазия пейеровых бляшек; снижение плотности интраэпителиальных лимфоцитов; нарушение архитектоники слизистой оболочки; ослабление продукции секреторного IgA; признаки субклинического воспаления и повышенной проницаемости кишечного барьера.

Данные изменения указывают на задержку иммунного созревания и формирование функциональной недостаточности мукозального иммунитета.

Обсуждение

Полученные данные подтверждают концепцию внутриутробного программирования иммунной системы под влиянием факторов окружающей среды. Хроническое воздействие загрязнителей воздуха в период эмбрио- и фетогенеза создает предпосылки для длительных морфофункциональных нарушений кишечного иммунитета. Это может способствовать повышенной восприимчивости к инфекционным и воспалительным заболеваниям желудочно-кишечного тракта в последующие периоды жизни.

Заключение

Хроническое внутриутробное воздействие загрязнителей атмосферного воздуха оказывает значимое влияние на структурно-функциональное формирование иммунной системы тонкой кишки в раннем постнатальном онтогенезе. Выявленные изменения лимфоидной ткани и иммунных механизмов подчеркивают необходимость дальнейших морфологических и молекулярных исследований, направленных на разработку профилактических и коррекционных стратегий.

Использованные источники:

1. Саидрасулова, С. С., & Шигакова, Л. А. (2025). ЗАГРЯЗНЕНИЕ АТМОСФЕРНОГО ВОЗДУХА И ЕГО ВЛИЯНИЕ НА ЗДОРОВЬЕ ЧЕЛОВЕКА. Экономика и социум, (2-1 (129)), 1423-1426.
2. Леднев, В. А., & Шигакова, Л. А. (2022). Актуальные вопросы медицинской генетики XXI Века. PEDAGOGS Jurnali.-23 (1).-2022.
3. Юлдашева, Ф. У., Тошматова, Г. А., & Шигакова, Л. А. (2023). ОКАЗАНИЕ МЕДИКО-СОЦИАЛЬНОЙ ПОМОЩИ НАСЕЛЕНИЮ. In Современная наука: актуальные вопросы социально-экономического развития (pp. 164-174).
4. Абдуллаева, М. Т., Ауталипова, У. И., Ашинова, М. К., Бабаева, Г. О., Бандурина, Н. В., Бивол, Т. А., ... & Юлдашева, Ф. У. (2023). Современная наука: актуальные вопросы социально-экономического развития.
5. Шигакова, Л. А., & Иванова, Л. Е. (2022). Актуальные вопросы медицинской генетики XXI века.
6. Курбанов, А. К., Халиков, П. К., Шигакова, Л. А., & Исламова, С. А. ЖКК (2022). Изучение условий труда и загрязнения окружающей среды при применении гербицида Зеллек. Международный журнал научных тенденций, 1(2), 91-94.

Юсупова М. Б.
студент
Ташкентский Государственный Медицинский университет
Научный руководитель: Турсунметов И.
ассистент
кафедра гистологии и медицинской биологии
Ташкентский Государственный Медицинский университет
Узбекистан, г.Ташкент

ГИСТОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ СЕМЕННИКОВ ПРИ РАЗЛИЧНЫХ ПАТОЛОГИЯХ

Аннотация: *Гистологическое исследование семенников является важным методом оценки состояния мужской репродуктивной системы и выявления патологических процессов. При различных патологиях тестикул наблюдаются характерные морфологические изменения, которые отражают нарушение сперматогенеза, сосудистого кровоснабжения и эндокринного баланса. В частности, при воспалительных заболеваниях (орхоэпидидимит) отмечается инфильтрация лимфоцитами и макрофагами, деструкция семенных канальцев и повышение количества фиброзной ткани. При варикоцеле выявляются расширение венозных сплетений, стаз крови и атрофия тестикулярной ткани, что приводит к снижению продукции сперматозоидов. Эндокринные нарушения, например гипогонадизм, сопровождаются уменьшением числа клеток Сертоли и Лейдига, а также редукцией сперматогенеза. Гистологические изменения также наблюдаются при травмах, токсических воздействиях и наследственных заболеваниях, таких как синдром Клайнфельтера. Анализ морфологических изменений семенников позволяет не только уточнить диагноз, но и оценить прогноз репродуктивной функции, а также эффективность лечебных мероприятий.*

Ключевые слова: *семенники, гистология, патология, сперматогенез, клетки Сертоли, клетки Лейдига, варикоцеле, орхоэпидидимит, гипогонадизм, атрофия тестикулярной ткани.*

Yusupova M. B.
student
Tashkent State Medical University
Scientific Supervisor: Tursunmetov I.
assistant
department of histology and medical biology
Tashkent State Medical University
Tashkent, Uzbekistan

HISTOLOGICAL CHANGES IN THE TESTES IN VARIOUS PATHOLOGIES

Abstract: *Histological examination of the testes is an important method for assessing the condition of the male reproductive system and detecting pathological processes. Various testicular pathologies are associated with characteristic morphological changes that reflect impaired spermatogenesis, vascular supply, and endocrine function. Inflammatory diseases (orchiepididymitis) are characterized by lymphocyte and macrophage infiltration, destruction of seminiferous tubules, and increased fibrous tissue. In varicocele, venous plexus dilation, blood stasis, and testicular tissue atrophy are observed, leading to reduced sperm production. Endocrine disorders, such as hypogonadism, are accompanied by a decrease in Sertoli and Leydig cells and impaired spermatogenesis. Histological changes are also seen in trauma, toxic exposures, and genetic conditions, such as Klinefelter syndrome. Analysis of testicular morphological changes allows not only accurate diagnosis but also assessment of reproductive function prognosis and the effectiveness of therapeutic interventions.*

Keywords: *testes, histology, pathology, spermatogenesis, Sertoli cells, Leydig cells, varicocele, orchiepididymitis, hypogonadism, testicular atrophy.*

Введение

Семенники являются ключевым органом мужской репродуктивной системы, отвечающим за продукцию сперматозоидов и секрецию мужских половых гормонов. Их нормальная структура и функция обеспечиваются сложным взаимодействием клеточных элементов, включая сперматогонии, клетки Сертоли и Лейдига. При различных патологиях — от воспалительных процессов и гормональных нарушений до опухолевых и генетических заболеваний — происходят специфические гистологические изменения, которые отражают степень повреждения ткани и нарушений сперматогенеза. Исследование этих изменений позволяет не только глубже понять механизмы патогенеза, но и способствует диагностике, прогнозированию и разработке терапевтических подходов при мужском бесплодии и других заболеваний половых органов.

Методы и материалы

В исследовании использовались ткани семенников живых организмов для изучения их микроскопической структуры при различных патологиях. Гистологический анализ образцов проводили методом окрашивания гематоксилином и эозином, что позволило детально оценить клеточный состав, состояние семенных канальцев и окружающей стромы. Этот метод обеспечивает возможность выявления морфологических изменений, характерных для различных заболеваний, и позволяет глубже понять механизмы нарушения сперматогенеза и функции половых клеток.

Результаты

Гистологическое исследование семенников является одним из ключевых методов оценки состояния мужской репродуктивной системы и позволяет выявлять патологические изменения на микроскопическом

уровне. Семенники состоят из семенных канальцев, где происходит сперматогенез, и интерстициальной ткани, содержащей клетки Лейдига, ответственные за синтез тестостерона. Нарушения структуры этих компонентов напрямую влияют на репродуктивную функцию.

При воспалительных процессах, таких как орхоэпидидимит, наблюдается выраженная инфильтрация лимфоцитами и макрофагами. Эти изменения сопровождаются деструкцией семенных канальцев, уменьшением числа клеток Сертоли и Лейдига, а также повышением количества фиброзной ткани. В результате нарушается нормальный процесс сперматогенеза и снижается продукция половых гормонов.

Варикоцеле, характеризующееся расширением венозных сплетений семенников, приводит к стазу крови, повышению температуры ткани и гипоксии. Гистологически это проявляется атрофией семенных канальцев, уменьшением числа зрелых сперматозоидов и дегенеративными изменениями интерстициальной ткани. Такие структурные изменения снижают фертильность и могут служить причиной мужского бесплодия.

Эндокринные нарушения, включая гипогонадизм, сопровождаются уменьшением количества клеток Сертоли и Лейдига, редукцией сперматогенеза и изменением морфологии семенных канальцев. Эти изменения отражают нарушение гормонального баланса и оказывают прямое влияние на репродуктивную функцию.

Кроме того, гистологические изменения наблюдаются при травмах, токсических воздействиях и наследственных заболеваниях, таких как синдром Клайнфельтера. В этих случаях наблюдаются атрофические процессы, дисплазия клеток семенных канальцев и интерстициальной ткани, что приводит к снижению или полной утрате фертильности.

Заключение

Гистологическое исследование семенников позволяет выявлять характерные микроскопические изменения при различных патологических состояниях, отражающие нарушения сперматогенеза, сосудистого кровоснабжения и гормонального баланса. Воспалительные процессы, варикоцеле, эндокринные расстройства, травмы и наследственные заболевания приводят к специфическим изменениям семенных канальцев и интерстициальной ткани, влияя на репродуктивную функцию. Полученные данные не только уточняют диагноз и прогноз, но и служат основой для оценки эффективности лечебных мероприятий и разработки целенаправленных стратегий восстановления мужской фертильности.

Использованные источники:

1. Кульченко Н. Г. Нарушение сперматогенеза. Морфологические аспекты // Вестник Российского университета дружбы народов. Серия: Медицина. — 2018. — Т. 22, № 3. — С. 265–271.
2. Abdullah L., Bondagji N. Histopathological patterns of testicular biopsy in male infertility: a retrospective study from a tertiary care center in the western part of Saudi Arabia // Urol Ann. — 2011. — Vol. 3, № 1. — P. 19–23.

3. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. NeuroQuantology, 20(6), 3471-3476.
4. FKh, A., Tukhfatullin, F. F., Tursunmetov, I. R., & Tukhtaev, K. R. (2001). Some aspects of the formation of the immune system organs in newborn rats born to females with chronic hepatitis. Likars' ka Sprava, (2), 100-103.
5. Турсунметов, И. Р., Мадаминова, Г. И., & Шермухамедов, Т. Т. (2021). Влияние экспериментального гипотиреоза матери на развитие и становление семенников потомства. In Фундаментальная наука и клиническая медицина (pp. 288-289).
6. Madaminova, G. I., Azizova, F. X., Rasulev, K. I., Shermuxamedov, T. T., & Tursunmetov, I. R. (2022). Tajribaviy gipotiryeoz chaqirilgan urg ‘ochi kalamushlar avlodlari urug ‘donlarining postnatal rivojlanishini morfologik asoslari.

ИНФОРМАЦИОННЫЕ И КОММУНИКАТИВНЫЕ ТЕХНОЛОГИИ

УДК 004:658:336.71:004

Зыблева В. А.
студент
Научный руководитель: Алексеенко Н. А.
доцент
кафедра экономической информатики
Гомельский государственный университет им. Ф. Скорины
Беларусь

РОЛЬ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ОПТИМИЗАЦИИ СИСТЕМЫ ДОКУМЕНТАЦИОННОГО ОБЕСПЕЧЕНИЯ УПРАВЛЕНИЯ КОММЕРЧЕСКИМ БАНКОМ: ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ И ПРАКТИЧЕСКИЕ РЕКОМЕНДАЦИИ

Аннотация: *В статье рассматриваются современные системы электронного документооборота в банковской сфере и их влияние на повышение эффективности управления. Анализируются ключевые технологические направления модернизации СЭД, включая облачные решения, микросервисы, искусственный интеллект, роботизацию процессов, интеллектуальный поиск, трансграничный документооборот и блокчейн. Описаны основные эффекты внедрения СЭД: ускорение документооборота, снижение ошибок и повышение контроля. Приведены примеры современных систем, полностью поддерживающих актуальные технологические тренды банковской сферы.*

Ключевые слова: *электронный документооборот, автоматизация, банковская система, искусственный интеллект, эффективность, автоматизация, облачные технологии.*

Zybleva V. A.
student
Scientific Supervisor: Alekseenko N. A.
associate professor
department of economic informatics
Francisk Skorina Gomel State University
Belarus

THE ROLE OF INFORMATION TECHNOLOGIES IN THE OPTIMIZATION OF A COMMERCIAL BANK'S DOCUMENT MANAGEMENT SYSTEM: THEORETICAL ASPECTS AND PRACTICAL RECOMMENDATIONS

Abstract: *The article examines modern electronic document management systems in the banking sector and their impact on improving management efficiency. Key technological directions for EDM modernization are analyzed, including cloud solutions, microservices, artificial intelligence, process automation, intelligent search, cross-border document flow, and blockchain. The main effects of implementing EDM systems are described: accelerated document flow, reduced errors, and enhanced control. Examples of modern systems fully supporting current technological trends in the banking sector are provided.*

Keywords: *electronic document management, automation, banking system, artificial intelligence, efficiency, process automation, cloud technologies.*

В условиях цифровой трансформации финансового сектора автоматизированные системы документационного обеспечения управления стали неотъемлемым элементом инфраструктуры коммерческих банков. Современные банки функционируют в среде высокой информационной нагрузки, где значительные объемы управленческих, регламентных и операционных документов требуют оперативной обработки, согласования и контроля исполнения. В связи с этим системы электронного документооборота рассматриваются как инструмент хранения и передачи документов, и в том числе как важнейший компонент системы управления банковской организацией.

Согласно исследованию, проведенному Mordor Intelligence, глобальный рынок систем электронного документооборота в 2025 г. оценивается в 10,51 млрд USD и прогнозируется рост до 19,81 млрд USD к 2030 г., при этом среднегодовой темп роста (CAGR) составит 13,5 % [1]. Особенно востребованы такие решения в секторах с высокой интенсивностью документооборота и повышенными требованиями к контролю и отчетности, к которым относится банковский сектор.

Автоматизированные системы документационного обеспечения управления (АС ДОУ) в банковской деятельности выполняют следующие основные функции:

- создание, регистрация и хранение документов;
- маршрутизация и согласование по регламентам;
- быстрый поиск и извлечение информации;
- управление версиями и история изменений документов;
- разграничение прав доступа и защита информации;
- контроль исполнения документов и соблюдения сроков обработки;
- интеграция с другими корпоративными системами;
- формирование отчетности и аналитики по документообороту [2].

Однако в современной банковской деятельности внедрение стандартной системы электронного документооборота (СЭД) уже не обеспечивает достаточного уровня конкурентоспособности и эффективности. Быстрый рост объемов данных, ужесточение регуляторных требований (включая импортозамещение и защиту персональных данных),

развитие цифровых каналов взаимодействия с клиентами и необходимость оперативного принятия решений требуют глубокой модернизации системы документационного обеспечения управления. Современная СЭД должна эволюционировать в интеллектуальную экосистему, интегрированную с другими банковскими системами, использующую искусственный интеллект, облачные технологии и автоматизацию сквозных процессов [3].

В таблице 1 приведено подробное описание основных технологических направлений модернизации СЭД, а также ожидаемый управленческий эффект от их внедрения.

Таблица 1

Технологические направления оптимизации СЭД в банковской деятельности

Технологическое направление	Сущность и содержание направления	Ожидаемый управленческий эффект
Облачные технологии (SaaS)	Централизованное хранение и обработка документов с доступом в режиме реального времени, масштабирование ресурсов без привязки к физической инфраструктуре	Снижение затрат на ИТ, повышение отказоустойчивости и непрерывности управленческих процессов
Микросервисная архитектура	Декомпозиция системы на независимые сервисы для регистрации, маршрутизации, контроля и архивирования документов	Гибкость модернизации, быстрая адаптация к изменениям регламентов и устойчивость системы
Искусственный интеллект	Автоматическая классификация, распознавание и анализ документов с использованием OCR и NLP	Сокращение ручного труда, повышение точности обработки и ускорение принятия решений
Роботизация процессов (RPA)	Автоматизация повторяющихся операций: регистрация, перенос данных, контроль исполнения	Рост производительности, снижение ошибок и повышение исполнительской дисциплины
Интеллектуальный поиск и аналитика	Семантический поиск и отчетность по документообороту	Быстрый доступ к информации, усиление аналитики и обоснованности решений
Трансграничные документопотоки	Электронный обмен документами с зарубежными контрагентами по международным стандартам	Ускорение внешних операций и интеграция банка в глобальное финансовое пространство
Блокчейн	Использование распределенного реестра для фиксации, передачи и хранения документов с криптографической защитой	Обеспечивает неизменность и проверяемость документов, ускоряет аудиторские проверки и снижает риски мошенничества.

Применение рассмотренных технологических направлений модернизации – облачных технологий, микросервисов, искусственного интеллекта, роботизации процессов и реализация трансграничного документооборота – уже находит практическое отражение в деятельности банков и финансовых организаций.

Ярким примером служит Альфа-Банк, который внедрил трансграничный электронный документооборот (ЭДО) с Республикой Беларусь. Ранее процесс подписания документов с белорусскими контрагентами занимал до 2 недель, требовал бумажных оригиналов, курьерской доставки и ручной обработки. Сегодня интеграция российской и белорусской ЭДО-инфраструктур позволяет проходить весь цикл – от создания до подписания документов – менее чем за 2 минуты. Применение квалифицированной электронной подписи (КЭП/ЭЦП) обеих стран в рамках единой системы документооборота стало возможным благодаря взаимному признанию электронных подписей между Россией и Республикой Беларусь [4].

Параллельно с развитием трансграничного документооборота в Республике Беларусь формируются и более масштабные цифровые инициативы, ориентированные на широкое внедрение искусственного интеллекта. Так, 18 июня 2025 г. в рамках международной выставки Digital Expo Национальный банк Республики Беларусь и Центр банковских технологий представили проект суверенной платформы искусственного интеллекта, который направлен на обеспечение технологического суверенитета страны и создание отечественной ИИ-инфраструктуры для финансового сектора и смежных отраслей экономики [5]. Эти инициативы соответствуют Государственной программе «Цифровое развитие Беларуси» на 2021–2025 гг., которая предусматривает внедрение современных технологий в экономике и социальной сфере [6].

В составе платформы предусмотрены передовые языковые модели (LLM) и специализированные модули машинного обучения, которые позволяют распознавать и структурировать неструктурированные документы, выявлять важные данные, автоматически проверять соответствие регламентам и законодательству, интегрировать документооборот с системами роботизированной автоматизации (RPA). Все процессы обрабатываются локально на серверах заказчика, обеспечивая безопасность, конфиденциальность и соответствие требованиям по защите персональных данных и банковской тайны.

На рынке представлено большое количество решений для автоматизации документооборота, однако не все из них соответствуют современным требованиям банковской сферы. В таблице 2 приведены системы, которые наиболее полно отражают актуальные технологические тренды и способны эффективно поддерживать процессы современного банка.

Таблица 2
Современные системы электронного документооборота, применяемые в банковской сфере

Система	Основное применение в банке	Современные возможности	Тип развертывания
Directum RX	Комплексное управление корпоративными документами и бизнес-процессами	Поддержка BPM и микросервисной архитектуры, интеграция с АБС и ERP, интеллектуальная маршрутизация, автоматизация согласований с использованием RPA	Облачное и гибридное
ELMA365 CSP	Управление корпоративными процессами и документооборотом	Интеллектуальные low-code маршруты, AI для классификации и анализа документов, семантический поиск, автоматическое формирование отчетности	Облачное
Tessa	Автоматизация документооборота и аналитика	AI-модули для OCR и NLP, интеллектуальная проверка регламентов, автоматическое выявление важных данных, интеграция с RPA	Локальное и облачное
Docsvision	Контроль маршрутов, жизненного цикла и соответствия документов	Гибкая настройка сложных процессов, глубокая интеграция с корпоративными системами, поддержка трансграничного документооборота, аналитика и отчетность	Локальное и гибридное

Функционирование банковских организаций сегодня невозможно представить без внедрения систем электронного документооборота, которые обеспечивают согласованность управленческих решений и регламентированность деловых операций. Их внедрение позволяет ускорить обработку и согласование документов, снизить количество ошибок и дублирующей работы, сократить затраты на ручной труд, повысить контроль процессов, а также обеспечить соответствие нормативным и регуляторным требованиям.

Использованные источники:

1. Document Management Systems Market Size & Share Analysis - Growth Trends And Forecast (2025 - 2030) [Электронный ресурс]. – URL: https://www.mordorintelligence.com/industry-reports/document-management-systems-market (дата обращения: 15.12.2025)
2. Зубов Я.О. Оптимизация процессов внутреннего документооборота: выбор EDMS [Электронный ресурс] // Финансовый университет при Правительстве Российской Федерации. – 2025. – URL:

https://www.fa.ru/university/structure/university/uso/press-service/press-releases/optimizatsiya-protsessov-vnutrennego-dokumentooborota-vybor-edms (дата обращения: 15.12.2025)
3. Electronic Document Management System Market Size, Share, Growth and Industry Analysis [Электронный ресурс]. – URL: https://www.globalgrowthinsights.com/market-reports/electronic-document-management-system-market-101265 (дата обращения: 15.12.2025)
4. Альфа-Банк запустил электронный документооборот с Республикой Беларусь [Электронный ресурс]. – URL: https://alfabank.ru/news/t/release/alfa-bank-zapustil-elektronnii-dokumentooborot-s-respublikoi-belarus/ (дата обращения: 15.12.2025)
5. Пресс-релиз: Суверенная платформа искусственного интеллекта [Электронный ресурс]. // Центр банковских технологий. – 2025. – URL: https://cbt.by/news/press-reliz-suverennaya-platforma-iskusstvennogo-intellekta/ (дата обращения: 15.12.2025)
6. Постановление Совета Министров Республики Беларусь № 66 «О Государственной программе «Цифровое развитие Беларуси» на 2021–2025 годы» от 2 февраля 2021 г. [Электронный ресурс]. – Национальный правовой Интернет-портал Республики Беларусь. – URL: https://pravo.by/document/?guid=3871&p0=C22100066 (дата обращения: 15.12.2025)

УДК 658.512:004.7=111(4/9=476.1)

Турутина Е. С.
студент
Научный руководитель: Алексеенко Н.А.
доцент
кафедра экономической информатики
Гомельский государственный университет им. Ф. Скорины
Беларусь

ЦИФРОВЫЕ ТЕХНОЛОГИИ В ЗАКУПОЧНОЙ ЛОГИСТИКЕ ПРОМЫШЛЕННЫХ ОРГАНИЗАЦИЙ РЕСПУБЛИКИ БЕЛАРУСЬ: ТЕОРЕТИЧЕСКИЙ И МЕТОДИЧЕСКИЙ ОБЗОР

Аннотация: *Актуальность исследования обусловлена необходимостью дальнейшей цифровизации закупочной логистики белорусских промышленных организаций в условиях санкционного давления и роста требований к устойчивости цепей поставок. Цель статьи – теоретический и методический обзор современных цифровых технологий в закупках. С помощью системного анализа и классификации технологии разделены по уровням цифровизации, раскрыты их возможности, преимущества и ограничения. Результаты представлены в табличной форме с анализом текущего состояния и перспектив до 2027–2028 годов. Сделан вывод о том, что переход к аналитическому и интеллектуальному уровням (IoT-мониторинг, предиктивная аналитика, ИИ) – ключевой фактор повышения эффективности и конкурентоспособности промышленности Республики Беларусь.*

Ключевые слова: *закупочная логистика, цифровые технологии, электронные торговые площадки, ERP-системы, искусственный интеллект, предиктивная аналитика, цифровизация.*

Turutina E. S.
student
Scientific Supervisor: Alekseenko N. A.
associate professor
department of economic informatic
Francisk Skorina Gomel State University
Belarus

DIGITAL TECHNOLOGIES IN PROCUREMENT LOGISTICS INDUSTRIAL ORGANIZATIONS OF THE REPUBLIC OF BELARUS: THEORETICAL AND METHODOLOGICAL REVIEW

Abstract: *The relevance of the study is determined by the need for further digitalization of the procurement logistics of Belarusian industrial enterprises in the context of sanctions pressure and increasing requirements for the stability of supply chains. The purpose of the article is a theoretical and methodological review of modern digital technologies in procurement. Using system analysis and classification, technologies are divided by levels of digitalization, their capabilities, advantages and limitations are revealed. The results are presented in tabular form with an analysis of the current state and prospects until 2027-2028. It is concluded that the transition to analytical and intelligent levels (IoT monitoring, predictive analytics, AI) is a key factor in increasing the efficiency and competitiveness of the industry of the Republic of Belarus.*

Keywords: *procurement logistics, digital technologies, electronic trading platforms, ERP systems, artificial intelligence, predictive analytics, digitalization.*

Современный этап экономики Республики Беларусь характеризуется переходом промышленных организаций к цифровым моделям управления, при этом закупочная логистика выступает одним из ключевых объектов цифровизации. По данным Министерства промышленности Республики Беларусь, в 2025 году доля электронных конкурентных процедур в организациях, специализирующихся на машиностроении и металлургии, достигла 96–99 %, а доля договоров, заключённых в системе электронного документооборота, составила 94–100 %. Вместе с тем уровень применения аналитических и интеллектуальных технологий остаётся недостаточным: только 35–48 % организаций используют системы мониторинга поставок в реальном времени, а предиктивные модели на базе искусственного интеллекта внедрены менее чем на 9 % [1].

Закупочная логистика в цифровую эпоху эволюционирует от простого перевода документооборота в электронный вид к созданию интеллектуальных систем поддержки принятия решений. Цифровизация закупок опирается на следующие ключевые концепции:

1. Supply Chain 4.0 – горизонтальная и вертикальная интеграция всех участников цепи поставок через технологии Интернета вещей (IoT), большие данные (Big Data) и искусственный интеллект (ИИ), что позволяет достичь полной прослеживаемости и синхронизации процессов [2].

2. Платформенная экономика – государственные и корпоративные электронные торговые площадки выступают центральными хабами экосистемы, обеспечивающими взаимодействие заказчиков, поставщиков и контролирующих органов в едином цифровом пространстве [3].

3. Smart Procurement – концепция «умных закупок», предполагающая переход от реактивного к проактивному управлению рисками и затратами за счёт применения предиктивной аналитике и автоматизированного принятия решений [4].

4. Sourcing 4.0 – сквозная автоматизация всего жизненного цикла закупок: от прогнозирования потребностей (MRP II + ML) до контроля

исполнения контрактов с использованием смарт-контрактов и искусственного интеллекта [5].

Для системного анализа применяемых цифровых технологий целесообразно использовать четырёхуровневую классификацию, отражающую последовательность их эволюции и глубину автоматизации процессов. Данные по состоянию на 2025 год представлены в таблице 1.

Таблица 1

Классификация цифровых технологий в закупочной логистике

Уровень цифровизации	Основные технологии и платформы	Ключевые функции	Доля применения в промышленности РБ, %
Базовый	Электронные торговые площадки (goszakupki.by, icetrade.by), электронный документооборот (BelBiz)	Проведение открытых и закрытых процедур, заключение электронных договоров, автоматическая проверка через реестр МАРТ	96–99
Операционный	ERP-системы (модули «Закупки», SRM), автоматизированная квалификация и ранжирование поставщиков	Формирование потребностей (MRP II), расчёт рейтинга, управление контрактами	82–94
Аналитический	BI-системы (Power BI, Qlik), GPS/IoT-мониторинг поставок («Поток-7» и аналоги)	Визуализация KPI, контроль исполнения в реальном времени, отчётность	35–48
Интеллектуальный	Искусственный интеллект, предиктивная аналитика, смарт-контракты	Прогнозирование рисков поставщиков, автоматическая корректировка решений	4–9

Как видно из таблицы 1, в 2025 году белорусская промышленность уверенно преодолела базовый и операционный уровни цифровизации. Основной разрыв наблюдается между аналитическим и интеллектуальным уровнями: переход к предиктивным технологиям тормозится недостатком данных, квалифицированных кадров и методических разработок [1].

Для более глубокого понимания перспектив внедрения необходимо рассмотреть не только функциональные возможности технологий, но и их ограничения. Сравнительный анализ преимуществ, ограничений и рисков цифровых технологий в закупочной логистике представлен в таблице 2.

Таблица 2

Преимущества и ограничения цифровых технологий

Технология	Преимущества	Ограничения и риски
Государственные ЭТП	Высокая прозрачность, снижение коррупционных рисков	Доминирование ценового критерия, ограниченная гибкость при закупках
ERP-системы	Сквозная автоматизация, интеграция с производственным планированием и финансами	Высокая стоимость внедрения и сопровождения, длительный период окупаемости (2–4 года)
IoT/GPS-мониторинг	Контроль поставок в реальном времени, полное устранение простоев	Ограниченный охват критических поставок, зависимость от качества связи и инфраструктуры
Искусственный интеллект	Точность прогнозирования рисков ≥ 92 %, автоматическая корректировка рейтинга	Недостаток качественных данных, дефицит специалистов, необходимость XAI

Проведённый сравнительный анализ (таблица 2) свидетельствует о том, что технические ограничения применения цифровых технологий в закупочной логистике постепенно преодолеваются благодаря развитию национальной телекоммуникационной инфраструктуры и доступности облачных решений. В то же время наиболее значимыми барьерами остаются организационные и кадровые факторы. Согласно данным Министерства промышленности Республики Беларусь и отчётам Белстата за 2025 год, дефицит специалистов в области анализа данных и машинного обучения, а также недостаточная структурированность исторических данных о поставщиках препятствуют широкому переходу промышленных организаций к интеллектуальному уровню цифровизации [6].

Решение обозначенных проблем требует комплексного подхода:

– со стороны государства: развитие программ профессиональной переподготовки, предоставление грантов и льготного финансирования пилотных проектов в сфере искусственного интеллекта [7];

– со стороны организаций: целенаправленное формирование репозиториев структурированных данных о поставщиках и истории исполнения контрактов.

Положительным примером служит реализуемый в 2024–2025 гг. в холдинге «Гомсельмаш» проект «Поток-7», в рамках которого IoT-мониторинг уже охватывает более 40 % критических поставок металлопроката и комплектующих, что позволило сократить простои производственных линий на 25–28 % по сравнению с 2023 годом [8].

На основе результатов классификации (таблица 1) и сравнительного анализа преимуществ и ограничений (таблица 2), а также с учётом текущих разрывов в уровне цифровизации белорусских промышленных организаций предлагается следующая поэтапная последовательность действий:

1. 2025–2026 гг. – завершение перехода на 100 % электронные процедуры и электронный документооборот, полная интеграция корпоративных систем с государственными реестрами и платформами [9].

2. 2026–2027 гг. – расширение охвата системами мониторинга в реальном времени до 100 % критически важных поставок, запуск предиктивных моделей оценки рисков поставщиков [10].

3. 2027–2028 гг. – пилотное внедрение смарт-контрактов и полностью автоматизированных систем многокритериального ранжирования и квалификации контрагентов на базе искусственного интеллекта.

Реализация предложенного плана позволит организациям, специализирующимся на машиностроении и металлургии, достичь целевых показателей государственной программы «Цифровая экономика и информационное общество» на 2021–2025 гг. (ред. 2024 г.), а также программы цифрового развития промышленности до 2030 года [7].

Перспективы развития до 2027–2028 гг. связаны с достижением полного охвата критических поставок системами мониторинга, внедрением предиктивных моделей на базе ИИ и переходом на смарт-контракты на платформе goszakupki.by. Ожидаемые эффекты: снижение затрат на закупки на 10–14 %, высвобождение 80–150 млн рублей оборотных средств и полное устранение простоев по вине снабжения.

Таким образом, в 2025 году промышленные организации Республики Беларусь достигли высокого уровня операционной цифровизации закупочной логистики. Основные резервы эффективности сосредоточены в аналитическом и интеллектуальном сегментах. Предложенная классификация технологий, их анализ и методические рекомендации формируют основу для совершенствования закупочной деятельности в соответствии с задачами цифрового развития и повышения конкурентоспособности белорусской промышленности.

Использованные источники:

1. Министерство промышленности Республики Беларусь. Анализ цифровизации промышленности Республики Беларусь за 2024–2025 гг. [Электронный ресурс]. – Режим доступа: https://mpt.gov.by/ru/analiz-raboty-predpriyatiy-promyshlennosti-po-novomu-kakie-esche-cifrovye-novshestva-vnedrit – Дата доступа: 06.12.2025.

2. Гришин, А. В. Стратегические тренды и технологии управления цепями поставок в условиях индустрии 4.0 [Электронный ресурс] // Молодой учёный. – 2021. – № 12. – Режим доступа: https://moluch.ru/archive/348/78338 – Дата доступа: 06.12.2025.

3. Уварова, А. А. Совершенствование системы государственных закупок в Беларуси [Электронный ресурс] // CyberLeninka. – 2022. – № 5. – Режим доступа: https://cyberleninka.ru/article/n/sovershenstvovanie-sistemy-gosudarstvennyh-zakupok-v-belarusi – Дата доступа: 06.12.2025.

4. Гутникова, О. Н. Логистика закупок как составляющая торгового процесса [Электронный ресурс] // CyberLeninka. – 2023. – № 11. – Режим доступа:

https://cyberleninka.ru/article/n/logistika-zakupok-kak-sostavlyayuschaya-torgovogo-protsessa – Дата доступа: 06.12.2025.
5. *Sourcing the Future: Textile Procurement Goes Digital* [Электронный ресурс] // ISPO News. – Режим доступа: https://www.ispo.com/en/news/markets/sourcing-future-textile-procurement-digital – Дата доступа: 07.12.2025.
6. Белстат. Промышленность Республики Беларусь, 2025 [Электронный ресурс]. – Режим доступа: https://www.belstat.gov.by/ofitsialnaya-statistika/realny-sector-ekonomiki/promyshlennost/publikatsii_13/index_151652/ – Дата доступа: 07.12.2025.
7. Указ Президента Республики Беларусь от 29 ноября 2023 г. № 381 «О цифровом развитии» [Электронный ресурс]. – Режим доступа: https://pravo.by/document/?guid=12551&p0=P32300381 – Дата доступа: 07.12.2025.
8. Холдинг «Гомсельмаш». Проект «Поток-7»: цифровизация логистики и мониторинга поставок [Электронный ресурс]. – Режим доступа: https://digitalleaders.by/gzlin – Дата доступа: 07.12.2025.
9. Закон Республики Беларусь от 13 июля 2012 г. № 419-З «О государственных закупках товаров (работ, услуг)»: в ред. Закона Респ. Беларусь от 15.07.2025 № 28-З // Нац. реестр правовых актов Респ. Беларусь. – 2012. – № 82. – 2/1967.
10. Пинчук Н.А., Костюкевич П.Е. Применение предиктивной аналитики в управлении цепями поставок [Электронный ресурс] // Материалы конференции Белорусского национального технического университета. – Минск, 2024. – С. 875–879. – Режим доступа: https://rep.bntu.by/bitstream/handle/data/152204/875-879.pdf – Дата доступа: 07.12.2025.

Akbarova M. T.
katta o'qituvchisi
Chirchiq Davlat pedagogika universiteti

KIMYO FANINI INNOVATSION TEXNOLOGIYALAR ASOSIDA O‘QITISH ORQALI TALABA KOMPETENTLIGINI SHAKLLANTIRISHNING ZAMONAVIY YONDASHUVLARI

Annotatsiya. *Mazkur maqolada yosh avlodda fanlararo kompetensiyalarni shakllantirish jarayonida zamonaviy axborot-kommunikatsiya texnologiyalaridan foydalanishning pedagogik va psixologik omillari tahlil qilinadi. Kimyo fani misolida raqamli resurslar, virtual laboratoriyalar, simulyatsiyalar, interfaol dastur va platformalarning o‘quvchi tafakkuri, motivatsiyasi hamda ijodkorlik qobiliyatlarini rivojlantirishdagi o‘rni ochib beriladi. Shuningdek, kimyo ta’limida AKTdan samarali foydalanish metodlari va o‘quv jarayoniga integratsiya qilish bo‘yicha tavsiyalar keltirilgan.*

Kalit so‘zlar: *axborot texnologiyalari, kimyo ta’limi, kompetensiya, pedagogik omillar, psixologik omillar, virtual laboratoriya.*

Akbarova M. T.
senior teacher
Chirchik State Pedagogical University

CONTEMPORARY APPROACHES TO DEVELOPING STUDENT COMPETENCE THROUGH TEACHING CHEMISTRY BASED ON INNOVATIVE TECHNOLOGIES

Annotation. *This article analyzes the pedagogical and psychological factors of using modern information and communication technologies in the process of forming interdisciplinary competencies in the younger generation. Using the example of chemistry, the role of digital resources, virtual laboratories, simulators, interactive applications, and platforms in developing students' thinking, motivation, and creativity is revealed. The article also presents methods for effectively using ICT in chemical education and recommendations for integrating them into the learning process.*

Keywords: *information technology, chemical education, competence, pedagogical factors, psychological factors, virtual laboratory.*

Kirish

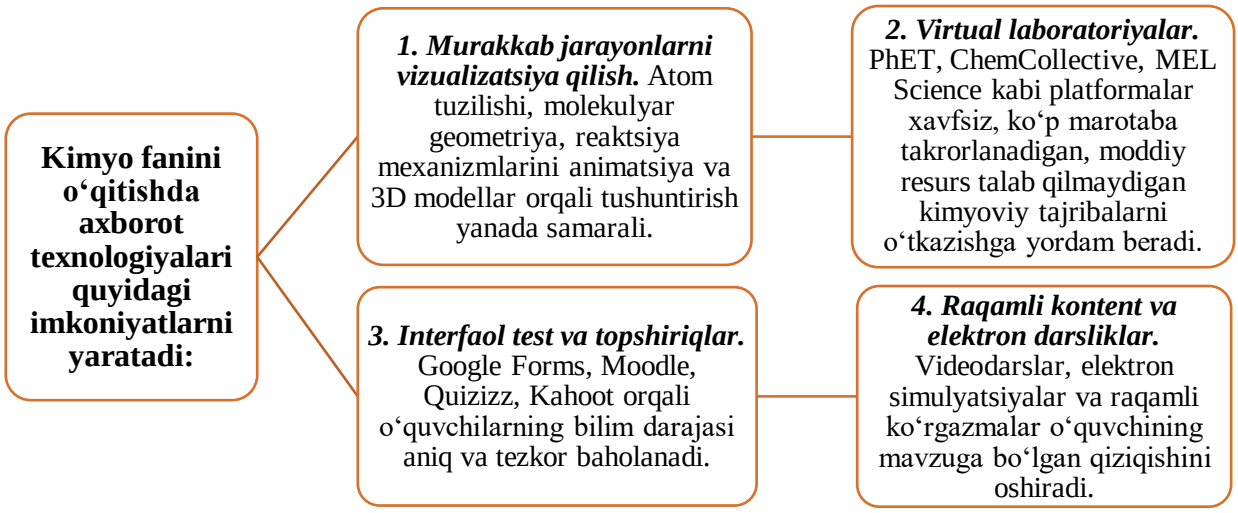
Bugungi kunda O‘zbekiston ta’lim tizimida raqamli texnologiyalarni joriy etish, o‘quv jarayonini modernizatsiya qilish, o‘quvchilarning funksional

savodxonligi va fanlar bo‘yicha kompetensiyalarini rivojlantirish ustuvor vazifalardan hisoblanadi. Xususan, Oliy ta’lim, fan va innovatsiyalar vazirligi tomonidan 2025-yilga mo‘ljallangan ilmiy-texnik tadbirlar rejasida ta’lim jarayonida AKTdan foydalanish bo‘yicha ilmiy-amaliy yangiliklar alohida e’tiborga olingani bejiz emas.

Kimyo fani o‘z tabiati bilan tajriba, modellar, tahliliy yondashuv va tasavvur talab qiladigan murakkab fanlardan biri bo‘lib, zamonaviy axborot texnologiyalari bu jarayonni sezilarli darajada yengillashtirishi mumkin. Virtual laboratoriyalar, 3D simulyatsiyalar, masofaviy platformalar, multimediya vositalari o‘quvchi ongida kimyoviy jarayonlarni aniq, qat’iy va vizual idrok etish imkonini yaratadi.

Asosiy qism

1. Zamonaviy axborot texnologiyalarining kimyo ta’limidagi o‘rni.



2. Pedagogik omillar. AKTdan samarali foydalanish quyidagi pedagogik shart-sharoitlar bilan uzviy bog‘liq:

2.1. O‘quv jarayonining innovatsion tashkiliy modeli.

Raqamli texnologiyalarni qo‘llashda dars quyidagi bosqichlar orqali tashkil qilinishi maqsadga muvofiq:

- motivatsiya yaratish (videorolik, animatsiya, real hayotdan misollar);
- yangi bilimni axborot texnologiyalari orqali taqdim qilish;
- virtual tajriba yoki interfaol topshiriqlar bajarish;
- refleksiya va xulosa bosqichi.

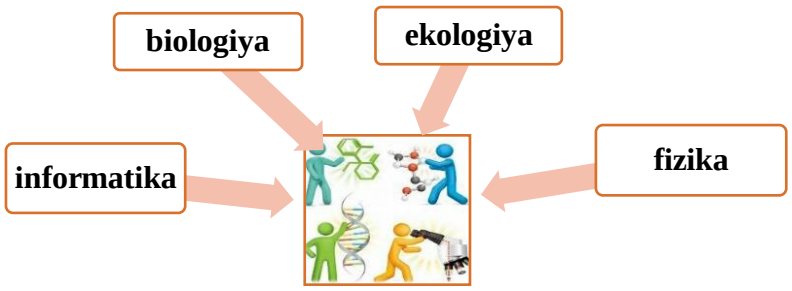
2.2. O‘qituvchining raqamli kompetensiyasi

O‘qituvchi:

- elektron ta’lim platformalarida ishlash;
- raqamli resurslarni loyihalash;
- simulyatsiyalardan amaliy dars jarayonida foydalanish ko‘nikmalariga ega bo‘lishi zarur.

2.3. Fanlararo integratsiya

Kimyo fanini AKT bilan uyg‘unlashtirish:



fanlari bilan integratsiyalashgan loyihalash faoliyatini amalga oshirish imkonini beradi.

3. Psixologik omillar

3.1. Talaba motivatsiyasi

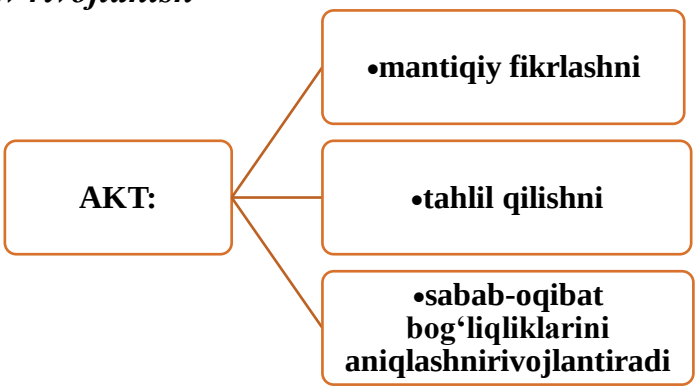
Texnologiyalar bilan boyitilgan darslar:

- e’tiborni ushlab turadi,
- qiziqishni oshiradi,
- o‘quvchida “o‘zim sinab ko‘rdim” degan ichki motivatsiyani shakllantiradi.

3.2. Mustaqil ta’limga intilish

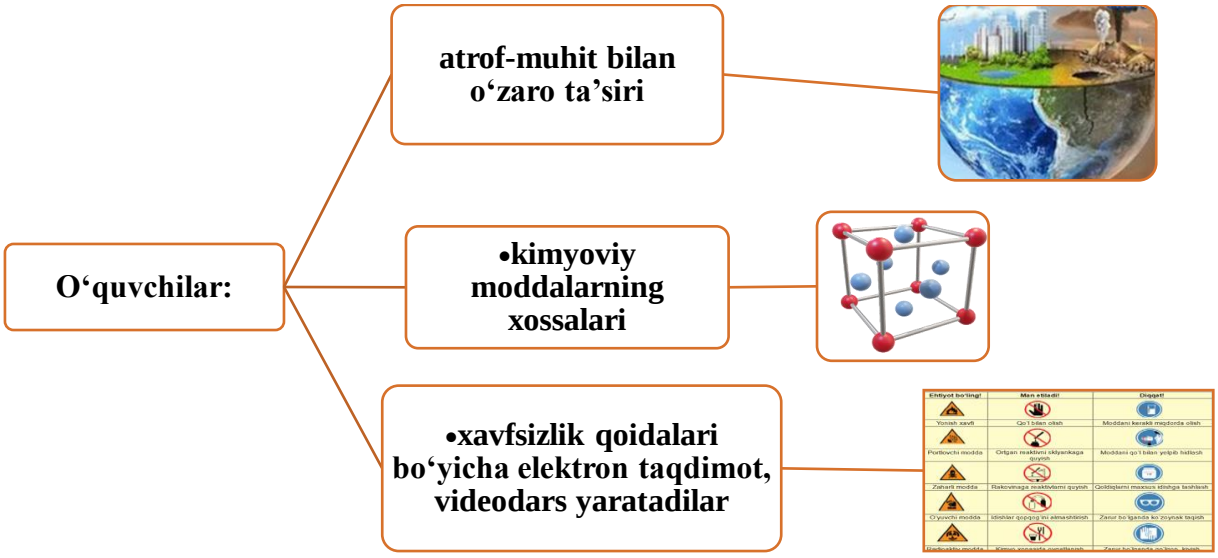
Interfaol dasturlar o‘quvchini mustaqil izlanishga undaydi. Simulyatsiyalar yordamida o‘quvchi xatolardan qo‘rqmaydi, chunki har bir tajribani qayta-qayta bajarish mumkin.

3.3. Kognitiv rivojlanish



4. Kimyo ta’limida kompetensiyalarni shakllantirishning AKT asosidagi modellar

4.1. Raqamli loyiha faoliyati



4.2. Adaptiv ta’lim texnologiyalari

Talabalarning individual qobiliyatlariga moslangan elektron platformalar (Coursera, Khan Academy, Moodle) kimyo fanini o‘rganishni qulaylashtiradi.

4.3. “Virtual–real” integratsiyalashgan o‘quv modeli

Avval virtual muhitda kimyoviy jarayon bilan tanishish, so‘ng real laboratoriyada tajriba o‘tkazish o‘quvchi kompetensiyasini mustahkamlaydi.

Xulosa

Kimyo ta’limida zamonaviy axborot texnologiyalaridan foydalanish yosh avlodning ilmiy-tadqiqot ko‘nikmalarini shakllantirish, kimyoviy tafakkurini rivojlantirish va fanlararo kompetensiyalarini mustahkamlashda muhim omil hisoblanadi. Pedagogik va psixologik yondashuvlar uyg‘unligi raqamli texnologiyalarning imkoniyatlarini to‘liq ro‘yobga chiqaradi. Virtual laboratoriyalar, interfaol platformalar, elektron simulyatsiyalar o‘quv jarayonini nafaqat zamonaviy, balki xavfsiz, qiziqarli va samarali qiladi.

Foydalanilgan adabiyotlar

1. O‘zbekiston Respublikasi Xalq ta’limi vazirligi. Kimyo fanini o‘qitishda AKTdan foydalanish bo‘yicha uslubiy qo‘llanma. – Toshkent, 2022.
2. Сергеев, А.П. Виртуальные лаборатории в обучении химии: методические рекомендации. – Москва, 2022.
3. Mayer, R.E. Multimedia Learning. – Cambridge University Press, 2021.
4. “Kimyo va biologiya yonalishlarida uzluksiz ta'lim sifatini va ilm-fan natijadorligini oshirish chora-tadbirlari to'g'risida” PQ 2020-yil 12-avgustdagi 4805-sonli qarori.
5. Akbarova M.T. “Kimyo fanining fanlararo aloqadorligi” b.196-199. https://www.conferencea.org/index.php/conferences/article/view/852/806
6. Akbarova M.T. “Kimyo” kursini o‘qitishda zamonaviy pedagogik texnologiyalardan foydalanish usullari” “Academic research in educational sciences (ARES)” jurnali (O‘zbekiston) Volume 3 | Issue 5 | 2022. ISSN: 2181-

1385 Cite-Factor: 0,89 | SIS: 1,12. DOI: 10.24412/2181-1385-2022-5-852-859 SJIF: 5,7|UIF: 6,1., http://ares.uz/storage/app/uploads/public/629/a16/ce9/629a16ce9810b147938999.pdf
7. Акбарова М.Т. Кимё ўқитиш методикаси фанини ўтишда педагогик технологияларни жорий қилиш усуллари. Ўқув қўлланма. 2021.
8. Нурмонов С.Э., Акбарова М.Т. Кимё (ўқув қўлланма)
9. PhET Interactive Simulations. University of Colorado Boulder. https://phet.colorado.edu
10. ChemCollective Virtual Labs. https://chemcollective.org
11. Khan Academy Chemistry Resources. https://www.khanacademy.org/science/chemistry
12. Moodle Learning Platform Documentation. https://moodle.org

УДК 376.33

Макаренко Я. П.
магистрант
Новосибирский государственный
педагогический университет
Россия, г. Новосибирск

РЕЗУЛЬТАТ ИССЛЕДОВАНИЯ ЛОГОПЕДИЧЕСКОЙ РАБОТЫ ПО ПРЕОДОЛЕНИЮ НАРУШЕНИЙ ПРОИЗНОСИТЕЛЬНОЙ СТОРОНЫ РЕЧИ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА С ДИЗАРТРИЕЙ

Аннотация: *Дизартрия у детей дошкольного возраста проявляется трудностями произношения, вызванными поражениями нервных путей, управляющих мышцами артикуляционного аппарата. Статья посвящена разработке и оценке эффективности научно обоснованной системы логопедической работы, направленной на преодоление нарушений произносительной стороны речи у детей дошкольного возраста с дизартрией. Проведен сравнительный анализ результатов коррекционной работы в целевой и контрольной группах. Применение специальной системы, включающей логопедический массаж, артикуляционную гимнастику и игровую терапию, подтвердило значительные позитивные результаты в формировании артикуляционной моторики, фонематического слуха и звукопроизношения у детей целевой группы. Разработанный подход рекомендуется для внедрения в логопедическую работу с дошкольниками с дизартрией.*

Ключевые слова: *дизартрия, логопедическая коррекция, произносительная сторона речи, артикуляционная моторика, фонематический слух, дошкольный возраст*

Makarenko I. P.
master's student
Novosibirsk State Pedagogical University
Novosibirsk, Russia

THE RESULTS OF A STUDY OF SPEECH THERAPY WORK ON OVERCOMING PRONUNCIATION DISORDERS IN PRESCHOOL CHILDREN WITH DYSARTHRIA

Annotation: *Dysarthria in preschool children is manifested by pronunciation difficulties caused by lesions of the nerve pathways that control the muscles of the articulatory apparatus. The article is devoted to the development and evaluation of the effectiveness of a scientifically based system of speech therapy aimed at overcoming pronunciation disorders in preschool children with dysarthria. A comparative analysis of the results of correctional work in the target*

and control groups was carried out. The use of a special system, including speech therapy massage, articulatory gymnastics and play therapy, confirmed significant positive results in the formation of articulatory motor skills, phonemic hearing and sound reproduction in the children of the target group. The developed approach is recommended for implementation in speech therapy work with preschoolers with dysarthria.

Keywords: *dysarthria, speech therapy correction, pronunciation, articulatory motor skills, phonemic hearing, preschool age*

Нарушения произносительной стороны речи являются распространённой проблемой у детей дошкольного возраста, особенно с дизартрией. Эта патология характеризуется нарушением формирования устной речи вследствие поражения нервно-мышечного аппарата, управляющего органами артикуляции [2, 3, 11]. Своевременная диагностика и грамотная коррекция играют важную роль в профилактике вторичных дефектов, влияющих на дальнейшее обучение и социализацию ребёнка [11, 13, 9].

Целью исследования было изучение научно-методических основ логопедической работы по преодолению нарушений произносительной стороны речи у дошкольников с дизартрией, разработка эффективной системы коррекции и оценка её влияния на качество произношения и артикуляционный аппарат.

Исследование проводилось в рамках экспериментальной программы, включающей предварительное обследование, разработку индивидуальной коррекционной стратегии и оценку полученных результатов. Всего в исследовании приняли участие две группы детей дошкольного возраста с диагнозом дизартрия: целевая группа (в работе с которой была реализована разработанная система преодоления нарушений произносительной стороны речи при дизартрии) и контрольная группа (с которой работали учителя-логопеды и педагогические работники ДОО по традиционной методике).

Использовались стандартизированные тесты для оценки уровня сформированности звукопроизношения, артикуляционной моторики, фонематического слуха и слухового самоконтроля. Были применены диагностические процедуры, рекомендованные ведущими специалистами в области патологии речи, такими как Архипова Е. Ф., Мастюкова Е. М., Лопатина Л. В. и др [2, 3, 9].

Разработанная многоуровневая система логопедической работы, направленную на устранение моторных и сенсорных нарушений, характерных для дизартрии. Система включала:

-Логопедический массаж и артикуляционную гимнастику [5].

-Игровой подход для повышения мотивации детей [4, 7].

-Коррекцию фонационного дыхания и слухового восприятия [12].

-Индивидуальные и групповые занятия, нацеленные на устранение конкретных проблем произношения [9, 11].

Программа охватывала 3 месяца регулярных занятий (три раза в неделю), включая индивидуальные и групповые, продолжительность которых варьировалась от 15 до 25 минут.

По завершении эксперимента провелся сравнительный анализ данных целевой и контрольной групп. Результаты продемонстрировали значительное улучшение показателей в целевой группе по сравнению с контрольной группой. Ключевые показатели, такие как звукопроизношение, артикуляционная моторика, фонематический слух и слуховой самоконтроль, существенно выросли.

Например, среднее увеличение баллов по шкале звукопроизношения в целевой группе составило около 1 пункта, тогда как в контрольной группе этот показатель остался практически неизменным. Аналогичную картину наблюдалось и по другим аспектам произносительной стороны речи.

Эти результаты подтверждают гипотезу о том, что разработанную систему логопедической работы можно считать высокоэффективной для коррекции нарушений произносительной стороны речи у детей с дизартрией.

Полученные результаты указывают на высокую эффективность разработанной системы логопедической работы по устранению нарушений произносительной стороны речи у дошкольников с дизартрией. Использование индивидуального подхода, игрового метода и комплексного воздействия на моторные и сенсорные компоненты позволили достичь значительных улучшений в показателях звукопроизношения, артикуляционной моторики, фонематического слуха и слухового самоконтроля [1, 8].

Практическое значение исследования заключается в возможности широкого внедрения предложенных подходов в практику логопедической работы с детьми дошкольного возраста с дизартрией. Полученные данные предоставляют основания для разработки дальнейших рекомендаций и расширения научных исследований в данной области.

Таким образом, проведенное исследование показало, что разработанный комплекс логопедической работы, охватывает как моторные, так и сенсорные нарушения, эффективен для решения задач коррекции произносительной стороны речи у детей дошкольного возраста с дизартрией. Результатом работы стало улучшение показателей у всех детей целевой группы.

Использованные источники:

1. Анищенкова Е. С. Практическое пособие по исправлению звукопроизношения у детей для логопедов и родителей. М.: АСТ: Астрель, 2011. 158 с.
2. Лопатина Л. В. Логопедическая диагностика и коррекция нарушений речи у детей. СПб.: Союз, 2006. 160 с.
3. Мастюкова Е. М. Ребёнок с отклонениями в развитии. М.: Просвещение, 1992. 95 с.
4. Нищева Н. В. Логопедическая ритмика в систее коррекционно-развивающей работы в деском саду. СПб.: ДЕТСТВО – ПРЕСС, 2014. 96с.

5. Османова Г. А. Игровой логопедический массаж и самомассаж при коррекции речевых нарушений. СПб.: КАРО, 2013. 88 с.
6. Савельева Е. А. Пальчиковые и жестовые игры в стихах для дошкольников. Детство-Пресс, 2010
7. Селиверстова В. И. Игры в логопедической работе с детьми М.: Просвещение, 1987. 144 с.
8. Туманова Т. В. Формирование звукопроизношения у дошкольников. М.: Гном и Д, 2001. 64 с.
9. Филичева Т. Б. Устранение общего недоразвития речи у детей дошкольного возраста: практ. пособие / Т. Б. Филичева, Г. В. Чиркина. 5-е изд. М.: Айрис-пресс, 2008. 224 с.
10. Чиркина Г. В. Методы обследования речи детей. М.: АРКТИ, 2003. 240 с.
11. Чиркина Г. В. Программы дошкольных образовательных учреждений компенсирующего вида для детей с нарушениями речи. М.: Просвещение, 2009. 192 с.
12. Шевцова Б. Б. Технологии формирования интонационной стороны речи. М.: АСТ: Астрель, 2009. 222 с.
13. Ястребова А. В. Коррекция нарушений речи у учащихся общеобразовательной школы. М.: Просвещение, 1984. 118 с.

СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ ОРГАНИЗАЦИЕЙ

DOI 10.24412/2225-1545-2025-12-2138-1708-1712
УДК 378.245:331.101.26

Бадаев А. А.
магистрант
Научный руководитель: Биктимирова Н. А., к.п.н.
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Россия, г. Уфа

ЭМОЦИОНАЛЬНЫЙ ИНТЕЛЛЕКТ И СТИЛЬ УПРАВЛЕНИЯ РУКОВОДИТЕЛЕЙ В ОРГАНИЗАЦИЯХ СПОРТИВНОГО ПРОФИЛЯ: ЭМПИРИЧЕСКОЕ ИССЛЕДОВАНИЕ НА ПРИМЕРЕ ООО «АБСОЛЮТНЫЙ ЧЕМПИОНАТ АХМАТ»

Аннотация: *В статье представлены результаты эмпирического исследования взаимосвязи между уровнем эмоционального интеллекта и предпочитаемым стилем управления у руководителей организации спортивного профиля - ООО «Абсолютный чемпионат Ахмат». В ходе диагностики использовались методики Д. Векслера (адаптация Н. Холланда), «Опросник эмоционального интеллекта» Н. Холланда и Д. Мэйера (русская адаптация Д. Люсиной), а также методика определения стиля руководства В. Штоля (в редакции Е.П. Ильина). Выборка составила 18 руководителей среднего и высшего звена. Установлено, что у 72 % респондентов наблюдается высокий уровень эмоционального интеллекта (от 85 баллов и выше), при этом доминирующим стилем управления выступает ситуативный (гибридный) - сочетание элементов демократического и авторитарного стилей в зависимости от оперативной обстановки. Выявлена положительная корреляция ($r = 0,63$, $p < 0,01$) между показателем «эмоциональная регуляция» и склонностью к демократическому вовлечению подчинённых в принятие решений. Полученные данные подтверждают гипотезу о том, что в условиях высокой динамики и медиатизации ММА-индустрии эффективность руководства напрямую зависит от способности быстро адаптировать управленческий стиль под эмоциональные и коммуникативные требования ситуации.*

Ключевые слова: *эмоциональный интеллект, стиль управления, спортивный менеджмент, ММА, руководитель, эмпирическое исследование.*

Badaev A. A.
master's student
Scientific supervisor: Biktimirova N. A., Ph.D.
State Budgetary Educational Institution of Higher Education «Bashkir Academy of Public Service and Management under the Head of the Republic of Bashkortostan»

EMOTIONAL INTELLIGENCE AND LEADERSHIP STYLE AMONG MANAGERS IN SPORTS ORGANIZATIONS: EMPIRICAL STUDY BASED ON LLC «ABSOLUTE CHAMPIONSHIP AKHMAT»

Annotation: *The article presents the results of an empirical study on the relationship between emotional intelligence levels and preferred leadership styles among managers of a sports organization - LLC "Absolute Championship Akhmat". The study employed N. Halland & D. Mayer's Emotional Intelligence Questionnaire (Russian adaptation by D. Lyusina), D. Wechsler's method (N. Holland's adaptation), and V. Stoll's leadership style questionnaire (as revised by E.P. Ilyin). The sample included 18 mid- and senior-level managers. Results indicate that 72% of respondents demonstrate high emotional intelligence (≥85 points), with the situational (hybrid) leadership style prevailing - a flexible combination of democratic and authoritarian elements depending on operational context. A significant positive correlation was found ($r = 0.63$, $p < 0.01$) between the "emotional regulation" subscale and the tendency to involve subordinates democratically in decision-making. Findings support the hypothesis that in the highly dynamic and media-saturated MMA industry, managerial effectiveness is strongly contingent upon the ability to rapidly adjust leadership style in response to emotional and communicative demands of the situation.*

Keywords: *emotional intelligence, leadership style, sports management, MMA, manager, empirical study.*

Развитие индустрии спортивных единоборств, и в особенности ММА, за последние десять лет превратило её из скромного направления в полноценный сегмент глобального шоу-бизнеса. Это наложило отпечаток не только на формат проведения соревнований, но и на требования к управленческому составу: сегодня от руководителя требуется сочетание спортивной экспертизы, медиа-грамотности, навыков кризис-коммуникации и способности управлять командой в условиях высокой неопределённости (например, при изменении статуса бойца, отмене турниров, санкционных ограничениях).

В этой связи особую актуальность приобретает эмоциональный интеллект (ЭИ) - способность распознавать, понимать и регулировать собственные и чужие эмоции [3]. Как показывают исследования последних лет, именно ЭИ, а не IQ или технические навыки, в 85 % случаев становится

ключевым предиктором управленческой эффективности в условиях VUCA-среды [3].

Однако в отечественной литературе по спортивному менеджменту по-прежнему преобладают работы, посвящённые организационно-экономическим аспектам (финансирование, монетизация контента), тогда как психологические ресурсы руководителей остаются слабо изученными, особенно в контексте специфических организаций - таких как ООО «Абсолютный чемпионат Ахмат» (АСА), один из крупнейших промоушенов ММА в Евразии.

Цель данного исследования - выявить характер взаимосвязи между уровнем эмоционального интеллекта и стилем управления у руководителей АСА, а также оценить, насколько эти параметры соответствуют вызовам современной спортивной индустрии.

Эмпирическая база работы сформирована в ходе преддипломной практики в ООО «Абсолютный чемпионат Ахмат» в октябре–ноябре 2025 г. В исследовании приняли участие 18 руководителей:

- 5 - генеральный директор, спортивный директор, директор по маркетингу, директор по развитию, HR-директор (высшее звено);
- 13 - руководители отделов и проектных команд (среднее звено), в т.ч. продюсеры турниров, PR-менеджеры, координаторы по работе с бойцами.

В качестве инструментария использовались:

1. Методика «Эмоциональный интеллект» (Д. Люсина, 2004) - 4 шкалы (осознание эмоций, управление эмоциями, эмпатия, эмоциональная регуляция), 46 утверждений, 5-балльная шкала Лайкерта. Интерпретация:
- 20–55 баллов - низкий ЭИ,
- 56–84 - средний,
- ≥85 - высокий.

2. Опросник стилей руководства В. Штоля (в адаптации Е.П. Ильина) - выделение 4 стилей:
- авторитарный (акцент на контроле и иерархии),
- демократический (коллективное принятие решений),
- либеральный (минимум вмешательства),
- ситуативный (гибкое переключение между стилями).

3. Качественный анализ - полуформализованные интервью (10 респондентов, по 25–35 мин), транскрипция с кодированием по темам: «трудные решения», «конфликты с бойцами/партнёрами», «работа под давлением СМИ».

Этические аспекты: анонимность гарантирована (все данные обезличены). Результаты психодиагностики представлены ниже в таблице 1.

Таблица 1

Уровень эмоционального интеллекта и доминирующий стиль управления руководителей АСА (n = 18)

Уровень ЭИ	Кол-во чел.	%	Доминирующий стиль управления
Высокий (≥85)	13	72%	Ситуативный - 11; Демократический - 2
Средний (56–84)	5	28%	Авторитарный - 4; Ситуативный - 1
Низкий (≤55)	0	0%	-

Источник: [составлено автором]

Примечательно, что ни один респондент не показал низкий уровень ЭИ, что, по моему мнению, может объясняться спецификой отбора в индустрию: руководящие должности в АСА традиционно занимают люди с опытом спортивной или военной карьеры, где эмоциональная устойчивость формируется системно.

В ходе интервью выяснилось, что ситуативный стиль не является осознанной «стратегией», а скорее формируется в ответ на оперативные вызовы. Например, один из продюсеров отметил: «Перед турниром - жёсткий контроль: сроки, бюджет, безопасность. Но если боец срывается на тренировке - здесь нужна поддержка, выслушать, предложить психолога. Авторитаризм в такой ситуации усугубит конфликт».

Корреляционный анализ (r Пирсона) выявил значимую связь:

- между шкалой «эмоциональная регуляция» и демократическим стилем ($r = 0,63$, $p < 0,01$),
- между «осознанием собственных эмоций» и склонностью к делегированию ($r = 0,51$, $p < 0,05$).

При этом у троих руководителей с высоким ЭИ, но авторитарной установкой, в интервью звучала фраза: «Здесь нельзя коллегиально решать - боец в клетке, и каждая секунда на счету». Это указывает на то, что в условиях высокой ответственности и риска даже эмоционально грамотные менеджеры интуитивно выбирают «жёсткие» решения - что не является дефицитом ЭИ, а, напротив, проявлением эмоциональной адекватности.

Проведённое исследование позволяет сформулировать следующие выводы:

1. В ООО «Абсолютный чемпионат Ахмат» сформировалась управленческая команда с преобладающе высоким уровнем эмоционального интеллекта, что соответствует требованиям современной ММА-индустрии.

2. Доминирующий стиль - ситуативный, что свидетельствует о зрелости управленческих практик: руководители способны гибко реагировать на изменения внешней среды, не «зацикливаясь» на одном подходе.

3. Выявлена не прямая, а контекстно-зависимая связь между ЭИ и стилем управления: высокий ЭИ позволяет не столько «быть демократичным», сколько выбирать оптимальный стиль под конкретную

задачу - будь то переговоры с федерацией, управление кризисом репутации или подготовка к турниру.

Практическая значимость: результаты могут быть использованы при разработке программ развития управленческого резерва - в частности, для включения тренингов по эмоциональному переключению (переход между стилями без эмоционального истощения) и диагностике невербальных реакций в стрессовых коммуникациях.

Перспективы: расширение выборки за счёт региональных офисов АСА, сравнительный анализ с руководителями других промоушенов (например, UFC, Bellator), а также включение в исследование показателя «эмоционального выгорания» как возможного «платёжа» за высокую эмоциональную нагрузку.

Использованные источники:

1. Федеральный закон от 04.12.2007 № 329-ФЗ «О физической культуре и спорте в РФ» (ред. от 08.08.2024). - URL: https://www.consultant.ru/document/cons_doc_LAW_73038/ (дата обращения: 01.12.2025).
2. Гоулман Д. Эмоциональный интеллект. Почему он может значить больше, чем IQ. - М.: АСТ, 2019. - 512 с.
3. Люсина Д.В. Диагностика и развитие эмоционального интеллекта. - СПб.: Речь, 2004. - 144 с.
4. Хлевная Е.А. Роль эмоционального интеллекта в эффективности деятельности (на примере руководителей) // Автореферат диссертации, ВШЭ. - 2012. – [Электронный ресурс] – URL: https://www.hse.ru/data/2012/02/13/1263336746/%D0%90%D0%B2%D1%82%D0%BE%D1%80%D0%B5%D1%84%D0%B5%D1%80%D0%B0%D1%82_%D0%A5%D0%BB%D0%B5%D0%B2%D0%BD%D0%B0%D1%8F%20.pdf (дата обращения 30.11.2025).
5. Mayer J.D., Salovey P., Caruso D.R. Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT): User’s Manual. - Toronto: MHS, 2002.
6. Правила организации и осуществления внутреннего контроля в ООО «Абсолютный чемпионат Ахмат». - Грозный, 2024. - 32 с.

DOI 10.24412/2225-1545-2025-12-2138-1713-1716
УДК 331.101.26:378.245

Бадаев А. А.
магистрант
Научный руководитель: Биктимирова Н. А., к.п.н.
ГБОУ ВО «Башкирская академия государственной службы и управления при Главе Республики Башкортостан»
Россия, г. Уфа

ЦЕННОСТНО-ОРИЕНТИРОВАННОЕ ЛИДЕРСТВО В СОВРЕМЕННЫХ ОРГАНИЗАЦИЯХ: КЕЙС СПОРТИВНОГО ХОЛДИНГА «АБСОЛЮТНЫЙ ЧЕМПИОНАТ АХМАТ»

Аннотация: *в условиях трансформации бизнес-среды под влиянием геополитических вызовов, цифровизации и запроса на социальную ответственность возрастает роль ценностно-ориентированного лидерства — стиля управления, при котором решения принимаются не только с учётом эффективности, но и в соответствии с устойчивыми внутренними убеждениями и корпоративными ценностями. В статье на основе анализа уставных документов, стратегических программ и 12 полуформализованных интервью с руководителями ООО «Абсолютный чемпионат Ахмат» (АСА) показано, как ценности, такие как честь, верность, патриотизм, уважение к традициям и социальная ответственность, интегрированы в управленческую практику. Выявлено, что именно ценностная основа позволяет организации сохранять устойчивость в условиях санкционного давления и формировать лояльность не только сотрудников, но и аудитории. Особое внимание уделено роли генерального директора как «носителя ценностей» и механизму трансляции ценностей через ритуалы (например, церемония открытия турниров, работа с ветеранами СВО). Сделан вывод: ценностно-ориентированное лидерство в АСА выступает не декларативным элементом корпоративной культуры, а реальным инструментом стратегической устойчивости.*

Ключевые слова: *ценностно-ориентированное лидерство, корпоративные ценности, спортивный менеджмент, Абсолютный чемпионат Ахмат, патриотизм, социальная ответственность, лидерство в кризисе.*

Badaev A. A.
master's student
Scientific supervisor: Biktimirova N. A., Ph.D.
State Budgetary Educational Institution of Higher Education «Bashkir Academy of Public Service and Management under the Head of the Republic of Bashkortostan»

VALUE-ORIENTED LEADERSHIP IN MODERN ORGANIZATIONS: A CASE STUDY OF THE SPORTS HOLDING «ABSOLUTE CHAMPIONSHIP AKHMAT»

Annotation: *Amidst business environment transformation driven by geopolitical pressures, digitalization, and growing demand for social responsibility, value-oriented leadership — a management approach where decisions align not only with efficiency but also with enduring beliefs and corporate values — gains increasing relevance. Based on analysis of charter documents, strategic programs, and 12 semi-structured interviews with managers of LLC «Absolute Championship Akhmat" (ACA), the article demonstrates how core values such as honor, loyalty, patriotism, respect for tradition, and social responsibility are embedded into daily management practice. Findings indicate that this value foundation enables the organization to maintain resilience under sanctions and foster loyalty not only among staff but also among its audience. Special emphasis is placed on the CEO's role as a «value carrier" and on ritual-based transmission mechanisms — e.g., tournament opening ceremonies, collaboration with veterans of the Special Military Operation (SMO). The study concludes that value-oriented leadership in ACA functions not as a declarative element of corporate culture, but as a tangible strategic resilience tool.*

Keywords: *value-oriented leadership, corporate values, sports management, Absolute Championship Akhmat, patriotism, social responsibility, crisis leadership.*

После 2022 года российские организации, особенно те, что находятся на стыке спорта, медиа и международных отношений, столкнулись с беспрецедентным вызовом: как сохранить идентичность, лояльность команды и доверие аудитории, когда внешние коммуникации разорваны, а ресурсы сокращены? Ответ, как показывает практика, лежит не в технологиях и даже не в финансах — а в ценностях.

Теория ценностно-ориентированного лидерства (values-based leadership), восходящая к работам Д. Хелмслика и Б. Барнетта [5], рассматривает лидера как «архитектора смысла», чьи решения основаны на чёткой иерархии убеждений. В отличие от трансформационного или авторитарного лидерства, здесь ключевым критерием эффективности становится не рост выручки, а соответствие действий заявленным ценностям — даже в ущерб краткосрочной выгоде.

Однако в российской научной среде эта концепция до сих пор воспринимается как «западная абстракция», не учитывающая специфики отечественной ментальности и институциональной среды. Между тем, как показывает анализ деятельности ООО «Абсолютный чемпионат Ахмат», именно в России формируются уникальные модели ценностного лидерства, где традиционные этнокультурные ценности органично вплетаются в бизнес-стратегию.

Цель статьи — на основе кейса АСА проанализировать, как ценности транслируются от топ-менеджмента к сотрудникам и партнёрам, и как эта трансляция влияет на устойчивость организации в кризисных условиях.

Исследование проводилось в рамках преддипломной практики в АСА (октябрь–ноябрь 2025 г.). Использованы следующие методы:

1. Контент-анализ документов: устав ООО «Абсолютный чемпионат Ахмат»; стратегия развития на 2023–2027 гг.; положение о корпоративной культуре; отчёты о социальных инициативах (2023–2025 гг.).

2. Качественное интервьюирование: 12 руководителей (генеральный директор, 4 директора по направлениям, 7 руководителей отделов), продолжительность — от 20 до 40 мин. Тематические блоки:

- «Какие ценности вы называете не переговорными?»
- «Бывали ли случаи, когда приходилось отказаться от выгодного контракта из-за несоответствия ценностям?»
- «Как ценности влияют на подбор и мотивацию персонала?»

Все данные обезличены; цитаты приводятся с сохранением стиля речи респондентов.

В уставных и стратегических документах АСА впервые ценности зафиксированы не как «преамбула», а как операционализированные критерии принятия решений. Например, в п. 4.2 Стратегии прямо указано: «Решение о сотрудничестве с иностранным партнёром принимается только при условии отсутствия публичных высказываний, противоречащих уважению к России, её Вооружённым Силам и традиционным духовно-нравственным ценностям».

В ходе интервью руководители единодушно выделили пять ядерных ценностей, которые, по их мнению, «держат» организацию:

1. Честь — «не продавать репутацию ради денег» (директор по маркетингу);

2. Верность — «если боец с тобой — он с тобой, даже в тяжёлые времена» (спортивный директор);

3. Патриотизм — не как лозунг, а как системная работа;

4. Уважение к традициям — сохранение этнической идентичности в брендинге (например, использование элементов чеченской культуры в оформлении турниров без стилизации под «экзотику»);

5. Социальная ответственность — не только благотворительность, но и создание устойчивых социальных лифтов (например, программа «ММА — путь в профессию» для подростков из неблагополучных семей).

Особый интерес представляет роль генерального директора как «живого носителя ценностей.

Анализ кейса АСА позволяет сделать три основных вывода:

1. Ценностно-ориентированное лидерство в российских условиях не копирует западные модели, а опирается на глубинные культурные коды — честь, верность, коллективная ответственность. Это делает его более устойчивым в кризис.

2. Ценности в АСА функционируют как реальный управленческий инструмент, а не декларация: они влияют на HR-политику, партнёрские соглашения и медиастратегию.

3. Эффективность ценностного лидерства напрямую связана с личной вовлечённостью топ-менеджмента — в первую очередь ген.директора, чьи действия служат «подтверждающим сигналом» для всей организации.

Практическая значимость: предложена модель «Ценностного ядра» как элемента системы внутреннего контроля — включение критериев соответствия ценностям в регламенты согласования договоров, оценки эффективности руководителей и отбора кадрового резерва.

Перспективы: сравнительное исследование с другими спортивными холдингами, а также разработка методики измерения стоимости ценностного капитала (value-based capital) в нематериальных активах компании.

Использованные источники:

1. Федеральный закон от 04.12.2007 № 329-ФЗ «О физической культуре и спорте в РФ» (ред. от 08.08.2024). - URL: https://www.consultant.ru/document/cons_doc_LAW_73038/ (дата обращения: 01.12.2025).
2. Устав ООО «Абсолютный чемпионат Ахмат» (ред. от 12.03.2024). — Грозный, 2024.
3. Барнетт М.Л. Организации и общество: социальная ответственность и корпоративное управление. — М.: ВШЭ, 2021. — 312 с.
4. Юшманов П.Н. Защита прав национальных меньшинств в Российской Федерации: проблемы и пути решения // Социология и право. – 2016. – № 2 (32) – С. 112-116
5. Helmig J., Spraul K., Ingenhoff D. Value-Based Leadership in Nonprofit Organizations // Nonprofit and Voluntary Sector Quarterly. — 2018. — Vol. 47, № 1. — P. 124–145.

Оглавление

Abdiholiqova G. A., Erdonov L. N., QASHQADARYO VILOYATI SANOATINI INNOVATSION RIVOJLANTIRISHNING KOMPLEKS METODOLOGIYASI8

Abdimurodova G. P., DIGITAL ECONOMY DEVELOPMENT IN UZBEKISTAN AND ITS PRIORITY DIRECTIONS.....13

Abdullayev D. D., O‘ZBEKISTONDA VA DUNYO BO‘YICHA KO‘ZI OJIZLAR FUTBOLINING RIVOJLANISHI.....17

Abdunazarov X. M., Xolboyeva M., Alimova J., SURXONDARYO VILOYATIDA TUPROQ QOPLAMINI MUHOFAZA QILISH 20

Abdunazarov X. M., Xolboyeva M., Alimova J., SURXONDARYO VILOYATIDA TRANSPORT TARMOQLARINING SHAKLLANISHI VA RIVOJLANISHI.....25

Abduqodirov N. F., Bozorboyeva I. N., Djurayeva F. A., Yusupbaeva M. R., Ashirbekova R. K., HEALTH INFORMATION SYSTEMS FOR HOSPITAL MANAGEMENT OPTIMIZATION 29

Abduqodirov N. F., Sobirova M. A., Qilichboyeva M. U., Kalandarova M. T., Xudoynazarova X. Z., ARTIFICIAL INTELLIGENCE APPLICATIONS IN MEDICAL DIAGNOSTICS.....33

Akhmadova M. A., THE USE OF PET TO EVALUATE THE EFFECTIVENESS OF DRUG THERAPY FOR DISSEMINATED THE TUMOR BREAST CANCER.....37

Akhmedova Kh. T., DEVELOPING LANGUAGE SKILLS THROUGH PROBLEM-BASED LEARNING TECHNOLOGIES.....42

Alijonova M. R., INTEGRATIV YONDASHUV ASOSIDA BO‘LAJAK AGRONOMLARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISH METODIKASINING NAZARIY ASOSLARI 45

Anarbayev A. A., Aliyev M. J., Murodjonov A. E., STAPHYLOCOCCUS EPIDERMIDISNING PATOGEN POTENSIALI: BIOFILM BIOGENEZINING GENETIK MEXANIZMLARI VA NOSOKOMIAL INFEKSIYALARDAGI ROLI 48

Aripov M. M.,METHODS OF TEACHING ROBOTICS IN SECONDARY SCHOOLS FROM THE TINKERCAD PLATFORM 53

Axmedov Y. M., Ro‘ziboyev R. B., Norboyev I. X., Ibrohimov Sh. H., HARBIY-AMALIY SPORT TURLARINING RIVOJLANISHI YOSHLARDA VATANPARVARLIK HISSINI RIVOJLANTIRISHNING ASOSIY OMILI 60

Axmedov X. R., Panjiyev H. A., Abdusalomova M. M., ZARAFSHON-OLOY ZONASINING TEKTONIK RIVOJLANISH TARIXI 65

Axrorova M. Sh., Temirova M. O., TISH PROTEZLARI. AKRIL YOKI NEYLON PROTEZLAR AFZALLIKLARI 70
Axrorov M. N., TIBBIYOTDA GELIY-NEON LAZER NURLARIDAN FOYDALANISH 79
Axrorov M. N., YOQUT LAZERI AHAMIYATI 83
Bahriddinov N. Z., METHODS OF FINANCIAL INCENTIVES FOR THE INNOVATIVE ACTIVITY OF BUSINESS ENTITIES BASED ON FOREIGN EXPERIENCE 88
Baxridinova M. B., Maxmudova Sh. I., Xujamuratova D. X., IMPLANTATSIYA PATOLOGIYALARI VA EMBRION RIVOJLANISHINING ILK NUQSONLARI 96
Begmatov X. I., QO‘QON QOG‘OZ ISHLAB CHIQARISH TARIXI VA TURIZMDAGI AHAMIYATI 99
Begmatov X. I., ABRI QOG‘OZINI TIKLASH VA UNING TARIXIY MANBALARNI TA’MIRLASHDAGI AHAMIYATI 104
Boboyeva N. T., SURXONDARYO VILOYATI SHAROITIDA DORIVOR MAVRAKNING MORFOFIZIOLOGIK VA BIOEKOLOGIK XUSUSIYATLARI 110
Boboyeva M. A., Umbetova E., Izzatullayeva Z., BO‘LAJAK SHIFOKORLARDA PSIXOLOGIK TRAVMALAR VA ULARNING KLINIK OQIBATLARI 113
Boboyeva N. T., Boltaboev I., O‘ZBEK TEATRIDA FOLKLORIZMNING ZAMONAVIY TALQINI: AKTYOR TAYYORGARLIGIDA NUTQ, PLASTIKA VA MAROSIM ELEMENTLARINING INTEGRATSIYASI 122
Botirov A., SOIL FERTILITY AND REPEATING CROPS 127
Bozorov Z. A., THE CONCEPT OF “HEALTH” IN UZBEK PROVERBS: A LINGUOCULTURAL INTERPRETATION 130
Buriyev S. B., Kayumov Kh. A., METHODOLOGY OF USING SECOND-ORDER DIFFERENTIAL EQUATIONS IN SOLVING PHYSICS PROBLEMS 136
Davronova Sh. R., CONTEMPORARY THEORIES ON THE ROLE OF THE THYMUS IN IMMUNE SYSTEM DEVELOPMENT 142
Dilmurodov D. U., PRACTICAL RECOMMENDATIONS FOR DISEASES OF THE BARTHOLIN'S GLAND 147
Egamberdiyeva Y. X., O’ZBEKISTON HUDUDIDA ATMOSFERA SUV BUG’LARIDAN ICHIMLIK SUVI SIFATIDA FOYDALANISHNING GEOGRAFIK JIIHATLARI 152
Ergashev J. J., THE ROLE AND IMPORTANCE OF SOCIAL PROTECTION MEASURS IN A MARKET ECONOMY 158

Ergashev J. J., O‘ZBEKISTONDA AHOLI O‘SISHINING IQTISODIYOTGA TA’SIRI VA ISHSIZLIK MUAMMOSI 164

Farmanova M. A., CLINICAL-LABORATORY ASPECTS OF CHRONIC BRUCELLOSIS INFECTION 168

Fayziev S. Kh., Ibodullaev O. O., RakhimovKh. K., Muxiddinova Sh. N., Razoqova O. B., MECHANICAL MODEL OF THE SAW CYLINDER-COTTON-BRUSH CYLINDER SYSTEM AND OPPORTUNITIES FOR IMPROVING CLEANING EFFICIENCY 172

Fayziev S. Kh., Ibodullaev O. O., Rakhimov Kh. K., Sadullaeva M. R., DEVELOPMENT OF A NEW DESIGN OF A MACHINE FOR CLEANING COTTON RAW MATERIALS FROM IMPURITIES 185

Fayziev S. Kh., Ibodullaev O. O., Rakhimov Kh. K., Muxiddinova Sh. N., Razoqova O. B., THE ORETICAL ANALYSIS OF THE SAW-DRUM-BARREL SYSTEM OF THE UXK UNIT IN CLEANING COTTON RAW MATERIALS FROM LARGE IMPURITIES 199

Ganibaev I. Sh., MODERN METHODS OF DIAGNOSING RESPIRATORY SYSTEM DISEASES 217

Hikmatova N. Y., GEOGRAPHICAL BASIS OF THE FORMATION OF PLACE NAMES IN THE KYZILKUM DESERT 225

Ibatova Sh. M., SOME FEATURES OF ACUTE STENOSING LARYNGOTRACHEITIS IN CHILDREN 230

Ibatova Sh. M., FEATURES OF BRONCHIO-OBSTRUCTIVE SYNDROME IN YOUNG CHILDREN 235

Ibodova D. F., ABDOMINAL ULTRASOUND IN PATIENTS WITH ABDOMINAL PAIN AS A FIRST-LINE DIAGNOSTIC IMAGING METHOD 242

Ibodova D. F., METHODS OF INVESTIGATION IN BONE DESTRUCTION: MODERN APPROACHES 247

Ibragimov. O’ I., Eshkobilova. M. E., GASTROENTEROLOGIYA AMALIYOTIDA XRONIK PANKREATITNI DAVOLASHDA QO‘LLANILADIGAN FARMAKOTERAPIYA DORI VOSITALARINING FARMATSEVTIK-IQTISODIY (FARMAKOEKONOMIK) TAHLILI 250

Ibragimov S. L., LAPLAS ALMASHTIRISHLARI YORDAMIDA IQTISODIY JARAYONLARNI MATEMATIK MODELLASHTIRISH 256

Ibragimova D. A., Xolmurotov B. Sh., Aynazarova D. B., Hasanova O. E., Norqulov M. N., ODAM ORGANIZMIDAGI BUFER SISTEMALARNING VAZIFALARI 260

Ibragimova D. A., Usanov Q. R., G'aniyev Sh. G'., Sirojboyev Sh. V., Rasulberdiyev S. E., MACHINE LEARNING METHODS FOR EARLY DISEASE DETECTION.....264

Ibragimova D. A., Mamaraximova M. O., Davronov J. B., Sirojiddinova S. S., Arslanov J. A., XELOTA TERAPIYANING ORGANIZMLARGA AHAMIYATI.....268

Imomova Yu. A., Jumabayeva U. A., Xasanova G. R., Shunkorov T. M., DUKKAKLI O'SIMLIKLARNING TIBBIYOTDAGI AHAMIYATI.....272

Inamov F. I., INVESTMENT DISPARITIES AND THE DEGREE OF ECONOMIC INTERDEPENDENCE BETWEEN REGIONS AS A FACTOR INFLUENCING THE SUSTAINABLE DEVELOPMENT OF THE NATIONAL ECONOMY.....276

Ismoilov S. B., QUVVAT VA IMPULSNI KO'CHIRISH TENGLAMASI.....281

Ismoilov S. B., BIR O'LCHAMLI SUSPENZIYANI FILTRLASH MASALASINI SONLI YECHISH.....284

Jalilova Ch. Z., Bobokalonova M. Z., BUXORO IXTISOSLASHTIRILGAN "JAYRON" PITOMNIGI – EKOTURIZM OBYEKTI SIFATIDA.....288

Jonibekov J. J., ASSESSMENT OF THE COMPETITIVENESS OF HIGHER EDUCATIONAL INSTITUTIONS IN THE HEALTHCARE SYSTEM.....293

Jumaxanov Sh. Z., Xasanova Sh. D., NORIN TUMANIDA AHOLINING TABIIY HARAKATI VA DEMOGRAFIK O'ZGARISHLAR DINAMIKASI 297

Qambarov A. M., KASBIY KOMPETENSIYALARNING TA'LIM YO'NALISHLARIGA TA'SIRI.....305

Karshiyeva F. Z., Abbosova H. A., Gaipnazarova D. E., INTEROPERABILITY CHALLENGES IN MEDICAL INFORMATION SYSTEMS.....310

Karshiyeva F. Z., Abduraximova M. I., Sobirova M. Sh., Xolboyeva S. X., Ilxomova S. I., MODERN IT TOOLS FOR MANAGING AND ANALYZING MEDICAL DATABASES.....313

Karshiyeva F. Z., Tursunaliyeva D. M., Baxtiyorova O. B., Rajabova D. R., Kabulova S. K., THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN MEDICAL DIAGNOSTICS.....317

Karshiyeva F. Z., Tursunov A. J., Aslonov J. O., Abdinazarov E. S., Kalbaeva X. K., THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE DEVELOPMENT OF MEDICAL SERVICE INFRASTRUCTURE.....321

Khidirov Z. E., ON THE ROLE OF AFFERENT NEURON IN MAINTAINING STRUCTURAL INTEGRITY AND ADEQUATE DIFFERENTIATION OF TISSUE.....325

Khidirov Z. E., RECONSTRUCTION OF THE VENOUS BED OF THE RABBIT'S PELVIC LIMBS WHEN CREATING REDUCED CIRCULATION 329

Khodjaeva N. T., COMMUNICATIVE APPROACH: FACTORS OF EFFECTIVENESS IN LANGUAGE TEACHING 332

Khodjaeva S. A., ADJUSTABLE DETERMINANTS OF PERINATAL CENTRAL NERVOUS SYSTEM DAMAGE IN NEWBORNS IN CONTEMPORARY SETTINGS 335

Kholmominova O. J., Abdisamatova M. A., THE ORETICAL AND METHODOLOGICAL FOUNDATIONS OF INCLUSIVE EDUCATION: CONCEPTUAL APPROACHES, STUDENT CHARACTERISTICS AND INNOVATIVE PEDAGOGY 340

Kiyomov B. E., TAJRIBA SHAROITIDA SUBARAXNOIDAL QON QUYILISHIDA KAPILLYAR TOMIRLARDA MORFOLOGIK O'ZGARISHLAR 343

Madaripova D. A., MICROELEMENT DEFICIENCIES AFTER SURGICAL TREATMENT OF OBESITY: EARLY DIAGNOSIS AND PREVENTION STRATEGIES 346

Madrahimov A. M., Makhmudov J. N., ROAD SAFETY PROBLEMS 351

Majidov B. Sh., UZBEKISTAN'S NATIONAL FOOD SECURITY STRATEGY: INSTITUTIONAL REFORMS, FAO ALIGNMENT, MONITORING EFFECTIVENESS, AND GLOBAL TRENDS 355

Makhmudova Z. I., Yusupova Y. O., Toremuratova U. J., Mammatkulova Y. I., Saidxonova N. I., BIG DATA ANALYTICS IN PERSONALIZED MEDICINE 359

Mallayeva M. M., Mallayeva G. B., Kungratova M. I., Abduxalimova D. A., BIOTEXNOLOGIYA VA BIOMEDITSINA MUHANDISLIGI MUAMMOLARI 363

Mamadiyarova D. U., Samandarov U. Y., Raximberdiyeva R. Sh., GLUKOKORTIKOIDLARNING ORGANIZMDAGI FIZIOLOGIK JARAYONLARDAGI AHAMIYATI 369

Mamadiyarova D. U., Azimkulova S., YUQORI DARAJADAGI SIMULYATSIYALARDA TALABALARDA STRESSNI BOSHQARISH 376

Mamajonova G. K., TRANSFORMATION OF BIOTIC VALUES IN THE ERA OF TECHNOLOGICAL DEVELOPMENT 381

Mamarajabov D. S., TIBBIYOT OLIY TA'LIM MUASSASALARIDA "RADIATSION DOZA VA RADIATSION XAVFSIZLIK" MAVZUSINI MULTIMEDIYA VOSITALARI YORDAMIDA O'QITISHNING AFZALLIKLARI 384

Mamatkulov A. L., SPIRITUAL AND MORAL EDUCATION OF MODERN YOUTH 388

Mamatova N. T., Ashurov A. A., Abdukhakimov B. A., Akhtamova Sh. Kh., PREVALENCE OF LATENT TUBERCULOSIS INFECTION AMONG MEDICAL STUDENTS: A SYSTEMATIC REVIEW AND ITS EMPIRICAL IMPLICATIONS 391

Maxsetdinova B. R., DAVLAT FISKAL VA MONETAR SIYOSATINING VUJUDGA KELISHI 395

Mirzayeva S. A., Abduvahobova G. T., KIMYOTERAPIYA: BAKTERIYALARNING ANTIBIOTIKLARGA SEZGIRLIGINI ANIQLASH 400

Mukumova H. I., Qazoqova O. X., GEOGRAFIYA FANINI AKADEMIK LITSEYLARIDA O'QITISH METODIKASI 404

Nabiyev A. A., TIBBIY TEXNIKA VA YANGI TIBBIYOT TEXNOLOGIYALARI FANINI YANGI PEDAGOGIK TEXNOLOGIYALAR ASOSIDA O'QITISH 408

Nasriddinov B. Z., METHODOLOGY AND CLINICAL SIGNIFICANCE OF MAGNETIC RESONANCE SPECTROSCOPY 413

Nasriddinov A. Sh., Maxmudov J. N., TEMPORAL VARIABILITY OF TRAFFIC FLOW INTENSITY AT SIGNALIZED URBAN INTERSECTIONS (CASE STUDY OF NAMANGAN CITY) 418

Navotova D. I., Mavlonova S. X., QASHQADARYO VILOYATI QISHLOQ XO'JALIGI RIVOJLANISHINING O'ZIGA XOS XUSUSIYATLARI 422

Nazarov D. A., MILLIY IQTISODIYOTNI TARTIBGA SOLISHDA DAVLATNING O'RNI VA MAQSADI 428

Ne'matov N. I., Jabborov I. J., Ro'ziyev A. X., Komekov S. K., Abdullayev A. A., THE ROLE OF VIRTUAL REALITY IN REHABILITATION: CLINICAL EXPERIENCES AND RESULTS 433

Ne'matov N. I., Ne'matova Z. R., Rabbimqulov Sh. B., Tolibjonova D. B., Arziyeva U. S., THE ROLE OF ELECTRONIC HEALTH RECORDS IN IMPROVING CLINICAL WORKFLOW 437

Ne'matov N. I., O'ktamova M. I., Shodiyeva F. R., Ergasheva G. Z., Ergasheva N. A., AI-BASED CLINICAL DECISION SUPPORT SYSTEMS 441

Ne'matov N. I., Rahmatullayeva N. P., Abjabborova Sh. F., Shirinbekov D. G., Fayzullayev O. A., PREDICTIVE ANALYTICS IN HEALTHCARE DECISION-MAKING 445

Ne'matov N. I., Yo'ldoshev J. Sh., Abduvaitov Sh. V., Akramqulov T. A., Baxitova A. N., DIGITAL TRANSFORMATION OF HEALTHCARE INSTITUTIONS 448

Nizomov M. A., Jabborov T. U., G'ofurov T. B., ISMOLOQ EFEMER O'SIMLIGINING INSON ORGANIZMIGA TIBBIY NUQTAI NAZARDAN FOYDALI EKANLIGI 452

Nomozov N. J., ISHLAB CHIQARISH FAOLIYATIDA XARAJATLARNI BOSHQARISH VA IQTISODIY SAMARADORLIKNI OSHIRISHNING NAZARIY-ASOSIY YO'NALISHLARI 456

Norova M. F., REASSESSING ENGLISH DIALECT VARIATION: A BIPARTITE SPECTRAL GRAPH PARTITIONING APPROACH 460

Norova M. F., SPECIALIZED TERMINOLOGY IN SCIENTIFIC AND TECHNICAL WRITINGS: FUNCTIONAL CATEGORIES AND THEIR LINGUISTIC TRAITS 466

Ochilov S., PATHOMORPHOLOGICAL CHANGES IN THE THYMUS AND LYMPH NODES OF NEWBORNS WHO DIED FROM ASSISTED INTRAUTERINE VIRAL PNEUMONIA 470

Omonov A. T., EKSPERIMENTDA NURJANTIRILGAN KALAMUSHLARNING TISH-JAG TIZIMI NERVLARINING GISTOLOGIK O'ZGARISHLARI 476

Omonov A. T., HISTOLOGICAL CHANGES IN THE NERVES OF THE TOOTH-JAW SYSTEM OF IRRADIATED MICE IN THE EXPERIMENT ... 480

Pardayeva S. B., Mirzoyev J., Achilov F., Oltiyev X., α-AMINOKISLOTA – KOFERMENTLAR, GORMONLAR VA VITAMINLARNING TARKIBIY QISMI SIFATIDA 483

Pathidinova U. C., OG'IR BETONNI KORROZIYADAN HIMOYA VOSITALARI YORDAMIDA HIMOYALASH 488

Payazov Sh. N., QORIN BO'SHLIG'I A'ZOLARI ENDOKRIN TIZIMINING O'SIMLIKLARNI KIMYOVIY HIMOYA VOSITALARI TA'SIRIDAGI MORFOLOGIK O'ZGARISHLARI 493

Qambarova M. X., TUT KO`CHATLARIDAGI ASOSIY DOMINANT TUR ZARARKUNANDALARINING RIVOJLANISHI 497

Qarabayeva D. J., Abdinazarov A. F., SURXONDARYO VILOYATI SHEROBOD TUMANIDA TARQALGAN SALVIA L. TURLARINING BIOEKOLOGIK XUSUSIYATLARI 500

Qarabayeva D. J., To'yev Q. H., SURXONDARYO VILOYATI SHEROBOD TUMANINING TABIIY FLORASIDA *SALVIA* L. TURKUMI TURLARINING TARQALISHI 504

Qobilov A., Bekberganov A. U., KOMPANIYALARNING BIZNES JARAYONLARIGA RAQAMLI TEXNOLOGIYALARNI QO'LLASH 508

Qoraboeva D. J., EFFECT OF BIOSTIMULANTS AND MICROFERTILIZERS ON GROWTH, YIELD COMPONENTS, AND SEED PRODUCTIVITY OF

SUNFLOWER (HELIANTHUS ANNUUS L.) UNDER IRRIGATED SOIL CONDITIONS 513

Qoraboeva D. J., Xudoyberdieva M., OPTIMIZATION OF BIOSTIMULANT APPLICATION RATES FOR IMPROVING SUNFLOWER GROWTH AND YIELD FORMATION 517

Qarabayeva D. J., Qayumova F. N., ODAM ORGANIZMIDA YASHOVCHI FOYDALI MIKROORGANIZMLARNING SALOMATLIKDAGI ROLI 521

Qarabayeva D. J., Ibragimov F. A., BOYSUN BOTANIKA-GEOGRAFIK MINTAQASIDA UCHRAYDIGAN CAREX L. TURLARINING EKOLOGIYASI 525

Qarabayeva D. J., Rustamova F. I., BOYSUN HUDUDI FLORASIDA CAREX L. TURKUMINING BIOEKOLOGIK MOSLASHUVCHANLIGI VA EKOLOGIK AHAMIYATI 529

Qarabayeva D. J., Primova Y., SURXONDARYO VILOYATI SHEROBOD TUMANIDA TARQALGAN AMARANTHACEAE JUSS. OILASIGA MANSUB DORIVOR O‘SIMLIKLARNING BIOEKOLOGIYASI VA TARQALISHI 533

Qudratillayev R. Z., KARANTIN ZARARKUNANDA SITRUS OQQANOTI (DIALEURODES CITRI ASHM.) NING BIOLOGIK XUSUSIYATLARI VA ZARARI 537

Rajaboyev Sh. Sh., Ishmuratov D. I., MECHANISMS FOR ENSURING INFORMATION SECURITY IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SERVICES 541

Rajaboyev Sh. Sh., Isroilov A. A., THE ROLE AND IMPORTANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN BANKS 547

Rajaboyev Sh. Sh., Alirizayev A. A., ELEKTRON JADVALNING IMKONIYATLARI VA VAZIFALARI 553

Rajaboyev Sh. Sh., Axrorkulov Sh. Z., KORXONALARDA AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARI BUXGALTERIYA HISOBINING O‘ZIGA XOS XUSUSIYATLARI 558

Rajaboyev Sh. Sh., Absalamov S. U., KORXONANI BOSHQARISHDA AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARINING O'RNI VA AHAMIYATI 565

Rajaboyev Sh. Sh., Xolmamatova H. E., AXBOROT-KOMMUNIKATSIYA SOHASIDA INNOVATSION XIZMATLARNI JORIY ETISHNING IQTISODIY SAMARASI 571

Rajaboyev Sh. Sh., Xabibulloyev J. I., KOMPYUT ER GRAFIKASI VA GRAFIK AMALLAR BILAN ISHLASHNING ZAMONAVIY AXBOROT TEXNOLOGIYALARIDAGI O‘RNI 578

Rajaboyev Sh. Sh., Yo‘ldoshev A. A., IJTIMOIY TARMOQLAR HAQIDA TUSHUNCHA 582

Rajaboyev Sh. Sh., Axrorkulov S. Z., RAQAMLI IQTISODIYOT SOHASIDA AXBOROT XAVFSIZLIGI MUAMMOLARI 587

Rajaboyev Sh. Sh., Asrorov J. I., MS ACCESS MA’LUMOTLAR BAZASINI BOSHQARISH TIZIMI BILAN ISHLASH 591

Rajaboyev Sh. Sh., Gafurova D. S., O‘ZBEKISTON ELEKTRON HUKUMAT TIZIMIDA AXBOROT-KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARIDAN FOYDALANISH MEXANIZMLARI VA ULARNING SAMARADORLIGI 596

Rajaboyev Sh. Sh., Abdimurodov S., KORXONA FAOLIYATIDA MS OFFICE DASTURLARIDAN FOYDALANISH 601

Rajaboyev Sh. Sh., Qushiyev G., ARCHITECTURE AND TYPES OF COMPUTER NETWORKS 608

Rajaboyev Sh. Sh., Malikov D. Q., AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARI XIZMATLARI TIZIMINI RIVOJLANTIRISH BOSQICHLARI 612

Rajapova U. B., Jumaniyazov M. B., Muxtarov J. R., Bolqiyev S. X., IPLARNI SHAKLLANISHI VA XOSSALARIGA TEXNOLOGIYANING TA’SIRI 616

Rakhimberdiyeva O. R., MODERN CLASSIFICATION AND CLINICAL APPLICATIONS OF ANTIDOTES 624

Raximberdiyev R. A., Xamrayeva N. A., BOLALARDA KARIES PROFILAKTIKASI: YANGI TEXNOLOGIYALAR VA PREPARATLAR 628

Raximberdiyev R. A., Mamatkulova A. K., MEDICINAL PLANTS APPLIED IN THE THERAPY OF ORAL MUCOSAL DISEASES 635

Raximov X. Sh., ANALYSIS OF INDICATORS DETERMINING THE ECONOMIC EFFICIENCY OF THE RAILWAY TRANSPORT SYSTEM 640

Rejapov A. A., EZGU QARASHLAR TARBIYASI: OG‘ZAKI AN’ANALAR, MILLIY QADRIYATLAR VA ZAMONAVIY MA’NAVIY TAHDIDLAR TALQINIDA 649

Rizayev Sh. A., Isroilov.Y. Y., REDUCING CORROSION RATE BY ADDING INHIBITORS INTO BITUMEN 654

Rustamov U. Q., METHODS FOR IMPROVING THE EXPRESSION OF CHARACTER AND INNER WORLD IN PORTRAIT ART 657

Sadullaeva I. K., FEATURES OF CYTOKINE REGULATION IN CHILDREN WITH ACYANOTIC CONGENITAL HEART DEFECTS 662

Sadullaeva I. K., COMPARATIVE ANALYSIS OF SERUM GROWTH FACTOR LEVELS IN CHILDREN WITH DIFFERENT TYPES OF CONGENITAL HEART DEFECTS 671

Sadullaeva I. K., Ruziyeva M. H., THE SIGNIFICANCE OF PRO-INFLAMMATORY IMMUNE MEDIATORS IN THE PATHOGENESIS OF VARIOUS FORMS OF CONGENITAL HEART DEFECTS IN CHILDREN..680

Shadjanova N. S., AGE-RELATED CHANGES IN PLATELET FUNCTION AND THEIR IMPACT ON COGNITIVE DECLINE AND CEREBRAL MICROCIRCULATION 689

Shakhidova D. M., WAYS TO EFFECTIVELY USE AND IMPROVE REGIONAL OPPORTUNITIES IN THE DEVELOPMENT OF SMALL BUSINESSES 693

Shamatov I. Y., HISTOLOGICAL CHANGES UPON TRANSECTION OF INTESTINAL NERVES IN THE EXPERIMENT 697

Shamotov I. Y., TAJRIBADA ICHAKLAR NERVLARI KESILGANDA GISTOLOGIK O`ZGARISHLAR 700

Sharobiddinov M. Z., O'TKIR KARDIOEMBOLIK INSULTLI BEMORLARDA ANTIGIPERTENZIV TERAPIYA.....704

Siddiqov R., SANOAT ROBOTLARI VA ULARNING STRUKTURASI 710

Sobirova M., Qilichbayeva M., Kalandarova M., Kamolova N., Dusmuratov M.M., EKOLOGIK TOZA KATALITIK TIZIMLAR YORDAMIDA OKSIDLANISH REAKSIYALARINI OPTIMALLASHTIRISH.....720

Sobitova R. S., To'rayeva X. R. IQTISODIYOT TARMOQLARIDA RAQAMLI TEXNOLOGIYALARNI KENG JORIY ETISH BO‘YICHA XORIJ TAJRIBASI VA ULARDAN FOYDALANISH 726

Sobitova R. S., Xursanova Sh. A., BANK TIZIMIDA RAQAMLASHTIRISH JARAYONINING SAMARADORLIGINI OSHIRISH YO’LLARI 729

Sobitova R. S., Noraliyeva G. M., EFFICIENT USE OF WATER RESOURCES AND MECHANISMS FOR AGROBUSINESS DIVERSIFICATION IN AGRICULTURE OF SURKHANDARYA REGION.....734

Sobitova R. S., SANOAT ISHLAB CHIQARISHNI INNOVATSION RIVOJLANTIRISHNING HUDUDIY JIHATLARI 737

Suleimanov R. I., COLLATERAL CIRCULATION IN THE LIGAMENTS OF THE ACCESSORY VEINS OF THE SPINE 740

Suyunov Sh. A., Jalolova M. M., Sharofiddinova X. X., QAYTA TIKLANADIGAN ENERGIYA MANBAALARINI KARTALASHTIRISHNING ZAMONAVIY YONDASHUVLARI VA ULARNING AMALIY QO‘LLANILISHI.....743

Tangirov X. T., Tangirova N. X., O‘ZBEKISTON SHAROITIDA UY PARRANDALARI VA YOVVOYI QUSHLAR UCHUN UMUMIY BO‘LGAN GELMINTLAR VA ULARNING SIRKULYATSIYASI.....755

Teshaboyev R. I., ELECTRIC POWER SUPPLY OF JSC ASSAKA DON MAHSULOTLARI ENTERPRISE 759

Tilavov M. T., BRAIN STRUCTURAL AND FUNCTIONAL ALTERATIONS ASSOCIATED WITH EXTRAPYRAMIDAL SYMPTOMS IN ANTIPSYCHOTIC-TREATED PATIENTS (REVIEW) 763

Toirov R. A., XORIJIY TILLARNI O‘RGANISH VA UNDAGI MUAMMOLAR VA YECHIMLAR 767

Toshev I. I., ISCHEMIC STROKE: ETIOLOGY, PATHOGENESIS, AND MODERN DIAGNOSTIC APPROACHES 770

Toshev I. I., CLINICAL AND EPIDEMIOLOGICAL FEATURES OF CARDIOVASCULAR SYSTEM DAMAGE IN COVID-19 PATIENTS 774

Toshev I. I., MECHANISMS OF CARDIOVASCULAR COMPLICATION DEVELOPMENT IN CORONAVIRUS INFECTION (COVID-19) 777

Toshmatova Z. J., MAKTABGACHA YOSHDAGI BOLALAR INTELLEKTUAL-IJODIY QOBILIYATLARINI ANIQLASH VA RIVOJLANTIRISHNING NAZARIY ASOSLARI 780

Turdiyev T. O., MORPHOMETRIC ANALYSIS OF HEPATIC MICROCIRCULATORY STRUCTURES IN 3- AND 9-MONTH-OLD ALBINO RATS 784

Tuxtaboyev A., WAYS TO ELIMINATE ENVIRONMENTAL PROBLEMS . 787

Umarova M. Y., GAVHARSHODBEGIMNING TEMURIYLAR DAVLATIDAGI SIYOSIY O‘RNI VA TA’SIRI 791

Umirzakov I. S., SHVITS ZOTLI SIGIRLARNING MAHALLIY SHAROITGA MOSLASHUVI VA SUT MAHSULDORLIGINI QIYOSIY TAHLILI 795

Umirzaqov O. E., AHOLI ORASIDA BUYRAK VA SIYDIK YO‘LLARI KASALLIKLARINI ERTA ANIQLASH VA BAKTERIOFAGLAR BILAN DAVOLASH ALGORITMINI ISHLAB CHIQISH 800

Umirzoqov S., Bazarbayeva J., Kudayberganov A., Jumayeva Z. J., Pardayeva S. B., KUMUSH BIRIKMALARINING ORGANIZMDAGI AHAMIYATI 806

Umizoqova S. U., Axmedova Sh. Z., Sirojiddinov O. I., INKLYUZIV TA’LIMDA BAHOLASH MEZONLARINI ISHLAB CHIQISHNING METODOLOGIK ASOSLARI 811

Urazbeyava S. T., MONOPOLIYANING IQTISODIY ASOSLARI VA ULARNING TURLARI ECONOMIC 816

Usmanov B. Sh., EFFECTIVE MANAGEMENT AND DEVELOPMENT OF STATE ASSETS IS A DEMAND OF OUR TIME 823

Usmanova M. B., Muradova R. R., O‘ZBEKISTONDA ZAMONAVIY ILM-FAN VA TA’LIM RIVOJI: FARMASEVTIKA, BIOTEXNOLOGIYA VA YOSHLAR DUNYOQARASHINING INTEGRATSIYASI 827

Xadjamuratova M. X., ZARDUSHTIYLIKNING MUQADDAS KITOBI “AVESTO”DA MADANIYAT MASALASI 833

Xadjamuratova M. X., ABITURIENTLARNI OLIY TA’LIMGA QABUL QILISHDAGI ISLOHOTLAR NATIJALARI 837

Xalimov A. O., CLINICAL RESULTS OF ELIMINATION OF INFLAMMATION FOCUS AND SANITATION OF ABDOMINAL CAVITY IN ACUTE PERITONITIS 840

Xamidova D. R., O‘QUVCHILARNING IJODIY YUTUQLARINI QO‘LLAB - QUVVATLASH VA RAG‘BATLANTIRISH USULLARI 844

Xasanova G. R., Mallaeva M. M., Botirov X. T., Matyoqubova M. K., EKOLOGIK MUVOZANATNI TIKLASH: MUAMMOLAR, OMILLAR VA ZAMONAVIY YONDASHUVLAR 849

Xaydarova S., Mamadaliyeva M., CHIZIQLI DASTURLASH MASALALARINI YECHISHNING OPTIMAL VARIANTLARINI ISHLAB CHIQISH VA TAHLIL QILISH 855

Khodjaeva S. A., A RELEVANT CLINICAL CASE OF TUBERCULOUS INVOLVEMENT OF THE STERNAL BONE 862

Xo’jaqulov S. U., TIRIK ORGANIZMLARGA TA’SIR ETUVCHI GEOGRAFIK OMILLAR 867

Xushnazarova M. N., BO‘LAJAK O‘QITUVCHILARNI IJTIMOIY PEDAGOGIK AMALIYOTGA AKSIOLOGIK MUNOSABATLARINI RIVOJLANTIRISHNING ASOSIY VAZIFALARI 871

Yadgarova G. S., ETIOLOGICAL, CLINICAL AND DIAGNOSTIC FEATURES OF FACIAL MALFORMATIONS 875

Zokirova Sh. A., Xo‘janazarova N. T., 3D OBYEKTLARNI VIZUALIZATSIYA QILISH VA XUSUSIYATLARNI ANIQLASHNING GEOMETRIK JIHATLARI 879

Абдикаримова Н. Ш., ИЗУЧЕНИЕ ДЕФИЦИТА ЖЕЛЕЗА У ЖЕНЩИН РЕПРОДУКТИВНОГО ВОЗРАСТА 886

Абдуганиев О. Т., ПЕДАГОГИЧЕСКИЕ УСЛОВИЯ РАЗВИТИЯ У СТУДЕНТОВ КОМПЕТЕНТНОСТИ НА ОСНОВЕ ОБЩЕЧЕЛОВЕЧЕСКИХ ЦЕННОСТЕЙ В УСЛОВИЯХ НОВОГО УЗБЕКИСТАНА 894

Абдумуминов Р. З., Мамасолиев С. Ж., Тиркашев Т. Х., ПУТИ ОПТИМИЗАЦИИ ГИДРОЛОГИЧЕСКОГО СОСТОЯНИЯ РЕКИ ЗАРАФШАН 900

Абдурахмонова С. А., ЛОГОПЕДИЧЕСКАЯ РИТМИКА КАК СРЕДСТВО ФОРМИРОВАНИЯ ПРОИЗНОШЕНИЯ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТАС НАРУШЕНИЯМИ РЕЧИ 904

Азимова А. А., МОЧЕВАЯ КИСЛОТА КАК МАРКЁР РИСКА ПРОГРЕССИРОВАНИЯ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ У МОЛОДЫХ ПАЦИЕНТОВ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА 908

Азнабакиева Д. Т., ШИРИН ВА АЧЧИҚ ҚАЛАМПИРНИНГ УРУҒПАЛЛА ВА МАЙСАЛАРИ ЧИРИШИ КАСАЛЛИГИ 916

Алиханов М. М., ТЕОРЕТИЧЕСКОЕ И ПРАКТИЧЕСКОЕ ЗНАЧЕНИЕ ПРЕДМЕТА «НОВЕЙШАЯ ИСТОРИЯ УЗБЕКИСТАНА» В ФОРМИРОВАНИИ ПАТРИОТИЗМА У МОЛОДОГО ПОКОЛЕНИЯ 920

Аманов О. А., РЫНОК ТРУДА МОЛОДЕЖИ В КОНТЕКСТЕ ПЕРЕХОДА К ЦИФРОВОЙ ЭКОНОМИКЕ 924

Арипов О. А., ИНДИЙСКИЙ ОПЫТ ПОВЫШЕНИЯ БЛАГОСОСТОЯНИЯ НАСЕЛЕНИЯ НА ОСНОВЕ РАЗВИТИЯ ПРЕДПРИНИМАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ 929

Артикова З. З., КОНСТРУКЦИЯ 把 (BǍ) В ЭКОНОМИЧЕСКОМ ДИСКУРСЕ СОВРЕМЕННОГО КИТАЙСКОГО ЯЗЫКА 936

Атаниязова М. Б., ПОНЯТИЕ И СУЩНОСТЬ ЦИФРОВОЙ ЭКОНОМИКИ, ЗАРУБЕЖНЫЙ ОПЫТ ЦИФРОВОЙ ЭКОНОМИКИ 940

Ахмадов М. Р., ЭТНОКУЛЬТУРНАЯ ОБУСЛОВЛЕННОСТЬ РЕПРЕЗЕНТАЦИИ ГЕНДЕРА В МЕДИЦИНСКОЙ И СОЦИАЛЬНОЙ РЕКЛАМЕ 947

Ахмадов М. Р., СЕМАНТИКА И СТИЛИСТИКА ЖЕНСКОЙ РЕКЛАМЫ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ РУССКОГО И УЗБЕКСКОГО ЯЗЫКОВ ... 957

Ахмадова М. А., УЛЬТРАЗВУКОВАЯ ДОППЛЕРОГРАФИЯ В ОЦЕНКЕ АРТЕРИАЛЬНОЙ И ВЕНОЗНОЙ ГЕМОДИНАМИКИ ПЛОДА 964

Ахмедов А. Т., Багдасарова И., ИННОВАЦИОННАЯ ХЛОПКОУБОРОЧНАЯ МАШИНА С ГОРИЗОНТАЛЬНЫМИ ШПИНДЕЛЯМИ И ПНЕВМАТИЧЕСКИМ ПРИВОДОМ БЕЗ КОНИЧЕСКОЙ ЗУБЧАТОЙ ПЕРЕДАЧИ 969

Ахмедов А. Т., Багдасарова И., ЭФФЕКТИВНЫЙ ВЫБОР КУЛЬТИВАТОРОВ ДЛЯ РАЗЛИЧНЫХ ТИПОВ ПОЧВЕННОЙ ОБРАБОТКИ 973

Ахмедов А. Т., Багдасарова И., ПРЕОДОЛЕНИЕ ПОЗНАВАТЕЛЬНЫХ БАРЬЕРОВ В УПРАВЛЕНИИ НАУЧНО-ИССЛЕДОВАТЕЛЬСКОЙ РАБОТОЙ СТУДЕНТОВ 977

Ахметзянов О. И., ОЦЕНКА ЭФФЕКТИВНОСТИ ГОСУДАРСТВЕННЫХ ГРАЖДАНСКИХ СЛУЖАЩИХ В ЦИФРОВОЙ СРЕДЕ: АНАЛИЗ СУЩЕСТВУЮЩИХ МЕТОДОВ И ПУТИ ИХ СОВЕРШЕНСТВОВАНИЯ (НА ПРИМЕРЕ МИНИСТЕРСТВА ЦИФРОВОГО РАЗВИТИЯ И ГОСУДАРСТВЕННОГО УПРАВЛЕНИЯ РЕСПУБЛИКИ БАШКОРТОСТАН) 981

Батирова Н. У., Рузимухамедова Ш. Б., Шукуруллаева С. У., ПЕРСПЕКТИВЫ ОБРАЗОВАНИЯ КАРБОНАТНЫХ ТОЛЩ В ПАЛЕОЗОЙСКИХ ОТЛОЖЕНИЯХ 986

Бахтиёрова Д., ЭКОЛОГИЧЕСКОЕ ЗНАЧЕНИЕ ОСОБО ОХРАНЯЕМЫХ ПРИРОДНЫХ ТЕРРИТОРИЙ В СОХРАНЕНИИ ТУГАЙНЫХ ЛАНДШАФТОВ БАССЕЙНА ЗАРАФШАНА 990

Бахтиёрова Д., РОЛЬ АНДИЖАНСКОГО ВОДОХРАНИЛИЩА В СОЦИАЛЬНО-ЭКОНОМИЧЕСКОМ РАЗВИТИИ УЗБЕКИСТАНА 994

Бахтиёрова Д., ВЫСОКОТОЧНЫЙ ГЕОДЕЗИЧЕСКИЙ МОНИТОРИНГ ДЕФОРМАЦИЙ БЬЕФОВ ГИДРОТЕХНИЧЕСКОГО СООРУЖЕНИЯ ПО ДАННЫМ НИВЕЛИРОВАНИЯ (на примере Андижанского водохранилища) 999

Бойтураев О. У., ОСНОВНЫЕ НАПРАВЛЕНИЯ ГОСУДАРСТВЕННОЙ ПОЛИТИКИ ПО ПОДДЕРЖКЕ МАЛОГО БИЗНЕСА И ЧАСТНОГО ПРЕДПРИНИМАТЕЛЬСТВА 1008

Буриева Н. Т., ОСОБЕННОСТИ РАЗВИТИЯ ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТИ У ПАЦИЕНТОВ С РЕВМАТОИДНЫМ АРТРИТОМ 1013

Бурляев А. С., Давыдович А. Р., ГЛЭМПИНГ: ИЗУЧАЕМ МНЕНИЕ ТУРИСТОВ 1021

Ганижонов П. Х., ИЗМЕНЕНИЕ УРОВНЯ КОРТИЗОЛА У СТРЕССИРОВАННЫХ МОРСКИХ СВИНОК (ЭКСПЕРИМЕНТАЛЬНОЕ ИССЛЕДОВАНИЕ) 1026

Губайдуллин Р. Ш., Йулчиев А. Б., ТЕХНОЛОГИЯ ПОЛУЧЕНИЯ КОМПОЗИТНЫХ МАТЕРИАЛОВ ДЛЯ ЖЁСТКИХ ПЕНОПОЛИУРЕТАНОВ НА ОСНОВЕ СИНТЕЗИРОВАННЫХ ПРОДУКТОВ 1030

Дэн Цяоэр, МЕХАНИЗМЫ И ПУТИ СИНЕРГЕТИЧЕСКОГО ВЗАИМОДЕЙСТВИЯ КИТАЙСКО-РОССИЙСКИХ ПАРКОВ В ТРАНСГРАНИЧНЫХ ЗОНАХ ДЛЯ УКРЕПЛЕНИЯ ЭКОНОМИЧЕСКОЙ УСТОЙЧИВОСТИ В РЕГИОНЕ ДАЛЬНЕГО ВОСТОКА И АРКТИКИ — ЭМПИРИЧЕСКИЙ АНАЛИЗ НА ОСНОВЕ ЗОНЫ ПРЕДВАРИТЕЛЬНОГО РАЗВИТИЯ 1034

Жамалова Г. Ж., РОЛЬ И СТРАТЕГИЧЕСКОЕ ЗНАЧЕНИЕ ИНВЕСТИЦИЙ В УСТОЙЧИВОМ РАЗВИТИИ ЭКОНОМИКИ 1047

Жамолдинова С. А., ВЛИЯНИЕ ИСТОРИЧЕСКИХ СОБЫТИЙ НА РАЗВИТИЕ РУССКОГО ЯЗЫКА 1054

Жуланов И. О., Аджимуратов С. М., ДЕФЕКТНАЯ СТРУКТУРА И ПАРАМЕТРЫ УСТАЛОСТНОГО РОСТА ТРЕЩИН В

КОНСТРУКЦИОННЫХ СПЛАВАХ ПОД ВОЗДЕЙСТВИЕМ ЦИКЛИЧЕСКИХ НАПРЯЖЕНИЙ 1059

Жуланов И.О., Аджимуратов С. М., МОДЕЛИРОВАНИЕ ЗАРОЖДЕНИЯ МИКРОТРЕЩИН И МЕХАНИЗМОВ ИХ РАСПРОСТРАНЕНИЯ В АЛЮМИНИЕВЫХ И СТАЛЬНЫХ МАТЕРИАЛАХ ПРИ ЦИКЛИЧЕСКОЙ ДЕФОРМАЦИИ 1063

Жураев Э. С., БЕДНОСТЬ, ЕЁ СУЩНОСТЬ И ВИДЫ 1067

Жураев Э. С., СТРАТЕГИЧЕСКАЯ РОЛЬ СНИЖЕНИЯ ИЗДЕРЖЕК ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ В ОБЕСПЕЧЕНИИ КОНКУРЕНТОСПОСОБНОСТИ НАЦИОНАЛЬНОЙ ЭКОНОМИКИ 1074

Зуннунова Н. М., РАССМОТРЕНИЕ И ТРАКТОВКА «ПОНЯТИЯ ПСИХИКА» 1080

Зуфаров Ш. М., ПУТИ СОВЕРШЕНСТВОВАНИЯ ПЕДАГОГИЧЕСКОГО МАСТЕРСТВА ОФИЦЕРОВ ПРЕПОДАВАТЕЛЕЙ 1084

Ибатуллин Т. Т., ГИБРИДНАЯ МОДЕЛЬ ВОЕННО-ПАТРИОТИЧЕСКОГО ВОСПИТАНИЯ: ИНТЕГРАЦИЯ ЦИФРОВЫХ ПЛАТФОРМ И ЖИВОГО НАСТАВНИЧЕСТВА ВЕТЕРАНОВ СВО В РЕГИОНАЛЬНОЙ ПРАКТИКЕ (НА ПРИМЕРЕ РЕСПУБЛИКИ БАШКОРТОСТАН) 1091

Исматов О. А., РАЗВИТИЕ МАЛОГО И СРЕДНЕГО БИЗНЕСА КАК ФАКТОР СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ РЕГИОНОВ УЗБЕКИСТАНА 1097

Карлыбаева А. М., МЕРЫ ПО ПРЕДОТВРАЩЕНИЮ ИНТЕРНЕТ-ЗАВИСИМОСТИ ШКОЛЬНИКОВ 1105

Кахрамонова Д. Ш., Холмаматова Ш. А., Бурханова Д. С., Кодиров Ж. Ш., ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ФИНАНСОВОГО УПРАВЛЕНИЯ И ЕЁ ВЛИЯНИЕ НА ПРОЗРАЧНОСТЬ И УСТОЙЧИВОСТЬ ЭКОНОМИЧЕСКИХ ПРОЦЕССОВ 1115

Кодиров Ж. Ш., ФИНАНСОВАЯ ГРАМОТНОСТЬ КАК ФАКТОР ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ЛИЧНЫХ И КОРПОРАТИВНЫХ ФИНАНСОВЫХ РЕШЕНИЙ 1125

Комилова Н. У., КЛАССИФИКАЦИЯ ПРИНЦИПОВ ЛАНДШАФТНО-ЭКОЛОГИЧЕСКОГО ПЛАНИРОВАНИЯ ДЛЯ СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ РЕГИОНА НА ОСНОВЕ ПРИМЕРОВ ЭТНОЭКОЛОГИЧЕСКОЙ КУЛЬТУРЫ 1134

Конышев Н. Ю., ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ РАБОТЫ С ОБРАЩЕНИЯМИ ГРАЖДАН В УСЛОВИЯХ РОСТА ЭЛЕКТРОННОГО ОБРАЩЕНИЯ: ОПЫТ АДМИНИСТРАЦИИ ГОРОДСКОГО ОКРУГА ГОРОД УФА 1142

Косбатыров А. Н., СОВЕРШЕНСТВОВАНИЕ МЕХАНИЗМОВ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ СУБЪЕКТОВ МАЛОГО БИЗНЕСА В УСЛОВИЯХ КОНКУРЕНТНОЙ СРЕДЫ 1147

Косбатыров А. Н., СОВЕРШЕНСТВОВАНИЕ МЕХАНИЗМОВ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ СУБЪЕКТОВ МАЛОГО БИЗНЕСА В УСЛОВИЯХ КОНКУРЕНТНОЙ СРЕДЫ 1159

Косимова Д. С., МИКРОБИОЛОГИЧЕСКИЕ ФАКТОРЫ РАЗВИТИЯ ЭНДОМЕТРИТА И СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ..... 1171

Кулиева М.У., Турсунов Б. Ш., Мухаммадиева З., КЛЕВЕР ЛУГОВОЙ (TRIFOLIUM PRATENSE L.) КАК ПЕРСПЕКТИВНОЕ ЛЕКАРСТВЕННОЕ И ПИЩЕВОЕ РАСТЕНИЕ..... 1176

Культуманов Р. У., ЦИФРОВИЗАЦИЯ УПРАВЛЕНИЯ ОСОБЫМИ ЭКОНОМИЧЕСКИМИ ЗОНАМИ КАК ФАКТОР ЭФФЕКТИВНОГО ВЗАИМОДЕЙСТВИЯ ОРГАНОВ ГОСУДАРСТВЕННОЙ И МУНИЦИПАЛЬНОЙ ВЛАСТИ: ИНСТИТУЦИОНАЛЬНЫЙ И УПРАВЛЕНЧЕСКИЙ АНАЛИЗ ОЭЗ ППТ «АЛГА» 1183

Қорабоева Н. Н., ФУНКЦИОНАЛЬНАЯ РОЛЬ И МЕТОДИЧЕСКИЕ ВОЗМОЖНОСТИ ХУДОЖЕСТВЕННЫХ ТЕКСТОВ В ОБУЧЕНИИ ЯЗЫКАМ..... 1189

Лыгина Д. А., МЕТОДЫ И ИНСТРУМЕНТЫ УПРАВЛЕНИЯ РИСКАМИ В ПРОЕКТНОМ МЕНЕДЖМЕНТЕ: АНАЛИЗ И ОПТИМИЗАЦИЯ 1193

Мамаджанова С. В., МЕТОД МОЗГОВОГО ШТУРМА В РАЗВИТИИ ТЕХНИЧЕСКОГО ТВОРЧЕСТВА СТУДЕНТОВ..... 1197

Мамажонова Г. К., ФИЛОСОФСКИЕ ПРОБЛЕМЫ БИОЭТИКИ В УСЛОВИЯХ ТЕХНОЛОГИЧЕСКИХ ИЗМЕНЕНИЙ 1201

Мулдабекова Б. Ж., Қаххаров Ф. Б., СОВРЕМЕННЫЕ НАПРАВЛЕНИЯ ПЕРЕРАБОТКИ ТРИТИКАЛЕ И ИХ ЗНАЧЕНИЕ ДЛЯ РАЗВИТИЯ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ УЗБЕКИСТАНА 1205

Мулдабекова Б. Ж., Қаххаров Ф. Б., ИСПОЛЬЗОВАНИЕ ТРИТИКАЛЕ В РАЗВИТИИ БЕЗОТХОДНЫХ ТЕХНОЛОГИЙ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ..... 1209

Муминова Г. Б., АНИМИЗМ -КАК ПРОЯВЛЕНИЕ ДЕТСКОГО ЭГОЦЕНТРИЗМА 1213

Муминова Г. Б., ОСОБЕННОСТИ ПСИХИЧЕСКОГО РАЗВИТИЯ В МЛАДЕНЧЕСТВЕ..... 1216

Нарзуллаева Ж., Мукарова С., СОВРЕМЕННЫЕ ПОСТКЕЙНСИАНСКИЕ И ИНСТИТУЦИОНАЛЬНЫЕ ПОДХОДЫ К ПРИРОДЕ ДЕНЕГ 1220

Негматов М. К., НЕТРАДИЦИОННОЕ ОРГАНОМИНЕРАЛЬНОЕ УДОБРЕНИЕ ИЗ ОСАДКОВ КАНАЛИЗАЦИОННЫХ СТОКОВ..... 1228

Паязов Ш. Н., СТРУКТУРНО - НЕЙРОННЫЕ ХАРАКТЕРИСТИКИ ПОЛОВЫХ ЖЕЛЕЗ У ЛАБОРАТОРНЫХ ЖИВОТНЫХ 1235

Попко-Садчикова И. А., медицинскИЙ туризм И СПА индустриЯ В РОССИИ: АНАЛИЗ СОВРЕМЕННОГО СОСТОЯНИЯ 1239

Рахимбердиева Ш. Р., СИНТЕЗ ПРОИЗВОДНЫХ НЕСИММЕТРИЧНЫХ ДИАЦЕТИЛЕНОВ 1244

Рахимов А. Х., ТАКОМИЛЛАШТИРИЛГАН СЕПАРАТОРНИ ЯРАТИШ ВА ИШЛАБ ЧИҚАРИШДА СИНОВДАН ЎТКАЗИШ 1247

Рустамов У., НЕКОТОРЫЕ РАЗМЫШЛЕНИЯ О ИСТОРИИ БУМАГИ В ЦЕНТРАЛЬНОЙ АЗИИ 1251

Сафарова Н. И., Каракулов Н. М., Умурова Н. Я., ЗНАЧЕНИЕ ПРОЦЕССА СУБУРБАНИЗАЦИИ В ТАШКЕНТСКОЙ ОБЛАСТИ И ГОРОДЕ ТАШКЕНТЕ В УЛУЧШЕНИИ ЭКОЛОГИЧЕСКОГО СОСТОЯНИЯ ГОРОДА 1261

Сержанова А. К., Мирзамбетов А. Б., АНАЛИЗ ПОКАЗАТЕЛЕЙ РОСТА И ВСХОЖЕСТИ СЕМЯН ЛЕКАРСТВЕННОГО РАСТЕНИЯ ЭХИНАЦЕИ ПУРПУРНОЙ (*ECHINACEA PURPUREA*) В ЛАБОРАТОРНЫХ УСЛОВИЯХ IN VITRO 1268

Содиков С. С., КАРДИОРЕНАЛЬНЫЕ ПРЕИМУЩЕСТВА НОВЫХ КЛАССОВ САХАРОСНИЖАЮЩИХ ПРЕПАРАТОВ (ISGLT2, АГПП-1) 1273

Сохибова З. О., SARS-COV-2 ИНФЕКЦИЯСИНИНГ ҚАНДЛИ ДИАБЕТЛИ БЕМОРЛАРДАГИ МЕТАБОЛИК ВА ЭНДОКРИН ЎЗГАРИШЛАРГА ТАЪСИРИ 1279

Суванова Д. Н., ЗНАЧЕНИЕ ОСОБО ОХРАНЯЕМЫХ ТЕРРИТОРИЙ В СОХРАНЕНИИ БИОРАЗНООБРАЗИЯ В РЕГИОНАХ 1283

Сулейманов Р. И., УМУРТҚА ПОҒОНАСИНИНГ ҚЎШИМЧА ВЕНОЗ ЧИГАЛЛАРИНИНГ КОЛЛАТЕРАЛ АЙЛАНМА ЙУЛЛАРИ 1288

Сулейманов Р. И., КОЛЛАТЕРАЛЬНОЕ КРОВООБРАЩЕНИЕ В СВЯЗКАХ ДОБАВОЧНЫХ ВЕН ПОЗВОНОЧНИКА 1292

Тагиров Д. З., ЦИФРОВЫЕ ПЛАТФОРМЫ КАК ИНСТРУМЕНТ КООРДИНАЦИИ МЕЖУРОВНЕВОГО ВЗАИМОДЕЙСТВИЯ: ОПЫТ ВНЕДРЕНИЯ СИСТЕМЫ «ЦЕНТР УПРАВЛЕНИЯ РЕГИОНОМ» В РЕСПУБЛИКЕ БАШКОРТОСТАН 1296

Тангиров Х. Т., ЖАНУБИЙ ЎЗБЕКИСТОН ТОВУҚСИМОНЛАР ГЕЛЬМИНТЛАРИНИНГ ФАУНИСТИК ТАҲЛИЛИ 1302

Тиркашев Т. Х., Назаров С. С., Нурлибоев Х. Х., Абдуллоева С. Р., ЗАГРЯЗНЕНИЯ ВОД РЕКИ ЗАРАФШАН И МЕТОДЫ ОПТИМИЗАЦИИ ЕЁ ЭКОЛОГИЧЕСКОГО СОСТОЯНИЯ 1307

Тиркашев Т. Х., Абдумуминов Р. З., Мамасолиев С. Ж., ПУТИ ОПТИМИЗАЦИИ АНТРОПОГЕННОГО ВОЗДЕЙСТВИЯ НА ВОДЫ РЕКИ ЗАРАФШАН 1311

Турдахун Г. Е., АКТУАЛЬНОСТЬ И СОВРЕМЕННОЕ СОСТОЯНИЕ ПРИМЕНЕНИЯ МЕТОДОВ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБРАЗОВАТЕЛЬНЫХ ПЛАТФОРМАХ 1316

Турсунов Б. Ш., КАРИЕС МОЛОЧНЫХ ЗУБОВ: ПРИЧИНЫ, ДИАГНОСТИКА И ЛЕЧЕНИЕ 1325

Турсунов Б. Ш., ИСПРАВЛЕНИЕ НЕПРАВИЛЬНОГО ПРИКУСА У ДЕТЕЙ 1332

Умарова О. М., ВЫДЕЛЕНИЕ АМИНОКИСЛОТ ИЗ РАСТЕНИЯ CICHORIUM INTYBUS L 1338

Умматов Р. Б., Абдуллаев З. Д., Улмасов Ф. Ё., Бобоназаров Ш. О., Умаров С. А., ВНЕДРЕНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБЕСПЕЧЕНИЕ ЕДИНСТВА СРЕДСТВ ИЗМЕРЕНИЙ 1343

Умуров Б. Ф., ТАЖРИБДА ОҚ ЗОТСИЗ КАЛАМУШЛАР СКЕЛЕТ МУШАК ТЎҚИМАСИНИНГ МЕХАНИК ЁПИҚ ЖАРОҲАТИДАН КЕЙИНГИ МОРФОЛОГИК ЎЗГАРИШЛАРИ (ЁШГА БОҒЛИҚ ТАҲЛИЛ) 1349

Файзиев Х. Б., МОРФОМЕТРИЧЕСКИЕ ИЗМЕНЕНИЯ СТРУКТУРЫ ТИМУСА У 1-МЕСЯЧНЫХ ЛАБОРАТОРНЫХ КРЫС ПОСЛЕ ХИМИЧЕСКОГО ОЖОГА ПИЩЕВАРИТЕЛЬНОГО ТРАКТА 1354

Хазраткулова А. В., Досалиев К. С., МЕТОДИЧЕСКИЕ ПОДХОДЫ К ОБУЧЕНИЮ НАУЧНО-ТЕХНИЧЕСКОМУ СТИЛЮ РЕЧИ НА ЗАНЯТИЯХ РУССКОГО ЯЗЫКА В ТЕХНИЧЕСКОМ УНИВЕРСИТЕТЕ 1359

Хазраткулова А. В., Досалиев К. С., ИНТЕГРАЦИЯ ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННОГО ОБУЧЕНИЯ РУССКОМУ ЯЗЫКУ В СИСТЕМУ ИНЖЕНЕРНОГО ОБРАЗОВАНИЯ 1363

Хайитов Ж. К., Рахимов Г. Б., Бердиев А. Ф., ХИМИЧЕСКАЯ ДЕСКАЛЬЦИНАЦИЯ ТЕПЛООБМЕННОГО ОБОРУДОВАНИЯ: МЕТОДЫ, КИНЕТИКА РАСТВОРЕНИЯ И ЭФФЕКТИВНОСТЬ ПРОЦЕССА 1367

Хайитов Ж. К., Хуррамов А. Т., ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ ЭКСПАНЗЕРНЫХ ГАЗОВ ПРИ АБСОРБЦИОННОЙ ОЧИСТКЕ ГАЗОВ 1373

Халикова Ф. Ш., МОРФОЛОГИЧЕСКАЯ СТРУКТУРА ЩИТОВИДНОЙ ЖЕЛЕЗЫ БЕЛЫХ КРЫС ПРИ ХИМИОТЕРАПИИ РАКА МОЛОЧНОЙ ЖЕЛЕЗЫ 1378

Халилова А. Р., ИСПОЛЬЗОВАНИЕ ЦИФРОВЫХ ТЕХНОЛОГИЙ ДЛЯ ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ФИНАНСОВОЙ ДЕЯТЕЛЬНОСТИ В СТРОИТЕЛЬНОЙ ОТРАСЛИ 1389

Халимов А. О., СОВЕРШЕНСТВОВАНИЕ ЭФФЕКТИВНЫХ СТРАТЕГИЙ ЛЕЧЕНИЯ ГНОЙНО-ХИРУРГИЧЕСКИХ ИНФЕКЦИЙ 1397

Халимова Г. С., Каландарова Д. Д., ОБ РАЦИОНАЛЬНОМ ИСПОЛЬЗОВАНИИ АТМОСФЕРНЫХ ОСАДКОВ В ПУСТЫННОЙ ЗОНЕ (НА ПРИМЕРЕ ХРЕБТА КУЛЬДЖУКТАУ И ПРИЛЕГАЮЩИХ ТЕРРИТОРИЙ) 1405

Хегай О. Ч., Саидова С. С., ОСОБЕННОСТИ ПОВЕСТВОВАНИЯ В РОМАНЕ М. Ю. ЛЕРМОНТОВА “ГЕРОЙ НАШЕГО ВРЕМЕНИ”..... 1411

Ходжиматов М.-Б. З., МОДЕРНИЗАЦИЯ СИСТЕМЫ УПРАВЛЕНИЯ АСИНХРОННЫМ ДВИГАТЕЛЕМ 1415

Холиков Р. Й., ФОРМИРОВАНИЕ, ТЕРРИТОРИАЛЬНОЕ РАЗМЕЩЕНИЕ И ЗОНИРОВАНИЕ САКРАЛЬНЫХ ЛАНДШАФТОВ ФЕРГАНСКОЙ ОБЛАСТИ 1420

Эркинова М. У., Тухташева З. А., Султоналиева М. М., АНТИБИОТИЧЕСКАЯ РЕЗИСТЕНТНОСТЬ МИКРООРГАНИЗМОВ: ГЛОБАЛЬНАЯ ПРОБЛЕМА И ПОДХОДЫ..... 1426

Юлдашев Э. Х., ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ИНВЕСТИЦИОННОЙ ПОЛИТИКИ КОММЕРЧЕСКИХ БАНКОВ 1433

Ядгарова Г.С., ВЫБОР ОПТИМАЛЬНЫХ МЕТОДОВ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ПРИ ВРОЖДЕННЫХ НЕСИММЕТРИЧНЫХ РАСЩЕЛИНАХ ГУБЫ..... 1438

Якубова С. Р., Мусахонова М. Ш., РОЛЬ МАКРО И МИКРОЭЛЕМЕНТОВ В ПОДДЕРЖАНИИ ФИЗИОЛОГИЧЕСКОГО ГОМЕОСТАЗА ОРГАНИЗМА ЧЕЛОВЕКА..... 1445

Январова Ж. Я., МЕТАБОЛИЧЕСКИЕ ФАКТОРЫ В ПАТОГЕНЕЗЕ АРИТМИЙ У ПАЦИЕНТОВ С ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ 1453

Яхёева Г. М., РОЛЬ МАГНИТНО-РЕЗОНАНСНОЙ ТОМОГРАФИИ В РАННЕЙ ДИАГНОСТИКЕ АВАСКУЛЯРНОГО НЕКРОЗА ГОЛОВКИ БЕДРЕННОЙ КОСТИ 1459

ЗДРАВООХРАНЕНИЕ В ОБЩЕСТВЕ 1465

Abdukadirov D. A., REVIEW OF MODERN METHODS FOR TREATING KELOID SCARS..... 1465

Allambergenova J. E., AYOLLAR JINSIY TIZIMI (TUXUMDON, BACHADONNAYI, BACHADON, QIN, SUT BEZLARI)..... 1471

Allambergenova J. E., MODELING OF HEMOLYSIS, BLOOD GROUPS AND TRANSFUSION INCOMPATIBILITY 1475

Allambergenova J. E., AYOLLARNING REPRODUKTIV TIZIMI ORGANLARINING MORFOFUNKSIONAL INTEGRATSIYASI VA TARTIBGA SOLINISHI 1479

Davronova Sh. R., NEW MORPHOLOGICAL IDEAS OF THE PARTICIPATION OF THE THYMUS GLAND IN THE PROCESSES OF IMMUNITY 1483

Gairatullaeva M. D., MORPHOFUNCTIONAL CHANGES IN FEMALE GENITAL ORGANS IN HYPERTHYROIDISM 1488

Istamov M. B., CLINICAL AND DYNAMIC FEATURES OF DEPRESSIVE DISORDERS IN PATIENTS WITH TYPE II DIABETES MELLITUS AND THEIR IMPACT ON THE DEVELOPMENT OF DIABETIC POLYNEUROPATHY 1491

Istamov M. B., Jahangirova Sh., HISTOLOGICAL CHANGES IN THE KIDNEYS IN PATHOLOGY 1503

Mahmudova M. R., MORPHOFUNCTIONAL CHANGES IN TISSUES IN OVARIAN CANCER 1506

Mukhtorova H. K., HORMONAL AND METABOLIC PROFILE AND GINGEN S INSOMNIA RASTROYSTVAMI AND MENOPAUSE 1510

Mukhtorova H. K., PSYCHOLOGICALASPECTS OF ALIMENTARY OBESITY (literature review) 1515

Murodova I. B., NORMAL HISTOLOGICAL STRUCTURE OF THE LIVER AND CHANGES IN HEPATITIS A 1522

Qodirxonov A., MORPHOFUNCTIONAL CHANGES IN BREAST CANCER 1525

Radjabova S., Karjavov A. R., MARGANETS BIOGEN ELEMENTINING TIBBIYOTDAGI AHAMIYATI 1528

Rustamov U. T., THE PLACE AND ROLE OF PSYCHOPHARMACOLOGY IN ONCOLOGICAL DISORDERS 1536

Salimova Sh., MORPHOLOGICAL CHANGES IN CERVICAL CANCER ..1545

Shodmonova G., Mirmuzafarova P., Ro'ziboyeva M., INSON GENOMIDA KENG TARQALGAN IRSIY KASALLIKLAR TURLARI VA ULARNI ANIQLASHNING ZAMONAVIY USULLARI 1548

Soataliyeva R. Sh., MORPHOLOGICAL CHANGES IN THE PANCREAS IN TYPE 1 DIABETES MELLITUS 1553

Turdaliyev A. S., NUTRITION AND FILTRATION: THE KIDNEYS EVALUATE EVERY BITE 1556

Valieva Z. A., THE ROLE OF EMBRYONIC GERM LAYERS IN THE FORMATION OF TISSUES AND ORGANS 1559

Абдукадиров Д. А., ИСПОЛЬЗОВАНИЕ СЕРОВОДОРОДНЫХ ВАНН ПРИ ЛЕЧЕНИИ КЕЛОИДНЫХ РУБЦОВ 1563

Абдукадиров Д. А., ЭФФЕКТИВНОСТЬ КОМБИНИРОВАННОГО ПРИМЕНЕНИЯ ТРИАМЦИНОЛОНА АЦЕТОНИДА ПРИ ЛЕЧЕНИИ КЕЛОИДНЫХ РУБЦОВ 1569

Абдуллаева С. Б., Тулқинова Д. Ж., БИОТИББИЁТ МУҲАНДИСЛИГИДА РОБОТ ТЕХНИКАСИ 1574

Абдуллаева С. Б., Тожиева Д. Т., ТИББИЙ-БИОЛОГИК МАСАЛАЛАРНИ ЕЧИШДА ИНТЕГРАЛ ҲИСОБЛАШДАН ФОЙДАЛАНИШ САМАРАДОРЛИГИ 1578

Абдуллажонов Х. М., Аширалиев Ж. Ф., ОПТИМИЗАЦИЯ ИНТРАОПЕРАЦИОННОЙ ИНФУЗИОННОЙ ТЕРАПИИ У НОВОРОЖДЕННЫХ 1585

Ботиров А. Р., ОЦЕНКА ЭФФЕКТИВНОСТИ СТАРТОВОЙ НУТРИТИВНОЙ ПОДДЕРЖКИ ПРИ ТОКСИКО-ДИСТРОФИЧЕСКОМ СИНДРОМЕ У ДЕТЕЙ 1609

Ешбанбетова Ш. С., МОРФОГЕНЕЗ РЕПРОДУКТИВНОЙ СИСТЕМЫ ПОТОМСТВА ПРИ ГИПЕРАНДРОГЕНИИ У МАТЕРИ 1617

Зокирова С. А., ИСПОЛЬЗОВАНИЕ СМАД ДЛЯ ВЫБОРА СТАРТОВОЙ ТЕРАПИИ ПРИ МАСКИРОВАННОЙ ГИПЕРТЕНЗИИ 1622

Қодиров М. А., ФАКТОРЫ РИСКА ПЕРИОПЕРАЦИОННЫХ АРИТМИЙ У ДЕТЕЙ 1629

Қодиров М. А., ОСОБЕННОСТИ СЕРДЕЧНОГО РИТМА У МЛАДЕНЦЕВ КАК ОТВЕТ НА ГИПОКСИЮ ПРИ ВИРУСНОМ БРОНХИОЛИТЕ 1634

Мадаминова Д. У., ГИСТОЛОГИЯ ЭРИТРОЦИТОВ И ИХ МОРФОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ ПРИ ПАТОЛОГИЯХ 1640

Мамаджанов С. К., СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ ОСТРОГО КОРОНАРНОГО СИНДРОМА: ОТ НЕОТЛОЖНОЙ ПОМОЩИ ДО ВТОРИЧНОЙ ПРОФИЛАКТИКИ 1644

Мирзоев Р. И., ОЦЕНКА ЭФФЕКТИВНОСТИ МУЛЬТИДИСЦИПЛИНАРНОГО ПОДХОДА В РЕАБИЛИТАЦИИ ПАЦИЕНТОВ С ТРАВМАМИ ПОЗВОНОЧНИКА 1648

Неъматова З. М., КОРРЕКЦИЯ ГИПОВОЛЕМИИ ПРИ ОБЕЗБОЛИВАНИИ ДЕТЕЙ С КИШЕЧНОЙ НЕПРОХОДИМОСТЬЮ С ВЫСОКИМ РИСКОМ РАЗВИТИЯ ОСЛОЖНЕНИЙ 1656

Норбоев Б., РОЛЬ ДЫХАТЕЛЬНЫХ УПРАЖНЕНИЙ И ФИЗИЧЕСКИХ ТРЕНИРОВОК В УЛУЧШЕНИИ КОНТРОЛЯ АСТМЫ У ПАЦИЕНТОВ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА 1661

Сафаров Х. Х., Казакова М. Р., Усманалиев С. А., ИММУНОМОДУЛИРУЮЩИЕ И АНТИБАКТЕРИАЛЬНЫЕ ЭФФЕКТЫ ВЛОК ПРИ ИСТИННОЙ ЭКЗЕМЕ КОЖИ 1668

Ходжиева К. Ф., ОПТИМИЗАЦИЯ ДИАГНОСТИКИ И КОНСЕРВАТИВНОГО ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ФАРИНГИТА НА ФОНЕ ХРОНИЧЕСКОГО ТОНЗИЛЛИТА 1673

Шигакова Л. А., МОРФОГЕНЕЗ ИММУННОЙ СИСТЕМЫ ТОНКОЙ КИШКИ В УСЛОВИЯХ ПРЕНАТАЛЬНОГО ВОЗДЕЙСТВИЯ АТМОСФЕРНЫХ ЗАГРЯЗНИТЕЛЕЙ 1679

Юсупова М. Б., ГИСТОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ СЕМЕННИКОВ ПРИ РАЗЛИЧНЫХ ПАТОЛОГИЯХ 1683

ИНФОРМАЦИОННЫЕ И КОММУНИКАТИВНЫЕ ТЕХНОЛОГИИ 1687

Зыблева В. А., РОЛЬ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ОПТИМИЗАЦИИ СИСТЕМЫ ДОКУМЕНТАЦИОННОГО ОБЕСПЕЧЕНИЯ УПРАВЛЕНИЯ КОММЕРЧЕСКИМ БАНКОМ: ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ И ПРАКТИЧЕСКИЕ РЕКОМЕНДАЦИИ 1687

Турутина Е. С., ЦИФРОВЫЕ ТЕХНОЛОГИИ В ЗАКУПОЧНОЙ ЛОГИСТИКЕ ПРОМЫШЛЕННЫХ ОРГАНИЗАЦИЙ РЕСПУБЛИКИ БЕЛАРУСЬ: ТЕОРЕТИЧЕСКИЙ И МЕТОДИЧЕСКИЙ ОБЗОР 1693

СОВРЕМЕННЫЕ НАУКИ ИОБРАЗОВАНИЕ 1699

Akbarova M. T., KIMYO FANINI INNOVATSION TEXNOLOGIYALAR ASOSIDA O‘QITISH ORQALI TALABA KOMPETENTLIGINI SHAKLLANTIRISHNING ZAMONAVIY YONDASHUVLARI 1699

Макаренко Я. П., РЕЗУЛЬТАТ ИССЛЕДОВАНИЯ ЛОГОПЕДИЧЕСКОЙ РАБОТЫ ПО ПРЕОДОЛЕНИЮ НАРУШЕНИЙ ПРОИЗНОСИТЕЛЬНОЙ СТОРОНЫ РЕЧИ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА С ДИЗАРТРИЕЙ 1704

СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ ОРГАНИЗАЦИЕЙ 1708

Бадаев А. А., ЭМОЦИОНАЛЬНЫЙ ИНТЕЛЛЕКТ И СТИЛЬ УПРАВЛЕНИЯ РУКОВОДИТЕЛЕЙ В ОРГАНИЗАЦИЯХ СПОРТИВНОГО ПРОФИЛЯ: ЭМПИРИЧЕСКОЕ ИССЛЕДОВАНИЕ НА ПРИМЕРЕ ООО «АБСОЛЮТНЫЙ ЧЕМПИОНАТ АХМАТ» 1708

Бадаев А. А., ЦЕННОСТНО-ОРИЕНТИРОВАННОЕ ЛИДЕРСТВО В СОВРЕМЕННЫХ ОРГАНИЗАЦИЯХ: КЕЙС СПОРТИВНОГО ХОЛДИНГА «АБСОЛЮТНЫЙ ЧЕМПИОНАТ АХМАТ» 1713