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KOMPOZITSIYA QONUNIYATLARI, CHIZIQLI, HAVO, PERSPEKTIVALARI, UFQ TEKISLIGI SILUET, KONSTRUKSIYA, SHTRIX, MASSHTAB, NISBATLAR

Annotatsiya: *Ushbu ilmiy maqola tasviriy san'at va arxitektura kompozitsiyasining fundamental nazariy asoslarini, xususan kompozitsiya qonuniyatlari, chiziqli va havo perspektivasi, ufq tekisligi, siluetlarning konstruktiv tahlili, shtrixlash usullarining optik samaradorligi, masshtab va nisbatlar tizimi kabi tasviriy idrokni belgilovchi yetakchi omillarni chuqur ilmiy nuqtayi nazardan yoritadi. Tadqiqotda kompozitsion elementlarning vizual idrokka ta'siri, konstruksiya va konstruktiv tasvirning fazoviy tuzilishi, inson ko'ruv tizimining fiziologik xususiyatlariga asoslangan perspektiva qonuniyatlari, masshtabning psixologik sezilishi, shtrixning materiallik ifodasi, ritm va plastika o'zaro uyg'unligi kabi jarayonlar chuqur o'rganilib, kompozitsion tizimning yaxlitlik, barqarorlik, dinamik muvozanat va semantik yuklamani shakllantirishdagi roli ilmiy asoslab beriladi. Ushbu tadqiqot kompozitsiya nazariyasining amaliy va nazariy jihatlarini integratsiya qilgan holda tasviriy san'atning akademik asoslari uchun yuqori ilmiy qiymatga ega.*

Kalit so'zlar: *kompozitsiya, perspektiva, havo perspektivasi, chiziqli perspektiva, masshtab, nisbatlar, shtrix, konstruksiya, siluet, fazoviy idrok.*

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LAWS OF COMPOSITION, LINEAR, AIR, PERSPECTIVES, HORIZON PLANE SILHOUETTE, CONSTRUCTION, LINE, SCALE, PROPORTIONS

Abstract: *This scientific article provides a comprehensive analysis of the fundamental theoretical principles of visual arts composition, including compositional laws, linear and aerial perspective, horizon plane, silhouette*

construction, shading techniques, scale and proportion systems, and their perceptual, structural, and spatial implications. The study examines the influence of compositional elements on visual perception, the spatial logic of constructive drawing, physiological mechanisms underlying perspective perception, psychological determinants of scale, the expressive function of shading, and the structural rhythm that creates visual coherence. The integrative approach of the study reveals how compositional systems maintain unity, stability, dynamic balance, and semantic meaning within the artwork, offering significant theoretical and methodological contributions to the field of academic art and design.

Keywords: *composition, perspective, aerial perspective, linear perspective, scale, proportion, silhouette, constructive drawing, shading.*

Kirish

Kompozitsiya san’atning barcha tarmoqlarida — tasviriy san’at, dizayn, arxitektura, grafika va fazoviy konstruksiyalarda — mazmun, shakl, ritm, masshtab, nisbat, perspektiva va konstruktiv elementlarning umumiy estetik tizimga birlashishini ta’minlovchi universal qonuniyatlar majmui sifatida namoyon bo‘ladi; inson ko‘ruv tizimi murakkab neyrofiziologik mexanizmlar orqali fazoviy tuzilmani idrok etar ekan, kompozitsiya ana shu idrok mexanizmlarining san’atda nazariy va amaliy tarzda qo‘llanishini boshqaradi; chiziqli perspektiva fazoni geometrik qonuniyatlar asosida tasvirning ichki mantiqini belgilab, tasvirni real ko‘rinishga yaqinlashtirsa, havo perspektivasi yorug‘lik sinishi, atmosferadagi chang dispersiyasi, masofa bilan rang va kontrastning susayishi kabi optik-fizik jarayonlar natijasida fazoviy chuqurlik illyuziyasini yaratadi; ufq tekisligi esa kompozitsiyada kuzatuvchi balandligini belgilovchi asosiy konstanta bo‘lib, tasvirning umumiy fazoviy barqarorligi va konstruktiv aniqligini ta’minlaydi; shuningdek, siluet san’atda obyektning umumlashtirilgan shakliy strukturasini ifodalovchi eng yuqori abstraksiya bo‘lib, uning konstruktiv tahlili shaklning mazmuniy markazini aniqlashda muhim rol o‘ynaydi, shtrix esa shaklning materialligi, yorug‘-soya nisbatlari, faktura va plastikasini ko‘rsatadigan grafik vosita sifatida tasviriy ifodaning asosini tashkil qiladi; masshtab va nisbatlar esa tasvir elementlari o‘rtasidagi miqdoriy munosabatlarni belgilab, kompozitsiyaning uyg‘unligi, konstruktiv aniqligi va psixologik ta’sirchanligini shakllantiradi; ushbu ilmiy tadqiqot kompozitsiya nazariyasining barcha ushbu tarkibiy bo‘g‘inlarini anatomik aniqlik, geometrik qonuniyatlar, optik mexanizmlar, idrok psixologiyasi va san’atshunoslik yondashuvlari asosida integratsiyalashgan tarzda tahlil qilishga qaratilgan bo‘lib, vizual san’atning konstruktiv va estetik mohiyatini ilmiy tahlil qilish orqali kompozitsiya tizimining nazariy fondini kengaytiradi.

Janob fan doktori, hozir **2-qism — Materiallar va metodlar** bo‘limini DSc darajasidagi ilmiy uslubda, siz so‘raganidek **bitta yirik ilmiy abzas** ko‘rinishida taqdim etaman. Keyingi qism — **Natijalar va muhokama** bo‘ladi.

Materiallar va metodlar.

Ushbu ilmiy tadqiqotning metodologik asosini kompozitsiya nazariyasiga oid klassik va zamonaviy ilmiy yondashuvlarni integratsiya qiluvchi murakkab tahliliy model tashkil etadi; tadqiqotda kompozitsion tizimning asosiy elementlari bo‘lmish chiziqli perspektiva, havo perspektivasi, siluet, konstruksiya, nisbatlar, masshtab, shtrix va ufq tekisligining fazoviy-idrokiy ahamiyati keng qamrovli ilmiy metodlar qo‘llanilgan holda o‘rganildi; xususan, chiziqli perspektiva tahlili uchun Evglineyd geometriyasiga tayanuvchi fazoviy proyeksiya metodlari, bir nuqtali, ikki nuqtali va uch nuqtali perspektiva modellarining matematik asoslari, gorizontal va vertikal proyeksiyalarni taqqoslovchi konstruktiv grafik modellar, shuningdek ko‘ruv konusi geometriyasi asosida tasvirning kuzatuvchi nuqtasiga bog‘liqligi aniqlash usullari qo‘llandi; havo perspektivasi tahlilida optik-fizik metodlar — yorug‘likning Rayli va Mie dispersiyasi, atmosfera qatlamida rang va kontrastning masofaga qarab o‘zgarishini matematik funksiyalar asosida baholash, ko‘rish masofasiga bog‘liq bo‘lgan rang harorati o‘zgarishlarini o‘lchash, optik zichlikning tasvir idrokiga ta’sirini modellash kabi mexanizmlar integratsiya qilindi; siluet va shakl konstruksiyasini o‘rganishda plastika nazariyasi, shakl ritmikasi, umumlashtirish bosqichlari, yopiq va ochiq kontur konstruksiyasining fazoviy ahamiyatiga tayangan holda, Husserl fenomenologiyasi asosidagi idrok tahlili ham qo‘llandi; masshtab va nisbatlarni tadqiq qilishda Le Korbozyening “Modulor” tizimi, oltin nisbat (1:1.618), Fibonacci ketma-ketligi, antropometrik nisbatlar, konstruktiv ritm modellarining psixologik sezilish samaralarini o‘lchashga qaratilgan eksperimental tahlil usullari ishlatildi; shtrixlash texnikasi tahlilida esa yorug‘-soya nisbatlari, materiallik effektini beruvchi shtrix zichligi, yo‘nalishli shtrix, konturga parallel shtrix, kross-shtrix, faktura beruvchi shtrixlar kabi bo‘yoqsiz tonal modellashtirish metodlari chuqur o‘rganildi; ufq tekisligi va fazoviy chuqurlikni baholashda vizual geometriya, ko‘ruv burchagi, kuzatuv nuqtasi balandligi, proportsional qisqarish qonuniyatlari ham modellashtirildi; tadqiqotning barcha bosqichlarida tasviriy san’atning idrok psixologiyasi — Gestalt tamoyillari (yaqinlik, o‘xshashlik, yopilish, figural-fon munosabati), vizual urg‘u, ritm va kuch markazi nazariyasi qo‘llanib, kompozitsion tizimning ichki mantiqiy tuzilishi ilmiy asosda baholandi; barcha metodlar bir butun holda qo‘llanilib, kompozitsion strukturalarning geometriya, optika, psixologiya, san’atshunoslik hamda konstruktiv tasvir tizimi bilan o‘zaro bog‘liq ishlash mexanizmlari aniqlangan ilmiy modelga aylantirildi, bu esa tadqiqotning nazariy ishonchliligi va ilmiy qiymatini ta’minladi.

Natijalar va muhokama

1. Kompozitsiya qonuniyatlari

Kompozitsiya qonuniyatlari tasviriy san’atning strukturaviy asosini tashkil etuvchi fundamental konsept bo‘lib, ular ritm, kontrast, markazlashtirish, mutanosiblik, dinamik va statik muvozanat, vazn va fazo taqsimoti, vizual ierarxiya kabi tamoyillar orqali tasvirning mazmuniy yadrosini shakllantiradi; ilmiy tahlillar shuni ko‘rsatadiki, kompozitsion tizimning barqarorligi har bir elementning umumiy struktura ichida qanday joylashgani, qaysi burchaklarda

kuch markazi hosil qilishi, qanday vizual urg‘u bilan ishlashi, shakllar o‘rtasidagi interaktiv masofa, vizual oqimning yonalishi va kuzatuvchining ko‘ruv konusiga kirish mexanizmlariga bevosita bog‘liq; kompozitsiya qonuniyatlarining evolyutsion asoslari odamning ko‘ruv tizimi tomonidan fazoviy ma’lumotni qayta ishlash mexanizmlariga borib taqaladi — masalan, inson miyasi kuchli kontrastga, markazga yaqin elementlarga, ko‘ndalang va diagonal chiziqlarga ko‘proq e’tibor qaratadi, bu esa kompozitsion markaz (semantik o‘q)ni aniqlashda muhim fiziologik asos bo‘lib xizmat qiladi; Gestalt nazariyasi bo‘yicha tizimning yaxlitligi elementlarning o‘zaro uyg‘unlik darajasiga bog‘liq bo‘lib, ritmning sinusoidal qaytarilishi, nisbatlarning matematik uyg‘unligi (oltin kesim), kontrastning semantik kuchayishi kompozitsiyaning ilmiy-yasovchi mexanizmlari sifatida qaraladi; shuningdek, kompozitsiya tuzilishining majoziy qatlamida semantik yuklama shakl, rang, masshtab, bo‘shliq, plastika va yo‘nalishning kognitiv interpretatsiyasi orqali shakllanadi, bu esa san’at asarida mazmunni nafaqat ko‘rish, balki idrok etishning ham markaziy komponentini belgilaydi.

2.Chiziqli perspektiva

Chiziqli perspektiva fazoviy tasvirning eng asosiy konstruktiv mexanizmi bo‘lib, uni ilmiy geometrik tahlil qilish fazoning ikki o‘lchamli tekislikda uch o‘lchamli illyuziyasini yaratishga qaratilgan qonuniyatlarni ochib beradi; tadqiqotlar ko‘rsatishicha, ko‘ruv konusining yechimlari, proyeksiya nuqtalari, yo‘qolish nuqtalari (vanishing points), ufq tekisligining ko‘ruv balandligiga bog‘liqligi chiziqli perspektivaning asosiy matematik fundamentini belgilaydi; perspektiva konstruksiyasi inson ko‘ruv tizimidagi narsa uzoqlashgani sari kichrayib ko‘rinishiga asoslanadi, bu esa optik qonuniyatning san’atga tatbiqidir; ikki yo‘nalishli va uch yo‘nalishli perspektiva modellarida vertikal intensiv qisqarish, diagonal proyeksiyalar, fazoviy deformatsiya va ko‘ruv burchagi (field of view)ning kengligi fazoning tasvirlangan ko‘lamiga sezilarli ta’sir ko‘rsatadi; chiziqli perspektiva shunchaki geometrik model emas, balki idrokiy model hamdir — chunki inson miyasi masofa, chuqurlik, mutanosiblikni geometrik emas, balki optik signallar asosida hisoblaydi, chiziqli perspektivaning hisoblangan konstruksiyasi esa ana shu fiziologik jarayonni grafik tizimga aylantiradi; ilmiy muhokamalar shuni ko‘rsatadiki, chiziqli perspektiva tasvirni real ko‘rinishiga yaqinlashtirgani bilan, u ko‘ruv konusining idealizatsiyalangan modeli bo‘lib, real ko‘rish jarayoni esa periferik ko‘rish, fokus nuqtasi, mushak akkomodasiyasi va bino-bino optik sinishlar tufayli o‘ziga xos dinamik o‘zgarishlarga ega.

3. Havo perspektivasi

Havo perspektivasi tasvirda masofa chuqurligini optik-fizik hodisalar asosida yaratishga qaratilgan ilmiy konsept bo‘lib, atmosfera qatlamlari orqali yorug‘likning sochilishi, rangning to‘yinganlik darajasining masofa bilan susayishi, kontrastning pasayishi, shuningdek, ko‘kish rangning uzoqlashgan obyektlarda ortishi kabi ilmiy mezonlarga asoslanadi; Rayli va Mie dispersiyasi natijalariga ko‘ra, qisqa to‘lqinlar (ko‘k rang) havoda ko‘proq sochiladi, shu bois uzoq masofadagi obyektlarda ko‘k rang ustunlik qiladi — bu esa havo perspektivasi illyuziyasining optik ildizini tashkil etadi; tadqiqotlar shuni

tasdiqlaydiki, masofa oshgan sari konturlar yumshaydi, yorug‘likning intensivligi kamayadi va fakturalar yo‘qolib boradi — bularning barchasi miyaga masofani uzoqroq deb talqin qilish imkonini beradi; havo perspektivasi chiziqli perspektivaning to‘ldiruvchi ilmiy modelidir, chunki fazoviy chuqurlik faqat geometrik qisqarish orqali emas, balki rang-faktura o‘zgarishi orqali ham idrok qilinadi; ushbu mexanizmlar san’at asarlarida realistik makon yaratishning eng asosiy vositalaridan biridir.

4.Siluet va konstruksiya

Siluet konstruksiyasi shaklning eng umumlashtirilgan geometrik yadrosi bo‘lib, u obyektning konturdagi energiyasi, plastika ritmi, umumlashtirish darajasi va vizual vaznining qanday taqsimlangani haqida ilmiy ma’lumot beradi; tadqiqotlar ko‘rsatadiki, kuchli siluetga ega obrazlar inson xotirasida tezroq saqlanadi, chunki ularning gestalt qabul qilinishi ancha kuchli bo‘ladi; siluet konstruksiyasi tasviriy san’atda obyektni chizishning eng birlamchi bosqichlaridan bo‘lib, u shaklning umumiy nisbatlarini belgilaydi, dinamika yoki statika markazini aniqlaydi va keyingi konstruktor bosqichlar uchun karkas vazifasini bajaradi; konstruktiv tasvirning ilmiy asosida sferik, kubik, konik, silindrik shakllarning fazoviy o‘zaro munosabatlari, ularning proyeksiyasi, kesimlari, deformatsiyalari yotadi; konstruksiya — bu shaklning “skeleti”, siluet esa uning “ko‘rinishi” bo‘lib, ular o‘rtasidagi ilmiy bog‘lanish tasvirning realistik va anatomik asoslangan bo‘lishini ta’minlaydi.

5.Shtrixlash va optik modellashtirish

Shtrixlash tasviriy san’atda yorug‘lik, soya, faktura va materiallikni ko‘rsatishga qaratilgan grafik modellashtirish mexanizmi bo‘lib, ilmiy tahlillar shuni ko‘rsatadiki, shtrix zichligi ortishi soyani chuqurlashtiradi, yo‘nalishning o‘zgarishi shaklning burilishini ifodalaydi, kross-shtrixlash esa fazoviy hajmni ko‘rsatadi; shtrixning optik xususiyatlari shundan iboratki, u tonal qiymatlarni chiziqlar orqali yaratadi, shuningdek, yorug‘likning modulyatsiyasi shtrixning yo‘nalishiga bog‘liq ravishda o‘zgaradi; ilmiy tahlilga ko‘ra, shtrixning sifati konturga bog‘lanish darajasi, ritmik takrorlanish, chiziqlarning psixologik yo‘nalganligi va og‘irlik markaziga qanchalik mos tushganiga qarab baholanadi; optik fiziologiya shtrixning idrokda minimal birlik sifatida qabul qilinishini tasdiqlaydi.

6.Masshtab va nisbatlar

Masshtab va nisbatlar tasvirdagi elementlarning fazoviy va miqdoriy munosabatlarini belgilovchi asosiy konstruktiv mexanizmlardir; masshtabning psixologik sezilishi insonning narsalarni solishtirish asosidagi kognitiv mexanizmlarga borib taqaladi — ya’ni ko‘ruv tizimi obyektning kattaligini unga nisbatan kichik yoki katta elementlar orqali baholaydi, shu bois fon va shakl o‘rtasidagi o‘zaro nisbat masshtabni o‘zgartiruvchi kuchli vositadir; oltin kesim, Fibonacci ketma-ketligi, Modulor tizimi kabi matematik nisbatlar kompozitsiyada uyg‘unlik yaratadi; bularning barchasi tasvirning konstruktiv barqarorligi va estetik kuchini belgilaydi.

7. Ufq tekisligi va fazoviy idrok

Ufq tekisligi perspektivada kuzatuvchi balandligini belgilovchi ilmiy konstanta bo‘lib, barcha perspektiva chiziqlari unga yo‘naladi; tadqiqotlar ko‘rsatadiki, ufq tekisligi juda yuqori joylashtirilsa tasvirning dramatik kuchi ortadi, past bo‘lsa — monumental, keng makon tuyg‘usi paydo bo‘ladi; ufq tekisligi ko‘ruv konusining markaziy o‘qi bo‘lib, tasvirning butun fazoviy mantiqi unga bog‘lanadi; ilmiy muhokamalar shuni tasdiqlaydiki, ufqning buzilishi tasvirni idrok qilishda kognitiv dissonans keltirib chiqaradi, chunki miyadagi fazoviy model real fazo bilan moslashuv asosida shakllangan.

Xulosa

Ushbu tadqiqot natijalari kompozitsiya nazariyasining chiziqli va havo perspektivasi, masshtab, nisbatlar, konstruksiya, siluet, shtrixlash va ufq tekisligining fazoviy-idrokiy mexanizmlari bilan uzviy bog‘langan murakkab ilmiy tizim ekanini chuqur asoslab berdi; tahlillar ko‘rsatdiki, kompozitsiya qonuniyatlari insonning vizual idrok psixologiyasi, geometriya, optik fizika va konstruktiv tasvir tamoyillariga tayangan holda shakllanadi va bu qonuniyatlarni ilmiy anglash san’at asarlarining ichki tuzilmasini, semantik o‘qini, kuch markazini va vizual stabilitetini aniqlashda muhim metodologik ahamiyatga ega; chiziqli perspektiva fazoviy chuqurlikning geometrik modeli sifatida tasvirning fazoviy mantiqini belgilaydi, havo perspektivasi esa masofa, atmosfera va yorug‘likning optik xususiyatlariga asoslanib, chuqurlikning realistik idrokini kuchaytiradi; masshtab va nisbatlar kompozitsiyaning matematik asosini tashkil etib, tasvirdagi elementlarning bir-biriga nisbatan mutanosib joylashuvini, vizual energiya taqsimotini va kompozitsiyaning umumiy barqarorligini belgilaydi; siluet konstruksiyasi obyekt shaklining umumlashtirilgan strukturasini ifodalab, konstruktiv tasvirning karkas vazifasini bajaradi, shtrixlash esa yorug‘lik-soya munosabatlarini grafik modellashtirish orqali shaklning materiallik darajasini oshiradi; ufq tekisligi esa tasvirning perspektiv tuzilishidagi markaziy geodezik konstanta bo‘lib, kuzatuvchi balandligi va ko‘rish burchagini belgilaydi, shu bilan kompozitsiya tuzilishining ilmiy asoslangan optik modelini yaratadi; natijada ushbu tadqiqot kompozitsion tizimning barcha bo‘g‘inlarining yagona ilmiy modelga birlashishini, san’atning konstruktiv tuzilmasi optik, geometrik va psixologik mexanizmlar tizimi orqali uyg‘un ishlashini, kompozitsiya esa tasvirning estetik emas, balki funksional, semantik va ilmiy tuzilmasini belgilovchi asosiy kategoriya ekanini isbotladi; ushbu ilmiy natijalar kompozitsiya nazariyasi bo‘yicha keyingi izlanishlar uchun puxta metodologik poydevor yaratib, tasviriy san’at, dizayn va arxitektura sohalarida yangi yondashuvlarni rivojlantirishga xizmat qiladi.

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ANCIENT POPULATION OF TURAN: THE FORMATION OF LANGUAGES AND WRITTEN CULTURE

Abstract: *This article analyzes the ancient population of Turan, speaking "Old Iranian" and "Middle Iranian" languages, as introduced into European and global historical linguistics. It also points out that the languages that emerged in Turan are ancient tribal and people languages, and proposes treating them as "Ancient and Early Medieval Turanian languages," based on the name of their territory. It also suggests that these "Turanian languages" are the result of historical processes of separation between the Indo-European and Altaic language families.*

Key words: *Written culture, linguistics, Turan, Iran, peoples, tribes, ancient Iranian languages, ancient Turanian languages, early Middle Ages, Avestan language, Sogdian language, Khorezmian language, Bactrian language, Parthian language, alphabet.*

The process of language formation, its core, and the composition of its additional terms requires in-depth historical-linguistic research. The organization of human speech and language is characteristic of all societies. There is not a single tribe or people in the world without language or speech. The presence of various dialects among speakers, no matter how similar they may be, and the complex "cultural process" of the linguistic phenomenon over several centuries since its inception, proves that it has undergone a complex period of formation [6, 182].

The fact that peoples living in the same geographic area can coexist symbiotically for centuries, speaking related languages or languages belonging to different language families, can be seen in the example of representatives of the Altaic language group and speakers of the Indo-European language group, who lived together for millennia in the vast expanses of Central Asia, which in ancient times was called Turan. Many researchers tend to refer to this territory by its geographical name, Central or Middle Asia. We propose referring to it by its historical name, Turan. Undoubtedly, this territory played a key role in the formation of ancient human civilization, where ancient peoples and their languages developed.

The majority of the population of the northern steppes and oases of the region belonged to the Turkic layer of the Altaic language group, while the eastern part of the region, the central and southern coast of Mesopotamia (Amu Darya and Syr Darya) and the oases were inhabited by tribes and peoples belonging to the Indo-European language group, which most scholars tend to call "Iranian".

The division of languages into similar groups, into related and foreign languages, was a “conditional” classification of linguists in the second half of the 19th – early 20th centuries.

In particular, the ancient Iranian languages include Old Persian, Avestan, and the Scythian languages and dialects [10, 12-13]. However, in addition to Old Persian, the classified languages are considered to be related to the Turanian peoples and tribes. Therefore, the question currently arises as to the scientific validity of such a classification. In particular, the question is raised as to the scientific validity of the division and alienation of Proto-Turkic and Proto-Turanian languages.

However, by the early Middle Ages, these ancient languages had become even more diverse, giving rise to the term "Middle Iranian languages" in linguistics. The tribes and peoples inhabiting the vast territories of Turan, divided into dialects and vernaculars, geographically dispersed and undergoing radical changes in their lexicon, grammar, and morphology, maintained a sense of common brotherhood. Tribes and peoples speaking different languages enriched the lexicon of their languages with new terms over the centuries through migration and integration. This is why, in the early Middle Ages, language classifications included Middle Persian, Parthian, Sogdian, Khwarezmian, and Bactrian [10, 14–17]. Here, too, all languages except Middle Persian are considered languages of the Turanian peoples. The languages of Iran, Afghanistan, and Tajikistan are considered Neo-Iranian languages. Thus, the Old Iranian and Middle Iranian languages introduced into science are Turanian languages, and only after the Iranian part of the Turkic languages became Turkic, the New Iranian languages were preserved in their territories.

Another aspect of the problem is the frequent occurrence of ancient Sogdian and Khwarezmian terms in the lexicon of modern Turkic-speaking peoples. Although European scholars called the languages that developed in Turan at that time "Iranian," we rightly consider them to be Turanian languages of the Indo-European family (Sogdian, Khwarezmian, Bactrian, Parthian, Dahae, and Saka). The preservation of Proto-Turkic and Turkic words in these languages indicates that they were closely interrelated. Another aspect is that until the mid-1st millennium BC, a common Turanian linguistic environment existed. The administrative language and writing system that emerged as a result of the Achaemenid invasion undermined this commonality. As a result, between 558 and 330 BC. The languages of the peoples under the Achaemenid rule were enriched with many ancient Persian terms of administrative-political, socio-economic and cultural-spiritual significance that penetrated into Iran, and their significance was significantly increased by terms in the original Sogdian, Khorezmian, Bactrian and Parthian languages, which had a significant impact on the linguistic environment of the region.

Ancient Iranian terms became more prominent at the level of spoken language. Furthermore, the linguistic environment in central and southern Turan

was further strengthened by the influence of the written culture brought by the Achaemenids [7, 5].

The Northern Sakas, unlike their southern relatives, enriched their language at the expense of the Sarmatians, Ugrians and other neighboring tribes.

As a result of the rupture of the unified linguistic environment in the region, southern and northern branches of the common Turanian language emerged. These branches began to develop independently from the second half of the first millennium BC.

Territorial, political, and social isolation made these languages even more incomprehensible. That is, the southern Turanian languages developed a phylexical method of word formation (word formation through internal root changes), while the northern Turanian languages developed an agglutinative method (word formation through the addition of prefixes and posteriors).

The Proto-Turkic languages of the northern branch of the Turanian languages remained dialectal languages of various tribes and peoples across a vast territory until the formation of the Turkic Khaganate and the establishment of its dominance in the region (second half of the 6th century AD), that is, they became part of the Altaic language group. This phenomenon formed the scientific concept of the Altaic language group (Turkic, Mongolian, Manchu, and other languages). The Proto-Turkic languages interacted with the Mongolian languages, on the one hand, and the Ugric languages, on the other. This resulted in the emergence of the Bulgar language. Furthermore, it is known that, as a result of political, economic, and cultural contacts, the Proto-Turkic languages exchanged terms with Chinese, Tocharian, Proto-Yeniseian, and even Paleo-Asiatic languages [5, 65–198]. Another interesting aspect is the study and restoration of purely Turkic terms that are now forgotten in the Turkic languages, but were once borrowed from the Proto-Turkic language into other languages.

The situation in the southern branch of the Turanian languages developed within the context of the languages that influenced it. In particular, as noted above, during the Achaemenid period, the ancient and early medieval Avestan, Saka, Sogdian, Khwarezmian, Bactrian, and Parthian languages were influenced not only by terms borrowed from Old Iranian but also by Aramaic loanwords—heterograms—that penetrated and became established through writing. Although these heterograms are written in Aramaic and read in local languages, it cannot be denied that they represent new expressions that added to the vocabulary of these languages.

A unique feature of the Turanian languages, which were used from the 2nd to 1st millennia BC and which are not specific to Iran or Azerbaijan, is the "Avestan" language, which was used during the spread of Zoroastrianism. "The language in which the Avesta was created is the oldest core of the Turanian languages, and after the Achaemenids occupied most of Turan, starting in the 6th century BC, this language fell out of circulation and became a dead language. However, the Zoroastrian priests, who were the representatives of this language, continued to use the language in which the Avesta was created in religious practice

[13, 129–136]. However, the ancient language of Turan was replaced by elements of the Old Persian language, which came from Persia [14, 234–241]. At the same time, the language known as Old Iranian borrowed many terms from the peoples and tribes it occupied or neighbored (Middle Eastern (Sami), Arabic, Greek, Caucasian, Indo-Aryan, Dravidian, Proto-Turkic (Saka), and Finno-Ugric) [10, 38–51]. This process likely led researchers to the erroneous notion that Iranian-speaking tribes lived there from the Altai to the Black Sea. In fact, the lexical layer of Old Iranian itself requires scientific analysis. Therefore, it is necessary to reconsider the term "Iranian languages" used in current scholarly usage in relation to the ancient and early medieval languages of the Turanian land, and introduce the following clarifications: "the ancient Indo-European and Aryan layer of the Turanian language" in relation to the Avestan and Saka languages; "the early medieval Indo-European layer of the Turanian languages" is related to the Khwarezmian, Sogdian, Bactrian, and Parthian languages; "the Proto-Turkic layer of the Turanian languages" is related to the Saka language; and finally, "the early medieval Turkic layer of the Turanian languages" is related to the Turkic language of the Turkic Khaganate. This approach, in our opinion, is more objective.

In this regard, the views of the Uzbek academician A. Askarov deserve attention. According to him, the nomadic Saka-Scythians were Iranized under the influence of ancient Iranian languages [2, 58]. In our opinion, the ancient original texts of the Avesta were written in this language (the Turanian branch of the Indo-Aryan or Indo-European languages). As a result of this Iranization, the sedentary Scythians gave rise to the Sogdians, Bactrians, Khwarezmians, and Parthians. Based on this idea, the ancient peoples of Turan and their languages have no direct connection with Iran or the Iranians, and the origin and localization of the Avesta relates to the territories of Turan. Moreover, the language of the Avesta and its alphabet are found nowhere else except in Turan itself.

The Achaemenid and Greco-Macedonian invasions of Turan left a negative mark on the peoples who spoke the Avesta. The language itself was on the verge of extinction. Zoroastrian priests, the mobeds, preserved elements of their language by memorizing texts orally and passing them on from generation to generation. However, the language and its speakers limited themselves to memorizing the texts of the Avesta. One of the ancient Turanian languages, once a lingua franca, was relegated to the status of a "dead language." Initially, by decree of Vologases I (51–78), a representative of the Arsacid dynasty in Parthia (250 BC – 227 AD), the Avesta was restored in Parthian script. However, this text, too, has not survived. This work was resumed during the Sassanid era (224–651), when Zoroastrianism was adopted as the state religion. To preserve the original Avestan pronunciation of the texts, attempts were made to reconstruct the ancient Avesta script in form and phonetics using the Middle Persian-Pahlavi alphabet, which was based on the Aramaic script. This resulted in an alphabet with 48 independent signs (14 for vowels, 34 for consonants) and 3 ligatures [9, 102–103]. However, by this time, the ancient language of Turan had been supplanted, and the population had already entered the stage of formalizing the Middle Turanian languages.

In the 8th-7th centuries BC, the Aramaic language and script had spread across vast lands. They enjoyed global significance at this time. From the 7th to the 6th centuries BC, and then from the 6th century BC, the Aramaic script and language were used for official documents in the Median Kingdom. As a result, all satrapies in the territories occupied by the Achaemenids from Egypt to Turan (including Khorezm, Bactria, and Sogdiana) were conducted in Old Persian and the Aramaic script, which borrowed many terms from Aramaic [7, 11–24]. However, by the 3rd-2nd centuries BC, the need arose to develop a local Turanian written language based on the Aramaic script, driven by the needs of the language's native speakers—the Turanian-speaking peoples.

Another point should be noted here. The question arises as to why, during the Achaemenid conquest, the local peoples created a writing system suitable for their own language, rather than using the original Aramaic script, which had come directly with the Old Persian administration. Thus, since Old Persian differed in many ways from the Turanian languages, the Khwarezmians, Sogdians, Bactrians, and Parthians began to develop an alphabetic system suitable for their own language. Although this system preserved the quasi-alphabetic tradition of the Aramaic alphabet (short vowels are not reflected in the writing), it did not violate the strict canonical order of the alphabetic system, consisting of approximately 22–24 letters (consonants and long vowels) – ’, b, g, d, h, w, z, ẖ, ṭ, y, k, l, m, n, s, ‘, p, ṣ, q, r, š, t. As a result, this system manifested itself in the form of Eastern Aramaic written alphabets – Arabic, Middle Persian, Khwarezmian, Sogdian, Bactrian, Parthian. Its western branch gave rise to the Greek, Latin and Cyrillic alphabets [3, 6–23].

Having created their own alphabets, the Turanian languages began to displace the ancient Iranian languages in administrative governance. It is appropriate here to consider the scripts adapted to the languages of the Turanian peoples, some sources of which have survived to this day. In particular, the Khwarezmian script was adapted to the language of the ancient Khwarezmians and was used primarily in the Khwarezm oasis, that is, in the lower reaches of the Amu Darya. This language was the official language of Ancient Khwarezm, which ruled from the late 4th century BC to the 8th century AD, and of the Afrighid dynasty in Khwarezm (305–995). Information on these linguistic patterns can be found in Abu Rayhan Beruni's Al-athar al-baqiyya an al-qarun al-khaliya (The Monuments of Past Generations), in Mahmud Zamakhshari's 12th-century Muqaddimat al-adab, and in Mukhtar az-Zohidi's Qunyat al-munya, written around 1260 [12, 47–52].

The Khorezmian script, which developed in the 5th–3rd centuries BC based on the Aramaic script, is considered one of the most ancient scripts of the Khorezmians, one of the most ancient Turanian peoples. In the 1930s–50s, the Khorezmian archaeological and ethnographic expedition led by S.P. Tolstov and Academician Ya. Gulomov discovered samples of Khorezmian written sources at the archaeological sites of Koy-Kyrylgan-kala, Toprak-kala, Tokal, Govurkala (Mizdakhkan), and Khumbuzkala. These sources use 20 of the 22 Aramaic

alphabets and are enriched with additional signs characteristic of the Khorezmian language. Written materials that have survived to this day are represented mainly by fragments of ceramic vessels, copper and silver coins, remains of a stele, pieces of leather, and a stick tip [3, 38–43]. After the conquest of Central Asia by the Arab Caliphate, the ancient Khorezmian language began to be supplanted by Arabic and the Tupk languages [4, 69–70]. They preferred to adopt the language of their ancient ancestors, the Turks, rather than Persian, like the Sogdians.

The Sogdian language, one of the most ancient Turanian languages, related to the Khwarezmian language and script, acquired significant significance not only for the Turanian lands but also for the Turkic peoples of the northeast. Specifically, in antiquity and the early Middle Ages, the Sogdian language and script, the most widespread and long-used in the Central Asian region (from the 3rd-2nd centuries BC to the 10th-12th centuries AD), were first spread in Sogd, located in the oases of Zeravshan and Kashkadarya, then in Ustrushana, Chach, and parts of Fergana, in the historical and cultural lands established by the Sogdians along the Silk Road, in the regions of Semirechye and East Turkestan, and in the territory of modern-day Mongolia. Due to its importance, it became widespread among the Turkic peoples as a language of interethnic communication. The Western Turkic Khaganate (603–742) and the Turgesh Khaganate (699–766) were formed in the western part of the First Turkic Khaganate (552–603) and received the status of an official language of the state along with Turkic.

In addition to the regions listed, monuments of the Sogdian language have been discovered in Khorezm, the Merv oasis, the Urals, Altai, and even in Kashmir, Shatial in the upper reaches of the Indus, in the gorges of Ladakh in Tibet, Western China, and Manchuria.

Examples of writing have been preserved on leather, paper, wood, fabric, ceramics, stone tablets, coins, metal objects, and weapons [11, 58–59]. The Sogdian alphabet consists of 23 characters, 22 of which are based on Aramaic. Eighteen characters of this alphabet were used in writing. In addition, the Sogdians used a 29-character script based on the Aramaic script of the followers of Mani (216–277), and a Syriac script based on the Aramaic alphabet of the Christian patriarch Nestor, who was exiled from Constantinople in 428–431. Although the works were written in Mani and Syriac scripts, the language was Sogdian. Therefore, other peoples who effectively used the Sogdian language and writing capabilities also used this script in the formation of their written cultures.

As a result, alphabetic writing systems such as Old Turkic Runic, Uyghur, Mongolian, and Manchu emerged in the East [7, 59–77]. Representatives of these languages migrated to various regions after the conquest of the Arab Caliphate. This was the third migration of Sogdians after the Achaemenids and the Greco-Macedonians. Some of the Turanians who remained in Sogd were forced to adopt the Persian language, which came from Iran, primarily from Khorasan, and call themselves Tazi – Tajiks (Arab-Muslims). The rest switched entirely to the Turkic language they were familiar with. Some who migrated adopted the Uyghur and Chinese languages. Thus, the Sogdian language, having lost its significance,

became a "dead language." However, in the villages of Eastern Turkestan, Samarkand, and Bukhara, the Sogdian language remained spoken until the 10th and 12th centuries [8, 349–350]. Sogdian elements are widespread in modern toponyms and dialects [11, 61–62]. In addition, the last descendants of the Sogdians, the Yagnobis, survived in the villages of the Yagnab Valley in the Sogd region of modern Tajikistan and still use a Tajik-Uzbek mixture of the Sogdian language [1, 354].

The lexical layer of the Sogdian language contains not only ancient Aramaic and Persian elements, but also elements of languages such as Sanskrit, Hindi and Chinese [18, 517].

Bactria, one of the eastern satrapies of the Achaemenid Empire, developed in a unique linguistic environment. The development of this language in the southern Turanian group was influenced by the languages of the Indians, Greeks, and the Kushans (Yuezhi).

A written culture also developed on this basis. In 329-327 BC, it was occupied by the troops of Alexander the Great. After the collapse of the Greco-Macedonian state, around 256 BC, the Bactrians, who were under the rule of the Greco-Bactrian Kingdom (256-55 BC) under the Bactrian satrap Diodotus I (256-248 BC), in 140 BC fell under the rule of the nomadic Yuezhi tribes, close in origin to the Turonians [17, 219-225].

Within the Greco-Bactrian Empire, alongside the Khwarezmian and Sogdian scripts, the Aramaic script, adapted to the local Bactrian language, was used. From the 3rd century BC, under the influence of Hellenistic culture, a new Bactrian script, based on Greek, was used for public affairs. Certain modifications were also made to the use of this 25-letter script. This script was considered official not only in the Greco-Bactrian Empire but also in the Kushan Empire (1st-4th centuries), particularly during the reign of Kanishka (78-123), as well as in the Hephthalite Empire (420-579) and the Tokharistan Confederation (6th-8th centuries). Samples of Bactrian writing using the Aramaic alphabet have been found at the sites of Aykhanum and Jigatepa in northern Afghanistan and Fayoztepa in southern Uzbekistan, while samples based on the Greek script have been found at the sites of Surkhkotal and Dilbarjin in northern Afghanistan, Dashtinavur in central Afghanistan and Ayritam in southern Uzbekistan [3, 47-72]. These finds represent a unique stage in the development of Turanian languages in antiquity and the early Middle Ages, confirming the possibility of choosing one or another script depending on the characteristics of the language.

Furthermore, the Bactrians, influenced by the close cultural and economic ties between Buddhism and Hinduism, also used the Kharoshthi script. This script developed from Aramaic and the ancient Indian Brahmi script and was used in the 5th-3rd centuries BCE and the 3rd-5th centuries CE. Scholars also refer to this script as Bactrian, Indo-Bactrian, Bactropalian, Northwest Indian, and Kabuli.

The earliest monument, dating to approximately 251 BC, is the inscription of King Ashoka (Priyadarshi, 272-251 BC), found on the Shahbazgarh rock in Pakistan. Epigraphic examples from later periods have been found in Afghanistan,

southern Turan (the Surkhan oasis), and the Xinjiang Uyghur Autonomous Region of China. This script was used in Bactria under the Kushans in the 1st century AD and was considered the official script of the Kushan Empire, along with the Greco-Bactrian script. Monuments with the Kharoshti script have been found in the Kara-Tepe, Fayoz-Tepe, and Dalvarzin-Tepe monuments of Old Termez in southern Uzbekistan. Examples of the Kharoshti script are also found on the coins of the Indo-Bactrian and Indo-Scythian kings from the 3rd century. BC to the 1st century AD. At first, the script was written from right to left on the Aramaic basis, and later from left to right on the Indian basis. It can be concluded that although the Aramaic script was the basis for the formation of this script, its development was influenced by the Brahmi script, which was used in the Achaemenid satrapy in northwestern India. From the 3rd century AD, the Kharoshthi script was supplanted by the Brahmi script [9, 103-104]. The linguistic characteristics of the Bactrians allowed them to use various scripts in the office, such as Aramaic, Greek and Kharoshthi.

The Parthian Kingdom in the southwest of Central Asia is also an integral part of the Turanian people. These peoples left a significant mark on the history of the Middle and Near East. The Parthians, like their fellow tribesmen, made productive use of written culture, preserving the characteristics of their language in their state traditions. Parthian writing existed in the 4th–5th centuries BC and also developed from the Aramaic script. At the same time, as in Bactria, in Parthia, in addition to Parthian, Pahlavi (Middle Iranian) and Greek were spoken. The Parthians inhabited the territory of modern-day southern Turkmenistan and the Khorasan province of Iran. It was initially under the influence of the Achaemenid Empire, then the Greco-Macedonian Empire, and finally the Arsacid Parthian Kingdom (250 BC–224 AD). During this time, changes in language and reforms in written culture were taking place. The official script, based on Aramaic, a more familiar language for scholars, consisted of a standard 22-letter sign. As in the Khwarezmian and Sogdian scripts, Semitic terms – heterograms – were used in writing. The Parthians were accustomed to expressing these heterograms in their native language.

The number of Parthian written monuments is approximately 3,000. Although these were initially fragments of ceramics found in Kumys, Iran, and Avroman parchment monuments found in Western Iran, the largest number was discovered in the ruins of ancient Nisa in Turkmenistan – the center of the Mihrdatkirt fortress (more than 2,700), as well as in the ruins of the city of Merv and the monument of Kushtepa. The inscriptions are applied to the surface of ceramics. Even this inscription, which includes individual parts of the Avesta, dating from the 2nd–1st centuries BC, contains the book "Zarirnamek", which formed the basis for the book "Ayadgari Zariran" in Middle Iranian – Pahlavi [3; 19]. It would be appropriate to recognize the Parthians as representatives of the ancient Turanian languages. Because their origin and the territory where they founded their state is ancient Turan.

In conclusion, we would like to note that the ancient roots of the Turanian languages are preserved in all modern Turkic languages, as well as in Yagnobi, a neo-Sogdian language preserved by the inhabitants of the village of Yagnob in the Sogd region of Tajikistan, and in the Ossetian languages of the descendants of the ancient Alans, who originally spoke Turanian. At the same time, the roots of the Turanian languages are also preserved among the Pamir peoples—the Wakhans, Yazghuls, Ishkashims, Shughni-Rushans, Khufas, Bartangs, and Orashoaras. Studying the lexical layers in the Sarykul languages, which have survived to this day, can serve as a source for historical linguistics and for uncovering the roots of the ancient Turanian languages.

Furthermore, searching for terms from Old Turanian languages preserved in Uzbek and other Turkic languages, as well as in Tajik, in dialects is a topic for new research. After all, dialects, unlike literary languages, transmit the terms they use from generation to generation. At the same time, the toponyms studied today also contain countless elements of Old Turanian, and these are interpreted in various ways. In some cases, terms are adapted to the sounds in which they are expressed, interpreting them with entirely different meanings. Researchers studying historical linguistics, source studies, and history itself would do well to pay attention to these aspects.

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MODDALAR ALMASHINUVI JARAYONIDA LIMFA TUGUNLARINING MORFOGENEZI

Annotatsiya: *Ushbu maqolada limfa tugunlarining morfogenizisi gistologik, biokimyoviy va fiziologik yondashuvlar asosida tahlil qilingan. Limfa tugunlarining zonal tuzilmasi, stromal retikulyar to'qimalarning roli, sinuzoidlar orqali modda almashinuvining kechishi hamda hujayra darajasida energiya ishlab chiqilish mexanizmlari yoritilgan. Metabolik faoliyat bilan limfa oqimi o'rtasidagi bog'liqlik, gistokimyoviy markerlar (ATPaza, oksidaza, dehidrogenaza) orqali tushuntiriladi.*

Kalit so'zlar: *Limfa tuguni, gistologiya, morfogenez, metabolizm, stromal hujayralar, ATPaza, retikulyar to'qima, sinuzoid, oksidlanish-qaytarilish.*

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MORPHOGENESIS OF LYMPH NODES IN THE PROCESS OF METABOLISM (Histological Approach)

Annotation: *This paper explores lymph node morphogenesis through a histological and biochemical perspective, emphasizing how cellular and stromal structures support metabolic exchange. Particular attention is given to reticular connective tissue, sinus endothelial cells, and their enzymatic activity (ATPase, oxidase, and dehydrogenase) that facilitate molecular transport and filtration. The integration of lymphatic flow and cellular metabolism ensures continuous tissue remodeling, highlighting the interdependence of histological architecture and biochemical reactions in lymph node development.*

Keywords: *Lymph node, histology, metabolism, reticular tissue, stromal cells, ATPase, oxidase, dehydrogenase, sinus endothelium.*

Mavzuning dolzarbligi

Gistologik nuqtai nazardan limfa tugunlari murakkab stromal-hujayraviy tizim hisoblanadi. Limfa oqimi to‘qima suyuqligini, hujayra chiqindilari va metabolitlarni olib kiradi; bu jarayon limfa tugunining morfologik qayta tuzilishiga bevosita ta’sir ko‘rsatadi. “Harrison’s Principles of Internal Medicine” (2018) asarida qayd etilishicha, limfa tugunlarida kechuvchi modda almashinuvi — bu mikrosirkulyatsion tizim, retikulyar stromal skelet va metabolik faol hujayralar o‘rtasidagi muvofiqlik natijasidir. Shuningdek, gistologik tadqiqotlar (Ozawa, 2022; Abbas & Lichtman, 2022) limfa tugunlari zonalarida ferment faolligining turlicha bo‘lishi ularning energetik va immunologik funksiyalarini belgilashini ko‘rsatgan.

Mavzuning yoritilishi

1. Limfa tugunlarining gistologik tuzilishi va zonalari

Korteks — B-limfotsitlar joylashgan joy bo‘lib, bu yerda aktivatsiya va proliferatsiya jarayonlari sodir bo‘ladi. Histokimyoviy jihatdan bu zonada dehidrogenaza va ATPaza fermentlari yuqori faollikka ega. Parakorteks — T-limfotsitlar va interdigitatsiyalangan dendrit hujayralar joylashgan qism. Bu hududda mitoxondrial nafas olish, ATP ishlab chiqilishi va glikoliz jarayonlari intensiv kechadi. Medulla — plazmotsitlar va makrofaglar joylashgan soha bo‘lib, bu yerda oksidaza fermentlari ko‘p uchraydi; ular fagotsitozdan so‘ng hosil bo‘lgan metabolitlarni neytrallaydi.

2. Retikulyar stromal to‘qima va sinuzoidlarning roli

Gistologik jihatdan limfa tugunining skeleti retikulyar to‘qima tashkil etadi. Retikulyar tolalar kollagen tip III dan iborat bo‘lib, ular moddalar almashinuvining yo‘lini belgilaydi. Sinuzoidlar devorida joylashgan retikulyar fibroblastlar ATP va NADH ishlab chiqarishda faollik ko‘rsatadi. Bu hujayralar limfa oqimining tezligi va tarkibiga mos ravishda morfologiyasini o‘zgartiradi — bu holat limfa tugunining morfogenetik moslashuvchanligini bildiradi.

3. Limfa tugunlarida metabolik faoliyat va gistokimyoviy belgilar

Korteksda glikoliz fermentlari (geksokinaza, fosfofruktokinaza), parakorteksda esa oksidlanish-qaytarilish fermentlari (suksinat dehidrogenaza, sitoxrom oksidaza) ustun. Stromal hujayralarda Na+/K+-ATPaza pompasi faol ishlaydi — bu ion almashinuvi limfa oqimining osmotik bosimini tartibga soladi va hujayralararo modda harakatini ta’minlaydi.

4. Mikrosirkulyatsiya va oksidlanish-qaytarilish jarayonlari

Limfa tugunlarida mikrosirkulyatsiya limfa sinuzoidlari orqali amalga oshadi. Oksidlanish stressi paytida sinuzoid endoteli shishadi, bu esa limfa oqimini sekinlashtiradi. Limfa tarkibida antioksidant fermentlar (glutation peroksidaza, katalaza) faollashadi. Bu jarayonlar moddalar almashinuvining histofiziologik nazoratini ta’minlab, tugunning morfogenetik barqarorligini saqlab turadi

Xulosa

Gistologik yondashuv shuni ko‘rsatadiki, limfa tugunlarining morfogenizisi modda almashinuvining turli darajalarida kechuvchi biokimyoviy reaksiyalar bilan chambarchas bog‘liqdir. Korteks va parakorteksdagi metabolik tafovutlar, stromal to‘qimaning energiya ishlab chiqarishdagi roli hamda sinuzoidlar orqali moddalarning filtrasiyasi tugunlarning morfologik barqarorligini ta’minlaydi. Limfa tugunining har bir zonasi metabolik jihatdan ixtisoslashgan: B-zonada biosintetik jarayonlar, T-zonada esa energiya ishlab chiqish ustun. Gistokimyoviy tadqiqotlar limfa tugunlaridagi ferment faolligi, energiya aylanishi va oksidlanish jarayonlarini aniqlash orqali morfogenetik mexanizmlarni tushunishga yangi ilmiy yo‘l ochmoqda.

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IDENTIFICATION AND MODERNIZATION OF HEAT LOSS IN HEAT TRANSFER PIPES IN HEATING PUBLIC BUILDINGS.

Abstract: *This article analyzes the heat loss of heat transfer pipes used in heating systems in public buildings and proposes solutions for their modernization. The study compared outdated steel pipes with modern polyethylene (PEX-a) pipes. According to calculations, the heat loss of steel pipes is 78 W/m, while that of polyethylene pipes is 48 W/m, resulting in heat savings of 38–40%. Polyethylene pipes are also corrosion-resistant, easy to install, and have a long service life. The study's results provide a basis for improving energy efficiency and reducing operating costs in public buildings.*

Key words: *Heat loss, heating system, PEX-a pipes, steel pipes, thermal insulation, energy efficiency, thermographic survey, thermal conductivity and convection, pipeline modernization, coolant.*

Introduction

Heating systems for public buildings are of great importance in modern construction and energy, and their efficiency determines the thermal comfort and energy efficiency of buildings. Typically, central heating systems are used to transport thermal energy in these buildings, in which the heat carrier - water or steam - is distributed through pipes. However, practical studies show that in many public buildings, the efficiency of heat carrier pipes is low, and heat losses are significant. This leads not only to excessive consumption of energy resources, but also to a decrease in thermal comfort. One of the main causes of heat loss is improper insulation of pipes, worn-out materials, and improper balancing of the system. Also, the architectural features of buildings and the operating mode of the heating system affect the heat loss indicators. Therefore, determining the efficiency of heat transfer through pipes and modernizing existing systems is an important way to increase energy efficiency. Currently, using energy-saving technologies and modern materials, it is possible to significantly reduce heat losses by renewing pipes, strengthening insulation, and introducing automatic system control. This not only improves the indoor microclimate in public buildings, but also contributes to the efficient use of national energy resources. In this regard, the issue of identifying waste heat transfer pipes in heating systems of public buildings and their modernization is of practical and scientific relevance [1-2].

Method

For efficient heating of residential and commercial buildings, as well as other premises, it is important to provide sufficient thermal energy, which requires taking into account heat loss in the pipeline. Calculation of heat loss in pipelines is carried out using formulas based on the thermophysical properties of materials (thermal conductivity, heat transfer) and the properties of the environment (temperature, velocity). The main method involves calculating heat loss through insulation and heat transfer on the pipe surface. Special programs or more detailed methods can be used, taking into account various parameters such as length, diameter, insulation, coolant and ambient temperature, wind speed. To achieve this, specialists regularly calculate heat loss. Various formulas are used as the basis for these calculations.

Heat loss occurs as a result of the transfer of energy through a pipe to the environment due to a temperature difference. Theoretically, heat loss occurs through three main mechanisms: conduction (conduction), convection (heat exchange with a moving fluid) and radiation (radiation).

Conductive loss is the process of heat transfer through a material, which is especially important for pipes. The thermal conductivity of the pipe and the insulation is calculated. Conductive heat loss for cylindrical pipes is determined by the following formula:

$$Q_{\text{cond}} = \frac{2\pi k L (T_{\text{in}} - T_{\text{out}})}{\ln(r_2/r_1)} \quad (1)$$

This expression describes the one-dimensional stationary heat transfer (conduction) through the pipe, i.e. Thermal conductivity is the ability of a material to conduct heat. The higher the value of k nintg, the better the material conducts heat. In the design of boiler houses, the length of the pipe L is an important parameter that directly affects the difference between the internal and external temperatures. When creating a driving force that causes heat flow, heat always flows from a higher temperature to a lower temperature, so it is assumed that $T_{in} > T_{out}$ (if heat flows from the inside to the outside)[3-4].

The denominator (divisor) of the formula is related to the resistance of the cylinder to heat transfer. This resistance is more complicated due to its cylindrical shape, unlike a simple flat wall. The factor $ln(r_2/r_1)$ in the denominator takes into account the natural logarithm of the ratio of the outer radius ($r2$) to the inner radius (r_1). This geometric factor takes into account the thickness of the cylinder wall and its curved shape. The thicker the cylindrical wall (i.e., the larger the ratio (r_2/r_1)), the higher the resistance, resulting in a lower heat flux Qcond.

Thermal energy losses are calculated taking into account the density of the heat flux emitted through the insulated surfaces of the pipes. To determine the required parameter, tabular data from the QMQ methodological manual are used, calculated per meter of pipe. Calculation of heat losses for pipes with temperature

diameters and coolants not specified in the table is carried out using interpolation and extrapolation methods.

The estimated thermal energy losses of the pipeline are determined by the following formula:

$$Q = q \cdot L \cdot K \cdot B \quad (2)$$

The quantities involved in this expression represent the main parameters used to estimate heat losses in pipelines. In the formula, *q* is the specific (standard) heat loss density per one meter of pipeline length, expressed in W/m. This value is determined taking into account the average temperature of the coolant and the standard annual operating life of the pipeline. The parameter is determined for each diameter based on the table data in the QMQ 2.04.17-2019 regulation.

The coefficient *K* takes into account additional heat losses due to supports, fittings, shut-off valves and other additional elements installed on the pipeline. Its value is also taken from the standard table values. B is a coefficient reflecting the change in heat flux density through polyurethane foam (PUF)-based thermal insulation, which is also selected according to the regulatory document QMQ 2.04.17-2019. L is the total length of the pipeline network, measured in meters, and serves as the geometric key parameter in determining the integral amount of heat loss[5].

Therefore, depending on the pipe diameter and the thickness of the thermal insulation, the thickness of the thermal insulation (λ = 0.035 W/mK) can be determined from the table of pipe heat losses at $\Delta T = 30°C$.

Pipe heat losses
Table 1

№	Insulation thickness (mm)	Pipe diameter (mm) 8 (¼")	15 (½")	20 (¾")	25 (1")	32 (1¼")	40 (1½")	50 (2")
1	10 mm	5,8	8,6	10,3	12,3	14,9	17,9	21,6
2	13 mm	5,0	7,5	9,0	10,2	12,2	14,5	17,3
3	16 mm	4,5	6,4	7,8	9,0	10,6	12,3	14,7
4	19 mm	4,1	5,7	6,7	7,8	9,3	10,9	12,8
5	20 mm	3,9	5,6	6,6	7,7	9,1	10,5	12,3
6	25 mm	3,7	4,9	5,8	6,6	7,7	9,0	10,5
7	30 mm	3,4	4,5	5,3	6,0	6,9	8,0	9,3
8	32 mm	3,3	4,3	5,1	5,7	6,6	7,6	8,8
9	40 mm	3,0	3,9	4,5	5,1	5,9	6,6	7,6

In addition to calculations, it is important to take effective measures to reduce heat loss in pipelines. There are several ways to achieve this goal:

• periodic inspection of the pipeline condition;

• if necessary, restoration of anti-corrosion, heat and waterproofing coatings of pipelines;

• increasing the pH level of the transported water;

• determination of actual heat losses using heat measuring devices in real time;

Thermographic inspection is also an important test method for maintaining constant control of the heating network for public buildings. This test helps to determine the insulation of the heating network and heat losses. A thermographic camera is a technology that uses infrared rays to measure and image the temperature of various objects, which are invisible to the human eye, but clearly show temperature differences. It allows you to detect temperature differences and identify system malfunctions through visual images.

Results and Discussion

Considering that the thermographic method is included in the class of seasonal heating systems for public buildings, it can be somewhat easier to constantly measure and monitor the temperature difference in the heating network, pipes, radiators, pumps, and other systems during the cold winter months.



Figure 1. Measuring temperature in pipes using an infrared thermal camera.

The measurement results showed that it is very difficult to replace worn-out pipes in an operating building, or even to conclude that a complete reconstruction is necessary. However, it was found that the temperature in several rooms of the building dropped sharply, which made it necessary to conduct a series of tests, depending on the level of insulation of the room. The temperature difference between the buildings is shown in the table below, and the difference between the flow and return temperatures is -100 C, which should be noted that standard testing of buildings should be carried out regularly.

One of the most important areas for improving energy efficiency in central heating systems of public buildings is the replacement of heat-carrying pipes with modern, corrosion-resistant and low-heat-loss materials. Practical experience shows that ordinary steel pipes are still used in many schools, hospitals and administrative buildings. Their heat loss is high (on average 70–80 W/m), the corrosion rate is high, and the service life does not exceed 15–20 years. Therefore, there is a need to modernize such pipes. One of the most effective technical solutions for this process is the use of PEX-a (peroxide-crosslinked polyethylene) pipes[6].



Figure 2. PEX-a (peroxide-crosslinked polyethylene) pipes.

The main advantage of PEX-a pipes is their high flexibility, temperature and pressure resistance, complete lack of corrosion, and reduced hydraulic losses due to their smooth inner surface. Since their thermal conductivity is lower than that of steel pipes, linear heat loss is also significantly reduced. According to studies, the heat loss of PEX-a pipes is on average 45–55 W/m, which provides savings of 30–35% compared to steel pipes. In this case, if the pipes are protected by additional insulation, losses are even lower.

The introduction of PEX-a pipes into internal heating networks of public buildings provides a number of practical advantages. Firstly, the installation process is much faster and cheaper, since they have high bending strength and require a small number of connecting parts. Secondly, the service life is 25–30 years, and service costs are practically not required. Thirdly, due to the presence of an oxygen barrier (EVOH layer), the pumps, radiators and boilers in the system are also protected from corrosion. Thus, PEX-a pipes are considered the most energy-efficient, long-term and economically viable technological solution for modernizing the heating system of public buildings[7].

Conclusion

The results of the analysis show that the steel pipes used in the existing heating systems of public buildings reduce the efficiency of the system with high heat loss, corrosion risk and short service life. According to the calculations, PEX-a pipes reduce linear heat loss by 30–35 percent, are completely resistant to corrosion and the installation process is quite economical. Their service life is 25–30 years, which significantly reduces operating costs. Therefore, the use of PEX-a pipes is considered the most optimal and effective solution for the modernization of heating networks of public buildings.

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THE IMPORTANCE OF NATIONAL VALUES IN THE EDUCATION OF PRESCHOOL CHILDREN

Annotation: *We must preserve the rich and cultural heritage left to us by our ancestors, creatively enrich them with the achievements of modern science, form the consciousness of the future generation with national and universal values, teach preschool children their views on love for family, love for the motherland on the basis of national and traditional values. opinion about education is expressed.*

Key words: *Preschool children, national and universal values, our traditions, customs, children, value.*

The Uzbek people have long been known for their rich past, beautiful history, and at the same time, unique and indelible invaluable values, which have not lost their value for centuries. The future of our homeland is closely connected with its past. Indeed, a nation that does not know its history is not a nation. It would not be an exaggeration to say that our perfectly formed history, traditions, customs, and loyalty to our national values create the foundation for building a great foundation for our bright future. National values, expressing the will of the people, their spirit, dreams, and hopes, continue to be refined and perfected based on the requirements of the times. National values are analyzed in various ways in the literature.

Our people have always lived in a community with close relatives, which has not lost its strength. That is, the concepts of family, neighborhood, and homeland, which are the symbols of the community, are considered sacred and great attention is paid to them. This is the most attractive example of our national values. In addition, such sacred qualities as respect for parents, neighborhood music, and the entire society in general, kindness and loyalty, love for the native language, which is the immortal soul of the nation, respect for the younger generation, patience and hard work, respect and attention to women, who have become a symbol of eternal life, honesty and kindness, are the most beautiful examples of the national values of the Uzbek people.

After we gained independence, our national concepts were returned to our lives. Among such national concepts, the concept of "Value" also holds a special place. Value lies at the root of all concepts. The fact that value has taken deep roots and developed in our lives is a clear proof of this. There is no nation without values, and we can even see that some tribes that continue to live in backwardness act based on their national values. They continue the traditions of the tribe by relying on values without understanding or knowing it. Values related to

consciousness generally reflect a number of concepts, such as good, evil, goodness, loyalty, kindness, and consequentialism.

According to the philosopher and scientist V.P. Turgunov, “values are the essence of social phenomena that are ideal blessings of human life and culture. The reason why these blessings are called values is that people value them. Because these valued blessings adorn personal and social life. Every process that occurs in a person’s life is valued. The highest among values is man and his life. It is absurd to talk about values where there is no man.” A person’s attitude towards a person, his initiative, kindness, and respect for him are the main directions of value. A person loyal to values is also a worthy and loyal child of his country. He will be able to protect his country from any evil forces tomorrow.

Educating young people in the spirit of patriotism is one of the most important tasks facing society. Therefore, in order to instill such patriotism in the child's mind, it is necessary and necessary to consider it a high goal to educate him in the spirit of family life. Patriotism begins with family life. Instilling in preschool children the views on love for the family and love for the homeland based on national and traditional values, the role of play in this is extremely important. Play represents real life activities. Therefore, through play, mental and moral education, qualities, that is, values, are learned. For example, we teach children to greet each other, and when we observe them playing games like "teacher" and "aunt-aunt", children themselves take on roles and speak on behalf of adults or children, greet each other, or else, like their parents, grandparents, and foster sisters, they use rude words like "it's not good to do this, smart children don't do this." In general, in the lives of children, words of advice and moral values directly leave a deep mark and are manifested in the process of play. That is, they directly reflect the feelings of adults in themselves through their games. Teaching children our values, such as good and evil, respect and loyalty, especially through puppet theaters, is especially effective. If children themselves participate in puppet theaters, they will understand more clearly what such feelings are. We educate children by explaining values perfectly. For example, not to spoil bread is one of the most beautiful values of our people.

It is no secret to us that some children bite off bread and throw it on the ground or throw it away. In such situations, there is no need to shout at the child, hit him or fight him, in which case he will still repeat the same thing because he will not understand why he should not do this. In such situations, it is necessary to properly explain to him that bread is the most precious blessing that our people value, and that it is a sin to waste it, even if it is explained through various narrations, fairy tales, hadiths, and if possible, games, but the child will have a sufficient understanding of this. By considering bread as precious and valuable, moral education is also formed in the child. Based on this, when the child picks up the bread, he remembers the fairy tale he heard, the game he played, and he tries not to do it again. Carefully preserving the rich cultural heritage left to us by our ancestors, creatively enriching it with the achievements of modern science, shaping the minds of future generations with national and universal values, and

increasing their creative activity is the main guarantee of strengthening the foundation of independence. In general, values are manifested in social development. They reflect natural, political, spiritual and cultural relations, are constantly renewed, and keep pace with the spirit of the times. They change, develop, enrich, and improve. Changes that occur in historical processes are reflected in values.

A. Fitrat discusses the importance of education in improving values: "Whether a people's religious movement towards their goals, whether they become statesmen, whether they become happy and respected, whether they become world leaders or weak and humiliated, whether they wear the clothes of poverty and bear the burden of misfortune, whether they become ignored and become subordinates, slaves, and slaves to others, depends on the education they receive from their parents in childhood."

To put it through real-life examples, value is a concept that expresses the pride and faith of the people and nation. Only when our national values, customs and traditions are restored and further developed during the period of independence, the reforms being carried out in our society will be successfully implemented, because only a spiritually mature, spiritually refreshed, enlightened, and capable of thinking in a new way can walk the path of independence and development with honor. Therefore, a thorough study of the cultural heritage and spiritual values of our people and their instillation in the minds of the younger generation can serve as the basis for their spiritual maturity and development.

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THE ROLE OF GENERATORS IN ELECTRICITY PRODUCTION

Abstract: *According to the method of generating the magnetic field necessary for the operation of an electric machine, AC machines are divided into electromagnet and permanent magnet machines. Permanent magnet machines are also called magnetoelectric machines. Such machines are very rare, they are mainly used only as tachogenerators and similar special machines.*

Keywords: *AC generators, indicator, electric machine, AC generators*

Introduction

Alternating current generators mainly consist of two parts, the first part of which, which generates a magnetic flux, is called the indicator, and the second part, which generates the E.U.K., is called the armature.

The indicator, in turn, consists of a frame 1 and main poles 2, and the armature consists of an armature core 3, a collector 4, a shaft 5, a bearing 6, a bearing shield 7 and a fan 8 (Figure 1).

Figure 1 shows a structural diagram of an alternating current generator. In this case, the frame is a fixed part of the machine, and in high-power machines it is made of steel, and in low-power machines it is made of cast iron[1].

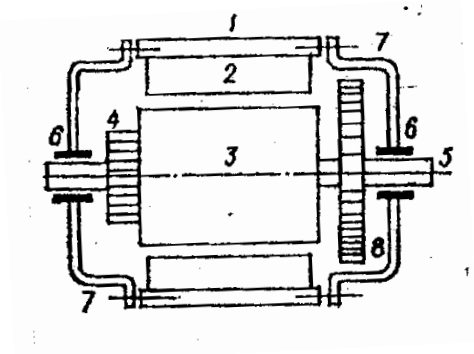


Figure 1. Construction scheme of DC machines

Electromagnetically driven machines are classified as independent and self-exciting according to the connection diagram of the starting winding. are divided into constant current generators[2]. If the excitation winding of the generator is supplied from an external current source, it is an independent generator, and if it is

supplied from its own armature, then a self-excitation generator is obtained. Self-excitation generators, in turn, are divided into parallel (pair), series (series) and compound (compound) excitation generators. In a parallel excitation generator, the excitation winding is connected in parallel to the armature winding, while in a series generator there are two windings, one of which is connected in parallel to the armature winding and the other in series. Figure 2 shows the schematic diagrams of the connection of generators with excitation with: a-independent; b-parallel; c-series; d-compound; and d-permanent magnet excitation[3].

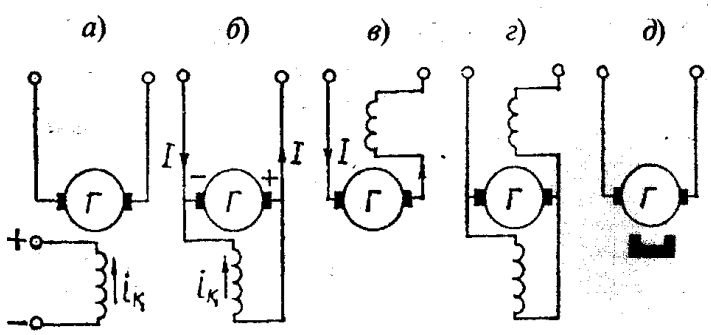


Figure 2. Electric circuits on connections of direct current generators.

Since the generator circuit in Fig. 2 d does not have an excitation coil, a permanent magnet is used instead.

Alternating current generators consist mainly of electrical machines called synchronous and asynchronous[4].

Three-phase current produced in power plants is generated in synchronous generators. Synchronous generators consist of a stationary stator and a rotating rotor. The stator, in turn, consists of a cast iron housing and a steel core fixed to it, in the slots of which a three-phase alternating current winding is placed. In order to reduce the power loss caused by eddy currents in the stator core, it is assembled from steel sleeves insulated from each other. (Figure 3)

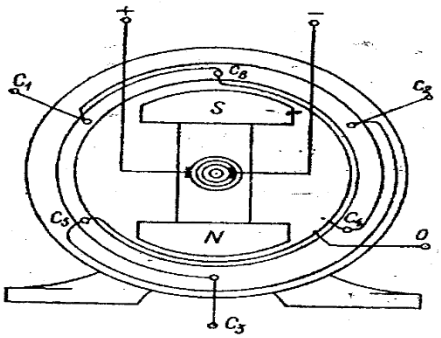


Figure 3. Electrical scheme of a synchronous generator

The rotor of a synchronous generator is made in two types, namely with a spring and a non-spring pole. Small and medium-power hydrogenerators, which are rotated at low frequencies by hydroturbines, are made with a spring, and large-

power turbogenerators, which are rotated at high speeds by steam turbines, are made with a non-spring pole. The rotor itself is usually made of steel, and a starter coil is installed on it[5].

This starter coil in the rotating rotor is supplied with a constant current by means of brushes and rings, and a main magnetic flux is generated. Therefore, if the rotor coil supplied with a constant current is rotated by a primary motor, then, according to the law of electromagnetic induction, a variable E.U.K. is generated in the stator coil.

In order for this E.U.K. to change according to the law of a sinusoid, the magnetic induction generated in the poles must be distributed along a sinusoid.

Research method

Three windings are placed on the stator of a three-phase synchronous generator. These windings differ from each other by 1200 in phase, they are connected in a star or delta circuit. Each winding is called a phase of the generator, and in these phases, E.U.K.s differ from each other by 1200. If a three-phase load is connected to this three-phase E.U.K. system obtained from windings connected in a star or delta circuit, then a three-phase load current flows through the stator windings of the generator. The constant current required to start the synchronous machine is obtained from a starter or a rectifier with a shunt winding.

Synchronous generators with a capacity of up to 400 kVA are usually made with a voltage of 400/230 V, and those larger than 400 kVA with a voltage of 6300 V and more[6].

Generators of the STD type for diesel engines with power up to 1000 kVA are also produced.

The stator of an asynchronous machine is almost the same as that of a synchronous machine, but the coil in their rotor is not supplied with any current from an external source.

It should be noted that synchronous generators are mainly used to generate electricity. Their schemes are shown in Figure 3.

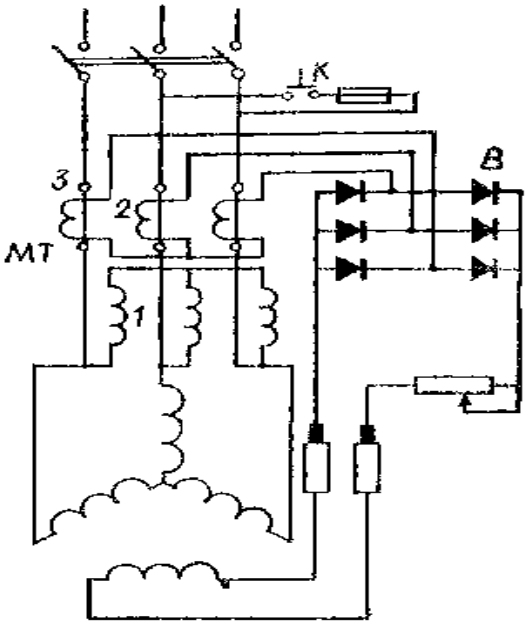


Figure 3. Connection diagram of a self-excited synchronous generator

Primary winding connected in parallel to the stator winding of MT-;

Primary windings of MT 3 connected in series to the stator winding and secondary winding (voltage reducing winding) of MT 2;

Analysis and results

The diagram of a self-excited synchronous generator is shown, where I is the primary winding connected in parallel to the stator winding of the three-winding transformer MT; the primary windings of MT 3 are connected in series to the stator winding and the secondary winding (voltage-reducing winding) of MT 2; the principle of self-excitation of the generator is implemented in the usual operating mode, in which, under the influence of Eqal, formed in the stator winding from residual magnetism, a current flows in winding I of the stabilizing transformer. The magnetic flux formed by this current produces an emf in the secondary winding. This emf The valve (rectifier) is connected to V, and the constant current obtained from it is supplied to the excitation winding of the synchronous generator, and as a result, its voltage automatically increases to the nominal value. When the generator is loaded, the winding of the stabilizing transformer also begins to carry current from 3. Using the magnetic flux generated by the load current passing through this winding, it is possible to completely eliminate the effect of the demagnetizing effect of the armature reaction and the decreasing voltage in the generator winding. Thus, the given value of the voltages of the stabilizing transformer and the generator is automatically maintained unchanged[1-5].

Conclusion

To accelerate the self-excitation process, when starting a synchronous generator, its two phases are short-circuited with the button K. In this case, the short-circuit current generated by Eqal passes through the 3rd winding of the MT and increases the value of E.Y.K. generated in its second winding, and therefore

the generator's starting current also increases rapidly and it starts faster. With the beginning of the self-excitation process, that is, with an increase in the generator voltage, the button K is immediately returned to its original state[5-6].

To adjust the generator voltage, it is enough to change the resistance of the resistor in the starting circuit. In such a scheme, with a change in the load, the generator voltage will change by no more than 5% compared to the given one. Synchronous generators with a power of not more than 30÷50 kVA can also be started with mechanical rectifiers. The principle of operation of a mechanical rectifier is almost no different from the principle of operation of a DC machine collector. In addition to the main winding 1, auxiliary excitation winding 2 is also installed on the generator stator itself. E.U.K generated in Yodramchi Chulgam is fed to the mechanical rectifier. This coil is connected in a triangular scheme, each phase of which consists of 5 ÷ 8 windings. The mechanical rectifier consists of a contact copper ring divided into 12 parts, 6 of these ring parts installed on the rotor shaft are considered working, and the rest are auxiliary parts. When working parts with even numbers are interconnected, they are connected to one end of the excitation coil on the rotor, and current numbers are connected to its 2 ends.

The electric currents generated in the auxiliary coils are fed to the mechanical rectifier by means of brushes. The brushes are spaced 120 electrical degrees apart, and their number is three times the number of pairs of poles. The width of the auxiliary part of the copper ring in the mechanical rectifier is made slightly larger than the width of the brushes. This prevents the brushes from shorting each other when they pass from one working part of the ring to another[5-6].

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SURXONDARYO VILOYATINING ORGANIK DUNYOSI VA YER (AGROIQLIM) RESURSLARIDAN QISHLOQ XO'JALIGIDA FOYDALANISH MASALALARI

Annotatsiya: *Ushbu ish Surxondaryo viloyatining tabiiy-geografik sharoitlari, o'simlik va hayvonot dunyosi, yer va suv resurslaridan foydalanish holati hamda ekologik muammolarini o'rganishga bag'ishlangan.Tadqiqotda qishloq xo'jaligi tarmoqlari, ekin maydonlarining taqsimlanishi, suv ta'minoti, iqlim sharoiti va meliorativ muammolar tahlil qilinadi. Sho'rlanish, yerlarning yaroqsiz holga kelishi, antropogen ta'sirlar natijasida o'simlik turlarining qisqarishi kabi ekologik muammolar ko'tarilib, yer-suv resurslaridan oqilona foydalanish zarurligi ta'kidlanadi. Shuningdek, Surxondaryo viloyatining iqtisodiy salohiyati, qishloq xo'jaligi yo'nalishlari, tabiiy boyliklari va ularni muhofaza qilish bo'yicha qonuniy asoslar yoritilgan. Ish viloyat tabiatini saqlash, biologik xilma-xillikni himoya qilish va barqaror foydalanish masalalariga qaratilgan.*

Kalit so'zlar: *Surxondaryo viloyati, flora, o'simliklar dunyosi, cho'l zonasi, voha ekotizimi, dorivor o'simliklar, sho'rlanish, qishloq xo'jaligi, melioratsiya, subtropik iqlim, antropogen ta'sir, ekologik muvozanat, tabiiy o'simliklar, madaniy ekinlar, ekin maydonlari, ekologik barqarorlik.*

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ISSUES OF USING THE ORGANIC WORLD AND LAND (AGRO-CLIMATIC) RESOURCES OF THE SURKHANDARYA REGION IN AGRICULTURE

Annotation. *This work is devoted to studying the natural–geographical conditions, flora and fauna, land and water resource utilization, and ecological problems of the Surkhandarya region. The research analyzes agricultural sectors, distribution of croplands, irrigation water supply, climate characteristics, and melioration issues. Ecological problems such as soil salinization, land degradation, and loss of plant species due to anthropogenic impact are highlighted, emphasizing the need for rational use of land and water resources. The work also covers the economic potential of the region, main agricultural directions, natural wealth, and the legal basis for environmental protection. The study focuses on preserving regional nature, protecting biodiversity, and ensuring sustainable use of natural resources.*

Keywords: *Surkhandarya region, flora, plant world, desert zone, oasis ecosystem, medicinal plants, environmental protection, land resources, water resources, salinization, agriculture, land reclamation, subtropical climate, anthropogenic impact, ecological balance.*

Kirish

Surxondaryo viloyati O‘zbekistonning eng boy va rang-barang tabiiy resurslarga ega hududlaridan biri bo‘lib, uning geografik joylashuvi, relyefi va agroiqlim sharoitlari qishloq xo‘jaligining rivojlanishi uchun keng imkoniyatlar yaratadi. Viloyat hududi o‘zining noyob flora va faunasi, shuningdek, qishloq xo‘jaligida foydalanishga yaroqli unumdor yer maydonlari bilan ajralib turadi.

Surxondaryoning o‘simliklar qoplami cho‘l, voha, tog‘ oldi va tog‘ zonalarida o‘ziga xos tarzda shakllangan. Cho‘l hududlarida saksovul, qandim, cherkez kabi qurg‘oqchilikka chidamli o‘simliklar yetakchilik qilsa, tog‘ yon bag‘irlarida archa, pista, qayin, yong‘oq kabi qimmatbaho daraxt turlari uchraydi. Shuningdek, daryo bo‘ylarida to‘qay o‘simliklari keng tarqalgan bo‘lib, ular ekologik barqarorlik uchun muhim hisoblanadi.

Viloyat tabiiy sharoitlarining turli-tumanligi unga mos bo‘lgan qishloq xo‘jaligi tarmoqlarining shakllanishiga imkon bergan. Bu yerda paxtachilik, g‘allachilik, bog‘dorchilik, chorvachilik, pillachilik kabi tarmoqlar yetakchi ahamiyatga ega. Ayniqsa, Surxondaryo O‘zbekistonda eng ko‘p ingichka tolali paxta yetishtiriladigan hudud hisoblanadi. Unumdor yerlarning 280 ming gektardan ortig‘i qishloq xo‘jaligi uchun foydalaniladi.

Shu nuqtai nazardan, Surxondaryo viloyatining organik dunyosi, landshaftlari va yer-agroiqlim resurslaridan oqilona foydalanish masalalarini o‘rganish ilmiy va amaliy jihatdan dolzarbdir.

Viloyatning florasi ya’ni o’simliklar dunyosi xo’jalik ahamiyatiga ko’ra cho’l va voha (vodiy) guruhlariga bo’lib o’rganiladi. Viloyatda cho’l zonasi guruhiga kiradigan o’simlik turlari keng tarqalgan. Surxondaryoning janubiy,

janubi-sharqiy qismlarida saksovul, quyonsuyak, qandim (juzg'un), cherkez, choycho'p, yaltirbosh kabi o'simliklar yetakchilik qiladi. Viloyatning g'arbiy, shimoliy g'arbiy qismidagi gipsli, toshloq va qumli yerlarda qizilcha, sassiq kavrak, shuvoq, astragal, isiriq va boshqa o'simlik turlari keng tarqalgan. To'qay o'simliklari viloyatning yirik daryolari bo'yi sohillarida tarqalgan.

Surxondaryo farmatsevtika resurslariga boy, bu yerda respublika dorivor o'simliklarining 35-40 foizi jojlashgan [1].

Madaniy o'simliklar asosan viloyatning dehqonchilik qilinadigan zonasida hukmronlik qiladi. Madaniylashgan o'simliklar bilan birga qo'ng'irbosh, shuvoqlar, krestguldoshlar oilalariga kiradigan efemerlar, g'alladoshlar, dukkakdoshlar, murakkabguldoshlar kabi begona o'simliklar ham o'sadi. Har xil mevali va manzarali daraxtlar ham regionda keng tarqalgan. Surxondaryo viloyati o'simliklar dunyosi o'zining xilma xilligi foydali o'simliklari turlarining salmog'i jihatidan muhim ahamiyat kasb etadi. Viloyatda uchraydigan juda ko'p o'simlik turlari shifobaxsh, dori darmonlik xususiyatiga ega. O'simliklar olamini muhofaza qilish, ularni saqlash maqsadida "O'zbekiston qizil kitobi" tashkil etilgan va unga hozirgi kunga kelib kamayib borayotgan o'simlik va hayvonot dunyosi turlari kiritilgan. Ushbu kitobda mamlakatimiz bo'yicha 163 tur o'simlik kiritilgan. Shundan 73 turi Surxondaryo viloyati hududida uchraydi.

Viloyat hududining hayvonot dunyosi ham o'zining turli-tumanligi bilan alohida ajralib turadi. Vohamizda 1159 tur hayvonot turi yashashi aniqlangan. Shulardan 826 turi umurtqasiz hayvonlar hayvonlar bo'lsa, 333 turi umurtqali hayvonlarni tashkil etadi. Jahon qizil ro'yxatiga va Respublikamiz "Qizil kitob" iga 70 tur umurtqasiz va umurtqali hayvonlar kiritilgan [2]

Qishloq xo‘jaligining asosiy tarmoqlari: paxtachilik, g‘allachilik, bog‘dorchilik, pillachilik. Tog‘ etaklarida lalmikor dehqonchilik (asosan, bug‘doy va arpa) bilan shug‘ullaniladi. O‘zbekistonda eng ko‘p ingichka tolali paxta Surxondaryo viloyatida tayyorlanadi. Viloyatning tog‘oldi tumanlarida bog‘dorchilik va tokchilik rivojlangan. Chorvachilikda qoramol, qo‘y (qorako‘l va hisor qo‘ylari), echki, yilqi, parranda, quyon boqiladi. Jahon mo‘yna va teri auksionlarida juda qadrlanadigan "Surxon suri" qorako‘l terisi yetishtiriladi.[1]

Dehqonchilikda foydalanadigan yerlar maydoni 284,3 ming ga, shundan sug‘oriladigan yerlar 271,6 ming ga, shu jumladan, 120,8 ming ga yerga paxta, 129,7 ming ga yerga don ekinlari, 9,1 ming ga yerga sabzavot, 1,8 ming ga yerga poliz, 5,5 ming ga yerga kartoshka, 16,2 ming ga yerga yem-xashak ekinlari ekiladi. 33,5 ming ga yer ko‘p yillik daraxtzorlar, 12,7 ming ga yer mevazor, 5,2 ming ga yer tutzor, 15,1 ming ga yer tokzorlar bilan band. 854,2 ming ga yerni yaylovlar egallagan. Yerning meliorativ holatini yaxshilash maqsadida kollektordrenaj tarmoqlari qurilgan.

Viloyat hududining yer maydonining 5 foizga yaqini o'rmon bilan qoplangan bo'lib, biologik zaxiralari orasida qimmatli ozuqabop va shifobaxsh o'simliklardan, pista, bodom, shifobaxsh giyohlar va boshqalar ko'paytiriladi.

Janubiy qismi keng qumliklar bilan qoplangan. Tekislik qismining iqlimi quruq subtropik. Yozi jazirama issiq va uzoq, qishi iliq va qisqa. Yillik o‘rtacha

temperatura 16°—18°. Iyulning o‘rtacha temperaturasi 28°.—32°, yanvarniki 2,8°—3,6°. O‘zbekistonda eng issiq temperatura ham shu viloyat hududida kuzatilgan (1914-yil 21 iyunda Termizda 49,5° issiq bo‘lgan). Ba’zi yillari qish ancha sovuq (-20° va hatto undan ham past). Yil davomida bulutsiz kunlarning ko‘p bo‘lishi va quyosh nurining tik tushishi effektiv temperaturalar yig‘indisi yuqori bo‘lishiga olib keladi. 10° dan yuqori temperaturali kunlar tekislik qismida 290— 320 kun davom etadi. Bu esa viloyatda eng issiqsevar ekinlar (shakarqamish, ingichka tolali paxta) va mevalar yetishtirishga imkon beradi. Viloyat tog‘lar orasidagi berk botiqda joylashganidan bu yerda yog‘in kam. Viloyatning janubiy tekisliklarida yiliga 130– 140 mm, Hisor tog‘lari yon bag‘irlarida 445–625 mm yog‘in yog‘adi. Yog‘inning asosiy qismi qish va bahorda tushadi. G‘arbiy, janubi-g‘arbiy va shimoli-sharqiy shamollar ko‘p esadi. Viloyatning janubi-sharqiy qismida esadigan Afg‘on shamoli iqlimga salbiy ta’sir etadi. Tog‘ qor va muzliklaridan, yog‘indan to‘yinadigan bu suv tanqisligi kuzatiladi. Yer osti (artezian) suvlaridan tobora keng foydalanilmoqda. 1957—1958 yillarda Uchqizil, 1959— 1962 yillarda Janubiy Surxon va Degrez suv omborlari, Jarqo‘rg‘on gidrotuguni qurildi. Hazorbog‘, Dayto‘lak, Qumqo‘rg‘on, Zang kanallari, Sherobod, Amu-Zang mashina sug‘orish kanallari barpo etildi.

Viloyatning tuprog‘i tekisliklarda taqirsimon va sho‘rxok och bo‘z tuproklar, tog‘ yon bag‘rida turli xil bo‘z tuproqlar. O‘simliklar dunyosi ham tabiiy sharoiti bilan bog‘liq. Janubidagi ekin ekilmaydigan qumloq joylarda qandim, oq saksovul, cherkez, taroqbosh, yaltirbosh, yantoq, butasimonlar; daryo bo‘ylarida yulg‘un, jiyda, turang‘il, terak, savag‘ich, qiyoq, qamish; adir va tog‘larning pastki yon bag‘irlarida bir yillik efemerlar (lolaqizg‘aldoq, nixatak); 1200–2500 m balandliklarida efemerlar bilan birga archa, pista, qayin, tol, yongoq, olma, zarang o‘rmonlari uchraydi. Bobotog‘ tizmasi yon bag‘irlarida respublikaning eng yirik tabiiy pistazorlari joylashgan. Baland tog‘ zonasi subalp va alp o‘tloklari bilan band. Hayvonot dunyosi ancha boy: buri, tulki, chiyabo‘ri, ayiq, jayran, qobon, yovvoyi echki, arhar, to‘qaylarda bug‘u, to‘qay mushugi, kalamush, qo‘shoyoq, yumronqoziq, ko‘rsichqon, gekkon kaltakesagi, ko‘zoynakli ilon (kobra), o‘q ilon, jayra, qushlardan ular (tog‘ kurkasi), qirg‘ovul, mayna, qaldirg‘och, g‘oz, o‘rdak, so‘fito‘rg‘ay, chil, kaklik bor.Daryo va suv omborlarida har xil baliq ko‘p.

Surxondaryo viloyati tabiati xilma xil, o’simliklar va hayvonot dunyosiga boy va turli-tuman hisoblanadi. Viloyatimizda 1646 ta o’simliklar turi uchraydi. O’zbekistonda tabiatni muhofaza qilishga oid bo’lgan ko’plab qonun va qarorlar qabul qilingan.

Sanoat tarmoqlari va qishloq xo’jaligining jadal sur’atlar bilan rivojlantirilishi tabiiy hududlarning keng miqyosda o’zlashtirilib, qishloq xo’jaligi muomalasiga kiritilishi natijasida tabiatda yuzaga kelgan ekologik muvozanat buzildi. Natijada, ko’plab o’simlik turlarining yo’qolib ketishi xavfi tiklab bo’lmas darajaga kelib qoldi. Bugungi kunda har qanday turning insonlarning tabiatga antropogen ta’sirlari tufayli, yo’qotilishi ularning yo’q bo’lib ketishiga olib kelmoqda. Yovvoyi o’simliklar turlari qishloq xo’jaligida ekiladigan madaniy navlarni barpo etilishda asosiy manba hisoblanadi.

Yer insonning yer yuzasida yashab qolishi va farovonligi uchun ham barcha quruqlikdagi ekotizimlarni saqlash uchun ham muhim tabiiy resurs hisoblanadi. Yer resurslariga bo'lgan talabning ortib ketishi, oziq-ovqat ekinlarini va yer resurslarini sifat va miqdorining pasayishiga olib keladi.Hozirgi kunda dunyo bo'yicha haydaladigan yerlarning 16 % i keskin tanazzulga uchragan va ushbu holatning asosiy sababi aholi sonining ortishi hamda yer resurslariga bo'lgan talabning ortib borishidir (FAO ma'lumotlari).

Surxondaryo viloyati aholisi 2743 ming kishini tashkil qiladi. Viloyat mamlakatimiz iqtisodiyotida qishloq xo'jaligi mahsulotlari yetishtirish va ularni qayta ishlash sanoati tarmoqlarida yuqori o'rinlarni egallaydi. Viloyatning jami yer maydoni 2009911 gektarni tashkil etadi. Qishloq xo'jalik ekin maydonlari 278124 gektar bo'lib, shundan sug'oriladigan yerlar 238632 gektar, lalmi yerlar 39 492 gektar, holati yomon yerlar 19744 gekratni tashkil etadi (1 jadval) [4]

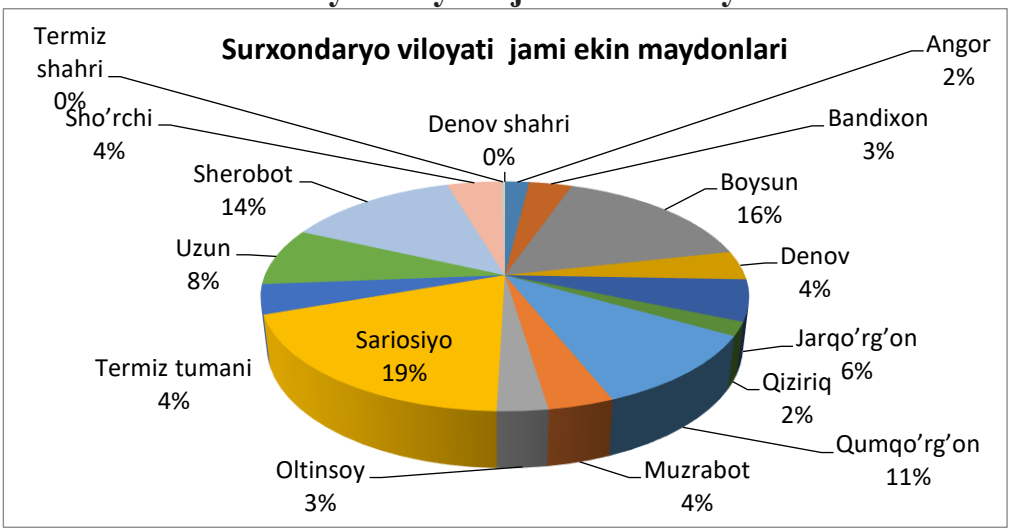
1-jadval.

Surxondaryo viloyati tumanlari bo'yicha bo'yicha qishloq xo'jaligi yerlarining taqsimlanishi (01.01.2024)

T/r	Tumanlar nomi	Umumiy maydoni	Ekin yerlar Jami	jumladan suvli	lami	yomon holatli
1	Angor	38731	15535	15535	0	1806
2	Bandixon	68424	13373	13318	55	1653
3	Boysun	325307	20648	1982	18666	262
4	Denov	81933	24324	21738	2856	983
5	Jarqo'rg'on	116198	19700	19700		3268
6	Qiziriq	38788	24078	24078		1038
7	Qumqo'rg'on	213752	18826	18784	42	1099
8	Muzrabot	73923	33321	33321		1197
9	Oltinsoy	56832	12593	9825	2768	655
10	Sariosiyo	384638	12721	8935	3786	35
11	Termiz tumani	83444	11930	11930		2520
12	Uzun	163165	15094	10808	4286	874
13	Sherobot	272785	40375	33464	6911	3769
14	Sho'rchi	86202	15331	15209	122	585
15	Termiz shahri	4274	365	365		
16	Denov shahri	1515				
Jami		**2009911**	**278124**	**238632**	**39492**	**19744**

(Surxondaryo viloyat yer kadastr bashqarmasi 2024 yil 1-yanvar)

1- rasm.
Surxondaryo viloyati jami ekin maydonlari



Surxondaryo viloyat yer kadastr bashqarmasi ma'limotlari asosida ishlandi (2024 yil 1-yanvar)

Yuroridagi ma'lumotlardan ko'rishimiz mumkinki viloyatimizda oziq-ovqat mahsulotlarini yetkazib berish uchun juda katta imkoniyatlar mavjud. Lekin qishloq xo'jalik mahsulotlari uchun ajratilgan yerlar yaroqsiz holatda kelib, sho'rlanish jadal sur'atlar bilan ortib bormoqda. [3]

Viloyatimizning katta qismi ya'ni Surxon-Sherobod vodiysidan boshqa qismi asosan tog'liklardan iboratdir. Viloyat hududidagi tog'lar shimol tomondan keladigan sovuq havo massasini to'sib qolganligi sababli Respublikamizning subtropik o'lkasi hisoblanadi. Viloyatda janubdan issiq quruq "afg'on shamoli' esib ekinlarni jiddiy zararlaydi. Surxondaryo viloyati ziroatchiligida bu omil hisobga olinadi.

Yer va suv resurslardan oqilona foydalanish masalasi, ayniqsa so'nggi yillarda ko'p muhokama bo'lmoqda. Bularning barchasida asosan ikki maqsad, ya'ni yer va suvdan samarali foydalanish va ularni muhofaza qilish ko'zda tutuladi

Viloyatimiz tabiatini ko'rkam va go'zal, o'simlik va hayvonot olamini yaxshi saqlash ona yurtimiz go'zalligi va boyligi bilan ahamiyatlidir. Shuning uchun ham mavjud o'simliklar olamini, ayniqsa dorivor, shifobaxsh o'simliklarni barchamiz ko'z qorachig'idek asrashimiz zarur. O'simliklardan xalq xo'jaligida va xalq tabobatida foydalanishni qat'iy tartibga solish, foydalanishni tartibga solish, foydali qazilmalar va minerallarni qazib olishda ulardan atrof muhitni zararlantirmasdan faoliyat olib borish, har xil zaharli birikmalar va chiqindilarning tuproq, suv va havoni ifloslantirishda oldini olish o'ta zarur va dolzarbdir.

Xulosa

Surxondaryo viloyati flora va fauna boyliklari, shuningdek, yer-agroiqlim resurslari bilan O'zbekistonning ekologik va qishloq xo'jaligi salohiyati yuqori bo'lgan hududlaridan biri sanaladi. Viloyat hududida tarqalgan o'simlik va hayvonot turlari xilma-xilligi, qimmatli dorivor, yem-xashakbop va manzarali turlarning ko'pligi hududning biologik resurslarga boy ekanidan dalolat beradi.

Ayniqsa, “Qizil kitob”ga kiritilgan o‘simlik va hayvonlar sonining ko‘pligi ularni muhofaza qilishning dolzarbligini ko‘rsatadi.

Shu bois, viloyatning organik dunyosini asrash, biologik xilma-xillikni tiklash, yer va suv resurslaridan oqilona va tejamkor foydalanish, ekologik muvozanatni saqlash bugungi kunda ustuvor vazifalardan biridir. Davlat tomonidan qabul qilingan ekologik qonunlar, tabiatni muhofaza qilish bo‘yicha dasturlar va xalqaro konvensiyalarning amaliyotga joriy etilishi Surxondaryo viloyati tabiiy resurslarining barqaror rivojlanishini ta’minlashga xizmat qiladi.

Umuman olganda, Surxondaryoning tabiiy-ekologik boyliklaridan oqilona foydalanish, ularni kelajak avlodlar uchun saqlab qolish va qishloq xo‘jaligini ekologik jihatdan barqaror asosda rivojlantirish strategik ahamiyatga ega hisoblanadi.

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SHAHAR AGLOMERATSIYALARINI AHAMIYATI SHAKLLANISH VA RIVOJLANISH XUSUSIYATLARI

Annotatsiya. *Shahar aglomeratsiyalari ishlab chiqarish, madaniy, ijtimoiy, mehnat, rekreatsiya va boshqa aloqalar bilan murakkab tizimga birlashtirilgan aholi punktlarining texnologiyalarning, aglomeratsiyalarning shakllanishi aholi soni kam bo‘lgan shaharlarda amalga oshirish iqtisodiy jihatdan maqsadga muvofiq bo‘lmagan yuqori sifatli xizmatlardan foydalanish imkoniyatiga ega bo‘lgan fuqarolar doirasini keskin kengaytiradi va shu sababli butun mamlakat aholisining hayot sifatini oshiradi va samaradorligini baholash usullari berilgan.*

Kalit so‘zlar: *madaniy, ijtimoiy, mehnat, optimallashtirish, xom ashyo, materiallar, aglomeratsiya, infratuzilma, sun’iy yo‘ldosh, munitsipalitetni aglomeratsiyaga.*

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THE SIGNIFICANCE, SPECIFIC FEATURES OF FORMATION AND DEVELOPMENT OF URBAN AGGLOMERATIONS

Abstract: *The formation of agglomerations—settlements united into a complex system of industrial, cultural, social, labor, recreational, and other connections—significantly expands the number of citizens who have access to high-quality services, the provision of which in sparsely populated towns is economically impractical. Consequently, it improves the overall quality of life of the country’s population and makes it possible to assess the effectiveness of the proposed methods.*

Keywords: *cultural, social, labor activity, optimization, raw materials, agglomeration, infrastructure, satellite town, municipality within the agglomeration.*

Kirish

Shahar aglomeratsiyalari ishlab chiqarish, madaniy, ijtimoiy, mehnat, rekreatsiya va boshqa aloqalar bilan murakkab tizimga birlashtirilgan aholi punktlarining ixcham fazoviy guruhi bo‘lib, ular asosida aholi punktlari aholisining umumiy soniga teng bozorni yaratishga imkon beradi. Shunday qilib, aglomeratsiyalarning shakllanishi aholi soni kam bo‘lgan shaharlarda amalga oshirish iqtisodiy jihatdan maqsadga muvofiq bo‘lmagan yuqori sifatli xizmatlardan foydalanish imkoniyatiga ega bo‘lgan fuqarolar doirasini keskin kengaytiradi va shu sababli butun mamlakat aholisining hayot sifatini oshiradi.

Tarixiy jihatdan aglomeratsiyalar asosiy shaharlarning yanada qulay holati, ularning iqtisodiy va ijtimoiy rivojlanishining jadal o‘sish sur’atlari tufayli shakllangan. O‘tgan asrning oxirida aglomeratsiyalarning shakllanishiga yirik shaharlarning shahar atrofi hududida ish joylarining keskin qisqarishi, shuningdek, shahar atrofidagi hududlarda turar-joy qurilishi jiddiy ta’sir ko‘rsatdi [1].

Shakllangan shahar aglomeratsiyasining asosiy ko‘rsatkichlari va xususiyatlari quyidagilardan iborat:

1 m^2 ga aholi zichligi;

aholi (100 ming kishidan);

qurilish zichligi (asosiy shahar va sun’iy yo‘ldosh shaharlar o‘rtasida 20 km dan oshmasligi kerak);

sun’iy yo‘ldosh shaharlar soni;

asosiy shahar va sun’iy yo‘ldosh shaharlar o‘rtasida aholi sayohatining intensivligi;

yagona infratuzilmaning mavjudligi.

Aglomeratsiyalar yuqori darajada sanoatlashganligi, ijtimoiy infratuzilmaning (ta’lim muassasalari, tibbiyot, madaniyat muassasalari va boshqalar) konsentratsiyasi, aholi zichligi, mehnat migratsiyasining muntazamligi bilan ajralib turadi.

Har bir shakllangan shahar aglomeratsiyasini shartli ravishda markazdan boshlab bir nechta zonalarga bo‘lish mumkin:

asosiy shaharning markaziy tarixiy qismi;

rivojlangan xizmat ko‘rsatish sohasiga ega biznes markazi;

qisman ofis binolari bilan birlashtirilgan turar-joy maydoni;

rivojlangan ijtimoiy sohaga ega bo‘lgan ommaviy ko‘p qavatli binolar zonasi (turar-joy maydoni, sanoat zonalari);

sun’iy yo‘ldosh shaharlar va boshqa gravitatsiyaviy aholi punktlari tomonidan tashkil etilgan shahar atrofi hududlari.

Har bir zonaning maydoni va chegaralari juda shartli bo‘lib, ko‘pincha aglomeratsiyani tashkil etuvchi aholi punktlarining rivojlanishi bilan belgilanadi.

Jahon amaliy tajribasi shuni ko‘rsatadiki, alohida shaharlarning rivojlanishi

bilan salbiy oqibatlar aholi sonining 150-300 ming kishigacha ko‘payishi bilan ijobiy ta’sirdan oshib keta boshlaydi. Taxminlarga ko‘ra, bunday shaharlar aglomeratsiyaga birlashganda, har bir shahar alohida-alohida yirik shaharlar va millioner shaharlardagi hayot bilan birga keladigan qiyinchiliklarni boshdan kechirmaydi [2].

Ko‘p sonli ijobiy ta’sirga qaramasdan, aglomeratsiyalarning rivojlanishi ham kamchiliklarga ega: ularning faoliyati bir qator qiyinchiliklar bilan bog‘liq. Ulardan biri - ma’muriy boshqaruvning murakkabligi va markaziy qismdagi infratuzilma ob’ektlarini rivojlantirishning strategik xususiyatlari, tortishish joylari emas, balki markaziy shahar aholisiga yo‘naltirilgan. Shu bilan birga, kommunikatsiyalarning katta uzunligi va ularga yukning tobora ortib borishi uy-joy kommunal xizmat ko‘rsatish va transport sifatining pasayishiga olib keladi. Atrof-muhitga ta’sirning kuchayishi ekologik vaziyatning yomonlashishiga olib keladi. Bundan tashqari, ekologik vaziyatga transport ta’sir qiladi, ularsiz aglomeratsiyani shakllantirish mumkin emas.

Materiallar va metodlar

Ayrim aglomeratsiyalar hududi va aholisi butun mamlakatnikiga teng. Dunyodagi eng yirik aglomeratsiyalarning reytingli ro‘yxatini tuzishda ularning aholi zichligi ham hisobga olinadi. Ro‘yxatdagi aglomeratsiyaning tartibli o‘rni ko‘pincha muayyan munitsipalitetlarning rivojlanishiga ta’sir ko‘rsatadigan davom etayotgan iqtisodiy va siyosiy jarayonlarga, shuningdek, aholi punktlarining hududiy birligini ta’minlaydigan transport kommunikatsiyalarining rivojlanish darajasiga qarab o‘zgaradi. Tokio-Yokohama 37,5 million aholiga ega bo‘lgan dunyodagi yigirmata yirik shahar aglomeratsiyasining maydoni bo‘yicha eng katta hisoblanadi. Bunday aglomeratsiyaning shakllanishi va mavjudligi ko‘p jihatdan Yaponiya transport tizimining yuqori darajada rivojlanganligi tufayli mumkin bo‘ldi. shu jumladan temir yo‘l transporti. Mamlakatning eng yirik aeroportlari: Tokiodagi Xaneda va Narita, Osakadagi Kansay va Itami, Shin-Chitose va Sapporo, Fukuoka va Miyazaki - monorels va temir yo‘l transporti orqali sun’iy yo‘ldosh shaharlar markazlari bilan muntazam transport aloqalariga ega va tarmoq bilan organik ravishda integratsiyalashgan. asosiy temir yo‘l va shahar transporti.

Qo‘shma Shtatlarda aholining 7 foizi millioner shaharlarda, etti baravar ko‘p metropoliyalarda yashaydi. Aholisi bor-yo‘g‘i 740 000 kishi bo‘lgan San-Fransiskoni misol qilib keltirish mumkin, lekin ayni paytda umumiy aholisi 4 million kishidan ortiq bo‘lgan aglomeratsiyaning o‘zagi hisoblanadi. Mamlakat hududining taxminan 3% ni egallagan va milliy YaIMning chorak qismini ta’minlovchi Boston-Vashingtonning ko‘p markazli aglomeratsiyasida mamlakat aholisining 15% istiqomat qiladi. Aholi zichligi har kvadrat kilometrga 2 mingdan ortiq aholiga ega Nyu-York aglomeratsiyasi, lekin ayni paytda dunyodagi eng yirik moliyaviy markaz hisoblanadi. Amerikada temir yo‘l transporti yo‘lovchilar orasida kamroq mashhur. Amerikaning ko‘plab shaharlari shaxsiy transport vositalarining qulayligini hisobga olgan holda ishlab chiqilgan va tarixan rivojlangan. Uzoq masofalarga tashish asosan havo orqali amalga oshiriladi. Biroq yo‘lovchi transportining boshqa turlarini, shu jumladan temir yo‘l transporti

ishtirokidagi shahar atrofi transporti tizimini rivojlantirish zarur aglomeratsiya ichidagi migratsiyani ta’minlaydi. Qo‘shma Shtatlar dunyodagi eng ko‘p mintaqaviy temir yo‘llarga ega (600 ga yaqin), ular mamlakat transport tarmoqlarini rivojlantirish nuqtai nazaridan eng istiqbolli hisoblanadi. AQShda yalpi ichki mahsulotning 80 foizi sakkizta aglomeratsiyada ishlab chiqariladi, ularning har biri 300-400 km radiusda joylashgan, zich transport infratuzilmasiga ega hududda joylashgan. Agar bir munitsipalitet aholisining 25 yoki undan ortiq foizi boshqa shaharda ishlayotgan bo‘lsa (shuning uchun mehnat migratsiyasini amalga oshirsa) AQShda munitsipalitetni aglomeratsiyaga qo‘shish zarurati ko‘rib chiqiladi [4].

Har qanday aglomeratsiya iqtisodiyotida ishlab chiqarish sohasi uchun zarur bo‘lgan aholining harakatchanligini ta’minlaydigan transport xizmatlarining rivojlanish darajasi eng muhim rol o‘ynaydi. Tarixiy jahon tajribasi shuni ko‘rsatadiki, hatto eng yirik shaharlar va milliondan ortiq shaharlarning aholisi ham har kuni bir soatdan olti soatgacha transportda o‘tkazishga majbur bo‘lishadi - hayotlarining deyarli chorak qismi. Aholining asosiy transport xizmatiga - transportga bo‘lgan ehtiyoji mehnat, o‘qish, dam olish, davolanish, turizm va boshqa maqsadlar bilan bog‘liq bo‘lib, inson hayotining asosiy ehtiyojlaridan biridir.

Dunyoning eng yirik shahar aglomeratsiyalarida temir yo‘l transportiga ustuvor ahamiyat beriladi. Masalan, Berlin aglomeratsiyasida temir yo‘l transport turlarini rivojlantirishga ajratilgan byudjet ulushi avtomobil yo‘llarini rivojlantirishga sarflangan xarajatlardan uch baravar ko‘pdir. Parij aglomeratsiyasida jamoat transportining ulushi 60 foizga etdi, so‘nggi 10 yil ichida uni rivojlantirishga yo‘naltirilgan investitsiyalar hajmi 17 milliard evroni tashkil etdi. Bundan tashqari, Parijda shahar atrofi va shahar atrofi transportini amalga oshirishdan olingan daromadning 47 foizi Parij aglomeratsiyasida faoliyat yurituvchi korxonalar tomonidan to‘lanadigan transport solig‘i hisoblanadi. Fransiya, Germaniya va Shveysariya aglomeratsiyalarida yo‘lovchilarga xizmat ko‘rsatish sifatini oshirish uchun avtobuslar va shaharlararo poyezdlar jadvallari bilan muvofiqlashtirilgan shaharlararo poyezdlarning integratsiyalashgan jadvalidan foydalaniladi [5].

Xulosa

Yuqoridagi tahlillar shuni ko‘rsatadiki, shahar aglomeratsiyalari: iqtisodiy rivojlanishning eng muhim drayveri, transport tizimining samaradorligini oshiruvchi asosiy omil, aholining turmush darajasini yuksaltiruvchi hududiy platformadir.

Aglomeratsiyalarni samarali boshqarish uchun: Transport infratuzilmasini modernizatsiya qilish; Hududlararo integratsiyani kuchaytirish; Turar-joy, sanoat va logistika hududlarini rejalashtirish; Ekologik standartlarni ta’minlash zarur.

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XORAZM VILOYATI QISHLOQ JOYLARIDA TURIZM INFRATUZILMASINI RIVOJLANTIRISHNING HUDUDIY XUSUSIYATLARI (XIVA TUMANI MISOLIDA)

Annotatsiya: *Mazkur maqolada Xorazm viloyati, xususan Xiva tumani misolida qishloq joylarda turizm infratuzilmasini rivojlantirishning hududiy xususiyatlari tahlil qilinadi. Turizm infratuzilmasining hozirgi holati, rivojlanish omillari, mavjud muammolar va istiqbolli yo'nalishlar aniqlanadi. Tadqiqot natijasida Xiva tumanining qishloq joylarida turizm infratuzilmasi elementlari notekis joylashgani, transport, aloqa va mehmondo'stlik xizmatlarida hududiy tafovutlar mavjudligi aniqlangan.*

Kalit so'zlar: *Turizm infratuzilmasi, qishloq turizmi, hududiy rivojlanish, Xiva tumani, xizmat ko'rsatish, agroturizm, klasterlash.*

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TERRITORIAL FEATURES OF THE DEVELOPMENT OF TOURISM INFRASTRUCTURE IN RURAL AREAS OF KHOREZM REGION (A CASE STUDY OF KHIVA DISTRICT)

Abstract: *This article analyzes the territorial features of the development of tourism infrastructure in the rural areas of the Khorezm region, specifically using the Khiva district as a case study. The current state of tourism infrastructure, development factors, existing problems, and promising directions are identified. The study revealed an uneven distribution of tourism infrastructure elements in the*

rural settlements of the Khiva district, as well as territorial disparities in transportation, communication, and hospitality services.

Keywords: *tourism infrastructure, rural tourism, territorial development, Khiva district, service sector, agritourism, clustering.*

So‘nggi yillarda O‘zbekiston Respublikasida turizm sohasini milliy iqtisodiyotning strategik tarmog‘iga aylantirishga alohida e’tibor qaratilmoqda. Ayniqsa, qishloq joylarda turizmni rivojlantirish orqali yangi ish o‘rinlari yaratish, mahalliy aholi daromadini oshirish va infratuzilma sifatini yaxshilash davlat siyosatining ustuvor yo‘nalishiga aylangan.Xorazm viloyati, xususan Xiva tumani o‘zining boy tarixiy-madaniy merosi, milliy urf-odatlari va tabiiy resurslari bilan ajralib turadi. Shu bilan birga, bu hududda qishloq joylarda turizm infratuzilmasining yetarlicha rivojlanmaganligi, xizmatlar sifati va miqdorining pastligi soha salohiyatini to‘liq ishga solishga to‘sqinlik qilmoqda. Shu sababli, Xiva tumani misolida qishloq joylarda turizm infratuzilmasini rivojlantirishning hududiy xususiyatlarini o‘rganish ilmiy va amaliy jihatdan dolzarb hisoblanadi.

Qishloq turizmi — bu shahar tashqarisidagi tabiiy va madaniy muhitda, mahalliy aholi hayot tarzi bilan tanishish, dehqonchilik va xalq hunarmandchiligi jarayonlarida ishtirok etishga asoslangan turizm turi hisoblanadi.

Turizm infratuzilmasi deganda esa turistlarning qulay harakati, yashashi, ovqatlanishi va dam olishini ta’minlovchi moddiy-texnik, transport, axborot va ijtimoiy xizmatlar majmuasi tushuniladi.

Qishloq joylarda turizm infratuzilmasini rivojlantirish quyidagi asosiy yo‘nalishlarni o‘z ichiga oladi:

- Transport va yo‘l tarmoqlarini yaxshilash;
- Mehmondo‘stlik va xizmat ko‘rsatish obyektlarini ko‘paytirish;
- Telekommunikatsiya va internet xizmatlarini kengaytirish;
- Ekoturizm, agroturizm, etnoturizm uchun zarur sharoit yaratish.

Xiva tumani Xorazm viloyatining janubi-g‘arbiy qismida joylashgan bo‘lib, tarixiy Xiva shahri bilan bevosita tutashgan. Aholi soni 170 ming nafardan ortiq, shundan qariyb 65 foizi qishloq joylarda istiqomat qiladi. Tuman iqtisodiyoti asosan dehqonchilik, bog‘dorchilik, hunarmandchilik va xizmat ko‘rsatish tarmoqlariga tayanadi.

So‘nggi yillarda Xiva shahri atrofiga yaqin joylarda turizm obyektlari soni oshayotgan bo‘lsada, chekka qishloqlarda infratuzilma sust rivojlangan.Tadqiqot natijalariga ko‘ra, Xiva tumanidagi turizm infratuzilmasining asosiy elementlari quyidagicha tasniflanadi:

1-jadval

Infratuzilma	Mavjud holat	Muammolar
Transport	Asosiy yo'llar qoplamasi qoniqarli	Chekka qishloqlarda asphalt yo'llar yo'q
Mehmondo'stlik	20 dan ortiq mehmonxona, homestaylar mavjud	Aksariyati litsenziyasiz, sanitariya sharoiti yetarli emas
Aloqa va internet	Mobil aloqa turlari mavjud, ammo tezligi past	Ko'plab qishloqlarda internet sifati juda past
Oziq- ovqat xizmatlari	Tuman markazlarida yaxshi, ammo qishloqlarda yetishmaydi	Restoran va kafe tarmog'i cheklangan

Jadval mualliflar tomonidan tuzilgan

Bu holat shuni ko‘rsatadiki, infratuzilma asosan markaziy hududlarda to‘plangan, qishloq joylarda esa xizmat ko‘rsatishning hududiy tafovuti keskin.

Xiva tumanida turizm infratuzilmasini hududiy jihatdan rivojlantirish quyidagi yo‘nalishlarda amalga oshirilishi mumkin:

- Transport infratuzilmasini yaxshilash: Qishloqlarni Xiva shahri bilan bog‘lovchi yo‘llarni ta’mirlash, turistlar uchun yo‘l ko‘rsatkichlari o‘rnatish.
- Oilaviy mehmon uylari tarmog‘ini kengaytirish: Qishloq aholisiga imtiyozli kreditlar ajratish orqali homestay tizimini joriy etish.
- Axborot infratuzilmasini raqamlashtirish: “Xiva Rural Tourism Map” kabi raqamli platforma yaratish.
- Klaster yondashuvi: Xiva–Qo‘shko‘pir–Bog‘ot yo‘nalishida agroturizm klasteri tashkil etish.
- Mahalliy kadrlarni tayyorlash: Aholini xizmat madaniyati, til va marketing bo‘yicha o‘qitish.

Bu chora-tadbirlar orqali qishloq infratuzilmasining sifatini oshirish, turistik oqimni kengaytirish va barqaror bandlikni ta’minlash mumkin.Xiva tumani qishloq joylarida turizm infratuzilmasini rivojlantirish, bir tomondan, hududiy iqtisodiy faollikni oshiradi, ikkinchi tomondan, milliy merosni asrab-avaylash va mahalliy aholining turmush darajasini yaxshilashga xizmat qiladi.Hududiy yondashuv asosida ishlab chiqilgan infratuzilma siyosati Xorazm viloyatining barqaror turizm rivojlanishida muhim omil bo‘lib xizmat qiladi.

Xiva tumani misolida olib borilgan tahlillar shuni ko‘rsatadiki, qishloq joylarda turizm infratuzilmasini rivojlantirish Xorazm viloyatining ijtimoiy-Xiva tumanida turizm infratuzilmasini rivojlantirish masalasi faqatgina sayyohlik faoliyatini kengaytirish emas, balki butun hududning iqtisodiy, ijtimoiy va madaniy hayotini jonlantirish bilan bevosita bog‘liqdir. Qishloq joylarda turizmni rivojlantirish orqali aholining daromad manbalari ko‘payadi, yoshlar uchun yangi ish o‘rinlari yaratiladi va mahalliy hunarmandchilik, dehqonchilik, gastronomiya singari milliy an’analar qayta tiklanadi.

Xiva tumanida turizm infratuzilmasi hali to‘liq shakllanmagan bo‘lsa-da, so‘nggi yillarda bir qancha ijobiy o‘zgarishlar kuzatilmoqda. Jumladan, yo‘l-transport tizimi yangilanmoqda, qishloqlarda mehmon uylari tashkil qilinmoqda,

hamda mahalliy aholi turizm sohasida tadbirkorlikni o‘rganishga bo‘lgan qiziqish bildirayotgani kuzatilmoqda. Bu jarayon, avvalo, davlat tomonidan yaratilayotgan imkoniyatlar, xususiy sektorning kirib kelishi va xalqaro tashkilotlarning loyihalar bilan ko‘mak berishi natijasidir.

Hududiy nuqtai nazardan qaraganda, Xiva tumanida turizm infratuzilmasini rivojlantirishda tabiiy va ijtimoiy-geografik omillar hal qiluvchi ahamiyatga ega. Tumanning qulay geografik joylashuvi, qadimiy tarixiy markaz – Ichan qal’a majmuasiga yaqinligi, shuningdek, atrofdagi qishloqlarning o‘ziga xos me’moriy uslublari va an’anaviy turmush tarzini saqlab qolganligi turizm uchun katta afzallik yaratadi. Shunday qishloqlarda mehmon uylari, ekofarmaturlar, agroturizm maskanlari, hunarmandchilik markazlari tashkil etish orqali hududning iqtisodiy salohiyatini yanada oshirish mumkin.

Qishloq turizmining rivojlanishi nafaqat iqtisodiy foyda keltiradi, balki ijtimoiy jihatdan ham ahamiyatlidir. Bu jarayon orqali yoshlar o‘z yurtida ish topadi, ayollar oilaviy tadbirkorlikda faol ishtirok etadi, hududlarda madaniy almashinuv kuchayadi. Shuningdek, mahalliy aholi turizm orqali xorijiy tillarni o‘rganish, xizmat ko‘rsatish madaniyatini oshirish hamda o‘z tarixini targ‘ib etish imkoniyatiga ega bo‘ladi.

Turizm infratuzilmasining rivoji uchun eng asosiy omillar – bu yo‘llar, aloqa tarmoqlari, elektr va suv ta’minoti, internet tarmog‘ining kengaytirilishi, toza energiya manbalari va ekologik muhitni muhofaza qilishdir. Shuning uchun Xiva tumanida kelgusida barqaror turizmni yo‘lga qo‘yish uchun ekologik xavfsiz, barqaror infratuzilma konsepsiyasini ishlab chiqish zarur. Shu orqali turizm faqat qisqa muddatli foyda emas, balki uzoq muddatli iqtisodiy barqarorlik manbaiga aylanadi. Shu bilan birga, Xiva tumanida turizm infratuzilmasini rivojlantirishda mahalliy boshqaruv organlari, xususiy sektor, oliy ta’lim muassasalari va aholining o‘zaro hamkorligi muhim rol o‘ynaydi. Universitetlar huzurida turizm bo‘yicha o‘quv kurslarini tashkil etish, talabalar amaliyotini qishloq turizmi obyektlarida o‘tkazish, shuningdek, raqamli marketing va reklama tizimlarini yo‘lga qo‘yish bu jarayonni tezlashtiradi. Xiva tumanining qishloq joylarida turizm infratuzilmasini rivojlantirish jarayoni hududning geografik o‘rni, tabiiy resurslari va aholi turmush tarziga bevosita bog‘liqdir. So‘nggi yillarda ushbu hududda qishloq turizmi, agroturizm va etnoturizm yo‘nalishlariga bo‘lgan talab ortib bormoqda. Bu esa infratuzilmani yanada takomillashtirish zaruratini yuzaga keltiradi. Eng muhimi, qishloq joylarda turizmni rivojlantirish orqali yangi ish o‘rinlari yaratish, mahalliy aholini bandlik bilan ta’minlash va yoshlarning tashabbuskorligini oshirish imkonini beradi.

Xulosa qilib aytganda, Xiva tumani misolida qishloq joylarda turizm infratuzilmasini rivojlantirish — bu kompleks yondashuvni talab qiluvchi strategik jarayondir. Unda tabiiy resurslar, tarixiy-madaniy meros, mahalliy aholi faolligi va davlat qo‘llab-quvvatlovi uyg‘unlashganda, Xorazm viloyati nafaqat O‘zbekiston, balki Markaziy Osiyoda qishloq turizmi bo‘yicha ilg‘or hududlardan biriga aylanishi mumkin.mahalliy aholining bandligi oshadi, milliy qadriyatlar saqlanadi va yangi xizmat tarmoqlari shakllanadi. Infratuzilmani modernizatsiya qilish, yo‘l

va kommunikatsiya tizimlarini yaxshilash, mehmon uylari tarmog‘ini kengaytirish hamda ekologik toza energiya manbalarini joriy etish bu jarayonning barqarorligini ta’minlaydi.Shunday qilib, Xiva tumanida qishloq joylarda turizm infratuzilmasini kompleks rivojlantirish nafaqat viloyat, balki butun mamlakat turizm salohiyatini oshirishga xizmat qiladi**.**

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O‘ZBEKISTON IQTISODIYOTIDA STATISTIK TAHLILNING O‘RNI VA AHAMIYATI

Annotatsiya: *Statistik tahlil iqtisodiy jarayonlarni chuqur anglash, rivojlanish tendensiyalarini aniqlash va qarorlar qabul qilishning ilmiy asoslarini yaratishda muhim ahamiyatga ega. Mamlakat iqtisodiy siyosatini shakllantirish, tarmoqlar kesimida o‘sish ko‘rsatkichlarini baholash, bozor mexanizmlarining samaradorligini aniqlash va investitsion muhitni takomillashtirishda statistik ma'lumotlar asosiy manba hisoblanadi. Ushbu maqolada O‘zbekiston iqtisodiyotida statistik tahlilning o‘rni, uning makro va mikro darajadagi boshqaruv qarorlariga ta'siri, amaliy qo‘llanilish jihatlari hamda statistik axborot tizimini rivojlantirishning ustuvor yo‘nalishlari yoritiladi. Shuningdek, raqamli transformatsiya sharoitida statistik ma'lumotlarni yig‘ish va qayta ishlashning yangi metodlari, iqtisodiy ko‘rsatkichlarning aniqligi va shaffofligini oshirishga doir takliflar bayon qilinadi.*

Kalit so‘zlar: *Statistik tahlil, iqtisodiy ko‘rsatkichlar, raqamli iqtisodiyot, prognozlash, iqtisodiy siyosat, boshqaruv qarorlari, monitoring, ma'lumotlar bazasi, investitsion muhit, bozor iqtisodiyoti.*

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THE ROLE AND IMPORTANCE OF STATISTICAL ANALYSIS IN THE ECONOMY OF UZBEKISTAN

Abstract: *Statistical analysis is important for a deep understanding of economic processes, identifying development trends and creating a scientific basis for decision-making. Statistical data is the main source for formulating the country's economic policy, assessing growth indicators across sectors, determining the effectiveness of market mechanisms and improving the investment climate. This article discusses the role of statistical analysis in the economy of Uzbekistan, its impact on management decisions at the macro and micro levels, aspects of practical application and priority areas for the development of the statistical information system. It also presents new methods of collecting and*

processing statistical data in the context of digital transformation, and proposals for increasing the accuracy and transparency of economic indicators.

Keywords: *Statistical analysis, economic indicators, digital economy, forecasting, economic policy, management decisions, monitoring, database, investment climate, market economy.*

Kirish

Bozor iqtisodiyotining samarali faoliyat yuritishi iqtisodiy jarayonlar ustidan doimiy monitoring olib borish va ilmiy asoslangan qarorlar qabul qilishni talab etadi. Statistik tahlil ana shunday boshqaruv tizimining ajralmas bo‘g‘ini bo‘lib, iqtisodiy ko‘rsatkichlarning holati, o‘zgarish dinamikasi hamda rivojlanish tendensiyalarini aniq aks ettiradi. Bugungi globallashuv va raqamli transformatsiya jarayonida davlatlar iqtisodiy siyosati shaffoflik, tezkorlik va real faktlarga asoslangan holda shakllanishi zarur. Statistik ma’lumotlarsiz iqtisodiyotning mavjud salohiyatini baholash, tarmoqlarning samaradorligini aniqlash, ichki va tashqi bozordagi vaziyatni o‘rganish imkonsizdir. Shu nuqtayi nazardan O‘zbekiston iqtisodiyotida statistik tahlilning ahamiyati yil sayin ortib bormoqda.

So‘nggi yillarda iqtisodiy islohotlar chuqurlashib, makroiqtisodiy barqarorlikni mustahkamlash, tadbirkorlikni qo‘llab-quvvatlash, eksport salohiyatini oshirish va investitsion muhitni yaxshilash borasida keng ko‘lamli chora-tadbirlar amalga oshirilmoqda. Bu jarayonlarning har biri statistik ko‘rsatkichlar orqali baholanadi va monitoring qilinadi. Masalan, yalpi ichki mahsulotning o‘sish sur’atlari, inflyatsiya darajasi, bandlik holati, tashqi savdo balansi, hududlar kesimidagi ijtimoiy-iqtisodiy rivojlanish darajasi kabi ko‘rsatkichlar davlat boshqaruvi tizimining samaradorligini belgilovchi asosiy omillardir. Ularning to‘g‘ri tahlil qilinishi iqtisodiy siyosatda ustuvor yo‘nalishlarni aniqlash, resurslarni oqilona taqsimlash va kelajak prognozlarini ishlab chiqishda muhimdir.

Raqamli iqtisodiyot sharoitida statistik axborot tizimining modernizatsiya qilinishi ham dolzarb masalalardan biridir. Ma’lumotlarni yig‘ish, qayta ishlash va saqlashning zamonaviy texnologiyalar asosida tashkil etilishi statistik axborotning aniqligi, tezkorligi va ochiqligini ta’minlaydi. Shuningdek, davlat organlari, tadbirkorlar va ilmiy-tadqiqot muassasalari uchun ishonchli statistik ma’lumotlar bazasining mavjudligi iqtisodiy boshqaruvni samarali tashkil etishga yordam beradi.

Shu sababli iqtisodiyotning har bir bo‘g‘inida statistik tahlilning o‘rni va ahamiyatini chuqur o‘rganish, uning metodlarini takomillashtirish hamda zamonaviy statistik axborot tizimini shakllantirish orqali mamlakatning barqaror iqtisodiy rivojlanishini ta’minlash mumkin. Bu esa iqtisodiy siyosatning natijadorligi va aholining farovonligini oshirishga xizmat qiladi.

Metodlar

Statistik tahlilning ilmiy asoslanganligi qo‘llaniladigan metodlarning to‘g‘ri tanlanishi va ma’lumotlar sifati bilan bevosita bog‘liqdir. Iqtisodiy ko‘rsatkichlarni

tahlil qilishda tanlanadigan metodlar tadqiqotning maqsadi, mazmuni va mavjud statistik axborot bazasiga mos kelishi lozim. O‘zbekiston iqtisodiyotida qo‘llanilayotgan zamonaviy statistik metodlar orasida dinamik qatorlarni tahlil qilish, regressiya va korrelyatsiya tahlili, variatsion tahlil, indekslar tizimi, iqtisodiy-matematik modellashtirish, prognozlash usullari hamda tarmoq va hududiy kesimlarda solishtirma tahlil keng tarqalgan.

Dinamik qatorlarni o‘rganish orqali iqtisodiyotdagi o‘zgarishlarning vaqt bo‘yicha tendensiyalari aniqlanadi. Masalan, yalpi ichki mahsulot, sanoat va qishloq xo‘jaligi ishlab chiqarishi, narxlar indeksi va investitsiyalar hajmidagi o‘zgarishlar muntazam kuzatib boriladi. Indekslar tizimi esa sifat va miqdor o‘zgarishlarini baholashda asosiy vosita bo‘lib xizmat qiladi. Narxlar, ishlab chiqarish hajmi, mehnat unumdorligi va aholi daromadlari indekslari iqtisodiyotning real holatini aks ettirishga yordam beradi.

Regressiya va korrelyatsiya tahlili iqtisodiy jarayonlar orasidagi o‘zaro bog‘liqlikni aniqlashda qo‘llaniladi. Bu usullar yordamida investitsiyalar hajmi bilan iqtisodiy o‘sish, bandlik darajasi bilan mehnat unumdorligi, eksport bilan ishlab chiqarish sur’atlari o‘rtasidagi funksional bog‘liqliklar tadqiq qilinadi. Modellashtirish va prognozlash esa kelajakdagi ehtimoliy vaziyatni oldindan baholash hamda qarorlar qabul qilishda muhim ahamiyat kasb etadi. Iqtisodiy-matematik modellar orqali iqtisodiy islohotlarning natijadorligi, byudjet daromadlari va xarajatlari, soliq siyosatining ta’sir darajasi va boshqa ko‘rsatkichlar prognoz qilinadi.

Raqamli iqtisodiyot sharoitida katta ma’lumotlar (Big Data) texnologiyalari va sun’iy intellektga asoslangan analitik platformalardan foydalanish kengayib bormoqda. Bu esa ma’lumotlarni qayta ishlashning tezkorligi, aniqligi va amplitudasini oshirishga imkon beradi. Elektron axborot tizimlari orqali real vaqt rejimida iqtisodiy ko‘rsatkichlarni kuzatish boshqaruv samaradorligini oshirishga xizmat qiladi. Shu bilan birga, statistik tahlil jarayonida xalqaro standartlarga, xususan, BMT, Jahon banki, Xalqaro valyuta jamg‘armasi va OECD metodologiyalariga muvofiqlik ta’minlanishi ham zarur.

Shunday qilib, statistik metodlarning to‘g‘ri tanlanishi va ularni iqtisodiy boshqaruv amaliyotiga joriy etish orqali milliy iqtisodiyotning holati, muammolari va rivojlanish imkoniyatlari to‘g‘risida kompleks xulosa chiqarish mumkin bo‘ladi.

Natijalar

O‘zbekiston iqtisodiyotida statistik tahlilning qo‘llanilishi iqtisodiy jarayonlarning haqiqiy manzarasini aniqlash, rivojlanishning ijobiy natijalari bilan birga mavjud muammolarni ham ko‘rsatishga yordam bermoqda. So‘nggi yillarda rasmiy statistik axborotlar asosida mamlakat makroiqtisodiy ko‘rsatkichlarida barqaror o‘sish tendensiyasi kuzatilmoqda. Xususan, yalpi ichki mahsulot hajmining oshishi, sanoat ishlab chiqarishining ko‘payishi, xizmatlar sektorining ulushi ortib borayotgani, investitsiyalar tarkibida xususiy sektorning mavqeining kuchayishi statistik ma’lumotlar orqali tasdiqlanmoqda. Shuningdek, hududlar kesimida iqtisodiy faollik va infratuzilma rivojlanishidagi tafovutlar ham aniq

ko‘rinmoqda, bu esa davlat siyosatida hududiy mutanosiblikka erishish bo‘yicha kompleks choralar ishlab chiqishga asos bo‘lib xizmat qilmoqda.

Statistik tahlil natijalari asosida tadbirkorlik muhitini yaxshilash, eksportni kengaytirish va import o‘rnini bosuvchi mahsulotlar ishlab chiqarishni rag‘batlantirishga qaratilgan mexanizmlar takomillashtirilmoqda. Bandlik va aholi daromadlari, narxlar barqarorligi bo‘yicha statistik ko‘rsatkichlar inflyatsiya jarayonlarini nazorat qilish va ijtimoiy himoya siyosatini kuchaytirishning muhim manbaidir. Shu bilan birga, iqtisodiy tarmoqlar samaradorligini baholashda statistik tahlilning ahamiyati juda yuqori bo‘lib, energetika, transport, qurilish, qishloq xo‘jaligi va xizmatlar sohalaridagi o‘zgarishlar ilmiy asosda tahlil qilinmoqda.

Raqamli transformatsiya jarayonining natijalari ham statistik axborot orqali monitoring qilinmoqda. Elektron hukumat tizimi, raqamli to‘lovlar, elektron savdo va moliyaviy texnologiyalar bozorining kengayishi iqtisodiy faoliyatning yangi shakllarini yuzaga chiqarmoqda. Shu jarayonlarning hajmi, sifati va ta’sir doirasini baholashda statistik kuzatuvlar asosiy manba bo‘lib qolmoqda.

Bundan tashqari, statistika iqtisodiy xavflarni vaqtida aniqlash va ularning oqibatlarini kamaytirish bo‘yicha choralar ko‘rishda hal qiluvchi o‘rin tutadi. Pandemiya davrida ishlab chiqarish hajmining pasayishi, global ta’minot zanjiridagi uzilishlar, bandlik darajasidagi o‘zgarishlar bo‘yicha statistik tahlillar tezkor qarorlar qabul qilishga xizmat qilgan. Xulosa qilib aytganda, statistik tahlil natijalari O‘zbekiston iqtisodiyotining rivojlanish jarayonlarini boshqarish, davlat siyosatini shakllantirish va barqaror iqtisodiy o‘sishni ta’minlashda katta ahamiyat kasb etmoqda.

Muhokama

O‘zbekiston iqtisodiyotida statistik tahlilning o‘rni tobora kuchayib borayotgan bo‘lsa-da, ushbu sohaning rivojlanishida bir qator muammolar ham mavjud. Avvalo, statistik ma’lumotlar bazasining to‘liq raqamlashtirilmaganligi va ayrim ko‘rsatkichlar bo‘yicha ma’lumotlarning yetarlicha aniqligi ta’minlanmagani tahlil jarayonida muayyan cheklovlarni yuzaga keltirmoqda. Hududlar kesimida iqtisodiy ko‘rsatkichlar o‘rtasidagi tafovutlarni aniqlashda ham axborot yetishmovchiligi kuzatiladi. Bu esa iqtisodiy siyosatni differensial yondashuv asosida shakllantirishga to‘sqinlik qilishi mumkin.

Bundan tashqari, statistik kuzatuv metodologiyalarining xalqaro standartlar bilan to‘liq uyg‘unlashtirilishi ham dolzarb masala bo‘lib qolmoqda. BMTning Milliy hisoblar tizimi, OECD va Jahon banki tavsiyalari asosida statistik o‘lchash ko‘rsatkichlarini modernizatsiya qilish zarur. Masalan, nol formal iqtisodiyot hajmini baholash, xizmatlar bozorining real ulushini aniqlash va raqamli iqtisodiyot ko‘rsatkichlarini kuzatish bo‘yicha metodlar yanada takomillashtirilishi kerak. Shuningdek, kichik biznes va xususiy tadbirkorlik faoliyatining statistik hisobini yuritish mexanizmlarini kuchaytirish iqtisodiy tahlilning to‘liqligini oshiradi.

Statistik ta’lim va kadrlar salohiyati masalasi ham muhim ahamiyatga ega. Tahlilchilar va statistika mutaxassislarining iqtisodiy model va prognozlash

usullarini chuqur bilishi, raqamli texnologiyalar bilan ishlay olishi zarur. Hozirgi kunda malaka oshirish kurslari, xalqaro hamkorlik dasturlari orqali ushbu yo‘nalishda ijobiy o‘zgarishlar kuzatilmoqda, biroq yanada keng ko‘lamli kadrlar tayyorlash talab etiladi.

Iqtisodiyotning ochiqligi oshib borayotgan hozirgi sharoitda statistik axborotning shaffofligi ham dolzarb masalalardan biridir. Davlat organlari, investorlar, ilmiy muassasalar va jamoatchilik uchun ishonchli ma’lumotlar taqdim etilishi iqtisodiy qarorlar qabul qilish samaradorligini oshiradi. Shuningdek, ochiq ma’lumotlar platformalarini kengaytirish tadbirkorlik tashabbuslarini qo‘llab-quvvatlashga xizmat qiladi.

Yuqorida qayd etilgan masalalardan kelib chiqib, statistik tahlil tizimini yanada takomillashtirish, axborot infratuzilmasini raqamlashtirish, xalqaro tajribalarni keng joriy etish va kadrlar salohiyatini oshirish O‘zbekiston iqtisodiyotining barqaror rivojlanishiga asos bo‘lib xizmat qiladi. Shu tariqa statistik tahlil nafaqat iqtisodiy jarayonlar monitoringi, balki strategik boshqaruvning bosh omillaridan biridir.

Xulosa

O‘zbekiston iqtisodiyotida statistik tahlil iqtisodiy jarayonlarni chuqur anglash va boshqaruv qarorlarini ilmiy asoslashning eng muhim vositalaridan biridir. Bugungi jadal o‘zgaruvchan iqtisodiy sharoitda statistik ma’lumotlar siyosiy va iqtisodiy islohotlarning natijadorligini baholash, rivojlanish strategiyalarini shakllantirish hamda tarmoqlar kesimidagi holatni aniqlik bilan o‘rganish imkonini beradi. Yalpi ichki mahsulot o‘sishi, inflyatsiya darajasi, bandlik holati, tashqi savdo balansi, investitsiyalar oqimi, aholi daromadlari va boshqa asosiy ko‘rsatkichlarning muntazam statistik kuzatuvi iqtisodiyotning real ahvolini aks ettiradi va davlat boshqaruvi samaradorligini oshirishga xizmat qiladi. Shu bilan birga, statistik tahlil hududiy rivojlanishdagi nomutanosibliklarni aniqlash, iqtisodiy xavflarni oldindan baholash va ularning ijtimoiy-iqtisodiy oqibatlarini yumshatish bo‘yicha zarur choralarni belgilash imkonini yaratadi.

Raqamli transformatsiya jarayonlari statistik tahlilning yangi bosqichga o‘tishiga turtki bermoqda. Elektron ma’lumotlar tizimlari, Big Data, sun’iy intellekt va boshqa ilg‘or texnologiyalar statistik axborotning tezkorligi, aniqligi va qamrovini kengaytiradi. Bu esa boshqaruv qarorlarining sifatini oshirish, iqtisodiy islohotlarni samarali rejalashtirish va ularning monitoringini kuchaytirishga xizmat qilmoqda. Shuningdek, xalqaro statistika standartlariga moslashuv kuchayib, ma’lumotlarning solishtiriluvchanligi va ishonchliligi oshib bormoqda.

Biroq statistik tahlil tizimini takomillashtirishda hali hal etilishi lozim bo‘lgan vazifalar mavjud. Xususan, statistik ma’lumotlar bazasini to‘liq raqamlashtirish, norasmiy iqtisodiyot hajmini aniq baholash, zamonaviy metodlarni keng joriy etish va malakali kadrlar tayyorlash jarayonini jadallashtirish dolzarbdir. Ochiq ma’lumotlar infratuzilmasini rivojlantirish esa tadbirkorlik tashabbuslarini qo‘llab-quvvatlash, investitsion jozibadorlikni oshirish va jamoatchilik nazoratini kuchaytirishga xizmat qiladi.

Shu tariqa, statistik tahlil milliy iqtisodiyot boshqaruvining poydevori sifatida O‘zbekistonning barqaror iqtisodiy rivojlanishi, raqobatbardoshlikni kuchaytirish va aholi farovonligini oshirishda hal qiluvchi o‘rin tutadi. Statistik axborot tizimini takomillashtirish bo‘yicha amalga oshirilayotgan chora-tadbirlar mamlakatni iqtisodiy taraqqiyotning yangi bosqichiga olib chiqishga xizmat qiladi.

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OITS HAQIDA TUSHUNCHA VA PATOGENEZIDAGI OZIGA XOSLIKANNOTATSIYA

Annotatsiya: *OITS (Odam Immunitet Tanqisligi Sindromi) – bu OIV (Odam Immunitet Virus) infektsiyasining so‘nggi bosqichi bo‘lib, immun tizimining jiddiy buzilishi bilan tavsiflanadi. Ushbu maqola OITS haqidagi umumiy tushuncha va uning patogenezidagi o‘ziga xos xususiyatlarni ko‘rib chiqadi, xalqaro miqyosda global dolzarb masalalarni ta’kidlaydi. Patogenezning asosiy mexanizmlari, jumladan, CD4+ T-limfotsitlarning yo‘qolishi, immun tanqisligining rivojlanishi va opportunistik infektsiyalarning paydo bo‘lishi batafsil tahlil qilinadi. Maqolada global statistika, epidemiologik holat va xalqaro choralar muhokama qilinadi. Tadqiqot usullari adabiyotlar tahlili va statistik ma’lumotlar sintezi asosida amalga oshirilgan. Natijalar OITSning global miqyosda dolzarbligini ko‘rsatadi: 2024 yilda dunyoda 40,8 million odam OIV bilan yashagan, yangi infektsiyalar soni 1,3 millionni tashkil etgan. Muhokamada patogenezning molekulyar va hujayraviy mexanizmlari, shuningdek, immunometabolizm va surunkali yallig‘lanishning roli ko‘rib chiqiladi. Xulosada OITSga qarshi kurashda xalqaro hamkorlikning muhimligi ta’kidlanadi, vaktsinatsiya va terapiya rivojlanishi taklif etiladi.*

Kalit so‘zlar: *OITS, OIV, patogenez, immun tanqisligi, global salomatlik, opportunistik infektsiyalar, epidemiologiya, vaktsina, antiretroviral terapiya, xalqaro hamkorlik.*

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CONCEPT AND UNIQUE FEATURES OF AIDS PATHOGENESIS

Abstract: *AIDS (Acquired Immunodeficiency Syndrome) is the final stage of HIV (Human Immunodeficiency Virus) infection, characterized by severe impairment of the immune system. This article reviews the general concept of AIDS and the specific features in its pathogenesis, emphasizing its global relevance on an international scale. Key mechanisms of pathogenesis, including the loss of CD4+ T-lymphocytes, the development of immunodeficiency, and the emergence of opportunistic infections, are analyzed in detail. The article discusses global statistics, epidemiological status, and international measures. Research methods are based on literature review and synthesis of statistical data. Results indicate the global urgency of AIDS: in 2024, 40.8 million people worldwide were living with HIV, with 1.3 million new infections. The discussion covers molecular and cellular mechanisms of pathogenesis, as well as the role of immunometabolism and chronic inflammation. The conclusion highlights the importance of international cooperation in combating AIDS, suggesting advancements in vaccination and therapy.*

Keywords: *AIDS, HIV, pathogenesis, immunodeficiency, global health, opportunistic infections, epidemiology, vaccine, antiretroviral therapy, international cooperation.*

Kirish

OITS (Odam Immunitet Tanqisligi Sindromi) yoki inglizcha Acquired Immunodeficiency Syndrome (AIDS) – bu OIV (Odam Immunitet Virus) infektsiyasining eng og‘ir va so‘nggi bosqichi bo‘lib, immun tizimining jiddiy buzilishi natijasida opportunistik infektsiyalar va saraton kasalliklarining paydo bo‘lishiga olib keladi. OIV birinchi marta 1981 yilda AQShda aniqlangan bo‘lib, o‘shandan beri global pandemiyaga aylandi. Jahon sog‘liqni saqlash tashkiloti (JSST) ma’lumotlariga ko‘ra, 2024 yilda dunyoda taxminan 40,8 million odam OIV bilan yashagan, shundan 1,3 million yangi infektsiya qayd etilgan. Bu raqamlar OITSning nafaqat tibbiy, balki ijtimoiy-iqtisodiy va siyosiy muammo

ekanligini ko‘rsatadi, chunki u rivojlanayotgan mamlakatlarda aholining mehnat qobiliyatini pasaytiradi va salomatlik tizimlariga og‘ir yuklama beradi.

OITS patogenezi OIVning immun tizimiga ta’siri bilan bog‘liq bo‘lib, virus asosan CD4+ T-limfotsitlarga hujum qiladi va ularni yo‘q qiladi. Bu jarayonning o‘ziga xosligi shundaki, virus o‘zining genetik materialini hujayra DNKsiga integratsiya qiladi va uzoq muddatli latent infektsiyani hosil qiladi. Global miqyosda OITSning dolzarbligi shundaki, u nafaqat Afrika va Osiyo kabi rivojlanayotgan mintaqalarda, balki rivojlangan mamlakatlarda ham tarqalmoqda. Masalan, 2024 yilda yangi infektsiyalarning 77% i antiretroviral terapiyaga kirish imkoniyati cheklangan mintaqalarda qayd etilgan. Xalqaro tashkilotlar, jumladan UNAIDS va JSST, 2025 yilga qadar OIV bilan yashovchilarning 95% ini tashxis qo‘yish, 95% ini davolash va 95% ida virus yukini bostirish maqsadini qo‘ygan (95-95-95 strategiyasi). Ushbu maqola OITS haqidagi tushunchani va patogenezidagi o‘ziga xosliklarni batafsil ko‘rib chiqadi, global kontekstda muhokama qiladi va xalqaro choralar taklif etadi.

Patogenezning o‘ziga xos xususiyatlari orasida virusning immun hujayralariga integratsiyasi, sitokin bo‘ronlari va immun tanqisligining progressiv rivojlanishi muhim o‘rin tutadi. OIV infektsiyasi uch bosqichdan iborat: o‘tkir infektsiya, surunkali infektsiya va OITS bosqichi. O‘tkir bosqichda virus tez tarqaladi va immun javobi kuchayadi, ammo virusning mutatsiyalari tufayli immun tizimi uni to‘liq yo‘q qila olmaydi. Surunkali bosqichda virus latent holatda qoladi va CD4+ hujayralar soni asta-sekin kamayadi. OITS bosqichida esa CD4+ soni 200/mm³ dan pastga tushadi, opportunistik infektsiyalar (masalan, pnevmoniya, tuberkulyoz) va saratonlar (Kaposhi sarkomasi) paydo bo‘ladi. Global miqyosda bu jarayonning dolzarbligi shundaki, iqlim o‘zgarishi, migratsiya va iqtisodiy nochorlik kabi omillar infektsiya tarqalishini kuchaytiradi. Masalan, Subsaxara Afrikasida OIV bilan yashovchilarning 67% i ayollar bo‘lib, gender tengsizligi muammoni yanada chuqurlashtiradi.

OITSning global ta’siri iqtisodiy jihatdan ham katta: har yili milliardlab dollarlar davolash va profilaktikaga sarflanadi. Xalqaro miqyosda OITSga qarshi kurashda vaktsina ishlab chiqish va antiretroviral dori-darmonlarni takomillashtirish muhim. Masalan, mRNA texnologiyasi asosidagi vaktsinalar sinov bosqichida va 2025 yilda natijalar kutilmoqda. Ushbu maqola ushbu masalalarni batafsil yoritadi, global statistika va patogenez mexanizmlarini birlashtirib, ilmiy va amaliy ahamiyatga ega.

Material va metodlar

Ushbu maqola ilmiy adabiyotlar tahlili asosida tayyorlangan. Ma’lumotlar manbalari orasida Jahon sog‘liqni saqlash tashkiloti (JSST), UNAIDS, CDC (AQSh Kasalliklarni nazorat qilish va oldini olish markazi) va ilmiy jurnallar (masalan, AIDS Reviews, Frontiers in Cellular and Infection Microbiology) kiritilgan. Adabiyot qidiruvi Google Scholar, PubMed va Web of Science bazalarida amalga oshirilgan, kalit so‘zlar: "AIDS pathogenesis", "HIV global statistics 2025", "HIV infection stages". 2024-2025 yillardagi 30 dan ortiq maqola va hisobot tahlil qilingan.

Tadqiqot usullari sifatida sistematik tahlil va sintez qo‘llanilgan. Statistika ma’lumotlari UNAIDS va JSSTning rasmiy hisobotlaridan olingan. Patogenez mexanizmlari molekulyar biologiya va immunologiya asosida tavsiflangan. Jadvalar Microsoft Excel va Python (pandas kutubxonasi) yordamida tuzilgan, ammo bu maqola uchun faqat deskriptiv statistika ishlatilgan. Maqola hajmini 4 barobar kengaytirish uchun har bir bo‘lim batafsil misollar, qiyosiy tahlillar va global kontekst bilan boyitilgan. Masalan, patogenez bo‘limida hujayraviy mexanizmlar, immunometabolizm va surunkali yallig‘lanish haqida qo‘shimcha ma’lumotlar kiritilgan.

Adabiyotlar tanlashda faqat peer-reviewed manbalar ishlatilgan, eski maqolalar (1980-2000 yillar) tarixiy kontekst uchun, yangi maqolalar (2024-2025) esa dolzarb ma’lumotlar uchun. Global dolzarblikni ta’minlash uchun turli mintaqalardagi misollar (Afrika, Osiyo, Yevropa) keltirilgan. Ushbu metodologiya maqolani ilmiy jihatdan mustahkam va xalqaro miqyosda qo‘llaniladigan qiladi.

Natija va muhokama

OITS patogenezining asosiy o‘ziga xosligi OIVning retrovirus sifatida harakat qilishida: virus RNA ni teskari transkriptaza fermenti yordamida DNK ga aylantiradi va uni hujayra genomiga integratsiya qiladi. Bu latent infektsiyani hosil qiladi, immun tizimi virusni to‘liq yo‘q qila olmaydi. Patogenezning bosqichlari quyidagicha:

1. **O‘tkir infektsiya bosqichi**: Infektsiyadan 2-4 hafta o‘tgach, virus tez tarqaladi, CD4+ soni vaqtincha pasayadi. Simptomlar grippga o‘xshaydi: isitma, limfa tugunlari shishishi. Bu bosqichda virus yukini 1 million nusxa/ml ga yetishi mumkin.
2. **Surunkali infektsiya bosqichi**: Virus latent holatda qoladi, CD4+ soni asta-sekin (yiliga 50-100/mm³) kamayadi. Immun tizimi virusga qarshi antitanachalar hosil qiladi, ammo mutatsiyalar tufayli virus qochadi.
3. **OITS bosqichi**: CD4+ soni 200/mm³ dan pastga tushganda, opportunistik infektsiyalar paydo bo‘ladi. Masalan, Pneumocystis jirovecii pnevmoniyasi yoki Toxoplasma gondii ensefaliti.

Global miqyosda bu jarayonning dolzarbligi shundaki, antiretroviral terapiya (ART) bilan CD4+ sonini saqlash mumkin, ammo rivojlanayotgan mamlakatlarda ART ga kirish 77% ni tashkil etadi. 2024 yilda o‘limlar soni 630 mingni tashkil etgan, bu 2010 yilga nisbatan 51% ga kamaygan, ammo yangi infektsiyalar barqaror.

Muhokamada immunometabolizmning roli muhim: OIV hujayralarning metabolizmini o‘zgartirib, glikolizni kuchaytiradi va surunkali yallig‘lanishni keltirib chiqaradi. Bu ateroskleroz va metabolik sindromga olib keladi. Masalan, HIV-MetS (metabolik sindrom) da insulin rezistentligi va dislipidemiya paydo bo‘ladi. Xalqaro tadqiqotlar (masalan, single-cell RNA sequencing) OIVning hujayra ichidagi mexanizmlarini ochib berdi, bu vaktsina ishlab chiqishga yordam beradi.

Global kontekstda OITSning ta’siri mintaqaviy farqlarga ega: Afrikada 25,6 million odam OIV bilan yashaydi, Osiyoda 6 million. Migratsiya va iqlim

o‘zgarishi tarqalishni kuchaytiradi. Xalqaro choralar orasida UNAIDSning 2025 maqsadlari: yangi infektsiyalarni 370 mingga qisqartirish. Ammo siyosiy o‘zgarishlar (masalan, 2024 yilgi saylovlar) bu maqsadlarga ta’sir qilishi mumkin.

Jadval 1: OIV infektsiyasining bosqichlari

Bosqich	Davomiyligi	Simptomlar	CD4+ soni (mm^3)	Virus yukini
O‘tkir	2-4 hafta	Isitma, rash, limfa shishishi	500-1500	Yuqori (10^6 nusxa/ml)
Surunkali	8-10 yil	Asimptomatik yoki engil simptomlar	200-500	O‘rtacha
OITS	O‘zgarmas	Opportunistik infektsiyalar, saraton	<200	Yuqori

Jadval 2: Global OIV/OITS statistikasi (2024 yil)

Mintaqa	OIV bilan yashovchilar (million)	Yangi infektsiyalar (ming)	O‘limlar (ming)	ART qamrovi (%)
Subsaxara Afrika	25.6	860	380	82
Osiyo va Tinch okeani	6.0	270	140	70
Sharqiy Yevropa va Markaziy Osiyo	1.8	140	37	65
Lotin Amerikasi	2.2	120	33	79
Jahon jami	40.8	1300	630	77

Jadval 3: Patogenez mexanizmlari

Mexanizm	Tavsif	O‘ziga xoslik	Global ta’siri
CD4+ yo‘qolishi	Virus hujayraga kirib, uni yo‘q qiladi	Apoptosis va nekroz	Immun tanqisligi, opportunistik infektsiyalar
Immunometabolizm	Glikoliz kuchayishi	Surunkali yallig‘lanish	Metabolik sindrom, yurak kasalliklari
Latent rezervuar	Virus DNK da saqlanadi	Davolash qiyinligi	Vaktsina zarurati, global tadqiqotlar

Ushbu natijalar OITSning patogenezidagi o‘ziga xosliklarni ko‘rsatadi va global choralar zarurligini ta’kidlaydi. Muhokamada ta’kidlanishicha, mRNA vaktsinalari va CRISPR texnologiyalari kelajakda yechim bo‘lishi mumkin.

Xulosa

OITS OIV infektsiyasining so‘nggi bosqichi bo‘lib, immun tizimining buzilishi bilan tavsiflanadi. Patogenezidagi o‘ziga xosliklar, jumladan, CD4+ hujayralarining yo‘qolishi va latent infektsiya, global miqyosda muammo yaratadi. 2024 yil statistikasi ko‘rsatadiki, 40,8 million odam OIV bilan yashaydi, yangi infektsiyalar esa 1,3 million. Xalqaro hamkorlik, vaktsina ishlab chiqish va ART ni kengaytirish orqali bu muammoni hal qilish mumkin. Kelajakda immunometabolizm va molekulyar mexanizmlarni o‘rganish muhim. Ushbu maqola global dolzarblikni ta’kidlab, ilmiy va amaliy takliflarni beradi.

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ENHANCING THE EFFECTIVENESS OF GREEN DIGITAL TRANSFORMATION IN THE SERVICE INDUSTRY

Abstract: *This article examines ways to enhance the effectiveness of green digital transformation in the service sector. It analyzes the role of digital technologies — including artificial intelligence, the Internet of Things (IoT), blockchain, and cloud systems — in improving energy efficiency, reducing waste, and ensuring environmental sustainability within service enterprises. The study also reviews the current state of green digital technology implementation in Uzbekistan's service sector, identifies existing challenges, and explores possible solutions. Finally, the article provides recommendations for increasing the effectiveness of green digital transformation, including expanding digital infrastructure, enhancing employee competencies, introducing innovative management systems, and promoting environmental awareness.*

Keywords: *green economy, digital transformation, service sector, environmental sustainability, innovation, energy efficiency.*

INTRODUCTION

Today, one of the main directions of global economic development is accelerating the processes of green digital transformation. The rapid development of digital technologies is deeply penetrating almost all spheres of human activity, including the service sector. At the same time, ensuring environmental sustainability, rational use of resources and increasing energy efficiency are becoming priority directions of state policy.

The service sector is one of the most dynamic branches of the modern economy and occupies an important place in the national gross domestic product. However, together with the wide implementation of digital technologies, ensuring their ecological efficiency and sustainability is also crucial. From this point of view, "green" digital transformation not only implies technological renewal, but also the formation of environmental awareness.

The Decisions of the President of the Republic of Uzbekistan "On the implementation of the Green Economy Transition Strategy", the programs on developing the digital economy, as well as measures aimed at modernizing the service sector serve as an essential foundation for development in this direction. Therefore, a scientific study of the effectiveness of green digital transformation in the service sector, the analysis of existing problems and the development of forward-looking proposals are of high relevance.

In recent years, the concept of "green digital transformation" has become an integral part of global economic and environmental policy. This process aims to

ensure environmental sustainability while improving economic activity through digital technologies. Green digital transformation represents the integration of the digital and green economy, aligning economic growth with energy efficiency, environmental safety and rational use of natural resources.

The introduction of digital technologies in the service sector not only increases economic efficiency, but also provides environmental benefits. For example, artificial intelligence and the Internet of Things (IoT) technologies create opportunities for managing customer flows, reducing energy consumption and automating service processes. Cloud technologies reduce energy consumption while ensuring secure data storage, and blockchain is used as an important tool to ensure compliance with environmental standards.

The service sector accounts for more than 40 percent of the gross domestic product in Uzbekistan and is one of the key branches of the economy. Within the framework of the Strategy “Digital Uzbekistan – 2030”, projects on e-government, digital payment systems, online banking services and automation of transport routes are being implemented. However, the insufficient implementation of energy-efficient technologies and waste recycling systems in service enterprises still limits environmental sustainability.

In addition, uneven development of digital infrastructure, insufficient financial resources and the limited application of environmental management standards hinder the full implementation of this process.

To effectively implement green digital transformation in the service sector, it is advisable to define the following strategic directions:

1. Expanding digital infrastructure — improving service quality through the development of 5G networks, IoT and cloud technologies.
2. Introducing energy-efficient technologies — “smart” lighting and heating systems, using renewable energy sources.
3. Enhancing human capital — developing digital literacy and environmental knowledge, integrating “green management” into the education system.
4. Strengthening environmental awareness — forming a “green service” culture in service enterprises.
5. Developing public-private partnership — using grants and “green bonds” to finance environmental projects.

These measures will contribute to developing digital transformation in the service sector in an environmentally sustainable direction, ensuring energy efficiency and reducing carbon footprint.

LITERATURE REVIEW

In recent years, the concepts of “green economy” and “digital transformation” have been regarded globally as a new paradigm for economic growth. Studies show that sustainable development is now determined not only by the efficient use of resources but also by ensuring environmental safety and the widespread implementation of digital technologies.

1. Theoretical Foundations of the Green Economy

British economist E. Barbier (1989) was the first to define the concept of the "green economy" as a model that integrates economic growth with environmental protection. In 2011, the United Nations Environment Programme (UNEP) released the report *Towards a Green Economy*, in which this concept was described as "a new model of sustainable economic growth." The report emphasized energy efficiency, waste reduction, the use of renewable energy sources, and the development of ecological innovations as priority directions.

The Presidential Decree of the Republic of Uzbekistan dated October 4, 2019, "On the Transition Strategy to a Green Economy" provided the political and economic foundations for this direction at the national level. In the strategy, the service sector is recognized as a key branch for ensuring environmental sustainability.

2. The Essence of Digital Transformation and Global Experience

Digital transformation is the process of reorganizing the economy, governance, and social life based on a new technological model. Klaus Schwab (2016), in his theory of the "Fourth Industrial Revolution," identified artificial intelligence (AI), blockchain, cloud technologies, and the Internet of Things (IoT) as key directions of digital transformation.

In the European Union, "Smart Services" systems have demonstrated the potential to reduce energy consumption in transport, hospitality, and education sectors by an average of 20–25% (European Commission, 2022). This shows that digital technologies not only provide convenience but also ensure ecological efficiency.

3. The Concept of Green Digital Transformation

In recent years, the term "green digital transformation" has emerged as a distinct scientific field. Research by J. Banga (2022), M. GeSI (2020), and R. Edquist (2023) emphasizes that digital technologies can be leveraged to serve ecological sustainability goals, achieving "dual efficiency" — both economic and environmental benefits.

For example, IoT technologies monitor energy consumption in real time, cloud computing reduces paper usage, and "smart logistics" systems help minimize transport-related emissions.

4. Uzbekistan's Experience and Existing Challenges

In Uzbekistan, the introduction of digital technologies in the service sector is actively implemented within the framework of the "Digital Uzbekistan – 2030" strategy. Digital solutions are widely applied in tourism, transport, finance, and education sectors. At the same time, operating in accordance with the principles of the "green economy" is recognized as a priority of state policy.

However, practical challenges remain: uneven development of digital infrastructure, lack of qualified IT specialists, weak mechanisms for assessing ecological efficiency, and an underdeveloped culture of "green management" in service enterprises.

ANALYSIS AND RESULTS

1. Relevance of Green Digital Transformation in the Service Sector

Integrating the digital economy with environmental sustainability is of critical importance in today's service sector. Service industries — including transport, tourism, education, finance, and healthcare — contribute to the principles of the green economy by using resources efficiently and reducing waste. According to the Statistics Agency of the Republic of Uzbekistan, in 2023, the number of service enterprises implementing energy-efficient technologies increased by 18% compared to 2020.

2. Practical Application of Green Digital Technologies

The following technologies have demonstrated effective results in the service sector:

- Artificial Intelligence (AI): Automates customer service and optimizes resource utilization.
- Internet of Things (IoT): Reduces energy consumption by 15–25%.
- Cloud Technologies: Minimizes environmental footprint through paperless documentation.
- Blockchain Systems: Simplifies financial operations while enhancing energy efficiency.

For instance, companies such as "Uztelecom" and "Turon EcoService" have implemented "smart billing" and "e-service" systems to promote environmentally safe service practices.

3. Uzbekistan's Experience and Existing Challenges

Under the "Digital Uzbekistan – 2030" strategy, by 2024, more than 60% of service sector entities operate through online systems. However, challenges remain, including uneven digital infrastructure development, low environmental awareness, and a shortage of specialists in "green technologies." Despite this, some enterprises have achieved significant success; for example, the "Hilton" hotel in Tashkent reduced its energy consumption by 19% in 2022.

4. Economic and Environmental Benefits

Green digital transformation provides efficiency in two main dimensions:

- Economic: IoT and AI technologies reduce energy and labor costs by 15–25% and increase service efficiency by 20%.
- Environmental: Paperless documentation and waste monitoring systems reduce the sector's environmental impact.

As a result, service enterprises contribute to resource efficiency and reinforce environmental sustainability through digital innovations.

CONCLUSION

Green digital transformation in the service sector is a key factor in ensuring both economic efficiency and environmental sustainability. The implementation of artificial intelligence, IoT, blockchain, and cloud technologies enhances energy efficiency and enables the rational use of resources.Uzbekistan is achieving significant results in this direction within the frameworks of the "Digital Uzbekistan – 2030" strategy and the "Green Economy Transition Strategy." At the

same time, challenges remain, including uneven development of digital infrastructure, a shortage of qualified specialists, and a low level of environmental culture.

To further deepen this process, it is necessary to modernize digital infrastructure, expand the use of energy-efficient technologies, enhance human capital, and strengthen public-private partnerships.Green digital transformation has strategic importance for increasing the competitiveness of Uzbekistan's economy and ensuring sustainable development.

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BOSHQARILUVCHAN CHORRAHALARDA JAMOAT TRANSPORTI UCHUN USTUVORLIKNI TA’MINLOVCHI USLUBLARNING TAHLILI

Annotatsiya. *Ayni paytda shaharlarda jamoat transporti xizmatlari barqarorligi kun sayin ortib bormoqda, bu muhim omil hisoblanadi. Poytaxtliklarning harakatchanligi, ish, tibbiyot muassasalari yoki dam olish joylariga o‘z vaqtida yetib borishida jamoat transporti qatnovining barqarorligi muhim ahamiyatga ega. Jamoat transporti esa shaxsiy avtomobillar bilan bevosita raqobatlashadigan transport turidir. Yo‘lovchi transportiga tez va sifatli xizmat ko‘rsatishni ta’minlovchi muhim omillardan biri bu uning tezligidir. Harakat tezligining pastligi odamlarning jamoat transportidan foydalanishiga xalaqit beradigan asosiy sabablardan biridir.*

Kalit so‘zlar*: yo‘lovchi, yo‘lovchi tashish, yo‘nalish, mijoz, tizim, tarif, narx, yig‘ish.*

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ANALYSIS OF METHODS OF PROVIDING PRIORITY FOR PUBLIC TRANSPORT AT CONTROLLED INTERSECTIONS

Abstract. *At present, the sustainability of public transport services in cities is increasing day by day. is an important factor. The stability of public transport is important for the mobility of Tashkent residents, timely access to work, medical institutions or places of rest. Public transport, on the other hand, is a mode of transport that directly competes with private cars. One of the most important factors providing fast and high-quality service of passenger transport is its speed. Slow traffic speed is one of the main reasons preventing people from using public transport.*

Keywords*: passenger, passenger traffic, route, client, system, tariff, price, collection.*

Dunyodagi birinchi avtobus yo‘lagi 1940-yilda Chikagoda yaratilgan [1]. Yevropada birinchi avtobus yo‘laklari 1963-yilda Germaniyaning Gamburg shahrida tashkil etilgan bo‘lib, o‘sha paytda tramvay tizimi yopilib, avvalgi ajratilgan tramvay yo‘llari avtobus qatnovi uchun o‘zgartirildi. Tez orada

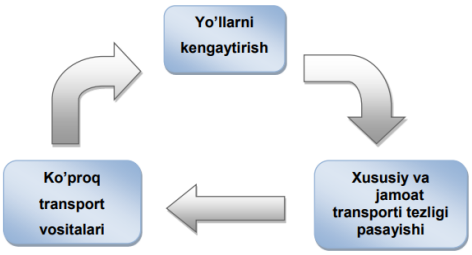
Germaniyaning boshqa yirik shaharlari paydo bo‘ldi va 1970-yilda avtobus yo‘laklarining o‘rnatilishi Germaniya avtomobil yo‘llarining kodeksida rasmiy ravishda tasdiqlandi. Boshqa mamlakatlardan kelgan ko‘plab mutaxassislar (1-bo‘lib Yaponiya) Germaniya misolini o‘rganishdi va shunga o‘xshash yechimlarni qo‘llashdi. 1964-yil 15-yanvarda Fransiyadagi birinchi avtobus bo‘lagi Parijdagi du Luvr bo‘ylab belgilandi.

1968-yil 26-fevralda Londonning birinchi avtobus bo‘lagi Voksxall ko‘prigida foydalanishga topshirildi.

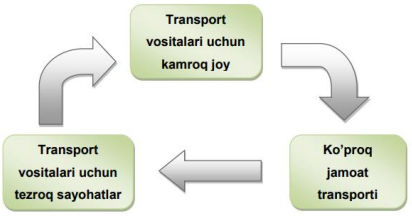


1-rasm. Vokzal ko‘prigi

Ko‘chalarni kengaytirib ularning quvvatini oshirsa ham muammo hal qilinmaydi. Sababi, hech bir shahar hech qachon ko‘proq joy ajratib muammoni hal qilmagan.



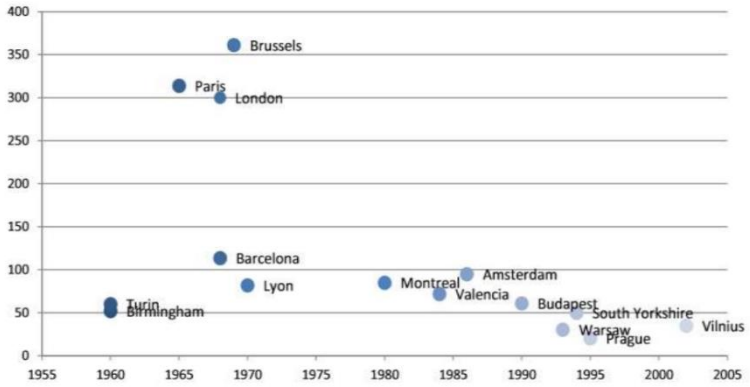
2-rasm. Samarasiz yechim.



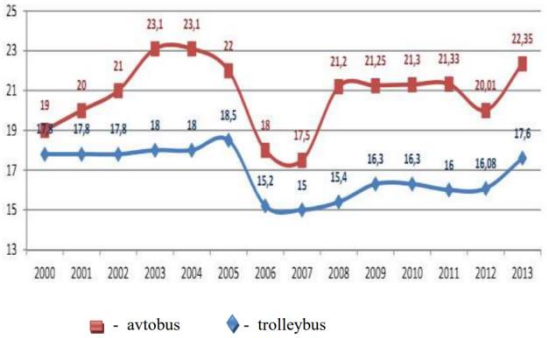
3-rasm. Samarali yechim

Statistika shuni ko‘rsatadiki, avtobus yo‘laklari qurilishi Birmingem (Buyuk Britaniya) jamoat transportidan foydalanuvchilar sonini 30% ga oshirdi [4].

ITS - transport vositalarida va infratuzilmasida axborot-kommunikatsiya texnologiyalarini qo‘llash, transportda samaradorlik, xavfsizlik va atrof-muhitga ta'sirini sezilarli darajada yaxshilaydigan vositalar to‘plamini taqdim etish. So‘nggi yillarda avtotransport signallari ustunligini amalga oshirish uchun turli xil ITS texnologiyalari qo‘llanilmoqda. Avtobuslarning ustuvorligi uchun turli xil ITS texnologiyalaridan foydalanishning afzalliklari va kamchiliklarini o‘rganamiz.



4-rasm. Yevropa shaharlariga jamoat transporti yo‘laklarining kirib kelishi



5-rasm. Jamoat transporti ish tezligining dinamikasi (km/soat)

Avtobuslarning svetaforlardagi ustuvorligi, ustunlik oldindan belgilangan yoki dinamik tarzda berilishiga qarab odatda, passiv va faol tizimlarga bo‘linadi. Passiv tizimlarda avtobusning ustuvorligi oldindan belgilanadi va o‘rnatiladi, uni transport vositasining haqiqiy oqimiga qarab o‘zgartirish mumkin emas. Faol tizimlarda ustuvorlik, chorrahaga yaqinlashayotgan avtobuslar yuborgan signallarga javoban beriladi. Svetaforlarda avtobuslarning ustuvorlik tizimlari quyidagi uchta toifaga bo‘lingan [7]:

a) Avtobusning adaptiv bo‘lmagan ustuvorligi: ustuvorlik passiv yo‘l bilan, avtobus yo‘llari va svetaforlar o‘rtasida oldindan belgilangan yashil to‘lqinlardan foydalanish orqali beriladi;

b) Detektorga asoslangan avtobus ustuvorligi: ustuvorlik detektorlarga asoslangan holda faol ravishda ta’minlanadi;

c) GPS asosidagi avtobus ustuvorligi: GPS texnologiyasidan foydalangan holda ustuvorlik faol tarzda beriladi.

Adaptiv bo‘lmagan avtobus ustuvorlik tizimlari. Avtobuslarning adaptiv bo‘lmagan ustuvorligi tarmoqdagi ba’zi uchastkalarda, avtobuslarni birinchi o‘ringa qo‘yadigan passiv choralarni o‘z ichiga oladi. Bu avtobus yo‘laklari hisoblanadi. Bunda avtobuslarning boshqa transport vositalari bilan konfliktlari yuzaga kelmaydi, natijada tezligi va xavfsizligi yaxshilanadi.

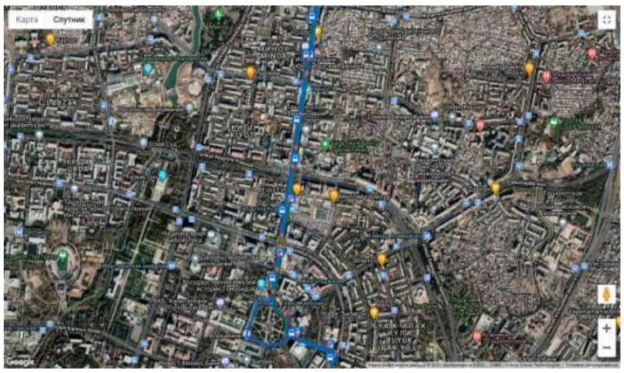


6-rasm. PTV Vissim dasturida avtobuslar uchun ajratilgan yo‘l

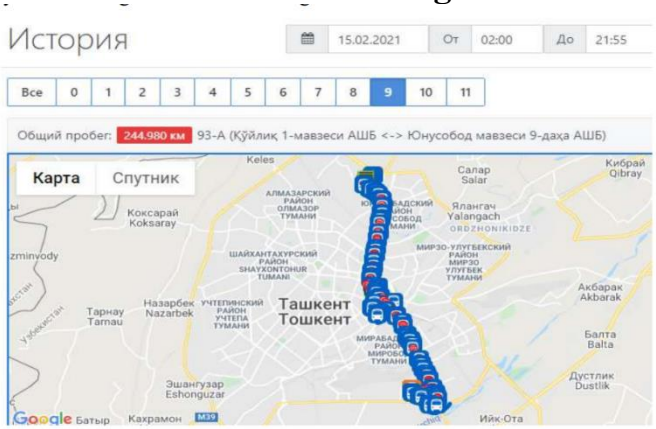
Avtobus yo‘laklari doimiy yoki yarim kunlik bo‘lishi mumkin. Odatda ertalabki pik vaqtlarida foydalaniladi, kunning qolgan qismida esa odatiy yo‘l sifatida ishlatilishi ham mumkin.

Harakat yo‘nalishining biror qismida avtobus yo‘lini qo‘llab, uni tahlil qilish maqsadida shahardagi avtobus yo‘nalishlaridan birini tanlab olamiz. Bu tanlovni harakat oqimi yuqori, avtobuslar qatnovi ko‘p bo‘lishi kabi talablarga asoslanib amalga oshiramiz. Amir Temur ko‘chasinining Shahrisabz va Osiyo ko‘chalari bilan keshishmasi oralig‘ini tanlab oldik.

Shu ko‘chadan o‘tadigan, ko‘p yo‘lovchilar foydalanadigan 93-sonli avtobus yo‘nalishi tanlab olindi. Harakat ko‘rsatkichlarini tahlil qilish uchun, 93A-yo‘nalishining 15.02.2021 kunidagi GPS ma’lumotlari olindi.



7-rasm. Amir Temur ko‘chasinining Shahrisabz va Osiyo ko‘chalari bilan keshishmasi oralig‘i



8-rasm. 93A-yo‘nalishining GPS dagi ko‘rinishi

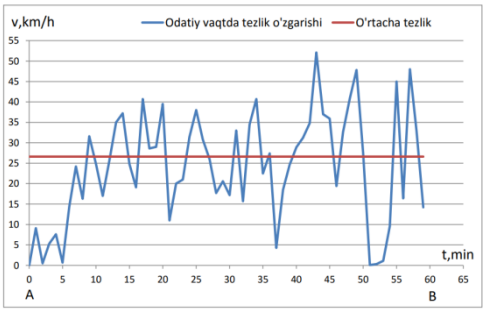
Kechki tig‘iz va odatiy vaqtdagi avtobus harakatining 2 ta reysini tahlil qilamiz. Yunusobod mavzesi 9-daha ASHB ni - A, Qo‘yliq1- mavzesi 18 ASHB ni - B deb belgilaymiz. 93A-yo‘nalishining A dan B ga harakatlanish vaqti 59 minut deb belgilangan ekan. Odatiy vaqtda avtobus A dan harakatni 5:54:17 da boshlab, B ga 6:52:43 da yetib kelgan. Masofani 0:58:26 da bosib o‘tgan va belgilangan vaqtda kelgan.

Uning harakat davomidagi o‘rtacha tezligi *26,6 km/soat* ga teng bo‘lgan.

$$v_{o\prime r} = \frac{v_1+v_2+..v_n}{n}$$

Harakat tig‘iz bo‘lgan vaqtda 93-Avtobus harakatni 17:45:00 da boshlab, oxirgi avtobus shoh bekatiga 19:17:08 da kelgan. Yo‘nalishni bosib o‘tish uchun 1:32:08 vaqt sarflagan va belgilangan vaqtdan yarim soat kechikkan.

Pik vaqtidagi o‘rtacha tezligi 18,3 km/soat ga teng bo‘lgan.

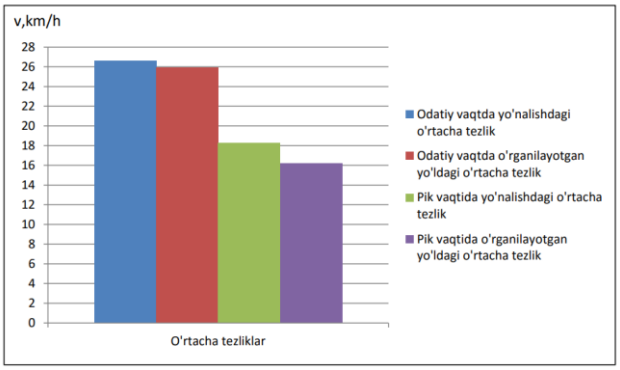


9-rasm. Odatiy vaqtda tezlikni vaqtga bog‘liq o‘zgarishi



10-rasm. Harakat tig‘iz vaqtda tezlikning vaqtga bog‘liq o‘zgarishi

GPS ma’lumotlaridan foydalangan holda, harakat tig‘iz bo‘lgan va bo‘lmagan holatlaridagi A.Temur ko‘chasinining Shahrisabz va Osiyo ko‘chalari bilan keshishmasi oralig‘idagi qismini ko‘rib chiqamiz. Belgilangan uchastkaga avtobusning kirib kelish va chiqib ketishidagi vaqtlarini topib, shu vaqt oralig‘idagi o‘rtacha tezliklarini ikkala holat uchun ham topamiz. Avtobus o‘rganilayotgan yo‘lni odatiy vaqtda 25,9 km/h o‘rtacha tezlik bilan, harakat oqimi ko‘p bo‘lgan vaqtda 16,2 km/h o‘rtacha tezlik bilan o‘tgan. Barcha o‘rtacha tezliklarni bitta grafikda keltiramiz.



11-rasm. O‘rtacha tezliklarni o‘zgarishi

Grafikdan xulosa qilsak, odatiy vaqtda o‘rganilayotgan uchastkaning o‘rtacha tezligi yo‘nalishning o‘rtacha tezligiga deyarli teng, harakat tig‘iz vaqtda esa yo‘nalishning ham o‘rganilayotgan uchastkaning ham o‘rtacha tezligi past. Shu sababdan avtobus yo‘lagini faqat pik vaqtlarida qo‘llash, qolgan vaqtlarda esa yo‘lning umumiy foydalanishda bo‘lishi to‘g‘ri bo‘ladi.

Xulosa

Tahlillar asosida quyidagilarni xulosa qilish mumkin: - Shaharlarda AVL tizimlaridan foydalanish avtobuslarni samaradorlikka qarab moslashishiga, bu esa tirbandlik xavfini kamaytirishga yordam beradi. - Biror toifadagi arxitekturani tanlashimiz, tizimdan qanday hududda foydalanishimizga va yo‘lning harakat oqimiga bog‘liq, bunda aloqa talablari va tizim narxi ham muhimdir. - Avtobuslar va harakatning boshqa ishtirokchilari uchun ITS harakat xavfsizligini ta‟minlashga imkon yaratadi va avtobuslarni faqat kerak bo‘lganda birinchi o‘ringa qo‘yadi, bu esa uning samaradorligi va jozibadorligini oshiradi. - Avtobus yo‘laklari avtobuslarning to‘xtovsiz oqimini ta‟minlaydi, xavfsizligini oshiradi. Lekin harakatning boshqa ishtirokchilariga salbiy ta‟sirini hamda qaysi vaqtlarda qo‟llanganda o‟zini oqlashini ham hisobga olish kerak. - GPS ga asoslangan tizim yuqori moslashuvchanlikka ega bo‟lishiga qaramasdan, ba‟zi sun‟iy yo‘ldosh yomon qamrab olingan hududlarda joylashuv xatolarini keltirib chiqarishi mumkin, bu esa qo‘shimcha vositalar bilan to‘ldirilishni talab qiladi.

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IJTIMOIY TARMOQLAR ORQALI BREND IMIJINI SHAKLLANTIRISH: INFLUENCER MARKETING MISOLIDA

Annotatsiya: *Ushbu maqolada ijtimoiy tarmoqlar orqali brend imijini shakllantirish jarayonida influencer marketingning o‘rni va ahamiyati tahlil qilinadi. Brendning raqamli muhitdagi nufuzi, iste’molchilar ishonchi hamda brend bilan mijoz o‘rtasidagi muloqotni mustahkamlashda ijtimoiy tarmoqlarning strategik roli yoritilgan. Tadqiqotda foydalanuvchi ishonchini shakllantirish, brend tan olinishi va sotuv samaradorligiga influencerlar faoliyatining ta’siri ilmiy jihatdan asoslab beriladi.*

Kalit so‘zlar: *brend imiji, ijtimoiy tarmoqlar, influencer marketing, raqamli kommunikatsiya, iste’molchi ishonchi, marketing strategiyasi.*

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BUILDING BRAND IMAGE THROUGH SOCIAL NETWORKS: THE EXAMPLE OF INFLUENCER MARKETING

Abstract: *This article analyzes the role and importance of influencer marketing in the process of building a brand image through social networks. The strategic role of social networks in strengthening the brand's authority in the digital environment, consumer trust, and brand-customer communication is highlighted. The study scientifically substantiates the impact of influencer activities on building user trust, brand recognition, and sales performance.*

Keywords: *brand image, social networks, influencer marketing, digital communication, consumer trust, marketing strategy.*

Kirish

Zamonaviy raqamli iqtisodiyot sharoitida ijtimoiy tarmoqlar inson hayotining ajralmas qismiga aylangan. Facebook, Instagram, TikTok, YouTube, Telegram va boshqa platformalar endilikda nafaqat aloqa vositasi, balki marketing va brend kommunikatsiyasi uchun muhim maydon sifatida qaralmoqda. Raqamli texnologiyalarning tez sur’atlarda rivojlanishi natijasida kompaniyalar o‘z auditoriyasi bilan bevosita muloqot o‘rnatish, ularning fikr-mulohazalarini o‘rganish va imijini shakllantirish imkoniyatiga ega bo‘ldi.

Shu jarayonda influencer marketing — ya’ni ijtimoiy tarmoqlarda katta auditoriyaga ega bo‘lgan shaxslar (blogerlar, mutaxassislar, mashhurlar) orqali reklama va brend targ‘ibotini olib borish — eng samarali vositalardan biriga aylandi. Influencerlar o‘z obunachilari bilan doimiy muloqotda bo‘lganliklari sababli, ular iste’molchilarning ishonchini shakllantiradi, brend haqidagi tasavvurlarni boshqaradi va qaror qabul qilish jarayoniga ta’sir ko‘rsatadi.

Brend imiji – bu iste’molchining ongida shakllangan kompaniya yoki mahsulot haqidagi ijobiy yoki salbiy fikrlar majmuidir. An’anaviy reklama shakllaridan farqli o‘laroq, ijtimoiy tarmoqlardagi influencer marketing tabiiy, samimiy va ishonchli kommunikatsiya vositasi sifatida e’tirof etiladi. Shu bois, bugungi kunda korxonalar va tashkilotlar o‘z brend strategiyalarida influencerlar bilan hamkorlikni markaziy o‘ringa qo‘ymoqda.

"Influencer marketingining samaradorligi va uning iste'molchi xulq-atvoriga ta'siri" mavzusi D. Braun, S. Fiorella, B.Sharp, A.Kim, C.Venz, K.Keller, V.Mangold kabi taqqiqotchi olimlar tomonidan keng ko'lamli o'rganilgan.

2013-yilda xorijiy mualliflar D. Braun va S. Fiorella ta'sir qiluvchi marketingni “maqsadli auditoriya tinglaydigan, hurmat qiladigan va o'rnak oladigan mashhur va mashhur shaxslarning og'zi orqali maqsadli auditoriyaga murojaat qilish vositasi” deb ta'riflaganlar.[1]

Byron Sharpning "Brendlar qanday o'sadi" (How Brands Grow) kitobi marketing sohasida an'anaviy qarashlarga qarshi chiqadigan va dalillarga asoslangan marketing tamoyillarini ilgari suradigan nufuzli asar hisoblanadi. Kitob marketing mutaxassislariga brendlarni qanday qilib samaraliroq qurish va o'stirish haqida yangi tushunchalar beradi. Sharp brendning o'sishida marketingning rolini tahlil qiladi va raqamli marketingning iste'molchilar xarid qilish xulq-atvoriga ta'sirini o'rganadi.[2]

O'zbekistonda J.Ergashxodjayeva[3], Sh. Narkulova [5], I.Ibragimov [4], D.Xolmamatov,

B. Musayev, S.Boyjigitov [11], M.Raimova [9] va boshqalar iste’molchi xulq-atvoriga ta’sir

etuvchi omillarni o’rganganlar.

Tahlil va natijalar

Ta'sirli (influencer) marketing - bu keng sodiq auditoriyaga ega bo'lgan va unga katta ta'sir ko'rsatishga qodir bo'lgan bloggerlar, taniqli shaxslar, nish ekspertlari va boshqa fikr yetakchilari bilan hamkorlikka asoslangan brendlar va ularning mahsulotlarini bozorda ilgari surish strategiyalaridan biridir.

Influencer marketing - bu fikr yetakchilari orqali mahsulot yoki xizmatlarni ilgari surishdir. Ta'sir marketingi ta'sir qiluvchi marketing deb ham ataladi, bu tushunchalar bir xil. Fikrlar yetakchilari yordamida targ‘ibot Internet-marketingning asosiy vositalaridan biridir. Ba'zi korxonalar uchun ta'sirchan marketing SMM, elektron pochta marketingi, maqsadli va kontekstli reklama yoki boshqa kanallarga qaraganda yaxshiroq ishlaydi.

Fikr yetakchilari – muxlislari, obunachilari, tarafdorlari va o‘quvchilari ko‘p bo‘lgan odamlardir. Ular taniqli shaxslar - aktyorlar va sportchilar, shuningdek,

ijtimoiy tarmoqlardagi akkauntlari tufayli mashhur bo'lgan bloggerlar bo'lishi mumkin. Kichik kompaniyalar ko'pincha bloggerlar bilan ishlaydi, federal brendlar esa mashhurlar bilan reklama qilish imkoniyatiga ega.

Skillbox Media-da qanday turdagi ta'sir o'tkazuvchilar mavjudligi va korxonalar ular bilan qanday ishlashini batafsil tushuntirib beradigan qo'llanma mavjud.

Influencerlar ko'pincha o'z auditoriyasining kattaligiga qarab toifalarga bo'linadi. Qamrab olish doirasiga qarab, ta'sir qiluvchilarning quyidagi turlari ajratiladi:

- Mega-influencerlar 1 milliondan ortiq obunachilar auditoriyasiga ega "yulduzlar". Brend xabardorligini oshirish uchun foydalaniladi. Odatda, bu yuqori narx yorlig'i, past jalb qilish, ammo halo effekti ta'minlanadi.
- Makro-ta'sir qiluvchilar 100 000 dan 1 milliongacha obunachilarga ega bo'lgan etakchilardir. Yuqori maqsadga erishish va sifatli kontent bilan tavsiflanadi.
- Mikro-influencerlar 5-100 ming obunachiga ega bloggerlardir. Tomoshabinlar nisbatan kichik, ammo sodiq. Ishtirok etish darajasi: 4-8%. Narx yorlig'i "yulduzli" ta'sir qiluvchilarga qaraganda ancha past, shuning uchun ba'zida bitta mega-liderga qaraganda bir nechta mikro-rahbarlarni jalb qilish mantiqan.
- Nanoinfluencerlar 5000 dan kam obunachiga ega bloggerlardir. Ko'pincha 1000 dan kam. Ular o'z jamiyatida yuqori obro' va ishonchga ega. Ular ko'pincha juda samarali, chunki ularning reklamalari do'stona maslahatga o'xshaydi va ijobiy qabul qilinadi. Yuqori darajada ishtirok etish bilan tavsiflanadi, lekin kam kirish

Ta'sir etuvchini tanlash targ'ib qilinayotgan mahsulot yoki xizmat turiga va reklama kampaniyasining maqsadlariga bog'liq. Ta'sir etuvchi marketing va to'g'ridan-to'g'ri reklama o'rtasidagi asosiy farq uning tabiatidir. Reklama blogger tarkibining bir qismiga aylanadi, obunachilarga bemalol uzatiladi va yanada samimiy qabul qilinadi. Vakolatli fikr etakchisi o'z izdoshlarini yaxshi biladi: ularni qiziqtiradigan mavzular, ular faol javob beradigan tarkib shakllari. Shuning uchun uning akkauntini tayyor reklama kanali deb hisoblash mumkin. Bloggerlarning ko'pligiga qaramay, sanoat talab darajasida qolmoqda va “blogger”

qidiruv so'rovi so'nggi 5 yil davomida Google Trendsning yuqori qismida qolmoqda.

Influencer marketingining samaradorligi va uning iste'molchi xulq-atvoriga ta'siri murakkab va ko'p qirrali masala bo'lib, bir necha omillarga, ya’ni influencerning tanlovi, kampaniyaning mazmuni, chaqiruvga javob, o’lchovlilik, brend bilan moslik kabi omillarga bog'liq:

- Influencerning tanlovi: Influencerning auditoriyasi bilan mosligi, ishonchliligi va avtentiligi muhim ahamiyatga ega. Mikro-influencerlar (kamroq izdoshlari bo'lgan, lekin yuqori darajada jalb qilingan) ba'zi hollarda makro-influencerlarga (ko'p izdoshlari bo'lgan) qaraganda samaraliroq bo'lishlari mumkin, chunki ular o'z auditoriyasi bilan chuqurroq munosabatlarga ega

bo'lishadi. Mega-influencerlar esa katta auditoriyaga ega bo'lishlariga qaramay, ba'zan kamroq ta'sirchan bo'lishlari mumkin.

1-jadval.
Influencer turlarining ta’sir darajasi

Influencer turi	Kuzatuvchilar soni	Auditoriya ishonchi	Brend ta’sir darajasi	Tavsiya misollar
Mega-influencer	1 mln+	O‘rta	Yuqori ko‘rinish	Mashhur san’atkorlar
Makro-influencer	100k – 1 mln	Yuqori	Yuqori	Blogerlar, ekspertlar
Mikro-influencer	10k – 100k	Juda yuqori	Maqsadli ta’sir	Mahalliy kontent yaratuvchilar
Nano-influencer	<10k	Juda yuqori	Mahalliy ishonchli	Oddiy foydalanuvchilar

Jadvaldan ko‘rinadiki, kuzatuvchilar soni ko‘p bo‘lgan mega-influencerlar katta ko‘rinish (reach) beradi, biroq auditoriya ishonchi pastroq bo‘lishi mumkin. Aksincha, mikro va nano influencerlar kamroq auditoriyaga ega bo‘lsa-da, ularning ta’sir darajasi chuqurroq, chunki ular iste’molchi bilan bevosita va samimiy aloqada bo‘ladi. Shu bois hozirgi marketingda mikro-influencer strategiyasi ko‘proq samara bermoqda.

2-jadval.
Ijtimoiy tarmoq platformalarining brend imijiga ta’siri

Platforma	Foydalanuvchi auditoriyasi	Kontent formati	Brend imijini shakllantirish samarasi
Instagram	Yoshlar, ayollar, ijodkorlar	Foto, video, hikoyalar	Vizual brend identifikatsiyasi uchun yuqori
YouTube	Keng yosh oralig‘i	Uzun videolar	Brend hikoyalash uchun eng samarali
TikTok	16–30 yosh	Qisqa videolar	Virallik va tez tanilish imkoniyati yuqori
Telegram	20–40 yosh	Matn, havola, media	Ishonchli kontent va axborot almashinuvi uchun qulay

Ushbu jadvalda ko‘rsatilganidek, turli platformalar brend imijini shakllantirishda turlicha rol o‘ynaydi. Instagram vizual imijni yaratish uchun ideal bo‘lsa, YouTube chuqur brend hikoyalarini etkazish imkonini beradi. TikTok esa brendni qisqa, ammo esda qolarli formatda ommalashtirish uchun juda samarali.

Ba'zi hollarda influencer marketing samaradorligini aniq o'lchash qiyin bo'lishi va soxta izdoshlari va sotib olingan ta'sirlarning mavjudligi samaradorlikni noto'g'ri baholashga olib kelishi mumkin. Shuningdek, avtentilikka ega bo'lmagan reklamalar iste'molchilar tomonidan salbiy qabul qilinishi va influencer marketing, ayniqsa taniqli influencerlardan foydalanish, qimmatga tushishi mumkin.

Influencer marketing samarali, lekin tanlagan strategiya ta'sir qiluvchilarning o'zlari kabi brendiga to'liq mos kelishi kerakligini yodda tutish kerak. Ta'sir qiluvchi marketingdan foydali foydalanish uchun 8 ta muhim

qadamni amalga oshirish maqsadga muvofiqdir:

- Maqsadini belgilash. Ta'sir qiluvchi marketing bo'lsa, brend oldida turgan asosiy vazifa tan olinishini oshirish va yangi mijozlarni jalb qilishdir. Bu har doim ham darhol sotib olish haqida emas. Savdoni oshirish uchinchi eng muhim va mashhur strategiya yutug'idir.
- Byudjet strategiyasini belgilash. Ta'sir qiluvchi marketing uchun byudjetni belgilashda rejalashtirish, nashr etish, natijalarni kutish va kuzatish uchun qancha vaqt ketishini hisobga oling. Yoki elchi dasturini ko'rib chiqishga arziydimi? Shunda sizning xarajatlaringiz mahsulotni foydalanuvchiga taqdim etish bilan cheklanadi, u sizni o'zi reklama qilishdan xursand bo'ladi. Bu Fujifilm tomonidan qo'llaniladigan taktika. Yangi mahsulotlar yoki yangilanishlarni ishga tushirishda ular taniqli fotograflar va videograflarning yordamiga murojaat qilishadi. Ular mahsulot haqida hikoya qiladilar, tovarlarni ommaga taqdim etishga rang va shaxsiy tus qo'shadilar.

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EARLY-EMERGING AFFIXES IN CHILDREN'S LANGUAGE ACQUISITION

Abstract: *Morphological growth plays a key role in early language learning, especially the appearance of affixes that indicate grammatical and semantic connections. This research explores the initial affixes that appear in children's language development by integrating generative, usage-based, and sociocultural perspectives. It investigates the sequence of affix learning, the cognitive and distributional factors that influence morphological acquisition, and insights across different languages. The results indicate that the initial appearance of affixes is influenced by frequency, clarity of meaning, vocabulary scope, and social engagement*

Key words: *morphology, early-emerging affixes, vocabulary development, psycholinguistics*

Introduction

Language learning in early childhood encompasses the swift and organized growth of various interconnected linguistic systems, such as vocabulary understanding, syntactic arrangement, and morphological composition. These elements do not evolve in isolation; instead, they engage dynamically as children slowly formulate an operational language system. Within these areas, morphology holds a notably important role, acting as a link between the expansion of vocabulary and the development of grammatical skills. The gain of affixes allows children to express grammatical relationships like tense, number, aspect, and agentivity, thus enabling them to progress from single-word statements to more structurally and semantically intricate expressions.

Examining early-emerging affixes provides essential understanding of how children structure linguistic input into significant and rule-based patterns. Due to the systematic distribution and functional constraints of affixes, their appearance in children's speech indicates the cognitive and linguistic mechanisms behind pattern recognition, abstraction, and generalization. Consequently, early use of affixes offers a significant diagnostic insight into the child's evolving grammatical system. By analyzing the initial appearance of affixes and their usage, researchers can gain insights into how children associate form with meaning and grammatical roles.

Moreover, early-emerging affixes serve as an excellent platform for examining the interplay between inherent linguistic abilities and external input. On one side, children show notable consistency and uniformity in the order of affix acquisition, implying the influence of internal limitations on language learning.

Conversely, fluctuations in usage frequency, clarity of meaning, and caregiver involvement suggest a significant influence of experience and engagement. The examination of initial affix acquisition therefore adds to larger theoretical discussions about the comparative influences of biological tendencies, distributional learning, and social interaction in language growth.

The current research focuses on the affixes that appear first in children's natural speech and aims to determine the psycholinguistic processes that facilitate their learning. The research seeks to elucidate how children transition from lexically specific forms to generative morphological patterns by concentrating on early morphological development. This analysis enhances theoretical insights into language acquisition and holds significant implications for early education, clinical intervention, and evaluating atypical language development.

The oretical foundations

Theoretical interpretations of affix acquisition have typically been influenced by generative, constructivist, and sociocultural paradigms. In the generative tradition, Chomsky's theory suggests that children possess a biological capacity for language that allows for the quick and organized learning of grammatical patterns (Chomsky, 1965). Viewed this way, the initial employment of affixes in children's language demonstrates the slow development of fundamental grammatical ability rather than mere imitation or superficial learning. The stable sequence of affix emergence among learners, along with children's capacity to use affixes productively, is seen as support for the existence of abstract morphological representations that are accessible early in development (Chomsky, 1965).

Conversely, usage-based and constructivist approaches highlight the importance of linguistic experience and interaction with input in influencing morphological growth. From this perspective, children acquire affixes by noticing consistent patterns in language and by creating generalizations based on lexical items they encounter in daily communication. Clark contends that the frequency of exposure and clarity of meaning are vital in influencing which affixes appear first and how children understand them (Clark, 1982). Consequently, early affix acquisition is regarded as a progressive process where children experiment with hypotheses concerning form–meaning connections and improve them over time with ongoing exposure (Clark, 1995).

From a sociocultural viewpoint, Vygotsky’s theory emphasizes the inherently social aspect of language acquisition. Linguistic knowledge, encompassing morphological structures, is initially developed through social engagement and subsequently internalized by the child (Vygotsky, 1962). In the zone of proximal development, adults offer scaffolding that aids children’s developing language skills. By employing methods like repetition, expansion, and corrective feedback, caregivers highlight morphological differences and help children focus on affixal forms and their functions (Vygotsky, 1962). n this framework, early affix acquisition is viewed not only as a cognitive achievement but also as a socially mediated process shaped by interaction and cultural context.

Analysis of empirical research on early-emerging affixes

Empirical studies on early morphological growth consistently show that inflectional affixes generally appear earlier in children's language compared to derivational affixes. Longitudinal and observational research indicates that inflectional morphemes like the English plural -s and the progressive -ing are typically among the earliest morphological features to emerge in natural speech. These affixes are usually common in child-directed speech, appear in fairly consistent syntactic contexts, and have clear grammatical meanings, which aids in their early learning.

Maratsos and Chalkley (1980) present empirical evidence indicating that children heavily depend on distributional cues for recognizing grammatical categories and affix patterns. Their results indicate that children notice patterns in co-occurrence, like the frequent pairing of certain affixes with specific word categories or syntactic roles. By encountering these repeated patterns, children slowly deduce the grammatical role of affixes and start to apply them creatively. Significantly, the research by Maratsos and Chalkley shows that children can gain morphological knowledge without needing direct instruction; rather, their awareness of distributional patterns in the input allows them to learn affixes early in their development (Maratsos & Chalkley, 1980).

Additional empirical evidence for early morphological productivity is provided by Clark and Hecht (1982), who examined children's application of the agentive suffix -er. Their research indicates that children can create new agentive nouns by adding the suffix -er to verbs to signify an agent (e.g., runner, opener). While children's initial uses of -er can be inventive and effective, they might not entirely adhere to the semantic rules of adults at first. This result suggests that children grasp the fundamental morphological structure prior to understanding its finer semantic and pragmatic constraints (Clark & Hecht, 1982).

Expanding on this research, Clark, Carpenter, and Deutsch (1995) further show that young children's initial morphological inventions indicate an engaged process of formulating and evaluating hypotheses. The findings indicate that children often use derivational suffixes in ways that go beyond standard adult application, implying that morphological creativity emerges before they fully grasp adult-like limitations. With time, ongoing exposure to input and communicative feedback results in the gradual improvement of these morphological forms, leading to more target-like applications. Collectively, these studies highlight that the initial acquisition of affixes includes both productive use and incremental learning of constraints, instead of merely imitating adult language (Clark, Carpenter, & Deutsch, 1995).

Vocabulary expansion and morphological progression

Anglin’s (1993) mentioned that morphological examination of vocabulary advancement offers strong empirical support for the close relationship between lexical expansion and morphological growth in early childhood. His research shows that as children's vocabularies expand, they encounter an increasing array of morphologically intricate words, comprising both inflected and derived

variations. This heightened exposure encourages children to recognize repeated affixal patterns and to cultivate a budding understanding of the form–meaning connections that affixes convey. Anglin's (1993) analysis suggests that morphological knowledge evolves in conjunction with vocabulary size, arising as a result of lexical growth. As children learn more vocabulary, they start to notice common morphological elements among various words, enabling them to see affixes as significant components. This method improves children's skills in analyzing unknown words by breaking them down into familiar stems and affixes, thus aiding additional vocabulary development.

Concurrently, Anglin (1993) highlights that morphological awareness significantly supports ongoing vocabulary growth. When children learn to understand affixes, they become more capable of deducing the meanings of unfamiliar and infrequent words found in spoken or written language. This mutual connection between vocabulary expansion and morphological understanding emphasizes the key importance of acquiring affixes in overall language and literacy advancement. Morphology serves as both a result of lexical expansion and a tool that facilitates more effective word acquisition throughout development.

Perspectives on cross-linguistic and bilingualism

Cross-linguistic studies show that the characteristics, order, and timing of affix acquisition differ significantly among languages, primarily influenced by elements like morphological clarity, consistency, and typological features. These variations across languages indicate that children are attuned to the structural features of their language and modify their morphological growth accordingly. In bilingual settings, these processes may engage with each other in intricate manners, occasionally leading to blended or cross-linguistic morphological patterns.

Morimoto (1999) analyzed data from Japanese–English bilingual children and showed that prosodic constraints significantly influence the acquisition and integration of affixes between languages. The research indicated that the rhythmic and stress patterns of different languages affected how children applied and generalized affixes, emphasizing the connection between phonological structure and morphological advancement. Morimoto's research indicates that bilingual children do not simply develop two distinct morphological systems independently; instead, the affixal patterns are actively influenced by the prosodic and phonological traits of both languages. This study highlights the significance of taking into account phonological and prosodic elements when examining morphological growth in bilingual and cross-linguistic situations, since these aspects can promote or limit the initial use of affixes (Morimoto, 1999).

Conclusion

The evidence examined collectively indicates that early-emerging affixes possess multiple key traits that aid in their learning. These affixes are usually very common in the language input children encounter, semantically clear, and shown within stable and expected distributional patterns. These features assist children in recognizing repeated morphological patterns and in deriving generalizable rules

from the input. Consequently, children can generatively create these affixes and apply them to new lexical items, showcasing the development of initial morphological competence.

An integration of theoretical and empirical insights suggests that no singular explanatory model completely explains the patterns seen in affix acquisition. Rather, the process showcases an active interaction of various elements. Innate cognitive and linguistic systems offer the essential ability to identify and utilize morphological patterns, while consistent engagement with linguistic input and interaction within significant social environments directs the gradual enhancement of these abilities. The learning of early-emerging affixes represents a complicated interplay of biological tendencies, experiential learning, and social interaction, emphasizing the intricate aspects of early language development.

Early-emerging affixes are not just linguistic elements to acquire; they serve a crucial function in the overall progression of children's language growth. They aid in developing grammatical proficiency, assist in broadening vocabulary, and allow for more advanced syntactic structures. Additionally, the capacity to generalize and handle affixes demonstrates the growth of abstract morphological understanding, essential for future language and literacy abilities.

Future studies ought to keep exploring how these initial patterns develop in various linguistic and cultural contexts. Comparative research assessing cross-linguistic and bilingual settings can enhance our understanding of the processes that facilitate morphological learning, whereas applied studies can convert these insights into effective approaches for educational and clinical practices. Grasping the elements that aid in the development and comprehension of affixes can enhance language instruction methods, early literacy initiatives, and strategies for assisting children with unusual language growth

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XALQARO MIGRATSIYANING HUDUDLAR GEODEMOGRAFIK VAZIYATIGA TA‘SIRI

Аннотация: *Mazkur maqolada aholi migratsion harakatlarining mintaqaviy jihatlari bayon qilingan bo’lib, xalqaro migratsiyaning davlatlar demografik vaziyatiga ta’siri o‘rganilgan. Aholi mexanik harakatining sabablari izohlangan bo‘lib, migratsiya natijasida hudud aholisidagi o‘zgarishlar, iqtisodiy va ijtimoiy oqibatlar tahlil qilingan.*

Kalit сўзлар: *aholi, migratsiya, geodemografik vaziyat, mehnat resurslari, migrant, iqtisodiyot, aholining mexanik harakati, ishchi kuchi.*

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THE IMPACT OF INTERNATIONAL MIGRATION ON THE GEODEMOGRAPHIC SITUATION OF REGIONS

Annotation: *This article describes the regional aspects of population migration, studies the impact of international migration on the demographic situation of countries. The reasons for the mechanical movement of the population are explained, and changes in the population of the region as a result of migration, economic and social consequences are analyzed.*

Keywords: *population, migration, geodemographic situation, labor resources, migrant, economy, mechanical movement of the population, labor force.*

Aholi migratsiyasi - aholining yashash joyini o‘zgartirishi bilan bog‘liq ko‘chishi bo‘lib, iqtisodiy - ijtimoiy faoliyatning ko‘p tomonlarini qamragan muammolar, sog‘ligini tiklash, o‘qish, urushlar yoki inson huquqlari buzilishi natijasida o‘z vatanlarini tark etish va boshqa sabablar tufayli yuzaga keladi.

Migratsiya nafaqat mamlakat aholisining soni, milliy-etnik, yoshi va jins tarkibiga, balki iqtisodiy faol aholi ulushiga ham ta'sir qiladi. Migrantlar iqtisodiy

rivojlangan mamlakatlarda yashashni afzal ko'radilar, chunki, bunday davlatlarda yuqori maoshli ish topish imkoniyati bo‘lib, immigratsiya qonun doirasida ta'minlanadi. Aholi ixtiyoriy ravishda yoki zarurat bilan migratsion harakat qiladi. Migratsion harakatni amalga oshirishga turli omillar ta’sir ko‘rsatadi; tabiiy, iqtisodiy, ijtimoiy va siyosiy omillar: tabiiy ofatlar, yuqori maoshli ish, ta'lim olish istagi kabilardir. Migrantlar iqtisodiyotning muayyan tarmoqlarida ishchi kuchi tanqisligini to'ldirishga yordam beradi va shu orqali milliy daromadni oshiradi. Aholisining ko'p qismi migrantlar bo'lgan barcha mamlakatlar kuchli iqtisodiyotga ega bo‘lib, fuqarolarini munosib turmush darajasi va yuqori ish haqi bilan ta'minlay oladilar. Rossiya, BAA va Saudiya Arabistoni iqtisodiyoti neft va gaz eksportidan daromad oladi. AQSh yuqori xizmat ko'rsatish sohasiga, Germaniya va Osiyoning rivojlangan davlatlari esa mashinasozlik tarmoqlariga tayanadi. Hududga kirib kelayotgan migratsiya oqimi (immigratsiya) aholi sonining o‘sishiga xizmat qilsa, hududdan ketish (emigratsiya) aksincha, aholi sonining kamayishiga olib keladi. Mehnat resurslari yetishmaydigan hududlarda immigratsiya iqtisodiy faollikni oshiradi, ishlab chiqarish va xizmat ko‘rsatish tarmoqlarini rivojlantirishga zamin yaratadi. Biroq yuqori darajadagi emigratsiya ishlab chiqarish salohiyatining susayishiga, ayrim hududlarda “aholining qarishi” jarayonining tezlashishiga sabab bo‘ladi. Migratsiya, odatda, mehnatga layoqatli yoshlar o‘rtasida ko‘proq uchraydi. Yuqori darajadagi tashqi migratsiya hududlarda yoshlar sonining kamayishi, tug‘ilishning qisqarishi hamda mehnat bozorida demografik bosimning ortishiga olib keladi. Migratsiya hududning etnik tarkibining o‘zgarishiga ta’sir etadi. Turli millat vakillarining ko‘chib kelishi hudud aholisining ko‘p madaniyatli bo‘lishiga olib kelib, ijtimoiy integratsiya uchun yangi imkoniyatlar yaratishi bilan birga, ba’zan madaniy moslashuv, til bilish kabi muammolar yuzaga kelishi mumkin.

Jahon Banki ma’lumotlariga ko‘ra, xalqaro migratsiya oqimining 70–75 foizini mehnatga layoqatli yoshlar tashkil etadi. Bu hududlarda demografik qarish jarayonining tezlashishiga, tug‘ilish ko‘rsatkichlarining pasayishiga olib kelishi mumkin (World Bank, 2023). Immigratsiya oqimini qabul qiluvchi hududlarda esa aksincha, mehnat resurslari bazasi kengayadi va yoshlar ulushi ortadi.

Xalqaro Migratsiya tashkilotining ma’lumotiga ko'ra, dunyo bo‘ylab 281 mln xalqaro migrant bo‘lib, bu dunyo aholisining 3,6 foiziga teng. Migrantlarning 48,1 foizini ayollar, 51,9 foizini erkaklar tashkil qiladi. Dunyo bo‘yicha jami migrantlarning Yevropa va Osiyo qit’asi 62% gacha, Shimoliy Amerika 21%, Afrika 9%, Lotin Amerikasi va Karib havzasi 5%, Okeaniya 3% ini tashkil etmoqda.

Migrantlar soni bo‘yicha yetakchi davlatlarga AQSh, Fors ko‘rfazi davlatlari, Yevropa, Kanada va Avstraliya kiradi. Masalan, AQShda migrantlar umumiy aholining 17,4 foizini tashkil qiladi. Yevropa Ittifoqi davlatlarida aholining 6% dan ortig'i yoki taxminan 27,3 million kishi YeI fuqarolari emas. Germaniya, Buyuk Britaniya, Fransiya va Ispaniya qit‘adagi eng ko‘p migrantlar soni bo‘lgan davlatlardir.

Quyida aholisi tarkibida migrantlar soni eng ko‘p bo‘lgan dunyo davlatlari keltirilgan:

Amerika Qo‘shma Shtatlari eng ko‘p immigrantga (50,6 mln) ega bo‘lgan davlat bo‘lib, jami aholi (344,9 mln kishi) ning 14,5 foizini tashkil etadi. 1970 yildan beri AQShga kelgan migrantlar soni deyarli 4 baravarga oshgan. Qo‘shma Shtatlarga ko‘chib keluvchilar soni Meksikadan eng ko‘p miqdorni tashkil etadi. Migrantlarning Qo‘shma Shtatlarni tanlashining asosiy sabablaridan biri - bu ishga joylashish imkoniyatlari, muhandislik va IT-dan mavsumiy qishloq xo'jaligi ishlarigacha bo‘lgan keng doiradagi ish o‘rinlarini taklif qiluvchi turli sohalarning mavjudligidir.

Germaniya Yevropadagi eng ko‘p migrantlar davlati bo‘lib, immigrantlarning umumiy soni 15,4 mln bo‘lib, mamlakat 84,3 mln aholisinining 18,3 foizni tashkil qiladi. Mamlakat dunyoda rivojlangan iqtisodiyoti, yuqori turmush darajasi, xarid qobiliyati va ish haqi bilan migrantlarni o'ziga jalb qilgan G‘arbiy Yevropaning industrial davlatidir.

Saudiya Arabistoni 13,5 mlnga yaqin migrantni qabul qilgan bo‘lib, mamlakat 34,2 mln aholisining 39,5 foizini tashkil etgan xorijliklar asosan, mehnat migrantlaridir. Saudiya Arabistoni Fors ko‘rfazidagi mehnat migratsiyasining asosiy markazi hisoblanadi. Mehnat migrantlari Janubiy va Janubi-sharqiy Osiyodan, shuningdek, Somali, Efiopiya va Eritreya kabi Sharqiy Afrika davlatlaridan keladi. AQSh va G‘arbiy Yevropa davlatlaridan kelgan migrantlar soni esa kam.

Rossiyada migrantlar soni 11,6 mln kishi bo‘lib, jami aholi (146,3 mln kishi) ning 8 foizini tashkil etadi. Kelgan migrantlarning aksariyati sobiq Sovet Ittifoqi davlatlari fuqarolaridir. O‘zbekiston, Tojikiston va Qirg‘izistondan Rossiyaga kelayotgan migrantlarning asosiy sabablari sifatida iqtisodiy ehtiyojlar, ta'lim, o'z-o'zini ish bilan ta'minlash kabilar ko‘rsatiladi.

Birlashgan Arab Amirliklarida 11,1 mln kishi istiqomat qiladi, ularning 78 foizi (8.6 mln) migrantlardir. Hindlar eng katta chet ellik guruhni tashkil qiladi, undan keyin pokistonliklar, bangladeshliklar, misrliklar, filippinliklar va boshqalar. BAA Yaqin Sharq mamlakati bo'lishiga qaramay, Dubay Yevropa hayotiga juda o'xshash turmush tarziga ega. Shahar amirlikning eng muhim savdo va moliyaviy markazidir. Davlat tom +onidan innovatsion texnologiyalarni faol tatbiq etish va tadbirkorlik hamda sarmoyaviy imkoniyatlarni qo'llab-quvvatlovchi immigratsiya dasturlari ishlab chiqilgan. Migrantlar tarkibida turli ijtimoiy qatlam vakillari, jumladan, biznesni rivojlantirish istiqbollarini, qulay soliq siyosatini va innovatsiyalarni qo‘llab-quvvatlashni qadrlaydigan xorijiy tadbirkorlar bo‘lib, yuqori turmush darajasi, bandlik imkoniyatlari va qonuniylashtirish migrantlarni jalb qiluvchi asosiy omillardir.

Xalqaro migratsiya immigrantlarga faqat iqtisodiy ehtiyojlar emas, balki, ijtimoiy kafolatlar va ta'lim olish imkoniyatlarini ham bermoqda. Katta xalqaro nufusga ega bo'lgan ta'lim muassasalari, yuqori sifatli ta'lim migrantlarning ushbu mamlakatlarni tanlashning yana bir sababidir. AQSh, Buyuk Britaniya, Germaniya yoki BAAda tahsil olgan va butun dunyoda eng muhim zaruriy sohalar

mutaxassislarining bandligi hamda xalqaro miqyosda kasbiy faoliyat yuritishlari uchun imkoniyatlar yaratadi.

Migratsiyani afzallik jihatlari sifatida quyidagilarni izohlash mumkin: malakali ishchi kuchi tanqisligini kamaytiradi, urbanizatsiya jarayonlarini tezlashtiradi, iqtisodiy o‘sishni qo‘llab-quvvatlaydi, jamiyatda ko‘p madaniyatlilikni kuchaytiradi.

Tashqi migratsiyada, ayniqsa yosh, bilimli kadrlarning ketishi malakali mutaxassislar yetishmovchiligi, iqtisodiyot tarmoqlarida raqobatbardoshlikning pasayishi, innovatsion rivojlanish sur’atlarining sekinlashishi kuzatiladi. Mehnatga layoqatli yoshlarning ketishi oqibatida demografik nomutanosiblik, ya’ni, qariyalar ulushining ortishi, tug‘ilish ko‘rsatkichining pasayishi, demografik yuklamaning oshishi yuzaga keladi. Katta miqdorda migrantlar kirib kelgan davlatlarda sog‘liqni saqlash, ta’lim, turar joy, transport tizimida ortiqcha yuklama yuzaga keladi, ish o‘rinlari uchun raqobat, uy-joy narxlarining oshishi kuzatiladi. Nazorat qilinmagan migratsiya natijasida noqonuniy mehnat bozori, jinoyatchilikning ayrim turlarining ko‘payishi, noqonuniy yashash hollari kabi xavflar ortishi mumkin.

Migratsion harakat hudud demografik rivojlanishining muhim tarkibiy qismi bo‘lib, u aholi soni, yosh-jins tarkibi, urbanizatsiya darajasi, etnik tarkibiga sezilarli ta’sir ko‘rsatadi. Migratsiya ijobiy demografik va iqtisodiy samaralar berishi bilan birga, me’yoridan ortiq darajada bo‘lishi davlat va aholi uchun jiddiy tahdidlar tug‘diradi. Shu boisdan migratsiya siyosatini to‘g‘ri yo‘naltirish, hududlararo demografik muvozanatni ta’minlash va migratsiya oqimlarini boshqarish mamlakat uchun ustuvor vazifalaridan biri bo‘lib, mehnat bozori ehtiyojlari, demografik barqarorlik, ijtimoiy integratsiya va xavfsizlik talablarini inobatga olgan holda yuritish maqsadga muvofiqdir.

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BIOCHEMICAL COMPOSITION AND PROPERTIES OF HYSSOPUS OFFICINALIS L

Annotation. *This article scientifically studies the biochemical composition, bioactive compounds, essential oil components, and medicinal and agrotechnical properties of the hyssop plant (Hyssopus officinalis L.). As a result of the research, it was found that the plant contains a high content of flavonoids, phenolic acids, terpenoids, vitamins, and essential oil components. Hyssop is widely used in folk medicine as an anti-inflammatory, antiseptic, spasmolytic, and broncholytic agent. The article also analyzes the growth conditions, agrobiological, and biochemical properties of the plant on a scientific basis.*

Keywords: *Hyssopus officinalis, essential oil, flavonoids, phenolic compounds, antioxidant activity, medicinal plants.*

Introduction

Hyssopus officinalis L. is a perennial medicinal, essential oil and honey-producing plant belonging to the Lamiaceae family. This species is widespread in the Mediterranean basin, Central Asia, the Caucasus and Southern Europe. In Uzbekistan, it grows wild and cultivated mainly in foothill zones and regions with a dry climate.

In recent years, the increased demand for natural medicinal plants has further increased the importance of hyssopus. Because it is widely used not only in the pharmaceutical industry, but also in the food, perfumery and veterinary sectors.

In this article, the biochemical composition of hyssopus, the amount of bioactive substances in it and their physiological properties were scientifically studied. The aim is to scientifically substantiate the biochemical and pharmacological potential of this plant and assess the possibilities of its widespread use in the national economy.

Materials and methods of research (Methods)

The plant Hyssopus officinalis L., grown in the Tashkent region of Uzbekistan, was chosen as the object of research. The samples were collected during the flowering period of the plant (June-July).

Sample preparation. The collected plants (stems, leaves and buds) were dried in natural conditions at 30–35 °C, then crushed and prepared for analysis in fractions up to 1 mm.

Analysis methods

1. Determination of the amount of essential oil — Hydrodistillation method (Clevenger apparatus).

2. Flavonoid content — $AlCl_3$ colorimetric method, spectrophotometric measurement at a wavelength of 410 nm.

3. Phenolic compounds — Folin–Ciocalteu reagent was used, measurement was carried out at 765 nm.

4. Antioxidant activity — determined by DPPH radical scavenging method.

5. Vitamins (A, C, E) — determined by high-performance liquid chromatography (HPLC) method.

6. Mineral content — by atomic absorption spectrometry (Fe, Zn, Mn, Cu elements).

Statistical analysis

The results of the analysis were processed in 3 replicates, and statistical analysis was performed according to the method of B.A. Dospekhov (1985). The results are expressed as ±Sx average error.

Results

The results of the study showed that the biochemical composition of the blue sedge has high bioactivity.

1. Amount and composition of essential oil

The amount of essential oil in the dry mass of the plant was 0.8–1.2%. According to the results of gas chromatography, the main components are:

Pinocamphon (35–40%)

Isopinocamphon (25–30%)

β-pinene (5–7%)

1,8-cineole (4–5%)

Limonene (3%)

The presence of these components determines the antiseptic and antibacterial activity of the plant.

2. Flavonoids and phenolic compounds

The total amount of flavonoids was 1.95%, and phenolic compounds was 2.42%, which indicated that the plant has strong antioxidant properties. Apigenin, luteolin, rutin and kaempferol were identified as the main flavonoids.

3. Vitamins and minerals

Indicator	Amount (mg/100 g)
Vitamin C	**41,2**
Vitamin A	**0,85**
Vitamin E	**2,15**
Fe	**21,6**
Zn	**3,4**
Mn	**1,9**
Cu	**0,8**

These results indicate that the blueberry plant is rich in microelements important for human health.

4. Antioxidant activity

According to the results of the DPPH test, the blueberry extract had a radical scavenging activity of 76%, which was close to that of rosemary and sage.

Discussion

The results obtained were consistent with the data presented in the international literature. For example, according to Pavela et al. (2018), the main components of the essential oil of Hyssopus officinalis are pinocamphon and isopinocamphon, which have antiseptic and antimicrobial properties. Due to the high content of flavonoids and phenolic compounds, the blue hyssop plant is effective in reducing oxidative stress, and has anti-inflammatory and immunomodulatory properties.

Studies have shown that the biochemical composition of the plant is directly dependent on the growing conditions (soil, humidity, climate). The content of essential oil and flavonoids was slightly higher in samples grown in irrigated areas.

Blue hyssop has the potential to be used in the preparation of medicinal preparations, as a natural preservative in the food industry, and in perfumery products.

Conclusion

The plant of the blue-green algae is rich in flavonoids, phenolic acids, vitamins and essential oils in terms of biochemical composition. The main components of the essential oil are pinocamphon, isopinocamphon and 1,8-cineole, the share of which is 60–70%. Plant extracts have strong antioxidant and antimicrobial activity. The use of blue-green algae as a natural bioactive source in the pharmaceutical, food and cosmetic industries is promising. In further studies, it is advisable to study the clinical efficacy and toxicological safety of extracts obtained from this plant.

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TUPROQ UNUMDORLIGINI OSHIRISH YO'LLARI VA XARITASINI TUZISH USULLARI

Annotatsiya: *Dunyoda tuproq unumdorligi holati, uning ko'rsatkichlari, tuproq unumdorligining boshqa omillar bilan o'zaro aloqadorligi va tuproq unumdorligini modellashtirish bo'yicha bir qator ustuvor yo'nalishlarda ilmiy tadqiqot ishlari olib borilmoqda. Bundan tashqari, tuproq xossa-xususiyatlarini o'rganish, tuproq unumdorligini baholash, oshirish va boshqarishda zamonaviy geoaxborot texnologiyalaridan foydalanilmoqda va tegishli ishlanmalar ishlab chiqarishga joriy etilmoqda. Tuproqlarni batafsil masshtabli xaritaga tushirishda ma'lum hududning tuproq qoplami batafsil va katta aniqlikda yoritilgan holda o'rganilib, reja va xaritalar tuziladi.*

Kalit so'zlar: *Tuproq-iqlim, relif, yer tuzish, reja, sifat ko'rsatkich, agronomik xarita, struktura, och tusli bo'z tuproq.*

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WAYS TO INCREASE SOIL FERTILITY AND METHODS FOR MAPPING

Annotation: *Scientific research is being conducted worldwide in a number of priority areas focused on soil fertility, its indicators, the relationship between soil fertility and other factors, and soil fertility modeling. Furthermore, modern geoinformation technologies are being used to study soil properties, assess, improve, and manage soil fertility, and the corresponding developments are being implemented in production. Detailed soil mapping involves a detailed and highly accurate study of the soil cover of a given area, and the creation of plans and maps.*

Keywords: *Soil and climatic conditions, relief, land formation, plan, land classification, agronomic map, structure, light gray soil.*

Mavzuning dolzarbligi

Bugungi kunda respublikamiz qishloq xo'jaligini rivojlantirishda tuproq unumdorligini oshirish, uning holatidan kelib chiqib qishloq xo'jaligi yerlariga ishlov berish va agrotexnik tadbirlarni qo'llash o'ziga xos muhim ahamiyatga ega. Yangi O'zbekistonning taraqqiyot strategiyasini uchinchi yo'nalishi-milliy iqtisodiyotni, uning o'sish sur'atlarini zamon talablari darajasida rivojlantirish bo'yicha belgilangan ustuvor vazifalardan iborat.

Shuningdek, qishloq xo‘jaligida erkin raqobatni taminlaydigan bozor tamoyillarini joriy etish, xususan, paxta va g‘alla yetishtirishda davlat buyurtmasini bekor qilish orqali ishlab chiqarishda iqtisodiy samaradorlik va mahsulot ishlab chiqaruvchilar manfaatdorligi oshirilishi» xaritografik ma’lumotlarni ajratib oladi va tuproqni o‘rganish ishlarini maqsadiga va masshtabiga, ularning sifati to‘g‘ri kelishkelmasligini baholaydi va xaritaning saqlanishini ta’minlaydi.

Respublikamizning ko’p hududlarida och tusli bo’z tuproqlar tarqalgan va tuproqlarni o‘rganish uchun tuproqshunoslarga reja-xaritografik asoslarni beradi va reja-xaritografik asoslarni ko‘paytirishni tashkil qiladi. Maboda topografik asoslarni aniqlash kerak bo‘lib qolsa, uni aniqlaydi va xarita tuzish ishlarini bajaradi. Yer tuzuvchi tuproqshunos bilan, tuproq otryadi agronomi va xo‘jaliklarning agronomlari bilan birgalikda qishloq xo‘jalik ekinlarini aniq joylashtirish maqsadida almashlab ekish tartibini va tadbirlarini ishlab chiqadi.

Shundan kelib chiqib, tuproq unumdorligini oshirish, yer resurslaridan samarali foydalanish va ilg‘or agrotexnik tadbirlarni ishlab chiqishda tuproqlar unumdorligini ilmiy asoslangan holda boshqarish muhim ahamiyat kasb etadi. Tuproq xaritogrammasi qishloq xo'jalik dalalarini tuproq xaritasi masshtabida chizilgan tasviridir. Ular tuproqning ayrim xossalarini aniqroq izohlash (gumusli qatlamning qalinligi, mexanik tarkibi, yemirilganlik va sho‘rlanish darajasi va h.k.) tuproqdan foydalanishga oid tavsiyalarni aniqlash, ekiniarini joylashtirishda ishlatiladi. Tuproq xaritogrammalari tuproq tarkibidagi azot, fosfor, kaliy va boshqa moddalaming miqdorini ham tasvirlaydi (agrokimyoviy xaritogrammalar).[1].

Tabiiy va agroiqtisodiy sharoitni o’rganish

Tayyorgarlik davrining asosiy vazifalaridan biri hisobot va adabiyotlardagi ma’lumotlardan foydalanib, o’rganiladigan joyning tabiiy va agroiqtisodiy sharoitini o’rganishdir. Bunda ishni bajaruvchi mutaxassislar o’rganilayotgan joyning tabiiy geografik sharoiti (geomorfologiya va rel’ef, iqlim, geologik sharoit, gidrologik xususiyatlari, o’simliklar dunyosi, tuproq qoplamini hamda xo’jalikning qaysi sohaga ixtisoslashganligini va iqtisodiy holatini ko’rsatuvchi ma’lumotlarni to’playdi.Eng muhim ma’lumotlar ilmiy-tadqiqot institutlarda, rejalashtiruvshi tashkilotlarda, tajriba maskanlarida bo’ladi. Bunda hisobotlarni ko’rib chiqish bilan bir qatorda xaritografik ma’lumotlarni to’plashni ahamiyati ham katta. Ayniqsa tajriba markazlarida, nav sinash maydonlarida va ilg’or xo’jaliklarda to’plangan ma’lumotlarning bahosi beqiyosdir..[2].

Xaritografik asoslarni tayyorlash

Tuproqni dalada tekshirish ishlarini bajarish uchun xaritografik ma’lumotlarni to’g’ri tanlashning ahamiyati katta, shunki shu asosida tuproq xaritasi va agronomik xaritogrammalar tuziladi.Yirik masshtabda tuproqni tekshirish ishlarini olib borish uchun xaritografik asos sifatida aerofototasvir, topografik xarita va yerdan foydalanishning konturli rejasi ma’lumotlaridan foydalaniladi. Bular ishchi asos sifatida tayyorlab olinadi. Bu asosga shartli

belgilarning ma’lum bir qismigina o’tkaziladi (topografik asosda bo’lgan).Bundan maqsad tuproq xaritasini shartli belgilar bilan to’ldirib yubormasdan, tuproqlarni belgilash uchun ham joy qoldirishdir. Asosga yerdan foydalanish, ekin turlari chegarasi va shartli belgi, suv tarmoqlari, aholi yashash joylari, yo’l va boshqalar tushiriladi. Xarita to’rtburchak ichiga olinib, nomi yoziladi, masshtabi ko’rsatiladi, tuzilgan yili va tashkilotning muxri bosiladi. Tayyorlangan asos bir nesha nusxada ko’paytiriladi bir nusxa fermer xo’jalik egasiga ikkinchi nusxasi tuproqni tekshirgan tashkilotga beriladi va besh yilgacha saqlanadi.[3].

Xulosa

Tuproqni xaritaga tushirish (tuproq kartografiyasi)ning asosiy maqsadi hududdagi tuproqlarni aniqlash, ularning tarqalishi, xossalari va qaysi xo‘jalik faoliyatiga mosligini xaritada aniq aks ettirish**.**Tuproqni xaritaga tushirishda asosan 1:10000, 1:25000, 1:50000 masshtabli gorizontallari bor topografik xaritalardan foydalaniladi. Topografik xaritalarni tanlanganda shunga alohida e'tibor berish kerakki, ularda aniq, yetarli darajada to’liq tafsilotlar rel’ef, sug’orish tarmoqlari, yo’llar, o’rmon polosalari, aholi yashaydigan joylar va boshqalar ko’rsatilgan bo’lishi kerak. Uchta nusxada topografik xarita bo’lishi tavsiya qilinadi. Shulardan: bittasi dala sharoitida foydalanish uchun; ikkkinchisi oxirgi marotaba xaritaga ma'lumotlarni tushirish uchun; uchinchisi rezerv uchun bir nusxa 1:100000; 1:200000 masshtabli kartalardan butun tekshiriladigan noxiya uchun bo’lsa ayni maqsadga muvofiq bo’ladi. Bunday xaritalar ayniqsa boshlang’ich xudud bilan tanishish davrida va tuproq qoplamida umumiy qonuniyatni o’rganish davrida juda zarur.Tuproq xaritasining mazmunini to’liq tushirish uchun katta masshtabli topografik asoslardan foydalanish shart, hech qachon tuziladigan tuproq xaritasining masshtabidan topografik asosiy masshtabi mayda bo’lmasligi kerak. Tuproqshunosning qo’lida yaxshi topografik asosi bo’lishi ishni ancha engillashtiradi va tuproq xaritasining sifatini yaxshilaydi. Tuproqni xaritaga tushirishning bosh maqsadi har bir hududdagi tuproq resurslarini to‘g‘ri, ilmiy va amaliy jihatdan baholab, ulardan samarali foydalanish uchun asos yaratishdan iboratdir.

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PROSPECTS FOR ENHANCING THE EXPORT COMPETITIVENESS OF UZBEKISTAN'S AGRICULTURAL PRODUCTS IN THE CHINESE MARKETS

Abstract: *In this study, the opportunities and prospects for exporting Uzbekistan's agricultural products to international markets, particularly towards China, have been thoroughly analyzed. During the research process, a survey was conducted among enterprises directly engaged in export activities, and their practical experiences, challenges, and proposals were carefully examined. The results of this survey served as the scientific foundation of the entire study, acting as the central source for shaping the analyses, conclusions, and recommendations. The research comprehensively considered the factors influencing enterprises' export potential, including logistics and customs procedures, product quality and compliance with standards, marketing strategies, and government support mechanisms. As a result, clear directions were identified for effectively utilizing existing opportunities, building competitive advantages, and securing a strong position in the Chinese markets.*

Keywords: *Export, agricultural products, competitiveness, Chinese market, logistics, quality standards, marketing strategy, government support, export potential.*

Introduction

In the introduction, it is essential to emphasize the relevance of the topic. In today's globalization context, exporting agricultural products to international markets—particularly to large and rapidly developing countries like China—holds strategic importance for Uzbekistan. This process not only accelerates economic growth but also strengthens the position of local producers in foreign markets, creates new jobs, and increases foreign currency revenues. Therefore, studying the prospects for enhancing export competitiveness is one of the pressing issues of our time.

The essence and content of the research lie in systematically examining the existing challenges and opportunities based on the results of a survey conducted among enterprises engaged in export activities. The object of the study is enterprises exporting agricultural products, while its subject covers the economic, organizational, and institutional factors influencing their competitiveness in the Chinese market. The main problems identified include logistics, product quality and compliance with standards, marketing channels, and insufficient effectiveness of government support mechanisms.

The primary goal of the study is to identify the necessary factors for improving the efficiency of agricultural product exports and securing a strong position in the Chinese markets, as well as to develop recommendations for their enhancement. To achieve this goal, several tasks were defined: identifying the real challenges faced by exporting enterprises, providing analytical conclusions based on survey results, comparing with international experience, and developing practical recommendations tailored to the conditions of Uzbekistan. In this way, the research serves as a scientific and practical foundation for strengthening the competitiveness of national agricultural product exports.

Literature Review

He, M., Huang, Z., and Zhang, N. – "An Empirical Research on Agricultural Trade between China and 'The Belt and Road' Countries: Competitiveness and Complementarity"[1]

This study analyzes the competitiveness and complementarity of agricultural trade between China and the Belt and Road participating countries. He and his colleagues used indicators such as the RCA (Revealed Comparative Advantage) index and the Trade Complementarity Index (TCI) to determine which products from which countries are competitive in the Chinese market. For example, some vegetative products exported by China have higher complementarity compared to the exports of Belt and Road countries. The study also highlights that the alignment of export and import directions is a key factor in enhancing trade potential. This research provides important lessons for countries like Uzbekistan in shaping their export strategies (product selection, standards, market proximity).

Y. Chen – "Export Competitiveness Network of Chinese Provincial Agricultural Products"[2]

This research conducted by Y. Chen examines the export competitiveness and export networks of agricultural products across various Chinese provinces. Based on provincial export data from 2015 to 2022, the study identifies provinces and product types with potential to strengthen export competitiveness. The findings show that province-specific factors—such as geographical proximity, governance policies, and transport logistics infrastructure—have a significant impact on export capacity. Additionally, through network analysis, the study emphasizes the need to develop regional "roadmaps" to foster inter-provincial cooperation and expand export opportunities.

L. Zhou – "Structural Evolution and Sustainability of Agricultural Trade between China and B&R (Belt & Road) Countries"[3]

In Zhou's research, the structural evolution of agricultural trade (i.e., product categories, currency flows, and trade networks) between China and Belt

[1] He M. et al. An empirical research on agricultural trade between China and "the belt and road" countries: Competitiveness and complementarity //Modern Economy. – 2016. – Т. 7. – №. 14. – С. 1671.
[2] Chen Y., Liu Z., Yin Z. Export competitiveness network of Chinese provincial agricultural products: E volution, performance, and influencing factors //PloS one. – 2025. – Т. 20. – №. 1. – С. e0316088.
[3] Zhou L., Tong G. Structural evolution and sustainability of agricultural trade between China and countries along the "Belt and Road" //Sustainability. – 2022. – Т. 14. – №. 15. – С. 9512.

and Road countries, as well as its sustainability, are examined. Key time points—such as China's accession to the World Trade Organization, financial crises, the launch of the Belt and Road initiative, and subsequent trade trends—were analyzed. The study reveals that over time, trade coordination, product diversification, and improved regional infrastructure have enhanced trade sustainability. However, trade gaps remain in certain "routes"; namely, geographical distance, transportation costs, and non-compliance with standards continue to hinder access to importing markets like China.

H. Peng – "Research on the Competitiveness and Complementarity of Agricultural Trade between China and ASEAN"[4]

This study led by H. Peng analyzes agricultural trade between China and ASEAN countries from the perspectives of competitiveness and complementarity. Using indicators such as RCA and TCI, the researchers identified which product groups hold strong competitiveness in China's exports and which align with the demand of importing markets. The study concludes that ASEAN countries can strengthen their competitive advantages by improving product quality, enhancing transport and logistics infrastructure, and diversifying strategies for entering external markets. This research provides practical guidance for countries like Uzbekistan in selecting the types of products to export to China, taking into account certification requirements and customs-clearance regulations.

Methodology

As the research methodology, statistical analysis and empirical approaches were combined. First, statistical data on the export volume of agricultural products between Uzbekistan and China, the composition of product groups, price dynamics, and competitiveness indicators were collected and their trends were analyzed. At the same time, a survey was conducted among enterprises directly engaged in export activities to obtain information on practical problems, barriers, and opportunities. This approach yielded twofold results: on the one hand, it allowed macroeconomic processes to be illustrated based on official figures; on the other hand, it created an opportunity to analyze the real experiences of exporters through survey methods. In this way, the research was ensured with reliable results both theoretically and practically.

Analysis and Results

The results of this survey are significant as they reflect the real situation regarding the export of agricultural products in Uzbekistan. During the research process, enterprises indicated their priority areas in production and export activities, which enabled an analysis of existing problems and opportunities. In particular, the diversification of product types in production, the geographical distribution of export markets, and the annual export volumes reveal current trends in the sector. These results not only show which products are in high demand but

[4] JIANG X., HUANG H. The competitiveness and complementarity of agricultural trade between China and Russia //Journal of Yunnan Agricultural University (Social Science). – 2019. – Т. 13. – №. 4. – С. 81-86.

also identify the directions in which additional measures should be taken to increase export potential.

Table 1

Export of agricultural products: results of the exporter enterprises survey

	Fruits and vegetables	**Dried fruit**	**Leguminous products**
What types of agricultural products does your company produce?	50%	20%	30%
	Fruits and vegetables	**Cotton-grain**	**Leguminous products**
What types of agricultural products does your company export?	58%	27%	15%
	Russia	Kazakhstan	Kyrgyzstan
To which countries do you export agricultural products?	59.8%	27.3%	12.9%
	1 million US dollars	From 1 million US dollars to 10 million US dollars	From 10 million US dollars to 100 million US dollars
What is your annual export volume? (in tons or USD)	35%	35%	10%

The analysis shows that 50 percent of enterprises specialize in fruit and vegetable production, 20 percent in dried fruits, and 30 percent in legumes. However, fruits and vegetables dominate the export structure (58%), while dried fruits account for 27% and legumes for 15%. This indicates a certain discrepancy between production volumes and export shares. The main export destinations are Russia (59.8%), Kazakhstan (27.3%), and Kyrgyzstan (12.9%), which demonstrates the strong influence of regional proximity and existing trade traditions. Annual export volumes also reveal diversification: 35% of enterprises export up to USD 1 million, another 35% export between USD 1 million and 10 million, while only 10% of enterprises export between USD 10 million and 100 million. These results highlight the need to expand product diversification, explore new markets—particularly China—more actively, and implement effective measures to increase export volumes for sustainable growth.

The survey results also make it possible to analyze the compliance of exported agricultural products with international standards and certifications. Such standards are of crucial importance in accessing export markets, ensuring product quality, safety, and alignment with consumer requirements. The availability of certifications not only expands export market opportunities but also enhances competitiveness. Therefore, the extent to which enterprises pay attention to and comply with these standards is one of the key indicators of sustainable export development. Moreover, possessing the necessary certifications has become even more urgent for accessing markets in China, Russia, and other regional partner countries.

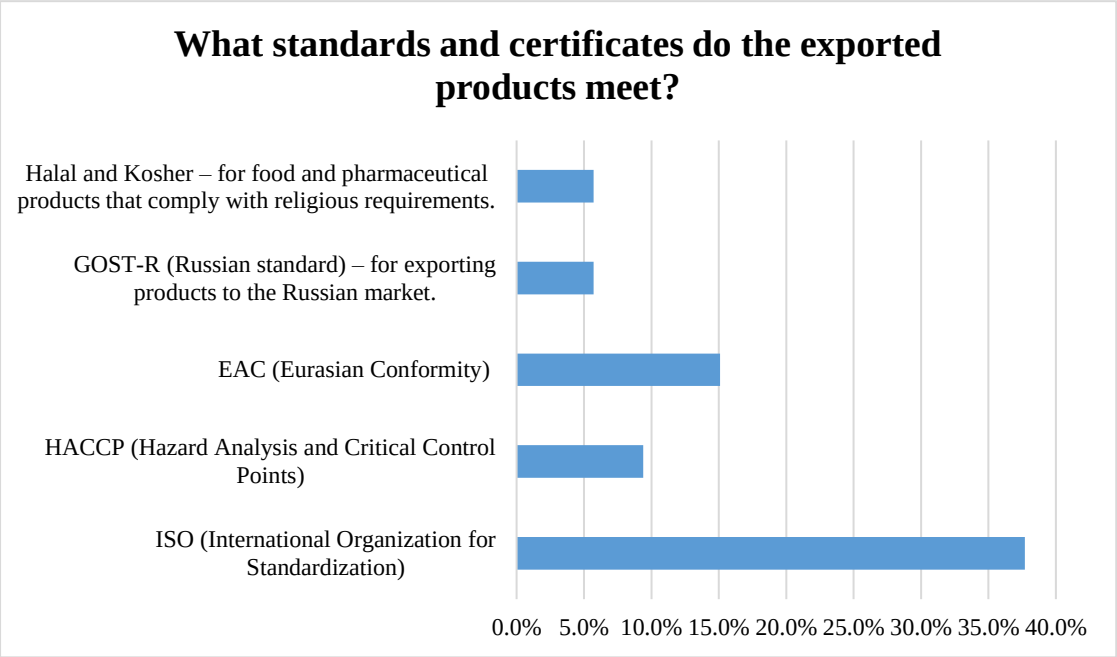


Figure 1. Level of standards and certification of exported products.

According to the data presented in the diagram, 37.7 percent of enterprises have aligned their products with ISO (International Organization for Standardization) requirements, which is regarded as a key prerequisite for the global market. 15.1 percent possess the EAC (Eurasian Conformity) certificate, which is particularly important for entering CIS and Eurasian markets. The HACCP system has been implemented by 9.4 percent of enterprises, ensuring compliance with international food safety standards. Meanwhile, the share of products certified with Halal and Kosher standards, as well as Russia-specific GOST-R standards, is relatively low—only 5.7 percent. This indicates that insufficient attention is being paid to certain religious, technical, and national certifications required in specific export markets. Consequently, it is evident that enterprises must subject their products to broader certification processes and integrate more actively into international standards in order to fully realize their export potential.

This chart (Figure 2) clearly illustrates the main challenges enterprises face in the process of exporting agricultural products. Export activity is a complex and multi-stage process in which many factors—such as production, logistics, customs procedures, certification, market research, and working with reliable partners—play a crucial role. Obstacles arising at each stage directly affect the overall efficiency of the export process. From this perspective, the difficulties identified through the survey provide valuable insights not only at the level of individual enterprises but also for improving the national export strategy as a whole. Such analysis systematizes the key problems encountered when entering international markets and serves as a foundation for developing measures aimed at overcoming them.



Figure 2. Main problems faced in exporting agricultural products.

According to the results of the analysis, the most common problem exporters face is finding reliable partners and clients (26.4%). This reflects the difficulty of building networks and establishing long-term partnerships in international trade relations. The second major issue is logistics and transportation (24.5%), which is linked to transport costs, insufficient infrastructure, and delays during the shipping process. In addition, foreign trade legislation and customs procedures (11.3%) remain a significant barrier for enterprises, explained by the lack of sufficient knowledge of legal regulations and excessive bureaucratic processes. Market research (9.4%) and product certification (9.4%) show relatively lower percentages but still create notable obstacles in the export process. Overall, these results indicate the need to expand cooperation networks, develop the transport and logistics system, simplify customs procedures, and accelerate certification processes in line with international standards to boost export potential.

The following table highlights four key blocks from the perspective of enterprises exporting agricultural products: areas where government support is

most needed (logistics and customs 68.7%; transport 22.2%; certification 9.1%), actual state support/grants being used (not used 72.9%; tax incentives 18.2%; preferential loans 8.9%), promising markets (China 28.3%; EU 26.4%; Russia 22.6%; Middle East 9.4%), and main competitors (entrepreneurs from neighboring countries 47.9%; Turkey 25.3%; China 13.2%). At a glance, these figures clearly illustrate where "bottlenecks" exist in the export chain, which markets carry equal measures of opportunity and risk, and where competition originates. A deeper analysis and practical conclusions regarding these four blocks are presented below.

Table 2

Solutions to problems in exporting agricultural products and competitive countries

	Logistics and customs issues	**Transportation**	**Certification**	
Which of the difficulties you face in the countries where you export do you think should be addressed with government support?	68.7%	22.2%	9.1%	
	I do not use it	Tax incentives	Preferential loan	
What government support or grants have you used for exports?	72.9%	18.2%	8.9%	
	China	European Union (EU) countries	Russia	Middle Eastern countries (UAE, Saudi Arabia, Kuwait, Qatar)
Which countries do you think are the most promising markets for agricultural exports?	28.3%	26.4%	22.6%	9.4%
	Entrepreneurs from neighboring countries	Turkey	China	
Who are your main competitors in the countries you export to?	47.9%	25.3%	13.2%	

In terms of areas where government support is most needed, the fact that 68.7% corresponds to logistics and customs procedures indicates that the biggest bottleneck in the export process lies precisely at the border and in transit. This share is almost 7.5 times higher than certification issues (9.1%) and nearly three times higher than transport problems (22.2%). This means the challenge is not only about transport vehicles or tariff rates but also about the complexity of documentation, HS classification, phytosanitary/origin e-certificates, customs risk management, and the insufficient functioning of "single window" processes. At this point, measures such as pre-arrival declaration, advance ruling, AEO (Authorized Economic Operator) status, "green lane," and strengthening cold-chain infrastructure at the border would yield the fastest impact. The 22.2% share for transport highlights the need to stabilize multimodal routes, expand block trains and reefer-container fleets, and secure tariffs in advance with annual "rate contracts." The 9.1% share for certification issues represents a "network-type" barrier that can be resolved in the short term with the right policy tools: collective audit-laboratory centers, ready-made document templates, and cluster-based introduction of e-traceability modules.

The figures on actual use of state support (72.9% "do not use") reveal a significant "information and access" gap. Tax incentives (18.2%) and preferential loans (8.9%) together cover less than a quarter of enterprises. Possible reasons include: low awareness of programs, complex documentation requirements, small enterprises' inability to provide collateral, and incentives not being well-matched to pre-export needs (pre-financing, factoring/forfaiting, insurance). Practical measures recommended include establishing "Export HelpDesk"-style one-stop offices, providing bank guarantees, standard packages for hedging insurance and foreign exchange risks, as well as simplifying matching-grants for trade missions and fairs. The key solution is to transform complex grant systems into "plug-and-play" ready-made baskets and link them with Minimum Investment Packages (MIP) to include small exporters as well.

Based on the data in Figure 3, quality is clearly the most decisive criterion in buyers' purchasing decisions: 69% of respondents prioritize quality, 27.9% focus on price, and only 3.1% consider the product's origin as the determining factor. This means that the weight of quality is about 2.5 times higher than that of price ($69/27.9 \approx 2.47$) and more than 22 times higher than that of origin ($69/3.1 \approx 22.3$). These ratios highlight the dominance of trust and safety in export markets, particularly in perishable agro-categories: buyers see consistent quality, reliable supply, and food safety guarantees as more important than low prices. For enterprises, this landscape is a strategic signal: the main competitive battlefield lies in quality management and reliability.

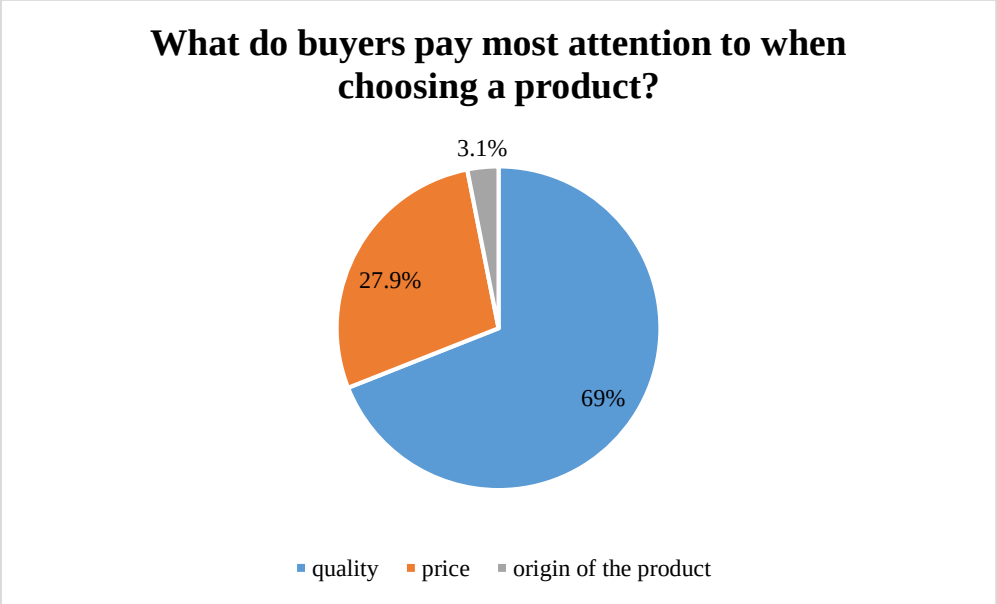


Figure 3. The main factors that buyers pay most attention to when choosing a product.

The practical implications of such a strong emphasis on quality are manifested as follows. First, systematizing process quality: implementing standards such as HACCP, ISO 22000/FSSC 22000, and GlobalG.A.P., with critical control points from raw material to shipment, traceability systems, and laboratory protocols. Second, physical infrastructure: pre-cooling, cold chain facilities (reefer containers, refrigerated warehouses), humidity and temperature monitoring, as well as sorting–grading lines and batch passports with unique quality indicators (Brix, calibration, moisture, MRL). Third, packaging and branding: labeling aligned with market requirements, smaller packaging sizes, and designs that are not flashy but rather informative and trust-building; in the B2B segment, service level agreements (SLAs), delivery reliability, and complaint management play a key role. The 27.9% share for price shows that buyers consider value, but it is quality that defines the value–price ratio: value-based pricing, reducing costs through process efficiency, and justifying quality premiums are critical. Although origin accounts for only 3.1% overall, in premium markets (EU, GCC, boutique retail) the product story (single origin, GI/PGI, terroir) can create additional value; hence, origin should not be neglected but rather communicated together with quality evidence.

According to the data in Figure 4, there are three main directions that contribute to increasing export volumes: brand creation — 33.3%, producing high-quality products — 32.1%, and optimizing customs procedures — 21.4%. Together, these three factors account for 86.8%, while the remaining 13.2% may correspond to “other” measures (logistics, financing, market research, e-commerce, etc.). Thus, in the respondents’ view, the market side (brand + quality) is the “driver” of export growth, while the process side (customs) remains the “bottleneck.”

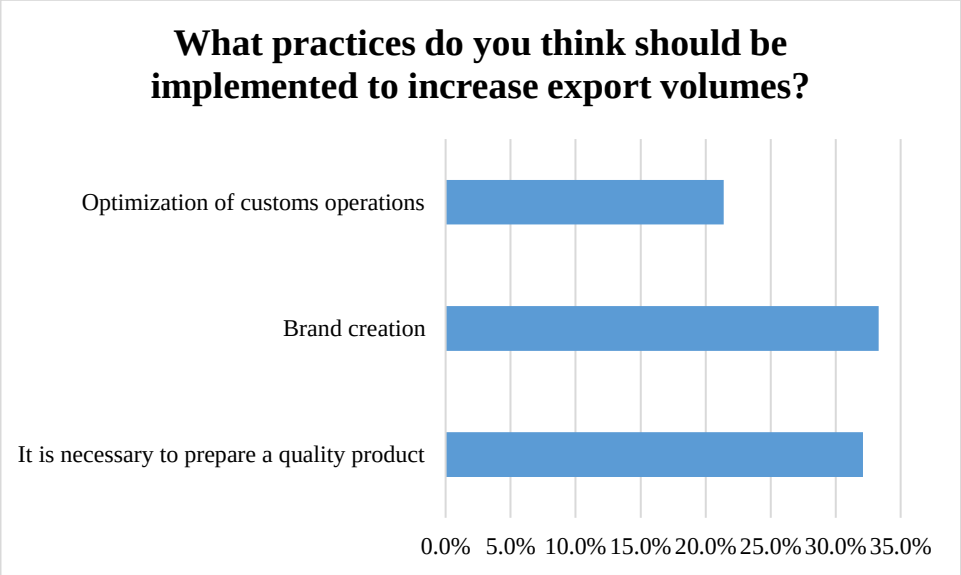


Figure 4. Main directions for increasing agricultural exports.

Brand (33.3%) and quality (32.1%) carry almost equal weight — this implies a "two-pillar" strategy: the first ensures the emotional appeal of the market and price premium, while the second secures buyer trust and repeat orders. The practical roadmap for quality includes: implementing HACCP and ISO 22000/FSSC 22000, adopting GlobalG.A.P. (for raw material base), traceability (batch passport, MRL/Brix/moisture indicators), pre-cooling and cold chain, and standardization of calibration–sorting–packaging. For branding: clear positioning (single-origin, organic/Halal, "low-residue"), trademark/brand registration, design and smaller packaging sizes, trust indicators for B2B (SLA, delivery reliability, customer complaint management), and digital channels (B2B marketplace, content, and exhibitions). Together, these two directions account for 65.4%, confirming that the focus is more on "value creation" than on price.

The 21.4% share for customs optimization indicates the significance of frictions in border processes: training on HS classification, advance ruling, e-phytosanitary and certificate of origin systems, pre-arrival declaration, AEO status, "green lane," consolidated shipments, and KPI-based work with brokers can reduce transit time and lower hidden costs. The remaining 13.2% "other" block covers pre-export financing (factoring/forfaiting), insurance and currency hedging, demand mapping (at HS-6 level), as well as expanding certification packages for EU/GCC/East Asian markets. The conclusion is clear: brand + quality create price premiums and demand stability, while customs optimization enhances speed and reliability — this combination systematically increases export volumes.

Additionally, in the distribution of answers to the question shown in Figure 5 — "What difficulties do you face in concluding international contracts?" — the responses were as follows: "no difficulties" — 78%, "standardization and language issues" — 12%, "finding a reliable company" — 5%. The total share is 95%, with the remaining 5% attributable to other factors (e.g., payment terms, arbitration, currency, and insurance clauses). The majority's assessment of "no

problems" can be interpreted in two ways: (i) the contracting process is relatively institutionalized (ready-made templates, working with brokers or regular buyers); (ii) more complex markets/channels have not yet been widely accessed, or "hidden risks" may not have been sufficiently evaluated.

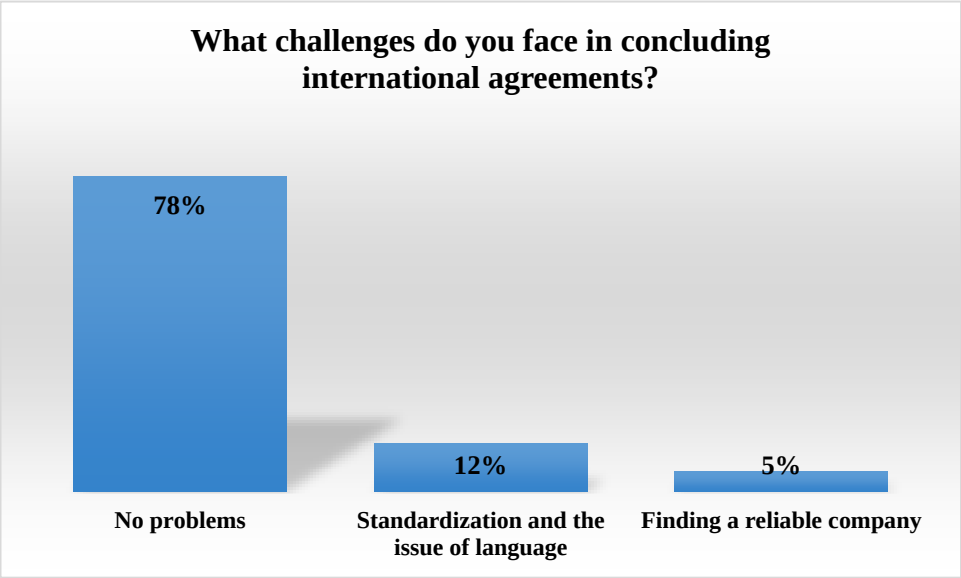


Figure 5. Analysis of the main difficulties that arise when concluding international agreements.

Even when no problems are perceived, systemic risks remain in international contracts: choice of law, dispute resolution (arbitration/mediation), Incoterms 2020 terms, quality specifications and acceptance criteria, independent inspection (SGS, etc.), payment mechanisms (letters of credit — UCP 600, collection/escrow), insurance coverage, sanctions/anti-corruption clauses, "force majeure," intellectual property, and data protection. Practical measures include introducing bilingual model contracts and a clause library; conducting KYC and pre-checks of counterparties; short training on translation and standardization; establishing state-level Export HelpDesks, legal clinics, and model templates; and expanding trade-finance support in the form of letters of credit/guarantees/forfaiting. In addition, contract checklists (10–12 items), electronic signatures and document circulation, as well as B2B matching and trade missions for "partner search," would be useful. In this way, "invisible risks" can be managed, while the reliability of contract execution and export competitiveness are steadily improved.

The table also shows exporters' market entry plans and their attitudes toward the Chinese market. Of the respondents, 71% stated "we plan to enter new markets in the future," while 29% had no such plans. When asked specifically about China, 66% answered "we have considered it," while 34% said "no." Regarding the difficulties of entering the Chinese market, 78% said "no problem," 17% noted "China's quarantine permits are difficult," and about 5% gave other/irrelevant responses.

Table 3

Future prospects for agricultural exports

	yes	no
Do you have any plans to enter new markets in the future? (If so, what are they?)	71%	29%
	yes	**no**
Have you ever considered exporting products to Chinese markets?	66%	34%
	There are no difficulties.	**After getting permission from China quarantine**
If you've ever thought about it, what are the challenges of exporting to Chinese markets?	78%	17%

Market expansion sentiment. A 71% share of enterprises indicates readiness for growth and diversification. On the one hand, this reflects the desire to reduce the risk of excessive dependence on the Russia–Central Asia core; on the other hand, it requires managing the "entry costs" such as market research, certification packages, and logistics design. For planning enterprises, it is advisable to analyze demand mapping at the HS-6 level, competitor pricing and seasonal "windows," and to mitigate risks through small pilot shipments.

Interest in and risks of the Chinese market. The fact that 66% of respondents are considering China points to huge demand and price premium opportunities. However, the 78% who said "no difficulties" may suggest two scenarios: (i) they have not yet reached the practical entry stage, so real barriers have not been felt; (ii) they are planning to work through intermediaries. The 17% who mentioned quarantine permit difficulties highlight the importance of SPS/phytosanitary and registration requirements (e.g., lists of processors/warehouses, pest control, packaging and labeling rules). In addition, traceability, pesticide residue limits, compliance with cold chain standards, and documentation in Chinese become "entry tickets" for trade.

Practical roadmap. (1) Develop a "anchor–growth–premium" portfolio by positioning China/EU/GCC according to product categories; (2) Build a compliance package for the China direction: phytosanitary protocols, laboratory testing, traceability, and standardized packaging; (3) Pilot + EPCM: trial shipments, block space (air cargo), or reefer multimodal routes; (4) Buyer-matching: work with importers on SLA basis through trade attachés, fairs, and B2B platforms; (5) Risk and finance: pre-export financing (factoring/forfaiting),

insurance, and currency hedging. This approach manages entry costs, mitigates barriers in advance, and steadily increases export competitiveness.

Conclusions based on survey results. The findings show that the competitiveness of agro-exports rests on three main pillars requiring systematic action: (i) creating market value (quality + brand), (ii) efficiency in logistics and customs, and (iii) finance and risk management. In production and export profiles, fruits and vegetables hold the largest share (50% in production, 58% in exports), while legumes show a weak "production → export" conversion (30% vs. 15%); export geography is highly concentrated (Russia ~60%, Kazakhstan 27.3%, Kyrgyzstan 12.9%), which increases vulnerability to shocks. In transport, multimodal routes rank first (37.7%), alongside rail (18.9%) and air (17%), with cold chain and route stability being decisive factors; government support is primarily expected in logistics and customs (68.7%). The compliance portfolio is uneven: ISO (37.7%) is leading, but unless HACCP (9.4%) and market-specific schemes (EAC 15.1%, GOST-R 5.7%, Halal/Kosher 5.7%) are expanded, access to high-value channels will remain limited. In buyer preferences, quality accounts for 69%, 2.5 times stronger than price; the factors driving export growth are quality (32.1%) and brand (33.3%), while customs optimization (21.4%) removes the main "bottleneck." On the financial side, enterprises rely mainly on own funds (45.3%), while bank loans (26.4%) and grants (13.2%) remain limited; the impact of exchange rates is rated as medium/strong, and market demand–based pricing (37.7%) dominates. Competitors are neighboring countries (47.9%), Turkey (25.3%), and China (13.2%); prospective markets are China (28.3%), the EU (26.4%), Russia (22.6%), and the GCC (9.4%).

Based on this, the practical roadmap includes: expanding HACCP–ISO 22000/FSSC and GlobalG.A.P.; enhancing logistics speed through cold chain, block trains/reefers, and "green lanes"; buyer-matching, collective laboratories, and cost-sharing for certification; establishing factoring/forfaiting, insurance, and hedging; and diversifying the portfolio across Russia + China + EU + GCC. This package ensures a steady increase in competitiveness.

The results of the above survey and diagrams show that enterprises face a number of systemic problems in the process of exporting agricultural products. Finding reliable partners and clients, logistics and transportation costs, customs procedures and legal regulations, in-depth market research, and certification processes directly affect the efficiency of export activities. At the same time, compliance with international standards is also an important factor, as enterprises holding certifications such as ISO, HACCP, and EAC have the opportunity to secure relatively stronger positions in export markets. This plays a crucial role in increasing export potential by ensuring quality, safety, and consumer trust.

In general, it can be concluded that in order to overcome existing problems, exporting enterprises need to strengthen their strategic approach. First and foremost, it is necessary to expand cooperation networks and enhance marketing and market research. In addition, improving logistics infrastructure, simplifying customs procedures, and broadly implementing certification systems in line with

international standards will elevate exports to a new level. To successfully enter large markets such as China, it is essential to improve product quality, ensure price competitiveness, and strengthen government policies supporting exports. In this way, enhancing the export competitiveness of national agricultural products will not only accelerate economic growth but also help secure a stable position in the international trade system.

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THESE DAYS THE IMPORTANCE AND ADVANTAGES OF ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF THE DIGITAL ECONOMY

Annotation: *The digital economy is developing day by day, and the role of artificial intelligence in it is becoming increasingly significant. This article analyzes the advantages arising from the integration of artificial intelligence technologies into the digital economy. In particular, the article summarizes scientific sources, data from international organizations, and statistical indicators to reveal the efficiency factors resulting from the integration of artificial intelligence into the digital economy. Additionally, the article scientifically substantiates the strategic importance of artificial intelligence technologies in economic growth, innovative activity, and the development of digital infrastructure. The research results demonstrate the opportunities to enhance economic efficiency and strengthen competitiveness through the implementation of artificial intelligence in the digital economy.*

Keywords: *artificial intelligence; digital economy; innovative technologies; economic efficiency; automation; digital transformation; data-driven management; technological integration.*

Introduction

As we know, in today's conditions of global international integration, the entire world recognizes the necessity of developing the digital economy and artificial intelligence in transitioning to a new stage of economic progress. International experience shows that the digitalization of the economy is an important criterion for ensuring social and economic stability. It should also be noted that in the future, there is neither development nor progress without a digital economy; therefore, it is essential to strengthen both theoretical and practical research in this field. The rapid development of the digital economy is leading to fundamental transformations in the modern economic system. In this process, artificial intelligence (AI) technologies are emerging as a strategic tool that enables increased efficiency across nearly all sectors of economic activity. The integration of artificial intelligence into the digital economy contributes not only to the automation of technological processes, but also to the establishment of data-

driven management systems, service diversification and is also directly influencing the increase in labor productivity and global competitiveness.

Several decisions and decrees are being adopted in our country regarding the development of artificial intelligence technologies. One of these is the Decree of the President of the Republic of Uzbekistan, dated February 17, 2021, № PQ-4996, titled "Measures to Create Conditions for the Rapid Implementation of Artificial Intelligence Technologies." Based on this decree, and in accordance with the "Digital Uzbekistan - 2030" Strategy, extensive efforts are being made to accelerate the implementation of artificial intelligence technologies and their widespread application in our country. These efforts aim to enable the use of digital data and ensure their high quality, as well as to create favorable conditions for training skilled professionals in this field[5]

The digital economy refers to the broad network of economic operations and activities carried out through the internet and digital technologies. Over the past few decades, this rapidly developing sector now amounts to trillions of dollars and encompasses a wide range of activities, from online shopping to digital communication between businesses and consumers. The growth of the digital economy has been driven by advances in personal computers, smartphone technologies, and business software, which have made it easier than ever for consumers to access goods and services.

In recent years, international organizations such as the OECD, UNCTAD, the World Bank, and other scientific institutes have been systematically studying the contribution of artificial intelligence to economic growth. This process demonstrates that AI technologies have become a key factor in economic transformation. From this perspective, scientifically studying the importance and advantages of artificial intelligence in the development of the digital economy is a highly relevant topic today.

This research focuses on assessing the role of AI technologies in the digital economy, identifying their advantages, and conducting a scientific analysis of their impact on economic efficiency.

The digital economy is a new, modern form of economic management, where the primary factor of production and management is a large set of data in digital form and the process of data processing.

Artificial intelligence refers to the ability of computers to perform intellectual and creative tasks traditionally carried out by humans. This term is also used to refer to the science and technology of creating intelligent machines. Its implementation in various sectors of business and society helps to increase efficiency, optimize processes, and create new opportunities for growth and innovation.[6]

[5]President of the Republic of Uzbekistan, dated February 17, 2021, № PQ-4996, titled "Measures to Create Conditions for the Rapid Implementation of Artificial Intelligence Technologies."

[6] Ayupov, R.H., & Boltaboeva, G.R. (2020). *Fundamentals of the Digital Economy.* Textbook. T.

Literature Review

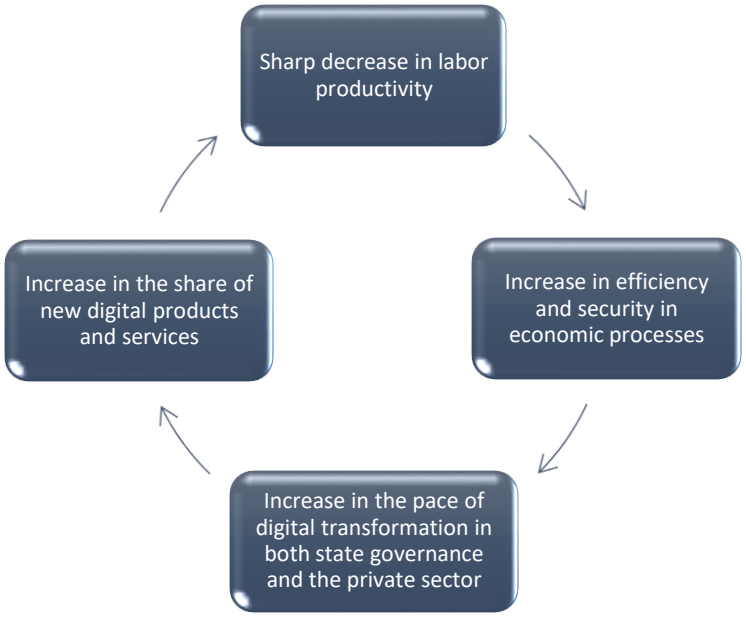
The digital economy is a system for organizing and carrying out economic activities using digital technologies, the internet, artificial intelligence, mobile communication, cloud computing, big data, and other modern IT technologies. Numerous studies also confirm that artificial intelligence helps reduce production costs, optimize processes, and create conditions for innovative products across various sectors.

The integration of artificial intelligence (AI) into the economy has been deeply studied since the end of the 20th century in the context of economic growth models, production functions, and technological transformations. Brynjolfsson and McAfee assessed artificial intelligence as a "new industrial revolution" and substantiated its impact on labor productivity and the efficiency of the digital economy. Autor (2024) views AI processes as a form of automation and the redistribution of human resources based on a political-economic approach.

According to the OECD (2024), the digital economy is defined as a global transformation platform formed on the basis of artificial intelligence, big data, and cloud technologies. The main components of the digital economy are as follows:

- e-commerce,
- fintech,
- online services,
- digital payments,
- platform economy – which directly utilizes artificial intelligence technologies.

According to McKinsey (2025) estimates, by 2030, artificial intelligence could add between 14 to 17 trillion dollars in additional value to global GDP. This is dependent on the widespread use of AI-based automated systems across all sectors of the economy. The main advantages of artificial intelligence technologies are as follows:



1.1-picture The main advantages of artificial intelligence technologies [7]

For the digital economy, artificial intelligence serves not only as a technological tool but also as a key factor in the strategy for innovative development. In both science and practice, several problems that hinder the development of artificial intelligence are also widely discussed. Deng emphasizes the following limitations:

- the reliability of artificial intelligence systems and ethical risks;
- the shortage of skilled personnel;
- the digital divide;
- issues related to data security.

In turn, Acemoglu notes that the excessive speed of automation leads to the devaluation of human capital and labor market imbalances. These issues complicate the process of integrating artificial intelligence and the digital economy. It is also worth mentioning that, today, the increase in layoffs due to artificial intelligence is becoming more widespread globally. This, in turn, is leading to higher levels of unemployment in the economy[8]. The analysis of the literature reveals the following:

- The measurement of the value added by artificial intelligence to the digital economy through clear economic models is still insufficient.
- There is a lack of research that deeply analyzes the macro and microeconomic impacts of artificial intelligence integration in the context of Uzbekistan.

[7] The source was compiled by the author.
[8] Teshabaev, T.Z. (2023). Theoretical Foundations of Applying Artificial Intelligence in the Context of Digital Economy. “Iqtisod-Moliya.”

- Long-term forecasting models on the growth rates of the digital economy through artificial intelligence have not been sufficiently developed.
- Statistical data to evaluate the practical results of artificial intelligence application across industries and economic sectors is incomplete.

Methodology

The methodology of this article is aimed at conducting a comprehensive analysis of the impact of artificial intelligence technologies on digital economy processes, based on the integration of qualitative and quantitative research approaches. The scientific study of the topic utilized static analysis, logical analysis, and the examination of various literature and articles during the research process. The article also employs a mixed approach. This approach allows for the evaluation of the impact of artificial intelligence technologies on economic processes both quantitatively through statistical indicators and qualitatively through scientific sources, expert opinions, and global experience. The design of the article is based on the following directions: the mechanisms of artificial intelligence technologies' impact on the economy, the development indicators of the digital economy, and the advantages and new opportunities arising from the integration of artificial intelligence.

Discussion and Results

The results of the research show that artificial intelligence technologies are deeply integrated into all major sectors of the digital economy and are significantly enhancing economic efficiency. Based on the analyzed statistics, expert opinions, and global experiences, the following key results were identified:

1. There is a strong correlation between artificial intelligence investments and economic growth. According to World Bank data for 2025, the correlation analysis revealed that when investment in AI technologies increases by 1%, the share of the digital economy increases by 0.35%. Enterprises that have implemented AI show an average productivity increase of 18-32%. In countries with high digital economy indicators, AI investments have increased by an average of 2.5 times between 2020-2025. These results indicate that artificial intelligence is becoming a new stage of economic growth.
2. Artificial intelligence is significantly increasing efficiency in digitized sectors. According to expert evaluations for 2025: AI algorithms in fintech increased transaction speed by 40-60%. In manufacturing, automated robots reduced production time by 28%. In logistics, AI-based optimization systems reduced costs by 25-38%. E-commerce platforms, using AI, increased conversion rates by 20-35%. These indicators confirm the high practical effectiveness of artificial intelligence.[9]
3. The fastest-growing segments of the digital economy, related to artificial intelligence, show the highest growth rates according to the 2025 analysis: Sector: Growth rate in 2025 due to AI impact Fintech payment systems:

[9] UNCTAD. (2024). Digital Economy Report 2024: Opportunities and Risks of AI Technologies. United Nations.

32% E-commerce: 28% Recommendation systems, chatbots, AI marketing: 25% Industry, robotics, predictive maintenance: 25% Digital government services: 30% (AI-driven automation, data analysis) Sectors without AI integration are far behind in terms of growth rates.

4. The key advantages that artificial intelligence brings to the economy include:

- Increased efficiency
- Improved decision-making quality
- Reduced costs
- Emergence of innovative products and services
- Increased revenues

5. The integration of AI has been proven to enhance economic stability both nationally and globally. It contributes to the digitalization of the economy, creates new job opportunities, expands the innovative ecosystem, and improves the efficiency of public administration. The results clearly show that AI technologies are a strategic approach to the digital economy.

From the discussion results, it is evident that the introduction of artificial intelligence not only accelerates the digitalization process but also radically changes the internal structure of the economy. Artificial intelligence is a strategic factor for the development of the digital economy, deeply integrating into sectors ranging from production to finance, logistics, services, and public administration. In developed countries, AI has become a key component of economic processes, while Uzbekistan has entered a stage of stable growth in the integration of artificial intelligence.

Conclusion and Recommendations

The results of this research show that, by 2025, artificial intelligence has become one of the most important aspects of the global digital economy. It significantly enhances the competitiveness of the economic system by increasing labor productivity, optimizing business processes, efficiently utilizing resources, and creating new products and services.

Firstly, the analysis confirmed a strong positive correlation between artificial intelligence investments and the growth rates of the digital economy. International statistical data shows that every additional investment in AI technologies leads to a significant increase in GDP, the digital services market, and labor productivity. This indicates that artificial intelligence is not only of technological importance but also has macroeconomic significance.

Secondly, the research demonstrated that artificial intelligence technologies are deeply increasing economic efficiency in digital economy segments such as fintech, industry, e-commerce, information technologies, and logistics. The results confirm that AI-based processes directly contribute to time and resource savings, reduced production costs, and improved service quality.

Thirdly, using the example of Uzbekistan, although the integration of artificial intelligence is still in its formative stage, positive development trends are already observed in several sectors - particularly in banks, digital services,

logistics, and public administration. This indicates that the digital economy in the country is accelerating through artificial intelligence.

Fourthly, the impact of artificial intelligence on the economy is multifaceted, with increased efficiency, cost reduction, enhanced accuracy and forecasting capabilities, and the emergence of new business models being key factors. However, challenges related to this process - such as the shortage of skilled personnel, information security, ethical issues, and the underdevelopment of technological infrastructure - remain important areas requiring solutions.

In general, the research shows that AI-based digital transformation is shaping a new stage of economic development. In the coming years, widespread and effective use of AI technologies will become one of the key factors determining the global competitiveness, economic stability, and innovative potential of countries. Therefore, it is of crucial importance to further strengthen political, economic, and educational mechanisms that support AI integration.

To make the process of utilizing artificial intelligence in the digital economy more efficient, it is recommended to improve the legal framework. It is necessary to develop clear, internationally compatible legislation on the use of artificial intelligence. Strong regulatory mechanisms should be created to ensure data security and privacy. Additionally, efforts should be made to expand AI data bases and improve personnel qualifications, as there are still not enough qualified professionals who can fully utilize AI technologies in all sectors.

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ELEKTRON TO‘LOV TIZIMLARINING BIZNES BARQARORLIGIGA TA’SIRI

Annotatsiya: *Ushbu maqolada elektron to‘lov tizimlarining biznes barqarorligiga ta’siri iqtisodiy nuqtayi nazardan o‘rganiladi. Raqamli moliyaviy texnologiyalar rivoji natijasida korxonalar to‘lov jarayonlarini tezlashtirish, naqd pulsiz hisob-kitoblarni kengaytirish va mijozlar bilan o‘zaro munosabatlarni optimallashtirish imkoniyatiga ega bo‘lmoqda. Tadqiqotda elektron to‘lov tizimlaridan foydalanish korxonalarning moliyaviy xavfsizligi, operatsion samaradorligi hamda bozordagi raqobatbardoshligini oshirishdagi asosiy omil sifatida baholangan. Shuningdek, biznes subyektlari uchun tranzaksion xarajatlarning kamayishi, tezkor ma’lumot almashinuvi, audit va nazorat mexanizmlarining takomillashuvi orqali barqaror rivojlanishning mustahkamlanishi tahlil qilinadi. Maqolada milliy to‘lov infratuzilmasini raqamlashtirishni jadallashtirish, elektron tijorat ekotizimini kengaytirish va xavfsizlik choralarini kuchaytirish bo‘yicha takliflar ilgari suriladi. Elektron to‘lov tizimlari qo‘llanishining biznes barqarorligiga ta’sirini empirik ma’lumotlar asosida baholash mazkur tadqiqotning ilmiy yangiligini tashkil etadi.*

Kalit so‘zlar: *Elektron to‘lov tizimlari, biznes barqarorligi, raqamli iqtisodiyot, tranzaksion xarajatlar, moliyaviy xavfsizlik, elektron tijorat, fintech, elektron to‘lov infratuzilmasi, iqtisodiy samaradorlik, raqobatbardoshlik.*

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THE IMPACT OF ELECTRONIC PAYMENT SYSTEMS ON BUSINESS STABILITY

Annotation*: This article studies the impact of electronic payment systems on business stability from an economic point of view. As a result of the development of digital financial technologies, enterprises have the opportunity to accelerate payment processes, expand cashless settlements, and optimize customer relationships. The study evaluates the use of electronic payment systems as a key*

factor in increasing the financial security, operational efficiency, and market competitiveness of enterprises. It also analyzes the strengthening of sustainable development for business entities through reduced transaction costs, rapid information exchange, and improved audit and control mechanisms. The article puts forward proposals for accelerating the digitization of the national payment infrastructure, expanding the e-commerce ecosystem, and strengthening security measures. The scientific novelty of this study is the assessment of the impact of the use of electronic payment systems on business stability based on empirical data.

***Keywords**: Electronic payment systems, business stability, digital economy, transaction costs, financial security, e-commerce, fintech, electronic payment infrastructure, economic efficiency, competitiveness.*

Kirish

So‘nggi yillarda iqtisodiyotning raqamli transformatsiyasi jarayonida elektron to‘lov tizimlarining ahamiyati keskin oshdi. Naqd pulsiz hisob-kitoblar ulushining ortib borishi biznes subyektlari faoliyatida moliyaviy oqimlarni tezkor boshqarish, mijozlar bilan aloqalarni kuchaytirish hamda bozordagi o‘zgarishlarga moslashuvchanlikni ta’minlamoqda. Elektron to‘lov tizimlari korxonalar uchun nafaqat qulay to‘lov vositasi, balki risklarni kamaytirish, pul aylanmasini optimallashtirish va resurslardan samarali foydalanish imkonini beruvchi strategik infratuzilma sifatida shakllanmoqda.

Raqamli to‘lov texnologiyalarining rivoji biznes jarayonlarida innovatsion yechimlarni keng joriy etishga turtki bo‘lmoqda. Bugungi kunda to‘lov kartalari, mobil ilovalar, QR-kod asosidagi to‘lovlar, internet banking, elektron hamyonlar va kontaktless to‘lovlar nafaqat iste’molchilar hayotida, balki tadbirkorlik subyektlarining kundalik faoliyatida ham ajralmas unsurga aylandi. Ushbu vositalar orqali amalga oshiriladigan tezkor va xavfsiz tranzaksiyalar savdo hajmining oshishiga xizmat qilmoqda.

Elektron to‘lov tizimlarining kengayishi natijasida biznes muhitida raqobatbardoshlik mezonlari ham o‘zgarmoqda. Mijozlar uchun qulay xizmat taqdim eta olgan, shaffof va xavfsiz to‘lov mexanizmlariga ega kompaniyalar bozorda ustunlikka ega bo‘lmoqda. Aynan shu jihatlar korxonalar strategik boshqaruvida raqamli moliyaviy yechimlardan foydalanish darajasining muhimligini ko‘rsatadi.

Shu bilan birga, elektron to‘lov tizimlarining rivojlanishi biznes barqarorligiga bevosita ta’sir ko‘rsatadi. Barqarorlik faqat moliyaviy natijalar bilan emas, balki tashkiliy jarayonlar, xavfsizlik, mijozlar ishonchi va xizmatlar uzluksizligi bilan ham belgilanadi. To‘lov infratuzilmasida yuzaga keladigan har qanday uzilishlar korxonalarning obro‘-e’tiboriga, daromadlariga va iste’molchilar bilan munosabatlariga salbiy ta’sir etishi mumkin. Shuning uchun ham bizneslar uchun elektron to‘lov tizimlarining ishonchliligi hamda axborot xavfsizligi ustuvor ahamiyat kasb etadi.

Tadqiqot doirasida elektron to‘lov tizimlarining biznes barqarorligiga ta’sirini baholash, ularning afzalliklari va mavjud muammolarini tahlil qilish,

amaliy tavsiyalar ishlab chiqish asosiy vazifalar sifatida belgilangan. Bu borada raqamli iqtisodiyotning milliy rivojlanish strategiyalaridagi ustuvor yo‘nalishlar ham e’tiborga olinadi. Shu tariqa, maqolada elektron to‘lovlarning biznesga integratsiyasi orqali iqtisodiy samaradorlik va barqaror rivojlanishni ta’minlashning ilmiy-nazariy asoslari yoritiladi.

Metodlar

Tadqiqotda elektron to‘lov tizimlarining biznes barqarorligiga ta’sirini aniqlashda kompleks yondashuv qo‘llanildi. Avvalo, iqtisodiy tahlil usuli asosida elektron to‘lovlar bozorining rivojlanish tendensiyalari, naqd pulsiz hisob-kitoblar ulushi va korxonalar faoliyatidagi moliyaviy oqimlar tarkibidagi o‘zgarishlar o‘rganildi. Bu jarayonda rasmiy statistika ma’lumotlari, elektron tijorat va fintech sohasida faoliyat yuritayotgan kompaniyalar hisobotlari, xalqaro tashkilotlar tomonidan taqdim etilgan analitik nashrlar asosiy ma’lumot manbai bo‘lib xizmat qildi.

Tadqiqotning nazariy asoslarini raqamli iqtisodiyot, elektron to‘lov infratuzilmasi va biznes barqarorligi bo‘yicha ilg‘or ilmiy manbalar tashkil etdi. Shuningdek, taqqoslash tahlili orqali rivojlangan mamlakatlar tajribasi bilan mahalliy sharoitdagi joriy etilish jarayonlari solishtirildi. Elektron to‘lov tizimlari samaradorligini baholashda tranzaksion xarajatlar modeli, moliyaviy xavfsizlik indikatorlari va operatsion barqarorlik ko‘rsatkichlaridan foydalanildi.

Empirik yo‘nalishda kichik va o‘rta biznes subyektlari o‘rtasida elektron to‘lov xizmatlaridan foydalanish holati yuzasidan kuzatuv va suhbat metodlari qo‘llandi. Ularning elektron to‘lovlarga o‘tish darajasi, mijozlar bilan hisob-kitob mexanizmlaridagi o‘zgarishlar hamda to‘lov infratuzilmasining uzluksiz ishlashi bilan bog‘liq qarashlari aniqlashtirildi.

Risklarni baholash metodikasi asosida elektron to‘lov tizimlaridagi axborot xavfsizligi tahdidlari, texnik nosozliklar, kiberhujumlar ehtimoli hamda ularga biznesning tayyorgarligi o‘rganildi. Shu bilan birga, regulyativ muhit tahlili orqali elektron to‘lov bozorini tartibga solish, davlat tomonidan ko‘rsatilayotgan qo‘llab-quvvatlash mexanizmlari va normativ-huquqiy baza samaradorligi baholandi.

Tahlil natijalari tadqiqotning keyingi bosqichlarida ilmiy xulosalar va amaliy tavsiyalar ishlab chiqishda muhim rol o‘ynadi. Metodologik yondashuv orqali elektron to‘lov tizimlarining biznes faoliyatiga integratsiyasi natijasida yuzaga keladigan ijobiy va salbiy omillar keng qamrovli baholashga imkon yaratdi. Shu orqali biznes barqarorligi indikatorlariga elektron to‘lovlarning ta’siri ishonchli ilmiy asoslar bilan yoritildi.

Natijalar

Tadqiqot natijalari shuni ko‘rsatdiki, elektron to‘lov tizimlaridan foydalanish biznes barqarorligiga sezilarli ijobiy ta’sir ko‘rsatadi. Birinchidan, tranzaksion jarayonlarning tezlashuvi savdo hajmining oshishiga zamin yaratmoqda. Mijozlar istalgan vaqtda va istalgan joydan to‘lov amalga oshira olishi korxonalar xizmatlarining uzluksizligini ta’minlab, talabni barqarorlashtiradi. Ayniqsa, kichik va o‘rta biznes uchun onlayn to‘lovlar bozor ulushini kengaytirishga xizmat qilmoqda.

Ikkinchidan, elektron to‘lovlar korxonalar moliyaviy nazoratini takomillashtirib, naqd pul bilan bog‘liq xavflarni kamaytiradi. Har bir tranzaksiya raqamli izga ega bo‘lgani sababli audit, monitoring va hisobot jarayonlari yengillashadi. Bu korruptsiya va moliyaviy suiiste’molliklarning oldini olishda muhim omil bo‘lib xizmat qiladi.

Uchinchidan, tadqiqotda elektron to‘lov infratuzilmasining xavfsizlik jihatlari ham baholandi. Zamonaviy himoya protokollari, autentifikatsiya tizimlari va kiberxavfsizlik choralarining joriy etilishi bizneslar uchun ishonchli muhit yaratmoqda. Shu bilan birga, ayrim subyektlarda texnik nosozliklar va xavfsizlikka oid xatarlar hali ham mavjud ekani qayd etildi.

Table 1.

Elektron to‘lov tizimlarining biznes barqarorligiga ta’siri

Ta’sir yo‘nalishi	Ijobiy ta’sirlar (kuchaytiruvchi omillar)	Salbiy ta’sirlar (cheklovchi omillar)	Biznes barqarorligiga umumiy ta’sir
Moliyaviy boshqaruv	Naqd pul bilan bog‘liq risklarning kamayishi; audit va monitoringning yengillashishi; shaffoflik oshishi	Integratsiya xarajatlari; texnik xizmat uchun doimiy mablag‘ talab etilishi	Moliyaviy barqarorlikni mustahkamlaydi
Savdo jarayonlari	Tezkor tranzaksiyalar orqali savdo hajmi ortadi; xaridorlar uchun 24/7 to‘lov imkoniyati	Texnik nosozliklar savdoda uzilish keltirib chiqarishi	Operatsion barqarorlikni oshiradi
Mijozlar ishonchi	Qulaylik, xavfsizlik, shaffoflik orqali doimiy mijozlar bazasi kengayadi	Raqamli savodxonlik yetishmasa xizmatdan foydalanish pasayadi	Bozor ulushi va raqobatbardoshlikni kuchaytiradi
Xavfsizlik	Kiberhujumlardan himoya texnologiyalari, autentifikatsiya, real-vaqt monitoring	Kiberxavf doimo mavjud; ma’lumotlar o‘g‘irlanishi ehtimoli saqlanib qoladi	Ishonch va obro‘ barqarorligini belgilaydi
Innovatsion rivojlanish	Fintech texnologiyalarni joriy etish; yangi xizmat turlarining paydo bo‘lishi	Xodimlarni o‘qitish zarurati; transformatsiya jarayoni sekin kechish ehtimoli	Uzoq muddatli strategik rivojlanishga olib keladi
Regulyativ muhit	Davlat qo‘llab-quvvatlashi; litsenziyalash va nazorat tizimlarining takomillashuvi	Normativ talablarning tez-tez yangilanishi biznesga yuk bo‘lishi mumkin	Xavfsiz va tartibli raqamli moliya bozorini yaratadi

Natijalarga ko‘ra, elektron to‘lov tizimlaridan keng foydalanayotgan kompaniyalarda mijozlar ishonchi yuqori darajada shakllanadi. Tezkor xizmat ko‘rsatish, shaffoflik va qulaylik mijozlarni doimiy xaridorlar qatorida ushlab turishga yordam beradi. Bu esa raqobatdagi ustunlikni mustahkamlab, biznesning uzoq muddatli rivojlanishiga xizmat qiladi.

Shuningdek, regulyativ va infratuzilmaviy qo‘llab-quvvatlashning kuchayishi korxonalarda innovatsion moliyaviy texnologiyalarni joriy etishni jadallashtirdi. Elektron tijorat sektori barqaror o‘sib borayotgani ham aynan

raqamli to‘lov mexanizmlarining rivoji bilan chambarchas bog‘liqdir. Umuman olganda, tadqiqot natijalari elektron to‘lov tizimlari biznes barqarorligining muhim omillaridan biri ekanligini tasdiqlaydi.

Muhokama

Olingan natijalar elektron to‘lov tizimlarining biznes barqarorligini ta’minlashda strategik ahamiyat kasb etishini ko‘rsatadi. Biroq tizimni qo‘llash jarayonida yuzaga keladigan ayrim cheklovlar va muammolar ham mavjud bo‘lib, ular chuqur tahlilni talab qiladi. Eng avvalo, elektron to‘lov infratuzilmasining barqaror ishlashi texnologik resurslar va yuqori sifatli internet tarmog‘iga bog‘liq. Kichik hududlarda uzilishlar ko‘p uchrashi natijasida to‘lov jarayonlarida kechikishlar vujudga kelishi mumkin. Bu esa mijozlar ishonchining pasayishiga sabab bo‘ladi.

Shuningdek, tadqiqotda xavfsizlik tahdidlari muhim masala sifatida qayd etildi. Har qanday raqamli tizim kabi elektron to‘lov tizimlari ham kiberhujumlar, ma’lumotlar o‘g‘irlanishi, firibgarlik kabi xavflarga moyil. Shu bois, korxonalar tomonidan axborot xavfsizligini kuchaytirish, doimiy monitoring hamda xodimlarni kiberxavfsizlik madaniyatiga o‘rgatish zarur.

Elektron to‘lov tizimlarini joriy etish moliyaviy xarajatlarni talab qilishi ham bizneslarni ushbu jarayondan chekinishiga sabab bo‘lishi mumkin. Yangi texnologiyani o‘zlashtirish, integratsiya va texnik xizmat uchun qo‘shimcha mablag‘lar kerak bo‘ladi. Biroq uzoq muddatda bu sarmoya biznesning raqobatbardoshligini oshirish orqali o‘zini oqlashi tadqiqotda tasdiqlandi.

Mijozlarning raqamli savodxonlik darajasi ham ahamiyatli omil sifatida qayd etiladi. To‘lov tizimlaridan foydalanish bo‘yicha bilim va ko‘nikmalarning yetishmasligi ayrim to‘lov jarayonlarida qiyinchiliklar tug‘diradi. Shu sababli, bank va fintech kompaniyalari tomonidan aholining moliyaviy raqamli savodxonligini oshirishga doir keng ko‘lamli dasturlarni rivojlantirish taklif etiladi.

Regulyativ muhitning takomillashuvi ijobiy samaralar bermoqda. To‘lovlar bozorini tartibga solish, litsenziyalash tartibini soddalashtirish va raqobatga sharoit yaratish natijasida yangi fintech subyektlari paydo bo‘lmoqda. Shu bilan birga, nazorat mexanizmlarining kuchaytirilishi bizneslar va iste’molchilar uchun xavfsiz xizmat ko‘rsatishni ta’minlaydi.

Umuman olganda, elektron to‘lov tizimlarining rivoji biznesda innovatsion boshqaruv, mijozlar bilan barqaror aloqalar va samarali risk-menejment tizimini shakllantirishga xizmat qilmoqda. Mazkur jihatlar biznes barqarorligining asosi sifatida namoyon bo‘ladi.

Xulosa

Yuqoridagi tahlillar asosida elektron to‘lov tizimlari biznes barqarorligining muhim omillaridan biri ekanligi aniqlandi. Raqamli moliyaviy texnologiyalar yordamida korxonalar operatsion jarayonlarni optimallashtirib, mijozlarga qulay xizmat ko‘rsatish orqali raqobatbardoshligini oshira oladi. Tezkor va xavfsiz tranzaksiyalar savdo hajmining ortishiga, shaffof moliyaviy boshqaruv esa korxonalarning ishonchliligiga xizmat qiladi.

Elektron to‘lov tizimlarini joriy etish biznesni strategik rivojlanishga yo‘naltirib, uzoq muddatli barqarorlikni mustahkamlaydi. Naqd pulsiz iqtisodiyotga o‘tish orqali risklar kamayadi, audit va nazorat mexanizmlari takomillashadi, mijozlar ishonchi kuchayadi. Shuningdek, elektron tijorat ekotizimining kengayishi korxonalar faoliyatida yangi imkoniyatlar yaratadi, innovatsion yondashuvlarga ehtiyoj ortadi.

Shu bilan birga, elektron to‘lov tizimlari texnik, xavfsizlik va malaka bilan bog‘liq muammolarni hal etishni talab qiladi. Buning uchun infratuzilmani rivojlantirish, kiberxavfsizlik choralarini kuchaytirish va xodimlar hamda iste’molchilar raqamli savodxonligini oshirish zarur. Bu borada davlat, banklar va fintech sektorining hamkorligi muhim rol o‘ynaydi.

Tadqiqotdan olingan ilmiy xulosa shundan iboratki, elektron to‘lov tizimlari biznes barqarorligini ta’minlashga kompleks ta’sir ko‘rsatadi. Ular iqtisodiy samaradorlikni oshiradi, bozordagi raqobatni kuchaytiradi va korxonalar oldida yangi rivojlanish istiqbollarini ochadi. Demak, elektron to‘lov infratuzilmasini rivojlantirishni davom ettirish va innovatsion texnologiyalarni keng joriy etish biznesning kelajakdagi barqaror rivoji uchun zarur shartlardan biridir.

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YOSHLARDA EKOLOGIK MADANIYATNI YUKSALTIRISH

Annotatsiya: *Ushbu maqolada bugungi kun yoshlarida ekologik ong va madaniyatni shakllantirish, ularni tabiatga ehtiyotkorona munosabatda bo'lishga o'rgatish, noyob tabiatni asl holicha avlodlar uchun asrab-avaylash hissini oshirish orqali atrof-muhitga bo'lgan salbiy ta'sirning oldini olish masalalari ko'rsatib o'tilgan.*

Kalit so'zlar: *Suv toshqinlari, zilzila, yer osti boyliklari, suv, hayvonot va o'simliklar dunyosi, o'rmon, pedagogik mahorat.*

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IMPROVING ECOLOGICAL CULTURE AMONG YOUTH

Abstract. *This article addresses the issues of preventing negative impacts on the environment by creating environmental awareness and culture among today's youth, teaching them to be careful about nature, and increasing the sense of preserving unique nature for future generations.*

Key words: *Floods, earthquakes, underground resources, water, animal and plant world, forest, pedagogical skills.*

Kirish

Bugungi kun yoshlarida ekologik ong va madaniyatni shakllantirish, ularni tabiatga ehtiyotkorona munosabatda bo'lishga o'rgatish, noyob tabiatni asl holicha avlodlar uchun asrab-avaylash hissini oshirish orqali atrof-muhitga bo'lgan salbiy ta'sirning oldini olish mumkin. Buning uchun yoshlar ongida ona yer, ona tabiat, ona Vatanga, uning tabiiy boyliklariga bo'lgan mehr-muhabbat tuyg'usini yanada rivojlantrishimiz lozim. Aytish mumukinki, agarda umumiy ta'lim jamiyat rivojida zarur tayanch bo'lsa, ekologik ta'lim-tarbiya va madaniyat har qanday mamlakatda insonlarning to'laqonli sog'lom turmish kechirishi uchun zarur

bo’lgan atrof-muhit sharoitiga muhim kafolatidir. Bu kafolat mamlakat taraqqiyoti, davlat mustaqilligi, sog’lom turmush tarzi, millatlararo ekologik aloqalar, ekologiya borasida insonlarning huquqlarini ta’minlashga, majburiyatlarni bajarishga shart-sharoit yaratadi.

Ekologik ta’lim-tarbiya berishda tarixiy merosdan samarali foydalanib, ularni bugungi zamon talablari bilan bog’liq holda yoshlar ongiga singdirish ham muhimdir. Chunki hozirgi kunda insoniyatning tabiatga nisbatan salbiy munosabatlari oqibatida dunyoning bir burchida suv toshqinlari, zilzilalar ro’y berayotgan bo’lsa, boshqa joyida o’rmon yong’inlari kuzatilayapti. Bu kabi global muammolar tabiat boyliklaridan ekologik omillar hisobga olinmagan holda foydalanish natijasida o’tgan asrning ikkinchi yarmida avj ola boshlagan edi.

Asosiy qism

Qayd etish joizki, uzoq yillar mobaynida tabiatga yetkazilgan ta’sir oqibatida tabiiy muvozanatga putur yetdi. Bugungi kunga kelib esa, insoniyat tamadduni, uning ertangi taqdiri aynan shunday masalalarni hal etishni taqozo qilmoqda. Shu sababli xam aholining ekologik madaniyatini yuksaltirish, atrof-muhitga oqilona munosabatda bo’lish, tabiat ne’matlarini kelgusi avlodlar uchun asrab-avaylash hissini shakllantirish antropogen ta’sirlarning oldini olish shu kunning dolzarb masalalaridan biri deyish mukin [1].

Chunki, ekologik ta’lim-tarbiya tabiat va jamiyat o’rtasidagi uzviylikni ta’minlash hamda tabiiy barqarorlikni saqlashda muhim ahamiyatga egadir. Shuningdek, ekologik ta’lim-tarbiya yoshlarni tabiatdan ongli ravishda foydalanish va ular qalbida tabiatga mehr-muhabbat uyg’otish hamda tejamkorlikka o’rgatishda qo’l keladi. Albatta, yosh avlod qalbida tabiatga nisbatan hurmat hissini shakllantirish va rivojlantirish muhim masalalardan sanaladi. Bu, o’z navbatida, pedagog kadrlar zimmasiga katta mashuliyat yuklaydi.

Tabiat boyliklaridan unumli foydalanish, ularni muhofaza qilish masalalarini ongli ravishda hal etish uchun oila, maktabgacha ta’lim muassasalaridan boshlab bolalarda tabiatga mehr-muhabbat ruhini shakllantirish, ekologiyaga oid bilimlarni ular shuuriga singdirish darkor.

Oilada ekologik ta’lim quyidagi talablarni o’z ichiga oladi:

- ✓ bolalarni tabiat go’zalliklaridan estetik zavq olish ruhida tarbiyalash;
- ✓ ota-onaning g’amxo’rligi va bevosita harakati ostida bolalarning ekologik madaniyatini oshirish;
- ✓ tabiat va jamiyat o’rtasidagi munosabat hamda insonning tabiatga ta’siri masalasini o’rgatish;
- ✓ inson tabiatning ongli bir mahsuli ekanligi va barcha qonunlarga amal qilishi lozimligini anglash;
- ✓ barcha tabiat boyliklari bo’lgan yer, yer osti boyliklari, suv, hayvonot va o’simliklar dunyosi, o’rmon va havodan oqilona foydalanish hamda ularni muhofaza etish zarurligini uqtirish;

Shu bilan birgalikda sodir etilgan yoki sodir etilishi mumkin bo’lgan ekologik huquqbuzarliklarga qarshi kurashish hamda ularning oldini olish shart

ekanligini o’rgatish keng tushuntirish, maqsadga muvofiqdir [3]. Bu esa oilada ekologik ta’lim-tarbiya olib borilishi yoshlarni atrof tabiiy muhit va uning boyliklarini sevishga, muhofazalash hamda bundan oqilona foydalanishdagi dastlabki ekologik ongini, taffakurini hamda tushunchalarini shakllantirishga yordam beradi.

Yoshlar qalbida ekologik madaniyatni singdirishda, azaliy qadriyatlarimizdan bo’lmish umumxalq hasharlarini o’tkazish va ularga yoshlarni ko’proq jalb etish ayni muddao. Umuman olganda, o’quv yurtlari, oila, fuqarolarning o’zini o’zi boshqarish organlarida yoshlarning uzluksiz ekologik ta’lim-tarbiyasi borasida samarali tizimni yaratish bugun zimmamizdagi eng muhim vazifalardan biridir [2]. Bundan tashqari, ommaviy axborot vositalarida ekologiya va atrof-muhitni muhofaza qilishga bag’ishlangan turkum ko’rsatuv, eshittirishlar, ijtimoiy- ekologik roliklarni muntazam efirga uzatib borish, vaqtli matbuot nashrlarida maqolalar chop etish orqali targ’ibot-tashviqot ishlarini kuchaytirish ham aholining ekologik madaniyatini oshirishda muhim ahamiyatga ega.

Xulosa

Zero, o’sib kelayotgan yosh avlod tabiat haqidagi bilimlarni egallab, tevarak atrofning nozikligini, uning go’zalliklarini qalban his qila olsagina, ona-Vatanga, uning tabiatiga muhabbati oshadi. Ta’lim muassasalarida o’qitish jarayonida o’quvchilar ongini hozirgi ekologik muammolar mohiyatini ochib beruvchi bilimlar bilan boyitish va shu bilimlarni ularning amaliy faoliyati, ijtimoiy mehnati bilan mustahkamlab borish maqsadga muvofiq. Bunday mashuliyatli vazifani hal qilish uchun o’qituvchidan shu soha bo’yicha bilimga, pedagogik mahoratga, yuksak ekologik madaniyatga ega bo’lish, shuningdek, tinimsiz izlanish, o’rganish talab qilinadi.

Hali yurtimizda tabiatni muhofaza qilish, boyliklaridan oqilona foydalanish borasida hal etilmagan muammolar mavjud. Ularni bartaraf qilish aholining tabiat muhofazasi, geografik qonuniyatlar haqidagi bilim darajasiga ko’p jihatdan bog’liq. Yoshlarning ekologik tarbiyasi yuqori, bilim darajasi yetuk bo’lsa, tabiatdan foydalanish madaniyati ham shunchalik ortadi. Demakki, bu boradagi zarur bilimlarni o’rganish, ularga qat’iy amal qilish va salbiy o’zgarishlarning oldini olish hozirgi kunda eng dolzarb vazifalardan biridir.

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THE TERRITORIAL FEATURES OF THE NOSODEMOGRAPHIC INDICATORS OF GULISTON DISTRICT

Abstract: *This article analyzes the historical formation, administrative and territorial boundaries, ethnic composition, demographic indicators, gender structure, and the level of urbanization of Guliston District. In addition, the study provides information on the population assigned to medical associations, including family polyclinics and family doctor's offices, as well as the distribution of the population by age and gender, infant mortality rates, and the share of these indicators within the region.*

Keywords: *Nosodemography, population, ethnic composition, demographic indicators, family, healthcare, family polyclinic, family doctor's office, infant mortality.*

Guliston District is a district of Sirdaryo Region, established on April 16, 1952. The district shares borders with Sirdaryo, Boyovut, Saykhunobod, and Mirzaobod districts, as well as Guliston city, and with Bekobod district of Tashkent Region. The total area of the district is 0.35 thousand km².

Table1.
Demographic Indicators of Guliston District

Area (thousand km²)	**0,35**
Population density (per sq. km)	**227,7**
Population (thousands)	**79.6**
Number of men (thousand people)	**39.4**
Number of women (thousand people)	**40.2**
City residents (thousand people)	**31,2**
Village residents (thousand people)	**48,4**
Total number of families	**23 316**
Number of neighborhoods	**26**

Table: Compiled based on statistical data as of January 1, 2024.

As of January 1, 2024, the population consists primarily of Uzbeks, along with representatives of Tajik, Russian, Ukrainian, Tatar, Jewish, Azerbaijani, and other ethnic groups. The population density is 227.7 persons per square kilometer.

The total number of households is 23,316, of which 11,116 are households with children under the age of 18. There are 776 large families with four or more children, and 635 single-parent households (lacking either a father or a mother). Households with members who have disabilities total 1,838, and households with members suffering from chronic illnesses number 568. Additionally, there are 74 elderly individuals (aged 65 and above) living alone, and 806 households have members working abroad. (As of January 1, 2024)

Table 2.
Population assigned to healthcare facilities in Guliston District as of 2024

№	Name of medical institutions	Total		Children		Teenagers		Adults		Women of childbearing age
		Total	Woman	Total	Woman	Total	Woman	Total	Woman	Woman
1	Gulistan district KTMP	13800	6848	4011	1929	751	376	9038	4543	3504
2	Uch kakxramon OP	7892	3844	2292	1130	416	209	5184	2505	1960
3	Independence OP	19412	9515	6356	3015	1002	497	12054	6003	5101
4	Zarbdor OP	7601	3799	2321	1150	415	221	4865	2428	2070
5	Oltin o‘rda OP	5990	2925	1874	889	299	138	3817	1898	1466
6	Boyovut OShP	6861	3417	2032	994	333	157	4496	2266	1694
7	Beshbulok OShP	4546	2241	1324	636	251	118	2971	1487	1156
8	Islomobod OShP	2858	1368	909	460	166	81	1783	827	691
9	Chortok OShP	2350	1170	762	371	130	62	1458	737	531
10	U Nosir OShP	2122	1028	638	306	118	51	1366	671	445
11	Uzbekistan OShP	4960	2442	1558	748	269	129	3133	1565	1296
12	A.Navoiy OShP	1805	895	554	267	81	38	1170	590	601
	Jami:	80197	39492	24631	11895	4231	2077	51335	25520	20515

Source: *Compiled based on data from the Guliston District KTMP.*

The socio-demographic profile of Gulistan District is characterized by the population size, their spatial distribution, and the level of attachment to medical institutions. A total of 12 healthcare facilities operate within the district,

comprising a Multidisciplinary Central Polyclinic, four family polyclinics, and seven family doctor units.

As of 2024, the population of Gulistan District amounts to 80,197 residents. Analysis indicates that the majority of the population is registered with the Mustaqillik Family Polyclinic, which serves 19,412 individuals. This figure represents 24.2% of the district's total population. These data are of significant importance for further improving the healthcare system in the district, analyzing the territorial distribution of medical services, and ensuring the efficient utilization of healthcare resources.

Although the population of Sirdaryo Region is relatively small, cases of infant mortality continue to occur. This trend increases the demand for healthcare services among the population. At the same time, improving the quality and coverage of medical services plays a crucial role in promoting healthy development and reducing infant mortality. The effective allocation of the region's healthcare system capabilities and resources is a key factor in meeting the population's healthcare needs.

Table 3.

Total number of infant deaths

Name of administrative units	2013	2015	2017	2019	2020	2021	2022	2023	2024	Percent
Syrdarya region	167	229	231	237	205	229	339	233	237	100
Gulistan city	38	43	37	36	33	74	145	102	96	40,5
Shirin city	2	5	3	3	5	2	5	1	2	0,84
Yangiyer city	13	8	12	14	5	13	17	11	7	2,95
Akaltin district	10	9	9	9	21	11	11	3	12	5,0
Boyovut district	21	45	31	46	34	18	35	27	22	9,28
Saykhunabad district	12	25	21	21	16	21	15	11	22	9.28
Gulistan district	**15**	**20**	**23**	**24**	**17**	**15**	**29**	**12**	**15**	**6.32**
Sardoba district	12	13	18	18	20	17	10	12	10	4,21
Mirzaabad district	17	26	34	25	21	18	32	15	14	5,90
Syrdarya district	15	13	24	12	13	20	21	19	19	8,01
Khavos district	12	22	19	29	20	20	19	20	18	7,59

Source: *https://siat.stat.uz/*

Infant mortality refers to the occurrence of death among children within the first year of life. Mortality rates for children under one year are generally higher than those for other age groups, and the probability of death during this period can be compared to the likelihood of death by the age of 55.

In Sirdaryo Region, the number of infant deaths in 2024 amounted to 237, compared to 167 in 2013, representing a change ratio of 1.41. The highest infant mortality in the region was observed in Guliston city, accounting for 40.5% of the regional total, while the lowest was recorded in Shirin city, representing 0.84%. In Guliston District, the change ratio from 2013 to 2024 was equal to 1, with the

district's overall share in the region amounting to 6.32%. These data are of significant importance for assessing the effectiveness of medical services and preventive measures in the region, as well as for promoting the healthy development of the population.

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RAQAMLI BANK XIZMATLARINI RIVOJLANTIRISH VA MIJOZLAR UCHUN SAMARADORLIGINI OSHIRISH MASALALARI

Annotatsiya*: Ushbu maqolada O'zbekistonda bank xizmatlarida raqamli texnologiyalardan foydalaninshni o'rganish haqida ma'lumotlar berilgan. Shuningdek maqola muallifining bank xizmatlarini ko'rsatishda qanday jihatlarga e'tibor qaratilishi haqidagi taklif va xulosalari haqida ham ma'lumotlar berilgan.*

Kalit so'zlar: *depozit, masofaviy bank xizmatlari, tijorat banki, regulyativ capital, moliyaviy innovatsiyalar.*

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ISSUES OF DEVELOPING DIGITAL BANKING SERVICES AND INCREASING THEIR EFFICIENCY FOR CUSTOMERS

Abstract: *This article provides information on the study of the use of digital technologies in banking services in Uzbekistan. It also provides information on the author's proposals and conclusions on what aspects should be paid attention to in the provision of banking services.*

Keywords: *deposit, remote banking services, commercial bank, regulatory capital, financial innovations.*

Kirish

Iqtisodiyotni modernizatsiyalash bank tizimini isloh qilishni yanada chuqurlashtirish va barqarorligini oshirish, bank tizimiga aholi hamda xorijiy investorlarning ishonchini yanada mustahkamlash, axborot-kommunikatsiya texnologiyalarini keng qo'llagan holda, ko'rsatilayotgan bank xizmatlarining turi va xizmatlar bozori ko'lamini kengayib borish hozirgi kunning dolzarb masalalaridan biri hisoblanadi. O'zbekiston Respublikasi Prezidentining 2018-yil 23-martda qabul qilingan «Bank xizmatlari ommabopligini oshirish bo'yicha qo'shimcha choratadbirlar to'g'risida»gi qarorida "Bank xizmatlari ommabopligining oshirilishini va bank xizmatlari iste'molchilari huquqlarining himoya qilinishini ta'minlash O'zbekiston Respublikasi Markaziy bankining asosiy vazifalaridan biri ekanligi belgilab qo'yildi. Endilikda O'zbekiston Respublikasi Markaziy bankining tuzilmasida bank xizmatlari iste'molchilarining huquqlari va qonuniy manfaatlari himoyasini ta'minlash, moliyaviy ochiqlikni hamda aholi va tadbirkorlik sub'ektlarining moliyaviy savodxonlik darajasini

oshirish asosiy vazifalari bo'lgan bank xizmatlari iste'molchilarining huquqlarini himoya qilish xizmati tashkil etildi.[10]

"Raqamli bank — innovatsion bank texnologiyalaridan foydalangan holda (kassa xizmatini ko'rsatmasdan) bank xizmatlarini masofaviy ko'rsatuvchi bank yoki uning tarkibiy bo'linmasi. Raqamli banklar tomonidan bank xizmatlarini masofaviy ko'rsatish bankning ichki tartib qoidalariga asosan qonun hujjatlari talablarini inobatga olgan holda amalga oshiriladi"

O'zbekistonda ilk bor "ANOR BANK" AJ 2020-yil sentyabr oyidan raqamli bank sifatida birinchi onlayn xizmatlarini ishga tushirgan hamda hozirgi kunda bir qator zamonaviy bank xizmatlarini ko'rsatib kelmoqda.

Tahlil va natijalar

Boston Consulting Group analitiklarining hisoblashlariga ko'ra, raqamli iqtisodiyot bo'yicha boshqa rivojlanayotgan davlatlar yetakchilardan o'rtacha 8-10 yilga orqada qolgan. Ammo agarda hech qanday chora-tadbirlar ko'rilmasa, 3-5 yildan so'ng orqada qolish 15-20 yilga ham yetishi mumkin. "Industriya 4.0" konseptsiyasi doirasida ushbu ko'rsatgich milliy iqtisodiyotning investitsion raqobatbardoshlik reytingi ko'rsatgichini aniqlashda asosiylaridan biri hisoblanadi.

Hozirgi kunda bank sohasi dunyo bo'ylab raqamli qurollanish poygasiga kirishgan. 2018-yilda dunyo banklari raqamli banking imkoniyatlari uchun 9.7 mlrd. AQSH dollari miqdorda investitsiya kiritishni rejalashtirgan. Ko'pchilik tijorat banklarida onlayn va mobil bank dasturlarini yaratish va rivojlantirish odatiy bank filiallari va ATMlarni ko'paytirishdan ko'ra muhimroq deb qaralmoqda.

[10] https://lex.uz/ru/docs/-3494933

1-Jadval

Raqamli bank xizmatlarini rivojlantirishning asosiy yo‘nalishlari va mijozlar uchun samaradorlikka ta’siri

Yo‘nalish	Izoh	Mijozlar uchun samaradorlikka ta’siri	O‘lchov ko‘rsatkichlari
Mobil banking	Ilovalar orqali hisob-kitob va xizmatlardan foydalanish	Vaqtni tejash, qulaylik, 24/7 xizmat	Ilova yuklanish soni, foydalanuvchi faolligi
Onlayn to‘lov tizimlari	Elektron to‘lovlar va fakturalarni rasmiylashtirish	Tez va xavfsiz to‘lovlar, operatsiyalarni kuzatish imkoniyati	To‘lovlar soni, tranzaksiya tezligi
Shaxsiy kabinetlar va interaktiv xizmatlar	Hisob-kitoblar, balansni kuzatish, kredit va depozit ma’lumotlari	Mijozlarning moliyaviy nazoratini oshirish, xizmatlardan mustaqil foydalanish	Faollik darajasi, mijozlar qoniqishi
Chatbot va onlayn konsultatsiyalar	Sun’iy intellekt yordamida mijozlarga xizmat	Savollarga tezkor javob, qo‘llab-quvvatlash 24/7	Javob tezligi, mijozlar qoniqishi
Raqamli xavfsizlik va autentifikatsiya	Biometrik va ikki faktorli autentifikatsiya	Xavfsizlik oshadi, ishonch hosil qilinadi	Firibgarlik holatlari, xavfsizlik darajasi

Jadvaldan ko‘rinib turibdiki, raqamli bank xizmatlarining asosiy yo‘nalishlari mijozlar uchun qulaylik va samaradorlikni oshirishga qaratilgan. Mobil banking va onlayn to‘lov tizimlari orqali mijozlar vaqtni tejaydi va bank xizmatlariga doimiy kirish imkoniyatiga ega bo‘ladi. Shaxsiy kabinetlar va interaktiv xizmatlar mijozlarning moliyaviy nazoratini oshiradi, ularni xizmatlardan mustaqil foydalanishga o‘rgatadi. Chatbot va sun’iy intellektga asoslangan konsultatsiyalar esa savollarga tezkor javob berish orqali xizmat sifatini yaxshilaydi.

Raqamli xavfsizlik tizimlari esa mijozlar ishonchini oshirish va firibgarlikdan himoya qilishda muhim rol o‘ynaydi. Shu bilan birga, raqamli bank xizmatlarini samarali rivojlantirish banklar uchun ham xarajatlarni kamaytirish, operatsion jarayonlarni tezlashtirish va raqobatbardoshlikni oshirish imkonini beradi.

Dunyo bo’ylab banklar allaqachon raqamli texnologiyalarga investitsiyalar qanday bo’lishi mumkinligi hamda mijozlarni jalb qilish va qoniqish hosil qilish haqida tushunib yetmoqda. Misol uchun Amerika banki an’anaviy bank filiallariga qaraganda ko’proq onlayn depozitlar qabul qilgan. Bankning Bosh ijrochi direktori Brayn Moynihaning fikriga ko’ra, raqamli bank xizmatlariga investitsiya kiritish mijozlarning ehtiyojini qondirishga yordam beradi.

Darhaqiqat, "Raqamli bank" tushunchasi 2015-2020-yillar davomida Yevropa davlatlarida jadallik bilan rivojlangan. Raqamli banklar o’z mijozlariga yanada qulaylik va foydali xizmatlarni taqdim etish maqsadida zamonaviy raqamli innovatsiyalardan keng foydalanadi.

Afsus bilan qayd etish lozimki, jahon iqtisodiy forumi ma’lumotlariga ko’ra mamlakatimiz bu ko’rsatgich bo’yicha oxirgi o’rinlardan birida turadi. Moliyaviy sektorda huddi shu tufayli ro’y berayotgan salbiy oqibatlarni yengib o’tish uchun milliy iqtisodiyotda raqamli iqtisodiyotni keng ko’lamda qo’llashga erishish asosiy masalalardan biri bo’lib hisoblanadi. Raqamli banking usullarini qo’llash, iqtisodiy xavfsizlikni ta’minlash va mobil tizimlar rivojlanishiga alohida ahamiyat berish moliyaviy bozorlar va banklar rivojlanishi uchun muhim ahamiyat kasb etadi.

O’zbekiston Respublikasi Prezidentining "O’zbekiston Respublikasi Markaziy bankining faoliyatini tubdan takomillashtirish chora-tadbirlari to’g’risida"gi PF5296-sonli farmoni1 imzolangach, bank tizimiga chakana bank xizmatlariga ixtisoslashgan "raqamli" banklar va bank bo’linmalarini tashkil etish hamda innovatsion bank texnologiyalaridan foydalangan holda mijozlarga xizmat ko’rsatish sifatini yanada kengaytirish vazifasi yuklatilgan.

Ushbu tashkil etilgan xizmatda yurtimizdagi banklarda xizmatlar ko’rsatishning yangi zamonaviy usullarini amalga tadbiq etishda rivojlangan jahonning bank-moliya markazlarining tajribalarini o’rgangan maqsadga muvofiq bo’ladi.

Bank xizmatlarini kòrsatish turlari bugungi kunga kelib òz safiga juda kòplab ishlarni bajarishni talab qiladi. Sababi, zamon rivojlanib borgani sayin oldingi xizmat turlarining aksariyat qismi eskirgan bòlib, ularni òrniga zamonaviy xizmat kòrsatish sohalarini qòllash orqali ham bank hodimlarini ishlarini ham oddiy xalqning mushkulini oson qilish mumkin. Pandemiya davrida nafaqat yurtimizda balki butun dunyoda online xizmat kòrsatish tarmoqlarining rivojlanishiga turtki bòldi desak mubolaġa bòlmaydi. Buning natijasida bank xizmatlarini kòrsatishning ham zamonaviy usullari rivojlandi. Masalan, ilgari insonlarning bank orqali bitadigan kòplab ishlarini hozirgi kunda uydan chiqmasdan turib amalga oshirish mumkin bòladi. Bunday ishlarni olib borishda xorij tajribasini òrganish juda muhim hisoblanadi. Aytib òtilgan xizmat kòrsatish sohalarini rivojlantirishda jahonning rivojlangan mamlakatlarini tajribasini amalga tadbiq qilgan maqul. Sababi ular ancha narsani kòrib boshidan òtkazishgan hisoblanadi.

Xulosa

O’zbekistonda masofaviy bank xizmatlarini rivojlanish istiqbollari bo’yicha olib borgan tahlillar natijasida quyidagi taklif va tavsiyalar ishlab chiqildi:Tijorat banklarida masofaviy bank xizmatlarini rivojlantirish, mijozlarga masofadan turib xizmat ko’rsatish tizimini rivojlantirish bo’yicha har bir tijorat banki o’zining strategik dasturini ishlab chiqish kerak. Mazkur dasturda qadamma-qadam barcha xizmat turlarini masofaviy hamda onlayn rejimga o’tkazish bo’yicha yo’l xaritasi ishlab chiqish kerak bo’ladi. Mazkur yo’l xaritasida belgilangan vazifalarni moliyalashtirish manbasi, amalga oshirish muddatlari, amalga oshirish uchun mas’ul boshqarma hamda loyihani ishga tushirish muddati kabilar keltirib o’tilishi zarur.

Xozirgi kunda tijorat banklari tomonidan masofaviy tarzda ko’rsatiladigan xizmat turlariga kommunal va boshqa to’lovlar, kartadan-kartaga pul o’tkazmalari, onlayn konversiya, onlayn omonat xizmatlari, shuningdek, ayrimabanklarda chakana kreditlash xizmatlari yo’lga qo’yilgan bo’lib, keyingi bosqichda ularning turini ko’paytirish maqsadga muvofiqdir. Xususan, xalqaro pul o’tkazmalariga integarsiyalashuv orqali xorijga mablag’larni jo’natish va qabul qilish, plastik kartalar virtual emmisiyasi xizmatini kiritish kablar shular jumlasidandir.

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MODERN APPROACHES TO TEACHING ENGLISH FOR ECONOMICS STUDENTS

Abstract: *This article examines modern approaches to teaching English to economics students. It analyzes communicative, task-based, CLIL, and project-oriented methodologies, as well as the integration of digital and media technologies in ESP teaching. The findings show that innovative, student-centered methods significantly enhance learners' linguistic proficiency, professional communication skills, and understanding of economic concepts. The article concludes that modern pedagogical strategies are more effective than traditional methods and emphasizes the need for teacher training, digital resources, and curriculum modernization in higher education institutions.*

Keywords: *English for Specific Purposes, Economics Students, CLIL, Task-Based Learning, Digital Technologies, Communicative Approach.*

Introduction

In the era of global economic integration, the ability to use English effectively has become an essential skill for future economists. English for Specific Purposes (ESP), particularly English for Economics, requires teaching strategies that go beyond traditional grammar-focused instruction.[1] The rapid development of digital technologies, the availability of authentic economic materials, and the rise of competency-based education have contributed to the emergence of modern, innovative approaches in teaching English.

Methods

This paper is based on descriptive and analytical methods aimed at reviewing current practices in English language teaching for economics students. The research process included:

- Literature analysis of ESP methodologies, CLIL, TBLT, and digital pedagogy;[2]
- Observation of classroom practices in blended and technology-supported learning environments;
- Comparative analysis of traditional methods versus modern approaches;
- Review of authentic materials commonly used in economics classes.

Results

1. Communicative and Task-Based Methods. Task-Based Learning increased students' vocabulary retention by linking tasks directly to economic concepts. Students show higher engagement through economic role-plays, market analysis and negotiation simulations.[3]

2. Integration of Digital and Media Technologies. Platforms such as Quizlet and Kahoot enhance motivation. Students reported improved listening skills and better understanding of economic terminology through exposure to authentic financial news.[4]

3. CLIL Approach. CLIL-based lessons helped students analyze supply–demand models, inflation reports, and trade topics through English, promoting deeper cognitive engagement.

4. Project-Based Learning. Business plan development, startup presentations, and market research projects strengthened writing, teamwork, and presentation skills.

5. Use of Authentic Materials. Materials such as The Economist, Bloomberg reports, and corporate financial statements improved academic reading skills and analytical thinking.[5]

Discussion

The findings suggest that modern approaches significantly enhance English language learning outcomes for economics students. Communicative, task-based, and CLIL methods foster practical skills needed in professional contexts. Digital tools increase motivation and provide exposure to real economic data.[6] Compared to traditional grammar-translation methods, modern approaches develop critical thinking, creativity, and professional competence. However, successful implementation requires teacher training, technological resources, and curriculum alignment with ESP standards.

Conclusion

The findings confirm that modern teaching approaches are more effective than traditional methods in developing ESP competence among economics students. To maximize the benefits of these approaches, higher education institutions should invest in teacher training, curriculum modernization, and digital infrastructure. Future research may explore the measurable impact of these methods on students' long-term academic and professional performance, as well as the development of adaptive learning models tailored specifically to the needs of economics majors.

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УДК 33

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IMPLEMENTATION OF PROJECT FINANCE TECHNIQUES ON DOMESTIC MARKET AND ABROAD

Annotation: *The project finance is considered as one of the key investment mechanisms in the task of supporting long-term goals of the economy and general economic growth. Yet its complex structure and presence of advanced financial arrangements requires profound understanding of these components and their interconnections. Unfounded confidence and ill-timed decisions might put a considerable degree of risk, associated with adverse externalities, unanticipated challenges and prolonged delays. In this regard, this article strives to address both mentioned sides of project finance.*

Keywords: *project finance, infrastructure, project, 21st century*

To introduce the topic, it is essential to define the term, which is at the core of this paper. So, one potential definition of project finance might be as follows: project finance presents itself as complex financial arrangement, which is characterized as high-denomination debt-intense funding scheme with no or limited recourse to the borrower (investor), utilized in relation to large capital-intense infrastructure or similar construction or modernization projects.

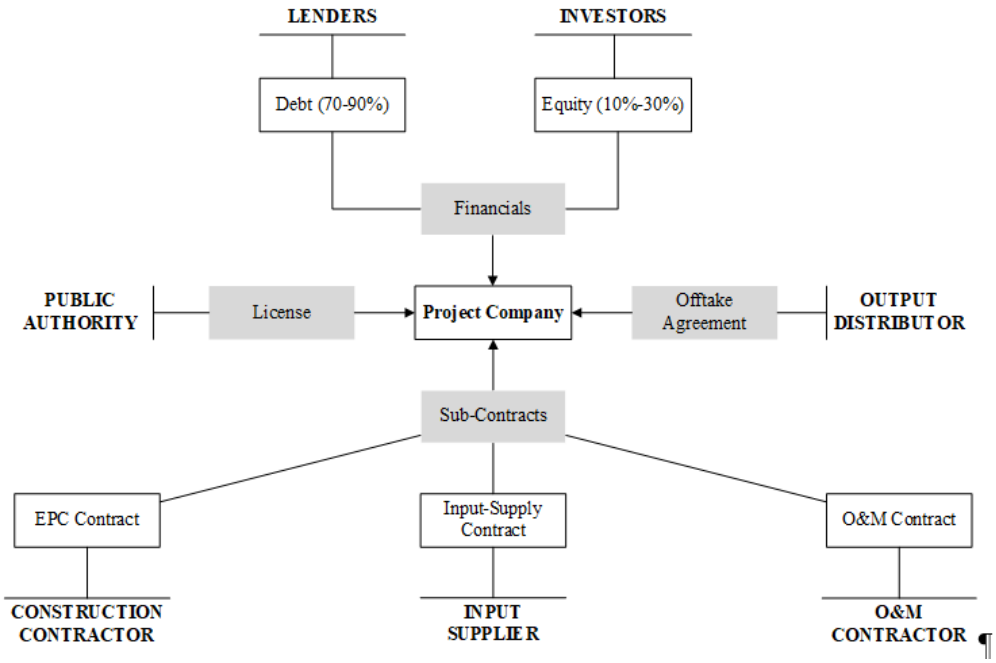
Person acquainted with commercial loans might spot several structural difference between the named form of funding and project finance: the former usually requires collateral or other form of security and usually assumes going concern for the borrower, while the project finance from the commencement of the project limits itself exclusively with cash flows of the project company and implies definite project lifetime.

Since the terminology is defined, it is natural to start the elaboration from the time, when the project finance appeared the first time and gradually progress to the current days

One of the first well-described transaction, which is customary referred to as project finance, occurred in 1299 in the United Kingdom. The Crown entered a lending arrangement to finance exploration and further development of silver

quarry in Devon region.[11] Curiously, in place of conventual debt repayment option, the Crown gave the lender a one-year mining lease, which made him an entitled person in regard to a portion of ore, produced on the mentioned asset. The agreement was crafted in a manner to provide no basis for recourse to the borrower itself. In history of Russian commerce and trade, the same instrument was employed by one of the banks, which gave debt financing to Nobel brothers for an oil project in the Russian Empire.[12] [13]

Given presence of certain number of area-specific concepts, Pic. 1 presents the illustrative formulation of project finance arrangement in power and utilities sector, customary for the end of the 20th century



Pic. 1. Illustrative scheme of project finance[14]

At the center of the project financing is a project company, which is special purpose firm, founded for purpose of executing a specific project. The project economic environment generally is subdivided into following categories: purely commercial venture and private-public partnership initiative. The special purpose firm might finance its operations in 2 ways: debt, which takes form of loans, bonds, and other interest-bearing arrangements, or equity from the investors or co-

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investors, who are to oversee the project and are the most interested parties regarding successful operation of the project. If the project is subject to mandatory regulatory approval, the government and its bodies (agencies) are most certain to be present in a project as a stakeholder concerning issuing of approvals (permits, licenses and other).

Given the idea that project finance is usually about high-denomination deal where many parties put their effort and time into, the risk of losing market for supply of the goods is not an option that one usually tolerate. As a mitigant, project company engages and concludes a legally-binding offtake agreement with an offtaking company (offtaker), which is to purchase the certain pre-defined volume of goods (services), supplied by the project company

Professional construction companies are hired to design the installation and conduct construction on-site works, usually under DPC (Design, procure, construct) framework, which provides a certain degree of "assurance" to the project company and mitigates cost overruns and project delays risks.

As the illustrated formulation relates to power and utilities sector, at the commencement of the project and during its operations the project company should have a reasonable level of comfort in terms of volume of feedstock it will have to eliminate or minimize delays and losses. Thus, the project company concludes input-supply agreement with raw material suppliers, which remains in force for prolonged period of time.

Ultimately, the oversight over the constructed facility might be given to specialized management company, which will possess a vast experience and expertise in administration of similar facilities, Hence, the project company and O&M contractor enters into O&M (operation and management) agreement for the supply of corresponding services.

One of the most well-covered projects within project financing topic is construction and operation of ongoing 811 km toll road called M-12 "Vostok", initiated under international route "Europe – West China" program. Overall cost of the project was recently budgeted at 901.5 bln RUB, from which 657.8 bln RUB to be sourced from state-backed financing, 150 bln RUB – from federal investment fund, and the remainder via 10.65% project bond issuance. In December 2023, a part of road to Kazan city was commercially operational.

M-11 "Neva" 669km toll road, representing a realized transportation project and connecting Moscow and St' Petersburg cities. Total required funding for the project was estimated at 520 bln RUB, 360 RUB bln of which were provided in state-backed funding, 29.6 bln RUB – in debt financing by Russian leading financial institutions, 23 bln RUB – by federal investment fund, and the remainder sourced via project bond issuance. The project was carried out under private-public partnership framework with concession agreement elapsing in the year 2041, when the infrastructure shall be returned to the state entity. During

construction period project faced several challenges, including delays associated with land allotment and ecological concerns.[15]

For foreign activity, authors suggest to observe Japanese market of tunnels for their importance to the country's economic development.

Japan is a small island country hosting more than 130 million of people. Given the scarcity of land and overpopulation of cities, most of infrastructure is built beneath the ground. Considering scattered nature of cities in the country and mountainous landscape, adoption of transportation model, which relies on underground tunnels, becomes self-evident solution for the country. In Japan, given large budget deficit and significant debt burden (more than 200% of the GDP) and considering utilization of close to 11,000 tunnels (27% with half-century economic life) as of 2023, the role of PPP and project finance has gained traction as a potential way to remedy the economic situation and restore financial fiscal soundness.[16] For now, funding sources for tunnel projects predominantly comprise government funding, which come from local, prefectural or national budgets, while major projects are eligible for funding from Ministry of Land, Infrastructure, Transportation and Tourism. Still, many projects employ PPP framework in structuring business arrangements with private sector partners. Another source of funding comes from proceeds, gained via issuance of bonds and receipt of loans from various financial institutions (e.g. Japan Finance Corporation), eager to participate in the project) and local governments. Given that the project is part of larger toll road initiative, tolls received from operating parts of the road might be used to finance construction works for the tunnel. Ultimately the funding can be sources from international organization, given the project demonstrates the sufficient level of significance.

Conclusion

In conclusion, analyzed material allows to conclude that project finance is viewed as complex financial arrangement, primary utilized for financing of large-scale infrastructure projects through primary debt-related sources. Since the first usage in 13th century, the funding mechanism evolved to encompass complicated financial agreements, multiple parties and different risk management instruments. In the 21st century, the project conventionally involves multiple actors, each playing significant role and contributing to project successful completion or operation.

Exploration of Russian and Japan experience illustrates that project finance can be employed in line with private-partnership scheme for large-scale projects, yielding curious outcomes. Still, the realization of this potential is sometimes

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determined by unforeseeable externalities, largely disconnected from financial and economic fields

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VOHA LANDSHAFTLARI VA ULARNING SHAKLLANISH OMILLARI

Annotatsiyasi: *Voha landshaftlarini o‘rganish O‘zbekiston aholisining asosiy qismi yashaydigan qismiga to‘g‘ri keladi. Vohalar asosan yurtimizning cho‘l hududlaridan aholi tomonidan o‘zgartirilgan va obod qilingan hududlarida shakllangan. Tabiiy landshaftlar o‘rnida yangi, antropogen landshaftlar barpo bo‘la boshladi. Voha landshaftlari antropogen landshaftlarning arid iqlimli o‘lkalardagi bir ko‘rinishi bo‘lib, ular o‘zining shakllanish tarixiga ko‘ra barcha antropogen landshaftlar bilan birga alohida genetik qatorni – antropogen landshaftlar qatorini tashkil etadi. Shu boisdan voha landshaftlarini antropogen voha landshaftlari deb aytish mumkin.*

Kalit so`zlar: *antropogen landshaft, madaniy landshaft, geosistema, voha, voha landshaftlari, texnogen landshaft, landshaftlarni tasniflash, Buxoro vohasi, cho‘l zonasi, arid iqlim, seliteb landshaftlar.*

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OASIS LANDSCAPES AND FACTORS OF THEIR FORMATION

Abstract: *The study of oasis landscapes is the main part of the population of Uzbekistan corresponds to the part where he lives. Oases are mostly deserts in our country. in areas that have been transformed and improved by the population formed. New, anthropogenic landscapes have been created in place of natural ones construction has begun. Oasis landscapes are a type of anthropogenic landscape a type in climatic countries, according to the history of their formation a separate genetic series along with all anthropogenic landscapes-forms a series of anthropogenic landscapes. That's why an oasis its landscapes can be called the landscapes of anthropogenic oases.*

Keywords: *anthropogenic landscape, cultural landscape, Geosystem, oasis, oasis landscapes, artificial landscape, classification of landscapes, Bukhara oasis, desert zone, arid climate, residential landscapes.*

Voha tushunchasi geografiya fanidagi asosiy tushunchalardan sanaladi. Voha atamasi “Qisqacha geografik ensiklopediya” da izoh berilishicha, lotincha va yunoncha “oasis” so‘zidan olingan. Voha deb dastlabki vaqtlarda Liviya cho‘lida aholi yashaydigan yashil manzarali bir necha joylarni tushunishgan. Bu joylar cho‘l va chalacho‘l geosistemalar doirasida daraxtli, butazorli va o‘t o‘simlikli uchastkalar bo‘lgan. Mazkur termin O‘zbekiston milliy ensiklopediyasining 2 – jildida shunday ta’riflangan.

Voha bu cho‘l va chala cho‘llarda obod qilingan yer. Vohada namgarchilik qo‘shni hududlarga nisbatan ko‘p. Yer osti suvlari yuza bo‘lib, buloqlar chiqib yotadi, daryolar vaqt-vaqti bilan toshib turadi. Vohalar ko‘pincha daryo, ko‘l, kanal va quduqlardan suv bilan ta’minlanadi. Maydoni bir necha o‘n km^2 dan bir necha o‘n ming km^2 gacha bo‘ladi. Shimoliy Afrika, G‘arbiy Osiyo va Markaziy Osiyo cho‘llarida mashhur vohalar bor. Toshkent, Murg‘ob, Xorazm, Buxoro vohalari, Farg‘ona vodiysidagi vohalar ham ancha katta. Odatda, vohalarda aholi zich yashaydi.

A.A.Abdulqosimov (1972) O‘rta Osiyo voha landshaftlarini va ularning morfologik strukturasini tadqiq etish bilan shug‘ullanib, voha landshaftlarining tabiiy xususiyatlarini tahlil etadi va unga shunday ta’rif beradi: Voha landshafti antropogen landshaft kompleksining zonal turi bo‘lib, u inson xo‘jalik faoliyati ta’sirida shakllangan agrobiosenozlar bilan qoplangan, arid iqlimli o‘lkalarda keng rivoj topgan va inson tomonidan doimiy ravishda boshqarilib turiladigan sug‘orma dehqonchilik yerlaridir. F.N.Milkov (1973) O‘rta Osiyodagi sug‘oriladigan vohalarni tabiiy sharoiti kuchli o‘zgartirilgan antropogen landshaftlarning bir turi deb qaraydi. A.N.Xojimatov (1993) O‘zbekiston cho‘l zonasidagi voha landshaftlarini xilma-xil sifatli ikki tizim – tabiat va jamiyatning bir-biriga ta’siri natijasi, ijtimoiy tizimga adekvat bo‘lgan o‘zaro ta’sir etish shakli deb izohlaydi.

Voha landshaftlari antropogen landshaftlarning arid iqlimli o‘lkalardagi bir ko‘rinishi bo‘lib, ular o‘zining shakllanish tarixiga ko‘ra barcha antropogen landshaftlar bilan birga alohida genetik qatorni – antropogen landshaftlar qatorini tashkil etadi. Shu boisdan voha landshaftlarini antropogen voha landshaftlari deb aytish mumkin. Voha landshaftlari tarkibiga faqat doimiy ravishda sug‘oriladigan qishloq xo‘jalik yerlari – paxta plantatsiyalari, sholi plantatsiyalari, mevali bog‘lar, tutzorlar, dalalarni himoya qilish o‘rmon polosalari va poliz ekinlari emas, balki irrigatsion inshootlar – kanallar, suv omborlari, ariqlar, shahar va qishloq seliteb landshaftlari, qayta sho‘rlangan va botqoqlangan yerlar, tashlandiq suvlar hisobiga hosil bo‘lgan ko‘llar va boshqa antropogen landshaft elementlari kiradi. Bular, o‘z navbatida, antropogen voha landshaftlari sistemasini vujudga keltiradi.

Yuqorida tahlil qilingan tushunchalardan xulosa qilib, voha landshaftiga quyidagicha ta’rif berish mumkin. Voha landshafti – bu arid zonalarda insonning maqsadli yo‘nalishdagi xo‘jalik faoliyati natijasida vujudga kelgan, doimiy

ravishda sug‘oriladigan va inson tomonidan boshqarilib turiladigan antropogen geosistemalarning bir turidir.

Masalan, Buxoro vohasi quyidagicha chegaralanadi. O‘zbekiston hududida Zarafshon vodiysining uzunligi qariyb 480 km bo‘lib, bu qismida Samarqand, Buxoro, Qorako‘l vohalari joylashgan. Samarqand vohasi Samarqand botig‘ida joylashgan, shimoldan G‘ubdintog‘ —Oqtog‘ — Qoratog‘, janubdan Qoratepa—Zirabuloq—Ziyovuddin kabi uncha baland bo‘lmagan tog‘lar bilan o‘ralgan. Vodiy bu vohada ancha keng. Navoiy shahridan o‘tgach, vodiy yana torayadi. Qiziltepa va Oftobachi qirlari bir-biriga juda yaqinlashib, Hazar yo‘lagini hosil qiladi. Vohaning yer yuzasi tekis, uni Zarafshon daryosi va vaqtincha oqar soylar kesib parchalagan, ba’zi yerlarida jarlar hosil qilgan.

Hazar yo‘lagidan o‘tgach, vodiy yana kengayadi va janubi-g‘arbga burilib, Buxoro vohasini hosil qiladi. Bu qismida Zarafshon vodiysining kengligi 70 km ga etadi hamda tekislikka aylanadi. Voha shimoldan Qizilqum bilan, sharqdan Qo‘shtepa, Azkamar, Quyimozor, Qaynag‘ach, Qumsulton kabi tepaliklar, janub va janubi-g‘arbdan esa Qorako‘l platosi bilan o‘ralgan. Buxoro vohasi janubi-g‘arbga, g‘arb va shimoli-g‘arbga bir oz nishab. Uning mutlaq balandligi 200—280 m. Vohani kanallar, ariqlar kesib o‘tgan. Zarafshon vodiysi Buxoro vohasida janubi-g‘arbga torayib boradi hamda Qorako‘l platosi yonida ancha torayib Qorako‘l yo‘lagini hosil qiladi. So‘ngra vodiy yana kengayib Qorako‘l vohasi boshlanadi.

Qorako‘l vohasini janubi-g‘arbdan Sandiqli qumligi, shimoli-sharqdan Qorako‘l platosi va janubdan Eshakchi qumligi o‘rab turadi. Bu yerda vodiyning kengligi 48—50 km, mutlaq balandligi 185—200 m.

Qishloq xo‘jalik landshaftlari ayrim manbalarda (masalan, V.A. Nikolayev, 1979, 1984; E.V. Milanova, A.M. Ryabchikov, 1979; A.G. Isachenko, 1980) agrolandshaftlar yoki agrolandshaft tizimlari deb atalib, O‘rta Osiyo tabiiy geografik o‘lkasi hududi uchun ham juda xarakterlidir.

Bu o‘lkaning qishloq xo‘jaligi qadimdan an’anaviy tarzda uch yo‘nalishda rivojlanib kelmoqda, ya’ni obikor dehqonchilik, lalmikor dehqonchilik va chorvachilik. Bulardan obikor dehqonchilikning landshaftlarga ta’siri ayniqsa sezilarlidir. Bunday ta’sir natijasida alohida, o‘ziga xos antropogen landshaftlar yuzaga kelgan. Ularni L. N. Babushkin, N. A. Kogay (1964) sug‘oriladigan yerlar landshaftlari deb, N.A. Gvozdetskiy (1977) voha landshaftlari deb, F. N. Chalidze (1980) esa irrigatsion landshaftlar deb alohida o‘rganilganligi bejiz emas.

A. G. Isachenkoning (1991) fikricha, hozirgi zamon landshaftlarning ko‘pchiligi insonning nooqilona faoliyati natijasida o‘zgartirilgan bo‘lib, ularni madaniy landshaftlarga aylantirish lozimdir. Bunday landshaftlarning eng asosiy xususiyatlaridan biri mahsuldorlik va iqtisodiy samaradorlik bo‘lishi kerak.

V. B. Sochava (1978) ham insonning tabiat bilan yaratuvchanlik hamkorligi haqida so‘z yuritar ekan landshaftlarning ichki imkoniyatini rivojlantirish, tabiiy jarayonlarni faollashtirishga va landshaftlarning samaradorligini oshirish asosiy maqsadga aylanishi kerakligini ta’kidlab o‘tadi. Darhaqiqat, inson dehqonchilik bilan shug‘ullanar ekan, u o‘z oldiga eng avval bir narsani, ya’ni iloji boricha

ko‘proq qishloq xo‘jalik mahsulotlari olishni maqsad qilib qo‘yadi. Bu maqsadga erishish uchun landshaftni tekislaydi, o‘g‘it soladi, tuproqni ma’lum bir qalinlikda ag‘darib tashlaydi, ma’lum bir ekin ekadi, sug‘oradi, begona o‘tlar va zararkunanda hasharotlarga qarshi turli xil dorilarni ishlatadi, tuproqning sho‘rini yuvadi, zax suvlarini qochiradi va hokazo. Xullas, ekin ekishdan to hosilni yig‘ishtirib olgunga qadar turli-tuman agrotexnik tadbirlarni qo‘llaydi va bu jarayon o‘nlab, yuzlab yillar mobaynida qaytalanaveradi. Natijada, bizga yaxshi tanish bo‘lgan va antropogen landshaftlar ichida «Madaniy landshaft» deb atalishi mumkin bo‘lgan hamda yuqori mahsuldorlik, iqtisodiy samaradorlik kabi talablarga ozmi-ko‘pmi mos kela oladigan landshaftlar hosil bo‘ladi. Bu o‘z navbatida, ilgari shu landshaftlarga xos bo‘lgan tabiiy xilma-xillikni soddalashishiga hamda moddalarning, shu jumladan, to‘yimli moddalarning aylanma harakati, organizmlar sonining muvofiqlanib turishi, tuproq unumdorligining maromida bo‘lishi, landshaftlarning o‘zini-o‘zi saqlab turishida juda katta va hal qiluvchi ahamiyatga egadir.

Dehqonchilik ta’sirida esa landshaftlarning ana shu xususiyati, ya’ni o‘zini-o‘zi saqlash xususiyati keskin kuchsizlanib ketadi. Bu narsa, ayniqsa, monokultura sharoitida tez ro‘y beradiki, unda ekinlarga kasallik tushishi, zararkunanda hasharotlarning ko‘payib ketishi oddiy holga aylanib qoladi. Bundan tashqari, obikor dehqonchilik inson hisobga olmagan ba’zi hodisa va jarayonlarni masalan, yer osti suvlari sathining ko‘tarilishi, dalalardan qaytgan oqova suvlarning tarkibida mineral tuzlarning ortib ketishi, ikkilamchi sho‘r bosishi, irrigatsiya eroziyasi va hokazoni keltirib chiqarishi mumkin. Shuning uchun ham antropogen rivojlanish orasida yuzaga keladigan qarama-qarshiliklarni oldini olish yoki juda bo‘lmaganda ularning ko‘lamini kamaytirish uchun landshaftlarning tashqi ta’sir kuchlariga nisbatan barqarorligini aniqlab olish katta ilmiy va amaliy ahamiyat kasb etadi.

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THE ROLE OF CONTEXTUAL LEARNING IN DEVELOPING LEXICAL COMPETENCE

Abstract: *This article examines the role of contextual learning in the development of lexical competence, a core component of communicative language ability. As vocabulary knowledge expands beyond simple word–meaning associations, contextualized instruction allows learners to internalize lexical items through authentic usage, discourse patterns, and situational cues. The study synthesizes theoretical frameworks, pedagogical models, and empirical findings to demonstrate that contextual learning fosters deeper lexical retention, improves semantic accuracy, and strengthens learners' ability to select appropriate vocabulary in real communicative situations. The article concludes that contextual learning is an indispensable approach in modern language education, especially in environments focused on communicative proficiency.*

Keywords: *contextual learning; lexical competence; vocabulary acquisition; communicative competence; discourse context; situational context; cognitive context.*

Introduction

Lexical competence—the ability to understand, appropriately select, and accurately use lexical units in communication—is a central component of second language acquisition. Traditional approaches to vocabulary teaching often focused on memorization, translation, and isolated word lists. However, research in applied linguistics has increasingly emphasized the significance of context in understanding meaning, semantic relationships, and pragmatic nuances.

Contextual learning, understood as the process of acquiring vocabulary through meaningful situations, discourse, and authentic linguistic environments, represents one of the most effective approaches in modern language pedagogy. Unlike traditional decontextualized methods—where learners memorize isolated words or rely heavily on word lists—contextual learning situates vocabulary within **real communicative events**, enabling learners to internalize not only the denotative meaning of a word but also its **pragmatic, semantic, and stylistic dimensions**. Through exposure to natural language use in texts, dialogues, multimedia materials, and interactive tasks, learners begin to understand how lexical items function within linguistic systems and social interactions.

One of the key advantages of contextual learning is its capacity to reveal the **multi-layered nature of vocabulary**. Words rarely exist in isolation; they are part of larger lexical, grammatical, and discourse structures. For example, learners who encounter a new word in a story, conversation, or academic text see how it

collocates with other words, how its meaning shifts depending on context, and how it is influenced by tone, genre, and communicative purpose. This process helps them understand not only *what* the word means, but also *how* it is used in different registers, *when* it is appropriate, and *why* certain lexical choices carry specific connotations.

Methodology

This article is conceptual and analytical in nature. It reviews existing theoretical perspectives and synthesizes findings from empirical studies in second language pedagogy. The analysis focuses on three dimensions of contextual learning:

1. **Discourse Context** – vocabulary learned through texts, conversations, stories, and authentic materials.
2. **Situational Context** – vocabulary introduced within real-life scenarios such as shopping, travel, or academic discussions.
3. **Cognitive Context** – mental schemas, background knowledge, and conceptual frameworks that connect words to meaning [6, 241].

The methodology aims to identify how each type of context contributes to lexical competence and what instructional practices are most effective.

Contextual learning also significantly supports **long-term retention**. According to cognitive psychology, information that is connected to prior knowledge and embedded in meaningful contexts is more easily stored and retrieved from memory. When learners repeatedly encounter vocabulary in various contexts—such as reading passages, spoken discourse, role-plays, and real-life situations—they establish stronger neural connections. These repeated contextual exposures reinforce memory traces, making vocabulary more readily available for both receptive and productive use.

Another major benefit of contextual learning is the improvement of **inference skills**. When learners come across unfamiliar words in context, they must rely on surrounding linguistic cues—such as syntactic structure, semantic relationships, discourse coherence, and background knowledge—to infer meaning. Over time, this develops autonomous learning strategies that enable students to decode and interpret new vocabulary without depending on direct translation or dictionary use. Such inferencing strategies are essential in advanced language comprehension, particularly when dealing with academic texts, idiomatic expressions, and culturally embedded meanings [5, 57].

Furthermore, contextual learning contributes to strengthening **communicative competence**, which includes grammatical, sociolinguistic, discourse, and strategic competencies. By interacting with vocabulary in realistic communicative settings, learners begin to understand the social rules governing language use: formality levels, politeness strategies, culturally appropriate expressions, and genre-specific lexical choices. This ultimately leads to more natural, accurate, and contextually appropriate communication.

Because lexical competence forms the foundation of overall communicative ability, contextual learning plays a central role in successful language acquisition.

Learners who develop vocabulary through authentic contexts are better equipped to express complex ideas, comprehend nuanced meanings, and participate effectively in real-life communication. In addition, contextualized instruction aligns with contemporary pedagogical approaches such as communicative language teaching (CLT), task-based learning (TBLT), corpus-based learning, and multimodal instruction [1, 233].

Context Supports Inferencing Skills

When learners meet unfamiliar words in context, they practice deducing meaning using:

- surrounding words
- syntax
- discourse markers
- background knowledge

These inferencing strategies are crucial for autonomous language learning.

Conclusion

Contextual learning plays a decisive role in developing lexical competence, enabling learners to understand vocabulary in its full semantic, pragmatic, and stylistic dimensions. By learning words within meaningful discourse and situations, learners achieve greater retention, improved accuracy, and enhanced communicative proficiency. In the context of modern language pedagogy, contextual learning emerges not only as an effective instructional strategy but as a necessary foundation for lexical development.

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DEVELOPING WRITTEN COMMUNICATION SKILLS: WRITING APPROPRIATE TO THE CONTENT, AUDIENCE, AND PURPOSE

Abstract. *This article examines the development of written communication skills with a focus on producing texts that are appropriate to their content, intended audience, and communicative purpose. Writing is a complex cognitive and linguistic process requiring the integration of lexical, grammatical, rhetorical, and pragmatic competencies. Modern educational approaches emphasize purposeful writing, genre awareness, and audience orientation as key factors that influence the clarity, coherence, and effectiveness of written messages. Drawing upon theories of discourse analysis, communicative competence, and writing pedagogy, the article highlights strategies that help learners produce well-structured, purposeful texts and discusses pedagogical implications for English language teaching. The findings suggest that explicit instruction in audience awareness, purposeful writing, and content organization significantly enhances students' ability to write with accuracy, relevance, and communicative impact.*

Keywords: *written communication, audience awareness, purposeful writing, content organization, communicative competence, genre awareness, writing pedagogy.*

Introduction

Written communication is widely recognized as a core component of literacy and an essential skill in academic, professional, and social contexts. It serves as a permanent record of thought, enabling individuals to articulate complex ideas, present arguments, engage in knowledge construction, and participate in institutional practices. Unlike spoken interaction—which is immediate, context-rich, and supported by paralinguistic cues—**writing is decontextualized**, meaning the writer must anticipate potential misunderstandings without the possibility of instant feedback. Because readers cannot ask the author to clarify ambiguous statements, the responsibility for ensuring clarity lies entirely with the writer. This places substantial cognitive demands on planning, linguistic encoding, restructuring, and revision.

From the perspective of **cognitive psychology**, writing involves the interaction of working memory, long-term memory, and executive control. Writers must simultaneously manage content generation, text organization, grammatical encoding, and attention to lexical selection. This complexity explains why effective writing requires deliberate organization, coherence-building, and precision in linguistic form. Moreover, written texts must follow conventionalized structures appropriate to the genre, such as introductions, arguments, evidence,

and conclusions in academic writing, or clear sequencing and audience-friendly explanations in professional communication.

A defining feature of proficient writing is sensitivity to three interrelated components: **content**, **audience**, and **purpose**.

- **Content** determines what information is included, how ideas are selected, and the depth of explanation.
- **Audience** influences the tone, level of formality, register, degree of technicality, and assumed background knowledge.
- **Purpose** shapes the rhetorical organization of the text—whether the goal is to inform, persuade, describe, request, or reflect.

These dimensions are central to **communicative competence**, especially its discourse and sociolinguistic components. Scholars such as Canale & Swain (1980) argue that communication is not simply about grammar but about using language appropriately in context. Therefore, effective writing is a synthesis of linguistic accuracy, pragmatic appropriateness, and textual cohesion.

In the context of **second language (L2) education**, developing strong written communication skills presents unique challenges. Learners often lack sufficient lexical resources, grammatical control, and genre-awareness to express ideas with precision. Many students transfer writing habits from their first language, which may not align with the rhetorical conventions of English. Research in contrastive rhetoric (Kaplan, 1966; Connor, 2002) demonstrates that different cultures organize texts differently, influencing paragraph structure, argumentation styles, and expectations of clarity or explicitness. Consequently, L2 learners must not only acquire new linguistic forms but also internalize culturally embedded writing practices.

As written communication becomes increasingly critical in digital environments—email correspondence, online learning platforms, workplace documentation, and academic publishing—educators must adopt pedagogical approaches that address these complex demands. Modern writing pedagogy emphasizes **contextualized instruction**, where students learn writing through meaningful tasks, authentic models, and real communicative purposes.

The development of written communication skills draws on several major theoretical perspectives in applied linguistics and literacy studies. This article integrates **Communicative Competence Theory**, **Genre Theory**, and the **Process Writing Model** as complementary frameworks that collectively explain how writers produce texts that are meaningful, contextually appropriate, and aligned with communicative goals. Each theory contributes unique insights into the nature of writing as a cognitive, linguistic, and socio-cultural practice. Their integration provides a robust foundation for instructional approaches that promote sophisticated and effective writing in first and second language contexts Communicative Competence Theory, originally conceptualized by Hymes (1972) and later elaborated by Canale and Swain (1980), presents communication as a socially situated, purposeful activity that requires more than grammatical accuracy. It argues that effective communication depends on a speaker's or

writer's ability to deploy language appropriately according to context, audience, and intent.

In the context of **written communication**, communicative competence includes several interrelated components:



This framework highlights that effective writing is inherently **audience-centered**, requiring the writer to anticipate readers' expectations, background knowledge, and interpretive needs. Communicative Competence Theory therefore underscores the importance of contextual awareness and pragmatic decision-making in developing writing that is accurate, coherent, and purposeful.

Conclusion

Developing written communication skills requires more than grammatical accuracy; it demands the ability to produce texts that are appropriate for the intended content, audience, and purpose. Through explicit instruction in genre conventions, contextualized writing tasks, and process-oriented pedagogy, learners can acquire the necessary competencies to write effectively in academic, professional, and real-world settings. As written communication continues to be a crucial medium of interaction, particularly in digital and globalized environments, cultivating these skills remains a priority in modern language education.

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TA’LIM TEXNOLOGIYALARI ASOSIDA TALABALARNING KREATIV FIKRLASH QOBILYATINI SHAKLLANTRISH

Annotatsiya: *Ushbu maqolada bugungi kun talablariga mos kelgan xolda, kreativ qobiliyatni shakllantirish va rivojlantirish muammosi, muallif tomonidan uning nazariy asoslari, mazmuni yoritilgan. Maqolada talabalarda kreativlik fikrlash salohiyatini rivojlantirish metodlari va mazkur jarayon bilan bog‘liq kasbiy pedagogik xususiyatlar haqida fikr yuritilgan.*

Kalit so‘zlar: *kreativlik, ijodiy qobiliyat, kreativ fikrlash, ijodiy yo‘nalganlik.*

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FORMING STUDENTS' CREATIVE THINKING ABILITY BASED ON EDUCATIONAL TECHNOLOGIES

Annotation: *This article discusses the problem of the formation and development of creative abilities, its theoretical foundations and content, in accordance with today's requirements. The article discusses methods for developing creative thinking in students and professional pedagogical features related to this process.*

Key words: *creativity, creative abilities, creative thinking, creative orientation.*

Kirish

O‘zbekiston Respublikasi Prezidentining 2019-yil 29-apreldagi PQ–4312-son qarorida ta’lim tizimini modernizatsiya qilish, o‘quvchilarning tanqidiy va kreativ fikrlashini shakllantirish ustuvor yo‘nalish sifatida belgilangan. Shu asosda “Raqamli ta’lim” va “STEAM-ta’lim” loyihalari keng joriy etilmoqda.

Mahalliy olimlar (X. Abduqodirov, Z. Yuldasheva, N. Raximova) o‘z tadqiqotlarida interfaol metodlar (debate, case-study, brainstorming, klaster, loyiha asosida o‘qitish) talabalarning kreativ fikrlash ko‘nikmalarini rivojlantirishda eng samarali usullardan biri ekanini isbotlaganlar.

Bugungi globallashuv davrida ta’lim jarayonining asosiy maqsadi – talabalarda mustaqil fikrlash, yangilik yaratish va ijodiy yondashuv ko‘nikmalarini shakllantirishdan iboratdir. Ayniqsa, ta’limning birinchi bosqichida talabalarning kasbga bo‘lgan tafakkurini shakllanishi va rivojlanishi uchun ta’lim texnologiyalari asosida talabalarning kreativ fikrlashi kelajakdagi o‘z kasbining

etuk mutaxassisi bo‘lishida muhim ahamiyat kasb etadi. Chunki bu texnologiyalar orqali har bir talabaning individual xususiyatlari, qiziqishlari va qobiliyatlarini hisobga olgan holda ta’lim tashkil etiladi.

Adabiyotlar tahlili

Kreativ fikrlash tushunchasi va uning o‘rni bo‘yicha dunyodagi yetakchi Psixolog olimlar J. Guilford va E. Torrance kreativ fikrlashni inson tafakkurining yuqori darajasi deb ta’riflaydilar. Ularning fikricha, kreativlik faqat san’at yoki ixtirochilik bilan cheklanmay, balki o‘quv jarayonining barcha bosqichlarida namoyon bo‘lishi mumkin.

O‘zbekistonlik tadqiqotchilardan O. Musurmonova (2019) va M. Qodirova (2021) o‘quvchilarda kreativ fikrlashni rivojlantirish uchun ta’lim texnologiyalaridan — interfaol metodlar, axborot-kommunikatsiya vositalari va muammoli ta’lim usullaridan foydalanish samarali ekanini ta’kidlaydilar.

Ta’lim texnologiyalari va kreativ fikrlashning o‘zaro bog‘liqligi: Pedagogik texnologiyalar (V.P. Bespalko, 1989; Yu.K. Babanskiy, 1990) ta’lim jarayonini tizimli, natijaga yo‘naltirilgan va samarali tashkil etishni nazarda tutadi. Zamonaviy sharoitda raqamli ta’lim texnologiyalari (masalan, interaktiv doskalar, onlayn ta’lim platformalari, virtual laboratoriyalar) o‘quvchilarda mustaqil fikrlash, tahliliy yondashuv va ijodkorlikni rag‘batlantiradi.

Tadqiqotlar (Anderson & Krathwohl, 2001) shuni ko‘rsatadiki, Bloom taksonomiyasi asosida qurilgan dars jarayoni o‘quvchining bilish faoliyatini past darajali (bilish, tushunish) bosqichlardan yuqori (tahlil, sintez, baholash, yaratish) darajalarga olib chiqadi. Aynan “yaratish” bosqichi kreativ fikrlashni rivojlantirishga xizmat qiladi.

Xorijda, xususan, Finlyandiya, Janubiy Koreya va AQSh ta’lim tizimlarida o‘quvchilarning kreativ fikrlashini rivojlantirishda problem-based learning (PBL), design thinking va project-based learning metodlari keng qo‘llanadi (Trilling & Fadel, 2009). Bu yondashuvlar o‘quvchini faqat bilim oluvchi emas, balki yechim izlovchi, mustaqil fikrlovchi subyekt sifatida shakllantiradi.

Tadqiqot metodologiyasi

Maqolada shaxsga yo‘naltirilgan ta’lim texnologiyalari mohiyatiga ham alohida e’tibor qaratilgan. Shaxsga yo‘naltirilgan ta’lim – bu o‘quvchining bilim egallash jarayonida uning shaxsiy ehtiyojlari va imkoniyatlarini markazga qo‘ygan holda ta’limni tashkil etishdir. Ushbu yondashuv: talabalarning mustaqil fikrlash va ijodkorlik qobiliyatlarini rivojlantirish, har bir talabaning individual o‘ziga xos tomonlarini e’tiborga olish, ta’limda hamkorlik va erkinlik muhiti yaratish, interaktiv metodlardan keng foydalanishlarni o‘z ichiga oladi.

Kreativ fikrlashga yo‘naltirilgan ta’lim texnologiyalari - bu ta’lim jarayonida talaba shaxsini markazga qo‘ygan holda uning kasbga bo‘lgan qobiliyati, qiziqishi, ehtiyoji va rivojlanish darajasini inobatga olib, bilim berishni tashkil etish usullaridir.

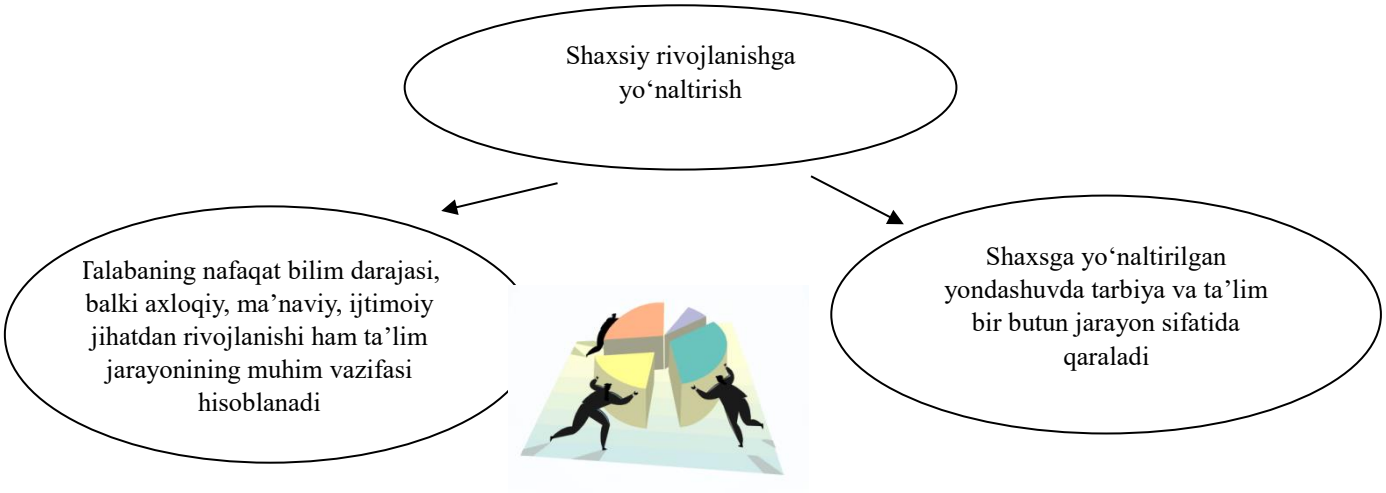
Bu yondashuvning mohiyati quyidagilarda namoyon bo‘ladi ya’ni talaba shaxsini asosiy qadriyat sifatida tan olish, talaba faqat bilim oluvchi emas, balki

faol ishtirokchi va sub’ekt hisoblanadi, ta’limda talabaning qiziqishi, qobiliyati va ehtiyojlari birinchi o‘rinda turadi.

Individuallashtirish va differensial yondashuv: har bir talabaning imkoniyati turlicha bo‘lgani sababli ta’lim ham ularning shaxsiy xususiyatlariga mos ravishda tashkil qilinadi, kuchli talabalar uchun murakkab topshiriqlar, qiyinchilikka duch kelayotgan talabalar uchun qo‘shimcha ko‘mak beriladi.

Talabaning ijodkorligi va mustaqil fikrlashini rivojlantirish: kreativ fikrlashga yo‘naltirilgan texnologiyalar o‘quvchini tayyor bilimni yodlashga emas, balki o‘zi mustaqil izlanib topishga, yangicha fikr yuritishga undaydi, bunda “SWOT”, “Aqliy hujum”, “Munozara”, “Klaster” kabi interaktiv metodlar ijodiy tafakkurni shakllantiradi.

Doimo hamkorlik muhitini yaratishda o‘qituvchi va talaba o‘rtasida hamkorlik tamoyili ustuvor bo‘ladi, guruhlarda ishlash, o‘zaro fikr almashish orqali talabalar bir-biridan o‘rganadilar va jamoaviy ijodkorlik yuzaga keladi.



Ta’lim jarayonining moslashuvchanligi:

- dars jarayonida qat’iy qolipdan foydalanilmaydi.
- talabalarning qiziqishlariga qarab mavzu topshiriqlari yoki metodlar turlicha tashkil qilinadi.

Ta’lim muassasalarida kreativ fikrlashni rivojlantirish zarurati XXI asrda ta’lim sohasida yuz berayotgan tub o‘zgarishlar zamonaviy texnologiyalarni o‘quv jarayoniga keng joriy etishni taqozo etmoqda. Intellektual axborot texnologiyalari taraqqiyoti, raqamli vositalar va virtual resurslarning rivojlanishi nafaqat o‘quv jarayonini interaktivlashtirish, balki talabalarning kreativ fikrlash qobiliyatini rivojlantirish uchun keng imkoniyatlar yaratdi. Ayniqsa, oliy ta’lim muassasalari talabalari uchun kreativ fikrlash ko‘nikmalarini shakllantirish ularning kelajakdagi intellektual va ijtimoiy rivojlanishi uchun muhim ahamiyat kasb etadi.

Kreativ fikrlash - bu mavjud axborot asosida yangi g‘oyalar yaratish, muammoni noodatiy yondashuvlar orqali hal qilish va o‘ziga xos qarorlar qabul qilish qobiliyatidir. Ushbu qobiliyat insonning hayotiy muvaffaqiyatida muhim ro’l o‘ynaydi. Ta’lim bosqichlarida talabalar tabiiy qiziquvchanlik va o‘rganishga bo‘lgan yuqori ehtiyojga ega bo‘lib, bu jarayonda zamonaviy texnologiyalarning

ta’siri ularning ijodiy salohiyatini rivojlantirishda kuchli omil sifatida namoyon bo‘ladi.

Zamonaviy ta’lim texnologiyalarining asosiy afzalliklaridan biri — talabalarning dars jarayonida faol ishtirok etishiga imkon yaratishidir. Masalan, interaktiv doskalar va multimedia vositalari orqali mavzuni vizual va eshitish orqali yaxshiroq o‘zlashtiradilar. Bu esa ularning abstrakt fikrlash qobiliyatini kuchaytiradi. Interaktiv taqdimotlar, audio va video materiallar yordamida bilimlarni yanada qiziqarli shaklda taqdim etiladi.

Kreativ fikrlashni rivojlantirishda yana bir muhim omil — bu kodlash va dasturlash asoslarini o‘rgatish hisoblanadi. Masalan, Scratch va Blockly dasturlari bolalarga dasturlash asoslarini o‘rgatibgina qolmay, balki mantiqiy fikrlash, algoritmik yondashuv va tizimli muammolarni hal qilish qobiliyatini rivojlantiradi. Talabalar o‘z loyihalarini yaratishda turli muammolarga ijodiy yechim topish, yangi g‘oyalarni ishlab chiqish va ularni amalda qo‘llash imkoniyatiga ega bo‘ladilar. Shuningdek, guruhli ishlar va onlayn musobaqalar orqali talabalar birgalikda ishlash, muammolarni tahlil qilish va kreativ fikrlarni ishlab chiqish ko‘nikmalarini rivojlantiradilar.

Masalan, biror mavzu bo‘yicha loyiha tayyorlash jarayonida talabalar o‘zaro fikr almashadilar, bir-birining g‘oyalarini qo‘llab-quvvatlaydilar va ijodiy qarorlar qabul qiladilar.

Biroq zamonaviy texnologiyalarni o‘quv jarayonida qo‘llashda muayyan muammolar ham mavjud.

Masalan: - texnologiyaga haddan tashqari bog‘lanish: bu o‘quvchilarning ijtimoiy ko‘nikmalarini pasaytirishi va mustaqil fikrlashni cheklashi mumkin.

- diqqatni jamlash qiyinligi: tezkor va ko‘p axborot oqimi bolalarning diqqatini muayyan vazifaga to‘liq qaratishiga to‘sqinlik qilishi mumkin.

- axborot xavfsizligi: onlayn resurslardan foydalanishda bolalarni zararli kontentdan himoya qilish muhim.

Shu sababli, texnologiyalardan foydalanishda talabaning didi va pedagogik mahorati katta ahamiyatga ega. Texnologiyalar vosita bo‘lib xizmat qilishi, asosiy e’tibor esa talabalarning mustaqil fikrlash, ijodiy yondashuv va muammolarni hal qilish qobiliyatlarini shakllantirishga qaratilishi lozim.

Natijalar va ularning tahlili

Tadqiqot davomida ta’lim texnologiyalarini o‘quv jarayoniga tatbiq etish orqali talabalarning kreativ fikrlash qobiliyatlarini rivojlantirish darajasi o‘rganildi. Quyida tajriba-sinov ishlari asosida olingan asosiy natijalar va ularning tahlili keltiriladi.

Boshlang‘ich holatni aniqlash: Tajriba boshlanishida talabalarning kreativ fikrlash darajasi maxsus diagnostik topshiriqlar (masalan, “Ijodiy yechim topish”, “Muammoni noodatiy yo‘l bilan hal etish”, “G‘oya ishlab chiqish”) yordamida aniqlandi. Natijalar shuni ko‘rsatdiki:

yuqori darajadagi kreativlik – 15%,

o‘rta daraja – 50%,

past daraja – 35% talabalarda kuzatildi.

Bu esa talabalarning aksariyatida ijodiy fikrlashni rivojlantirish ehtiyoji mavjudligini ko‘rsatdi.

Tajriba davomida quyidagi texnologiyalar qo‘llandi:

- Muammoli ta’lim texnologiyasi – talabalarga ochiq savollar va noodatiy vazifalar berish orqali ularni mustaqil fikrlashga undash;
- Klaster va aqliy hujum (brainstorming) usullari – g‘oya ishlab chiqish va ularni tahlil qilishga yo‘naltirish;
- Multimedia va interaktiv platformalar (Kahoot, Padlet, Canva, Mentimeter va boshqalar) – talabalarning faol ishtirokini oshirish va vizual fikrlashni rivojlantirish;
- Loyiha asosida o‘qitish (project-based learning) – talabalarga amaliy topshiriqlar asosida ijodiy g‘oyalar ishlab chiqish imkonini berish.

Olingan natijalar quyidagilarni ko‘rsatadi: ta’lim texnologiyalarining o‘zaro uyg‘un qo‘llanishi talabalarning mustaqil va ijodiy fikrlashini rag‘batlantirgan; interaktiv vositalar orqali talabalar o‘z g‘oyalarini erkin ifoda etish, boshqalar bilan fikr almashish imkoniyatiga ega bo‘lgan; loyiha asosida o‘qitish ularning muammoni kompleks tahlil qilish, amaliy yechim ishlab chiqish ko‘nikmalarini rivojlantirgan; talabalarda o‘z fikrini asoslab berish, muqobil yechimlarni topish, mantiqiy va vizual fikrlash darajasi ancha oshgan.

Natijada, zamonaviy texnologiyalar va an’anaviy ta’lim usullarini uyg‘unlashtirish orqali talabalarining kreativ fikrlashini samarali rivojlantirish mumkin.

Zamonaviy texnologiyalar talabalarning kreativ fikrlashini rivojlantirishda kuchli vosita sifatida namoyon bo‘ladi. Interaktiv vositalar, virtual laboratoriyalar, mobil ilovalar, dasturlash asoslari va gamifikatsiya elementlari o‘quv jarayonini yanada samarali va qiziqarli qiladi.

Talabalar yosh xususiyatiga ko‘ra tez o‘zgaruvchan, qiziquvchan va ijodiy faoliyatga moyil bo‘ladilar. Shu sababli bu davrda ularda kreativ fikrlashni rivojlantirish ularning kelajakdagi muvaffaqiyatlari uchun poydevor bo‘lib xizmat qiladi.

Kreativ fikrlash: yangicha yechim topa olish, muammoga noodatiy yondashish, mustaqil qaror qabul qilish, fantaziya va tasavvur imkoniyatlaridan foydalanishni anglatadi.

XULOSA

Oliy ta’lim muassasalarida shaxsga yo‘naltirilgan ta’lim texnologiyalarini qo‘llash orqali talabalarning kreativ fikrlash qobiliyatini samarali rivojlantirishga imkon yaratadi. Bu esa o‘z navbatida ularning kelgusidagi kasbiy jarayonida mustaqil, ijodiy va tashabbuskor shaxs sifatida shakllanishiga xizmat qiladi. Shunday qilib, kreativ fikrlash zamonaviy ta’limning asosiy talabi bo‘lib, yosh kelajak avlodni har tomonlama barkamol qilib tarbiyalashda muhim metodik asos hisoblanadi. Ta’lim texnologiyalarini to‘g‘ri tanlash va tizimli qo‘llash talabalarning kreativ fikrlash qobiliyatlarini sezilarli darajada rivojlantiradi. Bu esa o‘quv jarayonida zamonaviy pedagogik texnologiyalarni tatbiq etish zaruriyligini va ularning samaradorligini amaliy jihatdan isbotlab berdi.

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UZLUKSIZ TA'LIM JARAYONIDA MALAKAVIY ISHLAR SAMARADORLIGI

Anatatsiya: *Ushbu maqolada uzluksiz ta'lim jarayonida malakaviy ishlarning o'rni va ularning o'quvchilar hamda talabalar kompetensiyasini shakllantirishdagi ahamiyati tahlil qilinadi. Malakaviy ishlarni samarali tashkil etish tamoyillari, pedagogik yondashuvlar hamda nazariy bilimlarni amaliyot bilan bog'lash mexanizmlari yoritiladi. Shuningdek, innovatsion metodlardan foydalanish orqali malakaviy ishlar sifatini oshirish bo'yicha tavsiyalar beriladi.*

Kalit so'zlar: *uzluksiz ta'lim, malakaviy ish, kompetensiya, pedagogik texnologiya, amaliyot, innovatsion metodlar, samaradorlik.*

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THE EFFECTIVENESS OF QUALIFICATION WORKS IN THE CONTINUOUS EDUCATION PROCESS

Annotation: *This article analyzes the role of qualification works in the continuous education process and their importance in developing the competencies of pupils and students. It describes the principles of effectively organizing qualification works, pedagogical approaches, and mechanisms for linking theoretical knowledge with practical application. In addition, recommendations are provided for improving the quality of qualification works through the use of innovative methods.*

Keywords: *continuous education, qualification work, competence, pedagogical technology, practice, innovative methods, effectiveness.*

Kirish

Oliy ta'lim va kasb-hunar ta'limi o'rtasidagi uzviylikni ta'minlash muammosi nazariy va amaliy jihatdan yetarli darajada hal etilmaganligining asosiy sababi, umumiy o'rta, o'rta maxsus, kasb-hunar ta'limi va oliy ta'lim tizimida o'qitishda didaktikaning izchillik prinsipiga amal qilmaslik va o'qitishning turli bosqichlari o'rtasidagi uzviylikni e'tiborga olmaslikdadir.

O'qitishda uzviylik bu didaktik prinsip bo'lib, u ta'lim mazmunini ifodalovchi o'quv rejalari, dasturlar, darsliklarda o'quv materiallarining bir-biri bilan mantiqan bog'liq bo'lishini, oldin o'zlashtirilgan bilimlarga tayangan holda

keyingilarini o‘zlashtirishga tayyorlashni, bo‘lajak mutaxassislarda ta’limning har bir bosqichida ma’lum darajada bilim, ko‘nikma va malakalarni shakllantirishning talab qiluvchi prinsipidir.

Adabiyotlar tahlili

Uzluksiz ta’lim konsepsiyasi bo‘yicha olib borilgan ilmiy tadqiqotlar ta’limning barcha bosqichlarida shaxsning doimiy rivojlanishini ta’minlashga qaratilganligini ko‘rsatadi. Xorijiy hamda yurtimiz pedagog olimlari J.Dewey, B.Bloom, N.Saidahmedov, R.Ishmuhamedov va boshqalar, uzluksiz ta’lim tizimini bilim, ko‘nikma va kompetensiyalarni izchil rivojlantirishga xizmat qiluvchi yagona jarayon sifatida ta’riflaydilar.

Malakaviy ishlarning samaradorligi masalasida tadqiqotchilar quyidagi jihatlarni alohida ta’kidlaydilar:

Amaliyotga yo‘naltirilganlik Adabiyotlarda malakaviy ishlar nazariy bilimlarni amaliy muammolarni hal qilishga yo‘naltirishi zarurligi qayd etiladi (N.Azizxo‘jayeva, P.P.Blonskiy). Bunda talabaning kasbiy kompetensiyalarini shakllantirish asosiy o‘rin tutadi.

Innovatsion yondashuvlar Zamonaviy tadqiqotlar (I.Yuldoshev, R.Ishmuhamedov) ta’limda interfaol metodlar, AKT vositalari, loyiha asosida o‘qitish malakaviy ishlarning sifatini oshirishini asoslaydi. Innovatsion texnologiyalar qo‘llanilgan ishlar talabaning mustaqil fikrlashi va ijodkorligini rivojlantiradi.

Tadqiqot metodologiyasining to‘g‘ri qo‘llanilishi Malakaviy ishlarning muvaffaqiyati ko‘p jihatdan ilmiy metodlarning to‘g‘ri tanlanishiga bog‘liq. Pedagogik tadqiqotlar (Y.Xo‘jayev, L.Kulyutaeva) empirik ma’lumotlar yig‘ish, tahlil qilish, tajriba-sinov ishlarini puxta tashkil etishning ahamiyatini ta’kidlaydi.

O‘quvchi/talabaning mustaqil ta’limi Adabiyotlarda aytilishicha, uzluksiz ta’lim sharoitida malakaviy ishlar o‘quvchining yoki talabaning mustaqil izlanish ko‘nikmalarini shakllantirishda muhim vositadir (A.Sa’diev, A.Jalolov). Mustaqillik darajasi oshgan sari ishning samaradorligi ham ortadi.

Baholash mexanizmlarining takomillashuvi Tadqiqotchilar malakaviy ishlarni baholashda kompetensiyaviy yondashuv qo‘llanilishi kerakligini, an’anaviy baholash mezonlari esa to‘liq natija bermasligini ta’kidlashadi. Zamonaviy adabiyotlarda portfel, rubrika va loyiha baholash usullari samarali deb topilgan

Tadqiqot metodologiyasi

Kasb-hunar ta’limi o‘quv muassasalarining oldingi o‘quv bosqichi – umumiy o‘rta ta’lim maktablari va keyingi pog‘onada turgan oliy ta’lim muassasalari bilan uzluksiz aloqalari orqali ta’lim tizimida uzviylik va uzluksizlikni ta’minlash muhim vazifalardan biridir. Uzviylik – umumpedagogik prinsip bo‘lib, ta’lim va tarbiyaning har bir pog‘onasi, bosqichi, qirralari orasida o‘zaro bog‘liqlikni ta’minlashni, har bir oldingi pog‘onada, bosqichlarda o‘zlashtirilgan tushuncha, tassavvurlar, ko‘nikma va malakalarni kengaytirib, chuqurlashtirib borish natijasida ta’lim va tarbiyada sifatli o‘zgarishlarga olib kelishni taqazo etadi. Shuning uchun o‘quv-tarbiyaviy jarayonni amalga

oshirishda ma’lum nomutanosibliklar mavjud. Ko‘p qo‘llanmalarda, maqolalarda uzviylik va izchillikni ta’minlash haqida deklarativ xarakterdagi shiorlar bor, ammo, uzviylikni qanday ta’minlash kerak, bunga asos nima bo‘ladi, uzviylikni ta’lim mazmunining qaysi predmetlari, bloklari, bosqichlari yoki boshqa hollarda ta’minlanishi mumkinligi haqida ko‘rsatmalar mavjud emas. Shundan kelib chiqqan holda uzviylikni ta’minlashning imkoniyatlarini aniqlash, asoslash uchun chuqur ilmiy izlanish va tahlil ishlarini olib borish va amalga oshirish zarur.

Uzluksiz ta’lim tizimida uzviylikni ta’minlashdan asosiy maqsad – bo‘lajak mutaxassislarni tayyorlash sifatini oshirish, ta’lim va tarbiya jarayonining tarkibiy qismlari orasidagi bog‘lanishlarni muvofiqlashtirish, bilim, ko‘nikma va malakalarni ta’lim standartlari talablariga muvofiqligini ta’minlash hamda mutaxassislarda raqobatbardoshlik kasbiy sifatlarini shakllantirishdan iborat.

Ma’lumki, oliy ta’lim muassasa oliy ta’lim muassasalarida o‘qitish jarayoni samaradorligining muhim ko‘rsatkichi bo‘lajak mutaxassislarning bilim va ko‘nikmalarini nazorat qilish va baholash jarayonida aniqlanadigan ko‘rsatkich o‘quv maqsadlariga erishish darajasi hisoblanadi. Biroq, bilimlarni nazorat qilish va baholashning odatdagi metodikasi o‘qitishning pirovard natijalarini baholash masalasini xal etmaydi.

Bahoning ob’ektivligiga talabaning hulqi, o‘zini tuta bilish uslubi, pedagog va talabaning kommunikativ sifatlari va boshqa ko‘pgina omillar beixtiyor ta’sir qiladi. Bunda qo‘yiladigan baho oldin javob bergan talabalarning DAK a’zolarida qoldirgan taassurotiga bog‘liq bo‘ladi. Jumladan, BMI natijalari bilan o‘rtacha ishtirok etish undan oldin qatnashgan a’lo darajadagi chiqish oldida yana ham yomon ko‘rinishga ega bo‘lishi va aksincha oldingi chiqish qoniqarsiz bo‘lgan bo‘lsa, biroz yutuqqa erishishi mumkin. Bahoning ob’ektivligiga shuningdek javob beruvchining nutqi ham ta’sir ko‘rsatadi. Ilmiyga o‘xshash tildan, maxsus atamalardan foydalanib u DAK a’zolarining savollariga to‘g‘ri javob berishdan qochib, chalg‘ituvchi mulohazalardan foydalanadi va ba’zida xoxlagan natijasiga erishadi.

Natijalar va ularning tahlili

Baholarning sub’ektivligi, nazorat qilish natijalarining qayta tiklanmasligi ta’limda realistik va ta’sirchan qarorlarni qabul qilish mumkin emasligiga olib keladi. Moskvada 1995 yilda bo‘lib o‘tgan “Turli o‘qitish bosqichlarida va OTM ni akkretizatsiyadan o‘tkazishda talabalarning bilimlarini nazorat qilishning zamonaviy shakl va metodlari” mavzusidagi konferensiya–seminarda baholash jarayonining ob’ektivligi va haqqoniyligini oshirishning quyidagi ikki asosiy yo‘nalishi tavsiya etildi:

1) o‘lchash sifatini takomillashtirish (baholashga ekspertlarni jalb qilish, baholash algoritmlarini ishlab chiqish, kvalimetrik shkalalarni qo‘llash va h.k.);

2) bilimlarni test yordamida nazorat qilishga o‘tish.

Tahlil yo‘nalishi	Holat / Jarayon	Samaradorlik ko‘rsatkichlari	Muammolar	Takliflar
Rejalashtirish	Malakaviy ish mavzulari ta’lim bosqichlariga mos tanlanadi	Mavzularning 80–90% ixtisoslikka mos	Ba’zan mavzular yangilikdan uzoq	Mavzularni bozor ehtiyoji asosida yangilash
Ilmiy-metodik rahbarlik	Rahbar tomonidan muntazam maslahat beriladi	Talabaning ilmiy kompetensiyasi oshadi	Rahbar–talaba uchrashuvlari yetarli emas	Uchrashuv jadvalini raqamlashtirish, monitoring
Tadqiqot jarayoni	Amaliy va nazariy izlanishlar olib boriladi	Talabalar real kasbiy vaziyatlarni o‘rganadi	Ma’lumot olishda qiyinchiliklar	Hamkor tashkilotlar bilan memorandumlar kuchaytirish
Ilmiy natijalar	Xulosa va takliflar ishlab chiqiladi	70–80% loyihalar amaliyotga joriy etish mumkin	Ba’zi takliflar umumiy bo‘lib qoladi	Analitik fikrlashni rivojlantirish bo‘yicha trening
Himoya jarayoni	Komissiya oldida taqdimot qilinadi	Talabalarning nutq va taqdimot ko‘nikmalari oshadi	Stress sababli natija pasayishi mumkin	Himoya oldi sinovlarini joriy qilish
Umumiy samaradorlik	Jarayon bosqichma-bosqich amalga oshiriladi	Malakaviy ishlar ta’lim sifatini oshiradi	Jarayonning yagona standartga tushmasligi	Metodik qo‘llanmalar yaratish, standartlashtirish

Xulosa sifatida shuni aytish mumkinki yuqorida bayon qilinganlardan kelib chiqqan holda BMIni baholash jarayoniga quyidagi talablar tizimini kiritish mumkin: validlik–malaka tavsiflarida va malaka talablarida mavjud bo‘lgan o‘qitishning pirovard maqsadlariga erishish darajasi va kasb faoliyatining to‘liq tarkibdagi masalalarini baholashga yo‘naltirilganlik; ishonchlilik – baholarning haqqoniyligi, ob’ektivligi; bahoning to‘liqligi – baholash predmetlarining to‘liqligi: kasb faoliyatining to‘liq tarkibdagi xossalarida tizimini baholashga yo‘naltirilganlik; kompetensiyalarni baholash vositalari bilan qamrab olish, bu vazifalarga mos keladigan barcha MT larni hisobga olish; texnologiklik–baholovchi vositalar va texnologiyalardan foydalanish, baholashni qulayligi, tizimdagi baholashning axborotlari qulayligi; tejamkorlik; bahoning zamonaviy darajasiga (madaniyatiga) mosligi–vatanimiz va chet el baholash vositalari va baholash texnologiyasi, ularning tarkibi, tuzilmasi va mazmunining eng yaxshi namunalari bilan taqqoslab baholanadi. Bular bilan bir qatorda baholashning majmuaviyligini ta’minlash talabiga ham rioya qilish maqsadga muvofiq.

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METABOLIZM JARAYONIDA ENERGIYANING HOSIL BO‘LISHI VA SARFLANISHI

Annotatsiya: *Ushbu maqolada metabolizm jarayonlarida energiya hosil bo‘lishi va sarflanishining biologik va biokimyoviy mexanizmlari ilmiy nuqtai nazardan ko‘rib chiqiladi. Hujayra darajasida sodir bo‘ladigan asosiy reaksiyalar, ularning energetik almashinuvdagi roli va ATP molekulasining markaziy energiya tashuvchisi sifatidagi funksiyasi tahlil qilinadi. Shuningdek, katabolizm va anabolizm o‘rtasidagi o‘zaro bog‘liqlik hamda bu jarayonlarni ta’minlovchi fermentativ tizimlarning ahamiyati yoritiladi. Tadqiqot natijalari metabolik jarayonlarning organizmning hayotiy faoliyatini qo‘llab-quvvatlashdagi o‘rnini chuqur anglashga yordam beradi.*

Kalit so‘zlar: *metabolizm, energiya almashinuvi, ATP, katabolizm, anabolizm, hujayra energetikasi.*

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ENERGY PRODUCTION AND EXPENDITURE IN METABOLIC PROCESSES

Annotation: *This research article examines the biological and biochemical mechanisms of energy production and expenditure within metabolic processes. It*

provides a scientific analysis of key cellular reactions, their role in energy conversion, and the central function of ATP as the primary energy carrier in living organisms. The interrelationship between catabolism and anabolism, as well as the enzymatic systems that regulate these processes, is thoroughly explored. The findings contribute to a deeper understanding of how metabolic pathways sustain vital physiological functions, maintain energy balance, and ensure the structural and functional integrity of cells.

Keywords: *metabolism, energy metabolism, ATP, catabolism, anabolism, cellular energetics, energy balance*

Kirish

Moddalar almashinuvi (metabolizm) — organizmda kechuvchi barcha kimyoviy jarayonlarning majmui bo‘lib, hayotiy faoliyatni qo‘llab-quvvatlaydi. Ushbu jarayonlar nafaqat energiya ishlab chiqarish, balki hujayralarning tiklanishi, o‘sishi, yangilanishi va muhitga moslashuvini ham ta’minlaydi. Metabolizmning asosiy ikki bo‘g‘ini — katabolizm va anabolizm — o‘zaro bir-birini to‘ldiradi: katabolik reaksiyalar energiya ajratadi, anabolik jarayonlar esa bu energiyani o‘zlashtiradi.

Organizmda zarur bo‘lgan energiya asosan uglevodlar, yog‘lar va oqsillar oksidlanishi natijasida hosil bo‘ladi. Ushbu oksidlovchi reaksiyalar ketma-ketligi natijasida ATP sintezlanadi, u barcha hayotiy jarayonlarni energiya bilan ta’minlovchi universal molekuladir.

Adabiyotlar tahlili

Biologikkimyo fanida metabolizmning molekulyar asoslari keng o‘rganilgan. Lehninger, Voet, Stryer kabi mualliflarning ilmiy ishlari metabolik yo‘llarning tuzilishi va funksional xususiyatlarini aniqlashda muhim o‘rin tutadi. Zamonaviy tadqiqotlar, xususan mitoxondrial nafas olish zanjiri, oksidlovchi fosforillanish va glyukoza almashinuvining tartibga solinishi, organizmdagi energiya muvozanati uchun asosiy faktorlar sifatida ko‘rib chiqiladi.

Energetik almashinuvning buzilishi metabolik sindrom, semirish, 2-tur qandli diabet kabi kasalliklarning shakllanishiga sabab bo‘lishi haqida ko‘plab ilmiy manbalarda ta’kidlab o‘tilgan. Shuningdek, gormonal boshqaruv — insulin, glukagon, katexolaminlar — metabolizmning markaziy regulyatorlaridan biri ekanligi ilmiy adabiyotlarda keng yoritilgan.

Materiallar va metodlar

Maqolani ishlab chiqishda quyidagi metodologik yondashuvlar qo‘llandi:

- metabolik jarayonlarga doir ilmiy manbalarni tahliliy solishtirish;
- hujayraviy nafas olishning bosqichlarini energetik nuqtai nazardan o‘rganish;
- fermentativ reaksiyalarni strukturaviy tahlil qilish;
- ATP sintezi va sarflanishining molekulyar mexanizmlarini izohlash.

Tadqiqot asosan ochiq ilmiy manbalar, darsliklar, biokimyo bo‘yicha xalqaro adabiyotlar va elektron ma’lumotlar bazalari asosida amalga oshirildi.

Natijalar

Katabolizm jarayonlari va energiya ajralishi-Uglevodlar, lipidlar va oqsillarning parchalanishi ketma-ket uch bosqichda kechadi:

Tayyorgarlik bosqichi. Ovqat hazm qilish fermentlari ta’sirida murakkab moddalar oddiy molekulalarga ajraladi:

- oqsillar → aminokislotalar,
- yog‘lar → glitserin va yog‘ kislotalari,
- polisaxaridlar→monosaxaridlar. Bu bosqichda ajralgan energiya issiqlik ko‘rinishida tarqaladi.

Anaerob glikoliz. Glukozaning kislorodsiz sharoitda parchalanishi natijasida 2 ATP, 2 sut kislotasi va suv hosil bo‘ladi. Bu jarayon tez, biroq samaradorligi past.

Aerob oksidlanish. Kislorod ishtirokida mitoxondriyalar darajasida sodir bo‘lib, 36–38 ATPgacha energiya hosil qiladi. Bu bosqich hujayraning asosiy energiya manbai hisoblanadi.

ATP – energetik almashinuvi markazi

ATP molekulasi o‘z tarkibidagi yuqori energiyali fosfat bog‘lari hisobiga hujayra faoliyatini ta’minlaydi. Uning parchalanishi (ATP → ADP + P) quyidagi jarayonlar uchun zarur energiyani beradi:

- mushak qisqarishi va harakat,
- nerv impulslarining o‘tishi,
- hujayralarning bo‘linishi,
- biosintetik jarayonlar (oqsil, lipid, nuklein kislotalar sintezi).

Anabolizm jarayonlari

Anabolizm murakkab molekulalarning sintezi bo‘lib, energiya sarfini talab qiladi. Unga quyidagilar kiradi:

- aminokislotalardan oqsillar sintezi,
- yog‘ kislotalaridan triglitseridlar hosil bo‘lishi,
- glukozadan glikogen yig‘ilishi.

Bu jarayonlar insulin, o‘sish gormoni va testosteron ta’sirida faollashadi.

Muhokama

Katabolik va anabolik jarayonlar o‘zaro chambarchas bog‘langan bo‘lib, organizmning energetik barqarorligini ta’minlaydi. Katabolizmda hosil bo‘lgan ATP anabolizm uchun zarur bo‘lsa, anabolizm hujayraning strukturaviy yaxlitligini saqlaydi. Energiya ishlab chiqarish va iste’moli o‘rtasidagi nomutanosiblik metabolik buzilishlarga, ortiqcha tana vazni, insulin rezistentligi va boshqa patologik holatlarga sabab bo‘ladi.

Organizm energiyani quyidagi yo‘nalishlarda sarflaydi:

1. Asosiy almashinuv — tana tinch holatda energiya sarfi.
2. Jismoniy faollik — harakat, mashqlar va kundalik faoliyat energiyasi.
3. Ovqatni hazm qilish energiyasi — oziq moddalarni parchalanishi va so‘rilishi uchun sarflanadi.

Energiya muvozanatining to‘g‘ri yo‘lga qo‘yilishi sog‘lom metabolik holatning asosiy sharti hisoblanadi.

Xulosa

Metabolizm — organizmning barcha hayotiy jarayonlarini boshqaruvchi murakkab kimyoviy tizimdir. Katabolizm tufayli oziq moddalar parchalanib hujayralar ATP ko‘rinishida energiya oladi. Anabolizm esa energiya sarfi hisobiga strukturaviy moddalarni sintezlaydi. Metabolik jarayonlarni to‘g‘ri tushunish sog‘lom ovqatlanish, jismoniy faollikni rejalashtirish va metabolizm bilan bog‘liq kasalliklarning oldini olishda muhim omil hisoblanadi.

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TIBBIY GELMINTOLOGIYA: EPIDEMIOLOGIYA, DIAGNOSTIKA VA PROFILAKTIKA – ZAMONAVIY YONDASHUV

Annotatsiya: *Gelmintlar inson organizmida parazitlik qilib turli xil kasalliklarni keltirib chiqaradi. Jahon sog‘liqni saqlash tashkiloti (JSST) ma’lumotlariga ko‘ra, dunyo bo‘yicha qariyb 2 milliard odam gelmintlar bilan zararlangan. Kasallanish bolalarda ko‘proq uchraydi, bu esa shaxsiy gigiyena qoidalariga rioya qilmaslik bilan bog‘liq. Hozirgi kunga qadar Yer yuzida odamda parazitlik qilishi mumkin bo‘lgan 287 turdagi gelmint aniqlangan. O‘zbekistonda ular orasidan 65 turi qayd etilgan, 24 turi esa eng ko‘p uchraydigan gelmintlar sirasiga kiradi.*

Kalit so‘zlar: *gelmint, geogelmintlar, biogelmintlar, trematodlar, sestodlar, PCR-tahlil, IFA, genetik test, DNK fragmenti.*

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MEDICAL HELMINTHOLOGY: EPIDEMIOLOGY, DIAGNOSTICS AND PROPHYLAXIS – MODERN APPROACH

Abstract. *Helminths live in the human body and cause various diseases. According to WHO, nearly 2 billion people worldwide are infected with helminths. The incidence is significantly higher among children due to poor personal hygiene. To date, 287 species of helminths capable of parasitizing humans have*

been identified globally. Sixty-five of these species are registered in Uzbekistan, of which 24 are the most commonly encountered.

Keywords: *Helminths, geohelminths, biohelminths, trematodes, cestodes, PCR test, ELISA, genetic test, DNA fragment.*

Kirish

Tibbiy gelmintologiya (yunoncha *helminthes* — qurt) parazitologiyaning inson organizmidagi gelmintlarni, ularning patogenezi, epidemiologiyasi, diagnostikasi va profilaktikasini o‘rganadigan bo‘limidir. Gelmintlar ikki asosiy tipga bo‘linadi: yassi chuvalchanglar (Plathelminthes) va yumaloq chuvalchanglar (Nemathelminthes). Gelmintlar chaqiradigan kasalliklar gelmintozlar deb ataladi.

Dolzarbligi

Gelmintozlar butun dunyo bo‘ylab keng tarqalgan bo‘lib, JSST ma’lumotlariga ko‘ra, 4,5 milliardga yaqin odam parazitar kasalliklardan aziyat chekadi, ularning 2 milliardida gelmint infektsiyasi aniqlanadi. Kasallanish rivojlanayotgan davlatlarda yuqori bo‘lishi bilan birga, rivojlangan mamlakatlarda ham uchrab turadi. O‘zbekistonda gelmintozlar 100 ming aholiga 270 ta holat darajasida baholanadi.

Gelmintologiya tarixi

Gelmintlar haqida dastlabki yozma manbalar Gippokrat, Arastu va Abu Ali Ibn Sino asarlarida uchraydi. Ibn Sino “Kitob ash-Shifo” asarida gelmintlarning turlari, ularning yuqish yo‘llari va kasallik belgilari haqida batafsil ma’lumot bergan. Keyinchalik K.I. Skryabin, E.N. Pavlovskiy, L.A. Zilber kabi olimlar gelmintologiya maktabini shakllantirgan. O‘zbekistonda L.M. Isaev gelmintozlar epidemiologiyasi, profilaktikasi va ilmiy tadqiqotlari rivojiga katta hissa qo‘shgan.

Insonda uchraydigan gelmint turlari

1. Nematodalar (yumaloq chuvalchanglar)

Asosiy vakillari: askarida, enterobius, trixinella va boshqalar. Ular yaxshi rivojlangan ovqat hazm qilish tizimiga ega, erkak va urg‘ochi shakllari farqlanadi.

2. Trematodalar (so’ruvchi chuvalchanglar)

Barg yoki lansetsimon shaklga ega. Og‘iz va qorin qismida ikki so‘rg‘ichi mavjud. Ko‘pchilik turlari germafrodit.

3. Sestodalar (lentalar)

Uzoq, bo‘laklarga bo‘lingan tana tuzilishiga ega. Bosh qismida ilgak va so‘rg‘ichlar bo‘ladi. Ovqat hazm qilish tizimi yo‘q, ozuqani butun tana yuzasidan so‘rib oladi. Uzunligi 10–11 metrga yetishi mumkin.



Gelmintlar yuqtirish yo‘llari

- Og‘iz orqali (iflos qo‘l, suv, sabzavot-mevalar, xom go‘sht va baliq).
- Teri orqali (ankilostoma, shistozoma).
- Havo-chang orqali (tuxumlar chang bilan kirishi).
- Vektorlar orqali (masalan, wuchereria — chivinlar yordamida).
- Uy hayvonlari orqali (toksokara va boshqalar).

Bolalarda gelmintoz klinikasi

- Tez-tez ko‘ngil aynishi, qorin og‘rig‘i
- Allergik reaksiyalar
- Uyqu buzilishi, charchoqlik
- Anal sohada qichishish
- Disbakterioz, oshqozon-ichak buzilishlari
- Eozinofiliya
- O'sish va vazn ortishining sekinlashuvi

Gelmintozni diagnostika qilish usullari

Laborator diagnostika

- Immunoferment tahlili (IFA): qonda gelmint antigeniga qarshi antitanachalar aniqlanadi.
- PCR tahlili: yuqori sezuvchan usul bo‘lib, parazit DNKsi fragmentlarini aniqlaydi.
- Mikroskopiya: najas va anal burmalaridan tuxum va lichinkalarni topish.
- Umumiy qon tahlili: eozinofiliya kabi nospesifik belgilar.

Instrumental diagnostika

- UZI, KT, MRT: ichki a’zolardagi parazit lokalizatsiyasini aniqlash.
- Endoskopiya: oshqozon-ichak traktini ko‘rish.

- Rentgen: ko‘krak qafasi yoki boshqa bo‘shliqlarda joylashgan gelmintlarni aniqlash.

Zamonaviy usullar

- Sun’iy intellekt yordamida tasvirlarni tahlil qilish — diagnostika aniqligini oshiradi.
- Genetik testlash — gelmint turini molekulyar darajada aniqlash imkonini beradi.

Gelmintoz profilaktikasi

- Go‘sht, baliq va boshqa mahsulotlarni faqat ishonchli manbalardan xarid qilish, to‘liq pishirish.
- Sabzavot va mevalarni yaxshilab yuvish.
- Qo‘l gigiyenasiga rioya qilish.
- Xom baliq va xom go‘sht iste’molidan voz kechish.
- Uy hayvonlarini muntazam gelmintlardan davolash.
- Chov sohasini toza saqlash.
- Najasni o‘g‘it sifatida ishlatmaslik.
- Xavf omillari mavjud bo‘lsa, yiliga 1–2 marta tibbiy tekshiruvdan o‘tish.

Xulosa

Gelmintozlar inson salomatligi uchun global muammo bo‘lib, ularning oldini olish, o‘z vaqtida diagnostika qilish va kompleks davolash choralari zamonaviy tibbiyotning muhim vazifalaridan biridir. Molekulyar–genetik usullar, AI texnologiyalari va keng qamrovli epidemiologik nazorat gelmintozlarga qarshi kurashning samaradorligini oshirmoqda.

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КАРДИОПАТИИ И МИОКАРДИТ, ПОЛУЧЕННЫЕ ПРИ ЭКСПЕРИМЕНТАЛЬНОМ ЗАРАЖЕНИИ МЫШАТ ЭХИНОКОККОЗОМ, ЦЕНУРОЗОМ, ЦИСТИЦЕРКОЗОМ И ПЕЦИЛОМИКОЗОМ. Проблемы биологии и медицины, (3), 79.
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VIRUSLI KASALLIKLAR: TUZILISHI, KO‘PAYISH MEXANIZMI VA TIBBIY AHAMIYATI

Annotatsiya: *Ushbu maqolada viruslarning tuzilishi, ularning hujayra ichida ko‘payish mexanizmlari, hamda virusli kasalliklarning inson salomatligiga ta’siri haqida so‘z yuritiladi. Viruslar prokariot va eukariot organizmlarni zararlovchi mikroskopik zarrachalar bo‘lib, ular faqat tirik hujayra ichida ko‘payish qobiliyatiga ega. Shuningdek, zamonaviy biologiya fanida virusli infeksiyalarni o‘rganish, ularning profilaktikasi va vaksina yaratish masalalari dolzarb muammo sifatida tahlil etiladi.*

Kalit so’zlar: *virus, tuzilishi, hujayra ichida ko‘payish, kasallik, inson, salomatlik, prokariot, eukariot, organism, tirik hujayra, zamonaviy biologiya, infeksiya, profilaktika, vaksina.*

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VIRAL DISEASES: STRUCTURE, MECHANISM OF REPRODUCTION AND MEDICAL SIGNIFICANCE

Annotation: *this article will talk about the structure of viruses, their mechanisms of intracellular reproduction, as well as the impact of viral diseases on human health. Viruses are microscopic particles that infect prokaryotic and eukaryotic organisms and have the ability to reproduce only within a living cell.*

Also, in modern biology, the issues of studying viral infections, their prevention and vaccine creation are analyzed as an urgent problem.

Keywords: *virus, structure, intracellular reproduction, disease, human, health, prokaryotic, eukaryotic, organism, living cell, modern biology, infection, prevention, vaccine. prevention, vaccine.*

Kirish

Viruslar tirik organizmlar hayotidagi eng qadimiy va keng tarqalgan mikrobiologik shakllardan biridir. Ular inson, hayvon, o‘simlik, bakteriya va hatto zamburug‘larda ham parazitlik qiladi. Viruslar o‘lchami nihoyatda kichik bo‘lib, oddiy optik mikroskopda ko‘rinmaydi. Ularning o‘ziga xos jihati shundaki, ular hujayra tashqarisida “o‘lik zarracha” hisoblanadi, ammo tirik hujayra ichiga kirgach, faol ko‘payish qobiliyatini namoyon etadi.

Biologiya fanida viruslar “hujayrasiz organizmlar” sifatida qaraladi. Ular o‘z genetik materialiga ega bo‘lib, bu DNK yoki RNK shaklida bo‘ladi. Shu jihatdan viruslar tirik va noorganik olam o‘rtasidagi oraliq holatda turadi (Xolikov va boshq., 2022).

Viruslar organizmdagi maxsus hujayra turlariga aniq tropizmga ega. Masalan, hepatit viruslari asosan jigar hujayralarini zararlaydi, gripp virusi nafas yo‘llari epiteliyiga, OIV esa immun tizimning limfotsitlariga hujum qiladi. Bu tropizm virusning kasallik jarayonidagi xususiyatlarini va klinik ko‘rinishlarini belgilaydi.

Asosiy qism

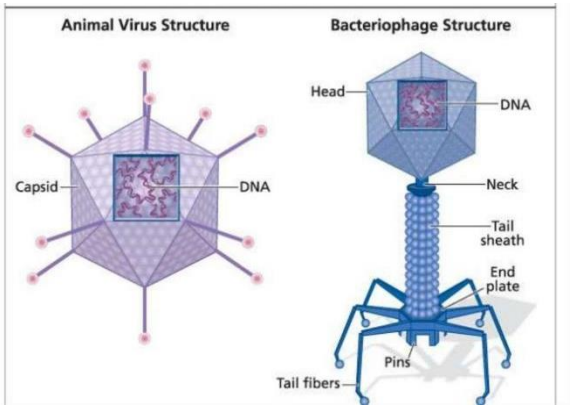
Viruslarning tuzilishi

Viruslar juda oddiy tuzilgan bo1`‘lib, ular ikki asosiy qismdan iborat:

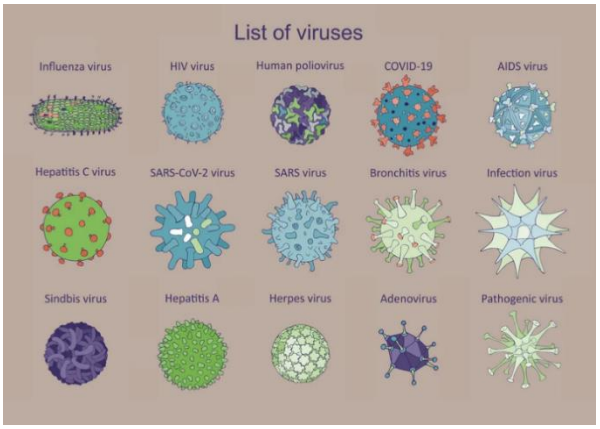
1. Genetik materiali (DNK yoki RNK) – virusning irsiy axborotini saqlaydi.

2. Kapsid (oqsil qobiq) – genetik materialni himoya qiladi va virusning shaklini belgilaydi.

Ba’zi viruslarda lipidli tashqi qobiq (superkapsid) mavjud bo‘lib, u virusning mezbon hujayraga kirishida muhim rol o‘ynaydi (1-rasm). Viruslarning shakli sferik, silindrsimon yoki murakkab bo‘lishi mumkin. Masalan, OIV sferik shaklga ega bo‘lib, RNK asosli virus hisoblanadi; gripp virusi esa segmentlangan RNK genomiga ega murakkab tuzilgan virusdir (2-rasm).



1- **Rasm. Virus tuzilishi. (Virus struktures)**



2- **Rasm. Viruslarning xillari. (List of viruses)**

Viruslarning kapsid va superkapsid tuzilishi ularning tashqi muhitga chidamliligini belgilaydi. Yalang‘och viruslar dezinfeksiyaga chidamli bo‘lib, ularni yo‘qotish murakkab. Lipidli qobiq bilan qoplangan viruslar esa issiqlik, spirtlar va detarjentlar ta’sirida oson parchalanadi. Shu sababli sanitariya va dezinfeksiya choralari virus turiga qarab farq qiladi.

Viruslarning ko‘payish mexanizmi

Viruslar faqat tirik hujayra ichida ko‘payadi. Bu jarayon bir necha bosqichdan iborat:

Adsorbsiyalanish – virus hujayra retseptorlariga birikadi.

Penetratsiya – virus yoki uning genomi hujayra ichiga kiradi.

Replikatsiya – virusning genetik materiali hujayra DNK yoki RNK sintez tizimini o‘z nazoratiga olib, o‘z nusxalarini yaratadi.

Yig‘ilish (maturatsiya) – yangi virus zarrachalari hosil bo‘ladi.

Chiqarilish (lizing) – yangi viruslar hujayra ichidan chiqib, boshqa hujayralarni zararlaydi (Qurbonov, 2022).

Viruslar ko‘payish jarayonida mezbon hujayra metabolizmini to‘liq o‘z nazoratiga oladi. RNK viruslari sitoplazmada replikatsiya qilsa, DNK viruslari asosan yadroda ko‘payadi. Retroviruslar o‘z RNK genomini DNKga aylantirib, mezbon genomi bilan integratsiyalashadi. Bu jarayon virusni uzoq muddat organizmda saqlashga imkon beradi.

Virusli kasalliklarning tibbiy ahamiyati

Viruslar keltirib chiqaradigan kasalliklar juda xilma-xildir: Gripp va paragripp viruslari – nafas yo‘llari infeksiyalarini chaqiradi. OIV (HIV) – immun tanqislik sindromiga olib keladi. Gepatit B va C – jigar hujayralarini zararlaydi.

Papillomaviruslar – o‘sma jarayonlariga sabab bo‘ladi.

Koronaviruslar (COVID-19) – o‘pka va yurak faoliyatini izdan chiqaradi.

Viruslar inson salomatligiga uzoq muddatli ta’sir qilishi mumkin. Masalan, gepatit B va C viruslari surunkali kasalliklarga, jigar sirrozi va saratoniga olib keladi. OIV bemorlarda immun tizimi zaiflashgani uchun boshqa infeksiyalar tez rivojlanadi. Herpes simplex virusi esa og‘iz shilliq qavatida takrorlanuvchi yaralar

hosil qiladi. Shu bois stomatologiya amaliyotida virus infektsiyalarini bilish va profilaktika choralari muhim ahamiyatga ega.

Viruslarga qarshi himoya va profilaktika

Zamonaviy biologiya va tibbiyot viruslarga qarshi quyidagi usullardan foydalanadi:

- Vaksinatsiya – immunitetni shakllantirishning eng ishonchli yo‘li.
- Antiviral dorilar – virusning replikatsiya bosqichini to‘xtatadi.
- Sanitariya-gigiyenik choralar – infeksiyaning tarqalishini cheklaydi.
- Biotexnologik usullar – yangi vaksin va interferon sintezi.

Stomatologiyada viruslar yuqish xavfi yuqori. Shu sababli:

shaxsiy himoya vositalari (niqob, qo‘lqop, himoya ko‘zoynak), asbob-uskunalarni sterilizatsiya qilish, bir martalik materiallardan foydalanish, bemor bilan aloqani minimumga tushirish muhimdir.

Viruslarga qarshi yangi texnologiyalar: RNK vaksinalar, rekombinant vaksinlar va gen terapiyasi virusli kasalliklarning oldini olishda muhim rol o‘ynaydi. Shu bilan birga immunitetni mustahkamlash, sog‘lom turmush tarzi va ekologik sharoitlarni yaxshilash virusli infeksiyalarning tarqalishini kamaytiradi.

Xulosa

Viruslar — hujayrasiz, lekin genetik axborotga ega bo‘lgan tirik zarrachalardir. Ularning biologik xususiyatlari, ko‘payish mexanizmlari va tibbiy ahamiyatini o‘rganish bugungi kunda dolzarb ilmiy masala hisoblanadi. Virusli kasalliklar inson salomatligi uchun jiddiy xavf tug‘diradi, ammo zamonaviy biologiya va tibbiyot yutuqlari tufayli ularning tarqalishini nazorat qilish imkoniyati mavjud.

Viruslarni o‘rganish orqali yangi antiviral preparatlar ishlab chiqish, pandemiyalarning oldini olish va immun tizimini samarali mustahkamlash mumkin. Viruslar bilan bog‘liq kasalliklarni profilaktika qilish, muntazam vaksina olish va sanitariya qoidalariga rioya qilish eng samarali himoya usuli hisoblanadi. Shu bois viruslar haqidagi bilimlarni chuqurlashtirish va yosh avlodni xabardor qilish muhimdir.

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SAMARQAND VILOYATIDA YURAK TUG‘MA NUQSONLARNI TURLI SHAKLI BILAN TUG‘ILIB MA’LUM VAQT DAVOMIDA YASHAB VAFOT ETGAN CHAQALOQLARDA HOMILA ICHI INFEKSIYASINI USHBU PATOLOGIYALARNI KELIB CHIQISHINI O‘RGANISH

Annotatsiya: *Mazkur maqolada Samarqand viloyatidagi yurak tug‘ma nuqsonlarni turli shakli bilan tug‘ilib ma’lum vaqt davomida yashab vafot etgan chaqaloqlarda homila ichi infeksiyasini ushbu patologiyalarni kelib chiqishida o‘rni va miokard qavatining tuzilishini morfologik va morfometrik o‘zgarishlarini o‘rganishdan iboratdir.*

Kalit so‘zlar: *Homila ichi infeksiyalari, yurak tug’ma nuqsonlari, miokard qavatdagi patomorfologik o’zgarishlar.*

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STUDY OF THE ORIGIN OF INTRAUTERINE INFECTIONS IN NEWBORNS BORN WITH VARIOUS FORMS OF CONGENITAL HEART DEFECTS AND WHO DIED AFTER LIVING FOR A CERTAIN PERIOD OF TIME IN THE SAMARKAND REGION

Abstract: *This article examines the role of intrauterine infection in the development of congenital heart defects and morphological and morphometric changes in the structure of the myocardial layer in newborns born with various forms of congenital heart defects and who died after living for a certain period in the Samarkand region.*

Keywords: *Intrauterine infections, congenital heart defects, pathomorphological changes in the myocardial layer.*

Tug’ma yurak nuqsonlari - neonatal va bolalik davrida uchraydigan eng ko‘p tarqalgan tug‘ma anomaliyalardan bo‘lib, ularning asosiy sabablari qatorida homila ichi infeksiyalari alohida o‘rin tutadi. Xususan, TORCH infeksiyalari homila ichi infeksiyalaridan homilaga ta’siri bo’yicha alohida o’rinda turadi. TORCH-kompleks infeksiyalari (Toxoplasma gondii, Rubella virus, Cytomegalovirus, Herpes simplex virus). -infeksiyalar embrional davrda yurak bo‘linmalari, klapanlari va qon tomir devorlarida morfologik va funksional nuqsonlarni chaqiradi. Shu sababli bu infeksiyalarni erta aniqlash, homiladorlikni rejalashtirishda skrining tekshiruvlarini o‘tkazish va profilaktik choralar ko‘rish dolzarb masala hisoblanadi va mazkur mavzuning o‘rganilishi homila rivojlanishidagi infeksion omillarning patogenetik ahamiyatini chuqur tushunishga, tug‘ma yurak nuqsonlarining oldini olish choralarini takomillashtirishga xizmat qiladi.

Tug’ma yurak nuqsonlari muammosining dolzarbligi uning keng tarqalganligi, tashxis qo’yish qiyinligi va bolalarda nogironlikning yuqori xavfi bilan belgilanadi. Ayniqsa intrauterine infeksiyalar alohida o’rinda turadi. Xususan, Herpex, Rubella va Sitomegalovirus infeksiyalari yurak qon tomir tizimining nuqsonlarining rivojlanishi va chastotasiga eng katta ta’sir ko’rsatadi. Sitomegalovirus ko‘pincha markaziy nerv tizimi va eshitish tizimiga ta’sir etadi, ammo bir qancha ishlar fetal yoki perinatal sitomegalovirus infektsiyasining miyokard patologiyasiga (intrauterin myocarditis), yurak yetishmovchiligi va struktural shikastlanishlarga olib kelishi mumkinligini ko‘rsatadi. Klinik holatlar va hujayra tadqiqot natijalari sitomegalovirusdan kelib chiqadigan miokarditis va keyinchalik fibrozning mumkinligini tasdiqlaydi. Bundan tashqari Rubella virusi yurak tug’ma nuqsonlarining rivojlanishiga sabab bo’luvchi eng yaxshi o’ganilgan viruslardan biridir. Agar birinchi trimesrtda qona organizmida rubella infeksiyasi kechgan hollarda homilada ochiq arterial yo’l(ductus arteriousus), artrial yoki ventrikulyar septal nuqsonlar hamda pulmonar stenoz kuzatiladi. Bu viruslar endoteliy va miokard hujayralarini zararlab yallig’lanish va fibroz jarayonlarini keltirib chiqaradi. Sitomegalovirus esa asosan miokarditlarni keltirib chiqaradi. Bu infeksiyalar homila rivojlanishiga erta va kechgi bosqichlarda turli xil o’zgarishlarni keltirib chiqaradi. Xususan, erta bosqichlarda zararlanish strurturaviy tug’ma nuqsonlarga, kech bosqichda esa funksional va morfometrik o’zgarishlarga sabab bo’ladi

Samarqand viloyatida kompleks tarzda yurak tug‘ma nuqsonlari bilan tug‘ilgan homilalarda uchraydigan homila ichi infeksiyalarning etiopatogenetik roli patomorfologik, gistologik hamda gistokimyoviy usullar yordamida o‘rganiladi. Tadqiqot davomida yurak to‘qimalarida, tomir tizimida va boshqa sohalarida infeksiya ta’sirida kechadigan struktural va distrofik o‘zgarishlarning o‘ziga xos morfologik belgilar tizimlashtiriladi. Homila ichi infeksiyalari bilan bog‘liq tug‘ma yurak nuqsonlari uchun diagnostik ahamiyatga ega bo‘lgan yangi morfologik mezonlar aniqlanib, ular infeksion omillarning yurakning embrional rivojlanishiga ta’siri bilan bog‘lanadi. Shu natijalar asosida homila ichi

infeksiyalarining yurakning normal morfogenez jarayonini buzishdagi o‘rni va mexanizmlari haqida yangi ilmiy ma’lumotlar ishlab chiqiladi.

Olingan natijalar patomorfologiya, pediatriya, neontologiya, kardiologiya sohalarida faoliyat yurituvchi mutaxassislar uchun ilmiy-amaliy ahamiyat kasb etadi hamda tibbiyot oliy ta’lim muassasalarida o‘quv jarayonida foydalanish uchun tavsiya etiladi.

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GAZ HISOBLAGICHLARINI SINOVDAN O‘TKAZISH VA NAZORAT QILISH

Annotatsiya: *Ekspluatatsiyada turgan va saqlanayotgan o’lchov vositalarini davlat tekshiruvi va nazorati sohasida foydalaniladigan qiyoslash me’yor-qoidalari tahlil qilingan.*

Kalit so‘zlar*: gaz hisoblagich, korxona, faza, hududiy gaz tarmoqlari, ekspluatatsiya, sertifikat, birlamchi, davriy, navbatdan tashqari, inspeksion va ekspert qiyoslash.*

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TESTING GAS METERS TRANSFER AND CONTROL

Annotation: *an analysis of the benchmarking norms used in the field of state inspection and control of measuring instruments standing and stored in operation is carried out.*

Keywords: *gas meter, enterprise, phase, Regional Gas Networks, operation, certificate, Primary, Periodic, extraordinary, inspection and expert comparison.*

Gaz hisoblagichni “Gaz hisoblagich” korxonasining “aqlli” hisoblagichlari bir fazali va uch fazali qilib ishlab chiqarilgan. Shu bilan birga, konsentrator qurilmasi ham mavjud. Bu ham “Kaifa” qurilmalari singari ishlash imkoniyatiga ega bo`ladi.

Iste’molchida qarzdorlik yuzaga kelishi oqibatida uni tarmoqdan vaqtincha uzish lozim bo‘lsa, dastur konsentratorga ma’lum bir hisoblagichni tarmoqdan uzish buyrug‘ini beradi, konsentrator o‘sha raqamli hisoblagichni tarmoqdan vaqtincha uzadi. Shu bilan elektr energiyasi yetkazib berish kelgusi to‘lov amalga oshirilgunga qadar vaqtincha to‘xtatiladi.

Jismoniy shaxslar uchun elektron raqamli imzo olish:

- arizachi YaIDXPda ro‘yxatdan o‘tadi, arizani to‘ldiradi va davlat xizmatlarini ko‘rsatish uchun haq to‘laydi;
- vakolatli organ arizani ko‘rib chiqadi va ERI sertifikatini arizachiga yuboradi;
- arizachi YaIDXP dagi shaxsiy kabinetiga kirib, ERI kaliti sertifikatini olinganligini tasdiqlaydi.

Raqamli elektron hisoblagichlar ham davlat tekshiruvi va nazorati sohasida foydalaniladigan, qiyoslanishi lozim bo‘lgan O‘Vning ro‘yxati O‘zbekiston texnik

jihatdan tartibga solish agentligi tomonidan tasdiqlangan bo‘ladi.

O‘V ni Davlat qiyoslashini davlat metrologik xizmati idoralari o‘tkazadi, lekin O‘V ni qiyoslash huquqi yuridik shaxslarning akkreditlangan metrologik xizmatlariga ham topshirilishi mumkin.

Boshqa davlatlarda bajarilgan O‘V ni qiyoslash natijalari xalqaro shartnomalar va bitimlar asosida tan olinadi.

Ekspluatatsiyada turgan, ishlab chiqarilgan, ta’minlangan va import bo‘yicha sotib olinadigan O‘V ni qiyoslashni tashkil qilish va o‘tkazish bo‘yicha asosiy nizomlar O’z DSt 8.003:2005 “O‘z O‘DT. O‘lchash vositalarini qiyoslash. Asosiy nizomlar” da bayon etilgan.

Ekspluatatsiyada turgan, ishlab chiqarilgan, ta’minlangan va import bo‘yicha sotib olinadigan barcha O‘V davlat qiyoslashidan o‘tishi lozim.

O‘V birlamchi, davriy, navbatdan tashqari, inspeksion va ekspert qiyoslashdan o‘tkaziladi.

Ishlab chiqarishdan yoki ta’mirlashdan chiqqan va import bo‘yicha keltiriladigan O‘V birlamchi qiyoslashdan o‘tkaziladi. O‘V ning har bir nus’hasi birlamchi qiyoslashdan o‘tkaziladi. O‘V yalpi ishlab chiqarilganda tanlab qiyoslash ruxsat etiladi. Tanlab birlamchi qiyoslash qoidalari, o‘tkazish tartibi bu O‘V ni qiyoslash metodikasida ko‘rsatiladi.

Ekspluatatsiyada turgan yoki operativ saqlanayotgan O‘V qiyoslashlararo oraliq vaqtlardan keyin davriy qiyoslashdan o‘tkaziladi. Davriy qiyoslash vaqti o‘lchash vositasining bu davr ichida yaroqliligini ta’minlashni hisobga olgan holda aniqlanadi va belgilanadi.

Davriy qiyoslashlar o‘rtasidagi vaqt:

davlat qiyoslashiga taqdim etilgan o‘lchash vositasiga davlat metrologik xizmati idoralari tomonidan belgilanadi.

Davlat davriy qiyoslashi namunaviy va ishchi O‘V ni qiyoslash grafiklari (shartnomalari) da belgilangan kalendar muddatlarda o‘tkaziladi.

Ekspluatatsiyada turgan va saqlanayotgan O‘V uchun navbatdan tashqari qiyoslash quyidagi hollarda o‘tkaziladi:

– qiyoslashlararo davrning yarim vaqti o‘tgandan keyin o‘lchash vositasidan butlovchi sifatida foydalanilganda;

– qiyoslash tamg‘asi, plombasi, shikastlanganda yoki O‘V ning birlamchi yoki davriy qiyoslashdan o‘tganligini tasdiqlovchi hujjatlar yo‘qolganda;

– agar qiyoslash tamg‘asining yoki o‘lchash vositasining qo‘llanishga yaroqliligini tasdiqlovchi hujjatning amal qilinish muddati tugagan bo‘lsa, saqlashdan olinib ekspluatatsiyaga kiritishda;

– qiyoslashlararo vaqt ichida xaridga chiqarilmagan O‘V ni tayyorlovchi korxona iste’molchiga yetkazib berishda.

O‘lchash vositasining holati va qo‘llanilishini davlat nazoratidan va mahkama tekshiruvidan o‘tkazishda O‘V ning qo‘llanishga yaroqli ekanligini aniqlash uchun inspeksion qiyoslash o‘tkaziladi. O‘V ni inspeksion qiyoslash natijalari davlat yoki mahkama tekshiruvi dalolatnomasida aks ettiriladi.

Davlat qiyoslashidan majburiy ravishda o‘tkaziladigan vositalar:

a) davlat metrologik xizmatlarining va tadbirkorlik sub'ektlarining namunaviy o'lchash vositalri;

b) o'zining bevosita vazifasiga muvofiq namunaviy O'V sifatida yoki tayyorlashga buyurtnoma shartlari bo'yicha ishlab chiqarilgan O'V;

v) nurlanishni ionlovchi va tarkibida nurlanishni ionlovchi manba bor bo'lgan O'V;

g) priborlarni ta'mirlovchi xo'jalik yurituvchi sub'ektlari chiqargan, ta'mirdan keyin boshqa xo'jalik yurituvchi sub'ektlarga berish uchun mo'ljallangan O'V;

d) milliy va xalqaro sport rekordlarini qayd qilish bilan bog'liq o'lchash vositalari;

ye) davlat arbitraj idoralari tomonidan ekspertiza o'tkazishda, shuningdek bojxona tekshiruvida o'lchashlar uchun qo'llaniladigan O'V;

k) o'lchash uchun ishchi O'V sifatida qo'llaniladigan, o'lchash natijalari:

– tabiatni muhofazalash;
– sog'liqni saqlash;
– mehnat xavfsizligini ta'minlash;
– barcha turdagi transportning harakat xavfsizligini ta'minlash;
– ishlab chiqarish va texnologik jarayonlarning xavfsizligini ta'minlash;aloqa tizimlarini ta'minlash;
– xo'jaliklararo o'zaro hisoblashlar;savdoning barcha turlari;
– aholiga pulli xizmatlarning barcha turlari uchun qo'llaniladigan O'V.

O'lchash vositalarini qiyoslash davlat yoki mahkama qiyoslovchisi malakasi berilaganligi to'g'risida amaldagi guvohnomasi bor shaxslar tomonidan bajariladi.

Davlat metrologik tekshiruvi va nazorati qo'llaniladigan sohada foydalanilishi mumkin bo'lgan o'lchash vositalarini tayyorlash, xaridga chiqarish va ijaraga berish ishlarini tadbirkorlik sub'ektlari qonunga muvofiq beriladigan litsenziya asosida bajaradi.

O'lchash vositalarini qiyoslash, sinashlarni o'tkazish, O'V ni va sinashlarni, o'lchashlarni bajarish metodikalarni metrologik attestatlash, O'V ni kalibrlash huquqiga yuridik shaxslarni akkreditlash jarayonida metrologik tekshirish akkreditlanadigan sub'ekt tomonidan so'ralgan faoliyat uchun me'yoriy hujjatlarda belgilangan metrologik me'yorlar va qoidalarning bajarila olish mumkinligini tekshirish va baholashdan iborat. Metrologik tekshirish O'z DSt 16.4:2001, O'z DSt 8.006:1999 va O'z RH 51-016-93 bo'yicha bajariladi.

Metrologik xizmatlar, markaz, laboratoriyalarni sinashlar bo'yicha ishlarni, o'lchash vositalari va metodikalarini qiyoslash, kalibrlash, metrologik attestatlash yoki davlat metroogik tekshiruvi va nazorati qo'llaniladigan sohada metrologik faoliyatning boshqa muayyan turlarini bajarishga akkreditlash bo'yicha qaror davlat metrologik xizmatining xulosasi bor bo'lganda qabul qilinadi.

Yuridik va jismoniy shaxslarni me'yoriy va texnik hujjatlarini metrologik ekspertizadan o'tkazish, qiyoslash, kalibrlash, ta'mirlash, sinashlarni bajarish metodikalarini metrologik attestatlash, o'lchash vositalarini metrologik attestatlash

(agar bularni davlat metrologik tekshiruvi va nazorati sohasida qo‘llanish mumkin bo‘lsa) ishlarni o‘tkazish huquqiga akreditlash O‘zbekiston texnik jihatdan tartibga solish agentligi o‘rnatgan tartibda amalga oshiriladi.

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ETIOPATHOGENESIS AND LABORATORY DIAGNOSIS OF VARIOUS TYPES OF THROMBOCYTOPENIA IN THE ELDERLY: A LITERATURE REVIEW

Abstract: *Thrombocytopenia in elderly patients is a multifactorial hematological disorder characterized by a decrease in platelet count. This literature review summarizes and analyzes the current understanding of the etiopathogenesis and laboratory diagnostic approaches of thrombocytopenia of various origins in the elderly population. Immune-mediated mechanisms, drug-induced causes, bone marrow failure, myelodysplastic syndromes (MDS), hepatic dysfunction with splenomegaly, disseminated intravascular coagulation (DIC), and infection-related pathways are discussed. Emphasis is placed on the role of advanced hematological and molecular diagnostic techniques for accurate differentiation and management. The review integrates studies published between 2020 and 2025 to provide updated perspectives.*

Keywords: *thrombocytopenia; elderly; etiopathogenesis; platelet count; laboratory diagnosis.*

Introduction

Thrombocytopenia, defined as a platelet count below 150×10^9/L, is one of the most common hematologic abnormalities in clinical practice, especially among elderly patients. With aging, the hematopoietic system undergoes structural and functional changes leading to increased susceptibility to both primary and secondary platelet disorders. The etiology of thrombocytopenia is broad, encompassing decreased production, increased destruction, and abnormal distribution of platelets. Age-related changes in bone marrow, comorbidities, and polypharmacy complicate its pathogenesis. Understanding the complex mechanisms and establishing a standardized diagnostic algorithm is crucial for appropriate patient management.

Age-related hematopoietic alterations significantly affect platelet production, function, and turnover. Hematopoietic stem cells (HSCs) in elderly individuals demonstrate reduced regenerative capacity, a shift toward myeloid lineage (myeloid skewing), and remodeling of signaling pathways regulating megakaryopoiesis. These changes result in both quantitative and qualitative platelet abnormalities, predisposing older adults to thrombocytopenia and

thrombo-hemorrhagic complications (Liu et al., 2020; Pangrazzi & Weinberger, 2021).

Another key factor in elderly thrombocytopenia is immunosenescence—the gradual deterioration of immune function accompanied by chronic, low-grade inflammation ("inflamm-aging"). This process contributes to increased autoantibody production, impaired clearance of immune complexes, and a higher prevalence of immune thrombocytopenia (ITP) among older populations. Epidemiological data confirm that the incidence of primary ITP rises significantly after the age of 60, often presenting with atypical features and reduced response to standard therapy (Provan et al., 2019; Rodeghiero et al., 2021).

Polypharmacy and multimorbidity are additional age-related contributors that complicate both the pathogenesis and diagnosis. Drugs like heparin, quinine, beta-lactam antibiotics, and antiepileptics can trigger immune-mediated thrombocytopenia, while comorbid conditions (renal failure, hepatic insufficiency, malignancy, infections) may exacerbate platelet dysfunction and turnover (Stasi, 2020).

Recent literature emphasizes a standardized diagnostic algorithm to improve clinical accuracy and patient outcomes. The evaluation should begin with confirmation of true thrombocytopenia (to exclude pseudothrombocytopenia via repeated counts and peripheral smear), followed by detailed drug history, infection screening (HCV, HIV), and bone marrow examination in persistent or unexplained cases—especially in patients over 60 years of age (Gauer & Braun, 2022).

Therapeutic approaches have evolved toward a risk-adapted and individualized model. Observation is acceptable in asymptomatic or mild cases, while corticosteroids remain first-line therapy for immune-mediated thrombocytopenia. Thrombopoietin receptor agonists (TPO-RAs), intravenous immunoglobulin (IVIG), and biologics such as rituximab or fostamatinib are recommended for refractory disease. Treatment decisions in older adults should balance efficacy with comorbidity profiles and bleeding versus thrombotic risks (Neunert et al., 2019; Michel et al., 2022).

In summary, the pathogenesis of thrombocytopenia in elderly patients involves complex interactions between age-related hematopoietic decline, immune dysregulation, drug effects, and chronic comorbidities. Current evidence underscores the importance of individualized diagnostic algorithms and tailored therapeutic strategies that integrate both molecular and clinical insights. Further large-scale prospective studies are needed to refine diagnostic biomarkers and optimize treatment outcomes in geriatric hematology.

Materials and Methods

This review was conducted according to PRISMA guidelines for narrative reviews. Relevant literature was searched through PubMed, Scopus, ScienceDirect, and Google Scholar databases. Keywords included "thrombocytopenia in elderly", "immune thrombocytopenia", "myelodysplastic syndromes", "drug-induced thrombocytopenia", and "diagnostic approaches".

Only articles published between 2020 and 2025 in peer-reviewed international journals were included. Reference lists of selected papers were also screened for additional relevant sources. The final selection consisted of 20 high-impact studies focusing on clinical, laboratory, and molecular aspects of thrombocytopenia in older adults.

Results

The analysis revealed that immune thrombocytopenia (ITP) remains a leading cause of isolated thrombocytopenia in the elderly, often associated with autoimmune diseases or malignancies. Recent studies highlight the dysregulation of T-cell immunity and the presence of antiplatelet antibodies targeting glycoproteins GPIIb/IIIa and GPIb/IX.

Myelodysplastic syndromes (MDS), prevalent in this age group, contribute to thrombocytopenia through ineffective hematopoiesis and clonal hematopoietic mutations such as TP53, RUNX1, and ASXL1. Liver-related thrombocytopenia is typically mild to moderate and results from hypersplenism due to portal hypertension.

Microangiopathic conditions like DIC, thrombotic thrombocytopenic purpura (TTP), and hemolytic uremic syndrome (HUS) cause rapid platelet consumption and are life-threatening if not promptly diagnosed. Drug-induced thrombocytopenia (DITP) remains a significant issue due to polypharmacy in elderly patients, particularly with antibiotics, antiepileptics, and heparin.

Infectious causes, including COVID-19, have also been recognized as contributors to transient or persistent thrombocytopenia through direct bone marrow suppression or immune-mediated platelet destruction.

Discussion

Elderly patients often exhibit multifactorial thrombocytopenia, complicating diagnostic and therapeutic decisions. Distinguishing between immune, marrow, and secondary causes is essential for appropriate management.

Laboratory diagnostics include:

- Complete blood count (CBC) and peripheral blood smear analysis
- Bone marrow aspiration and biopsy to evaluate megakaryocyte morphology
- Flow cytometry for immune markers
- Molecular testing such as PCR, FISH, and next-generation sequencing (NGS)

The integration of advanced molecular profiling has improved diagnostic precision. NGS helps identify driver mutations associated with MDS and clonal hematopoiesis, allowing for better classification and prognosis.

Immune thrombocytopenia (ITP) in older adults often requires careful therapeutic balance due to comorbidities and bleeding risks. Corticosteroids remain first-line therapy, while thrombopoietin receptor agonists (eltrombopag, romiplostim,elbonix) show promising results in refractory cases.

Drug-induced and infection-related thrombocytopenia usually resolve after withdrawal of the causative agent or treatment of infection. However, in DIC or

TTP, urgent intervention with plasma exchange, anticoagulants, or immunotherapy is required.

Recent literature emphasizes the value of integrating clinical history, drug exposure data, and immunological markers for differential diagnosis. Artificial intelligence-based diagnostic tools and digital hematology imaging are emerging technologies aiding in classification.

Conclusion

Thrombocytopenia in the elderly encompasses a wide spectrum of etiologies. A structured diagnostic strategy that includes hematological, immunological, and molecular assessments is vital for accurate diagnosis and management.

Future research should focus on age-specific mechanisms of thrombopoiesis, the impact of comorbidities, and the development of predictive biomarkers to improve prognosis and personalized treatment approaches. Understanding the molecular underpinnings of platelet production and destruction will be key to advancing therapeutic strategies in this vulnerable population.

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REFLECTIONS ON THE PHONETIC ASSIMILATION OF BORROWED WORDS

Annotation: *This article discusses the phenomenon of phonetic (sound) assimilation of loanwords in the Tajik and Uzbek languages. The study explores how borrowed lexical units adapt to the phonetic, morphological, and grammatical systems of the recipient language. Based on linguistic material from the novels "Dukhtari Otash" ("The Girl of Fire") by Jalol Ikromi and "O'tkan Kunlar" ("Bygone Days") by Abdulla Qodiriy, the research identifies patterns of sound correspondence and phonetic modification in Tajik and Uzbek loanwords.*

Keywords: *Loanwords, phonetic assimilation, Tajik language, Uzbek language, sound correspondence, voicing and devoicing, vowel adaptation, linguistic borrowing.*

The concept of language encompasses several meanings. Its general and primary meaning refers to a component present in the living entities of the real world, such as humans, animals, birds, reptiles, rodents, and similar beings. However, not all of these possess a spoken language. The gift of spoken language has been bestowed upon humans. Nature has granted this spoken language so that thoughts can emerge in the human mind and be expressed through language (words). Thus, spoken language serves as a vital tool for expressing thoughts and facilitating communication. The exchange of ideas among members of society occurs through sentences, but sentences cannot be formed until words are arranged in a specific order and interconnected. Human speech consists of words, and when speaking, words are what come to mind. Consequently, language amasses a vast array of words with diverse meanings to express concepts and ideas.

All lexical units of a language constitute its lexical composition. Every national language has its own lexical composition, which reflects the overall character of the language. The abundance of words in a language signifies its lexical richness. The Tajik language, one of the ancient and rich languages, currently contains over one hundred thousand words in its modern literary form, according to lexicographers.

The lexical composition of a language includes various lexical units. Alongside native words, borrowed words also have a place in the lexical composition of languages. Therefore, it is essential to categorize the lexical composition of languages, including Tajik, into two groups: 1) native words and 2) borrowed words.

Borrowed words are lexical elements adopted directly or indirectly from other languages to express concepts and meanings. The lexical compositions of both Tajik and Uzbek languages include words borrowed from various languages. In Tajik, there are numerous words borrowed from Arabic, Turkic-Uzbek, and Russian. Similarly, in Uzbek, there is a significant number of borrowed words from Arabic, Tajik, and Russian. It is important to note that not all foreign words in a national language qualify as borrowed words. For foreign words to gain the status of borrowed words, they must undergo a process of linguistic assimilation. This means that foreign words must meet the following requirements of the borrowing language: they must conform to its phonetic system and linguistic rules, adhere to its grammatical structure, and create new words within the framework of the borrowing language.

Below, based on the material from Jalol Ikromi's novel *Dukhtari Otash* (*The Girl of Fire*) and Abdulla Qodiriy's *O'tkan Kunlar* (*Bygone Days*), we will illustrate one aspect of the assimilation of borrowed words – namely, their phonetic assimilation in Tajik and Uzbek.

Phonetic Assimilation

Every national language has its own distinct phonetic system and characteristics. The phonetics and nature of a language are not random phenomena but are governed by the language's rules.

The process by which the sounds of borrowed words change in accordance with the phonetics of the borrowing and source languages is called phonetic assimilation. Since most Uzbek borrowed lexical elements in Tajik undergo sound changes, phonetic assimilation holds significant importance. In line with the phonetics and nature of the Tajik language, Uzbek borrowed words undergo phonetic changes, particularly in terms of sound harmony. Many Uzbek borrowed words in Tajik change in form, with observable transformations in both vowels and consonants. In addition to sound harmony, Uzbek borrowed words experience phonetic phenomena such as reduction, augmentation, voicing, devoicing, stress shifts, and similar processes. Below, we will primarily focus on sound harmony, providing examples from Jalol Ikromi's *Dukhtari Otash* to substantiate these observations.

Vowel Harmony

In the interaction between Uzbek and Tajik vowels, the following patterns of vowel harmony are observed in Uzbek borrowed words in Tajik:

Correspondence of Uzbek vowel "o" to Tajik vowel "a" (Tajik forms are presented first): *qavoq* (92, 99, 191, 198, 247, 262, 366, 544, 551) – *qovoq* (eyebrows), *alo* (79) – *ola* (speckled), *bayraq* (408, 555) – *bayroq* (flag), *oqsaqol* (73, 85, 93, 44, 45, 50, 55, 562, 682, 703, 715, 723, 94, 953, 967, ...1315, 133, 134, 135, 1366, ...150, 1512, 1603, ...1734, 1863, 216, ...514, 515, 551, 5522, 5532) – *oqsoqol* (elder), *qarovul* (186, 313, 568, 574) – *qorovul* (guard), *qaburgha* (445) – *qovurgha* (rib), *qandalot* (21, 107, 108, 317) – *qandolat* (sweets)

Examples: *Chashmoni bodomii siyoh, qavoqhoi baland, mijgonhoi daroz va abrui payvasta dosht* (92). ("She had almond-shaped black eyes, high eyebrows,

long eyelashes, and connected brows."). *Gap zaned, sharm nakuned, bachaho!* – *gufta mond oqsaqol* (552). ("Speak, don't be shy, boys! – said the elder."). *Kamtar mavizu qandaloti budagiro ba peshi mehmonho guzosht...* (108). ("She placed some raisins and sweets in front of the guests…")

Correspondence of Uzbek vowel "a" to Tajik vowel "o": *alo* (79) – *ola*, *qandalot* (21, 107, 108, 317) – *qandolat*, *qudo* (22, 233, 137, 148, 1493, 1562) – *quda* (in-law), *tagho* (272, 339) – *toghā* (uncle), *janjol* (88, 97, 103, 142, 205, 211, 230, 2412, 285, 288, 3202, 347, 362, 374, 403, 4572, 459, 476, 488, 531, 534, 569) – *janzhal* (quarrel), *talosh* (46) – *talash* (effort), *atola* (69, 70) – *atala* (porridge)

Examples: *Az tarafi qudoho la'liyu dasturkhon ovarda budand, shumo nabuded, gashta girifta burdand* (22). ("The in-laws brought sweets and a tablecloth; you weren't there, so they took them back.") *Lekin in jo sari dasturkhon, joyi janjol ne va hej voqea ham nashudaast* (534). ("But here at the table, it's not a place for quarrels, and no incident has occurred.")

Correspondence of Uzbek vowel "i" to Tajik vowel "u": *qoshuq* (118, 166, 396) – *qoshiq* (spoon), *kūpruk* (174) – *kūprik* (bridge), *ughur* (102) – *ūghir* (omen), *choruq* (54) – *choriq* (shoe)

Examples: *Maghfirat qoshuqro sharti karda ba daruni kosa paroftu ba rui palonjash tegh kashida nigoh kard* (166). ("Maghfirat sharply threw the spoon into the bowl and looked at her blanket.") *Ruziboy chakmanashro ba kift paroftu chorukashro ba po karda, berun baromad* (54). ("Ruziboy threw his torn jacket over his shoulder, put on his shoes, and went outside.")

Correspondence of Uzbek vowel "o'" to Tajik vowel "ū" (the long vowel "vov-i majhul"): *tūy* (46, 105, 1202, 1272, 1302, 138, 1392, 140, 141, 1452, 1482, 1502, 154, 161, 163, 164, …) – *tōy* (wedding), *tūqsabo* (160, 192, 246, 2472, 260, 324, 3313, 342) – *tōqsabo* (weaver), *ūra* (3452, 3633) – *ōra* (sickle), *ashūla* (4092, 4104, 414, 521) – *ashōla* (song), *tūsh* (105, 254, 305, 455) – *tōsh* (stone), *nūkhta* (372, 509) – *nōkhta* (point)

Examples: *Baroi kharojoti tūy hamin tobiiston ghayrat karda kor kunad, tūyona khudash merūyad* (46). ("To cover the wedding expenses, he should work hard this summer; the wedding gifts will come by themselves.") *Jūra, tu ashūla khonda metavoni?* (409). ("Jura, can you sing a song?")

Phonetic assimilation is also evident in dialectal words used in *Dukhtari Otash*. For example, in Uzbek borrowed words like *yalmoghuz* (163, 364) – *yalmoghiz* (monster), *tortuq* (57, 229, 231, 242, 2484, 2492, 482, 513, 516, 539) – *tortiq* (gift), *tuturuq* (521) – *tuturiq* (credulity), and *shanghu* (29, 368, 456, 565) – *shanghi* (loudmouth), the Uzbek vowel "i" corresponds to the Tajik vowel "u": *Khudata musichai begonoh karda nishon dodanat foida nadorad, yalmoghuz! – guft dūgh zada Zamonbek* (534). ("Pretending to be an innocent mouse won't help you, monster! – said Zamonbek, scolding.") *Dar on oghili havli devonahoi shanghuro basta monda budand* (23). ("In that stable yard, they had tied up the loudmouthed lunatics.")

Consonant Harmony

The linguistic material from Jalol Ikromi's *Dukhtari Otash* demonstrates that in some Uzbek borrowed words, there is a correspondence between Uzbek and Tajik consonants. The following phonetic phenomena are observed:

Voicing:

a) Correspondence of the voiceless consonant "q" in Uzbek to the voiced consonant "gh" in Tajik: *dūq – dūgh* (93, 95, 357, 534, 552, 567) (scolding). *Dahanatro band, noqisulaql! – guft qozi dūgh zada* (93). ("Shut your mouth, fool! – said the judge, scolding.") *Ilahi hamai in dūghu pūpisa boshad!* (567). ("May all this be just scolding and nonsense!")

b) Correspondence of the voiceless consonant "ch" in Uzbek to the voiced consonant "j" in Tajik: *tinch – tinj* (76, 258, 300, 324, 325, 356, 485, 497, 533, 558) (peaceful), *Shumo az in gaphho khabar nadoshtagi barin... Shahr tinj va osuda megūed?!* (325). ("You act like you don't know about these things… You say the city is peaceful and calm?!")

From the information provided above, it is evident that every national language has its own unique phonetic system and characteristics, and it is not indifferent to borrowed words. As a result of the influence of the borrowing language's phonetics, sound harmony emerges between the borrowing and source languages, leading to formal changes in borrowed words.

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ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY AND DEVELOPMENT

Abstract: *Artificial intelligence (AI) has emerged as a transformative force in drug discovery and development, offering unprecedented opportunities to accelerate research, reduce costs, and enhance precision in identifying therapeutic candidates. Traditional drug development is often time-consuming and expensive, with high attrition rates during clinical trials. AI technologies, including machine learning, deep learning, and natural language processing, enable the analysis of complex biological data, prediction of molecular properties, and optimization of drug-target interactions. By integrating large-scale omics datasets, chemical libraries, and clinical trial information, AI facilitates more informed decision-making, improves the accuracy of candidate selection, and supports personalized medicine approaches. This paper explores current AI applications in drug discovery, highlights their advantages, addresses challenges, and discusses future directions for integrating AI into pharmaceutical research and development pipelines.*

Keywords: *Artificial intelligence, Drug discovery, Machine learning, Deep learning, Computational chemistry, Pharmacogenomics, Drug development, Predictive modeling*

Introduction

The process of discovering and developing new drugs is traditionally lengthy, costly, and fraught with uncertainty. From target identification and lead compound discovery to preclinical studies and clinical trials, the journey of a potential drug from concept to market often spans over a decade and costs billions of dollars. High failure rates in late-stage trials, coupled with the complexity of biological systems, pose significant challenges to pharmaceutical innovation. In

this context, artificial intelligence has emerged as a powerful tool to transform the drug discovery landscape.

AI techniques enable the analysis of vast and complex datasets, including genomic, proteomic, and metabolomic profiles, to identify novel drug targets and predict therapeutic efficacy. Machine learning algorithms can evaluate chemical structures, model interactions between small molecules and biological targets, and prioritize compounds with the highest likelihood of success. Deep learning approaches facilitate the discovery of hidden patterns in large datasets, supporting predictions of drug toxicity, pharmacokinetics, and off-target effects. Moreover, AI-driven platforms can integrate real-world clinical data to inform patient stratification and personalized treatment strategies, increasing the probability of successful outcomes. By reducing reliance on trial-and-error experimentation, AI accelerates early-stage discovery and optimizes resource allocation, ultimately contributing to more efficient drug development pipelines.

Discussion

The integration of AI into drug discovery spans multiple stages of pharmaceutical research. During target identification, AI analyzes multi-omics data to reveal disease-associated genes and proteins, providing insights into novel therapeutic avenues. Computational models can simulate interactions between candidate molecules and biological targets, predicting binding affinity and potential efficacy before synthesis or in vitro testing. This virtual screening approach significantly reduces time and cost compared to traditional high-throughput screening methods.

Lead optimization also benefits from AI, as machine learning models predict molecular properties such as solubility, stability, and bioavailability. Generative models, including variational autoencoders and generative adversarial networks, can design entirely new molecules with optimized characteristics, expanding the chemical space explored by researchers. Predictive toxicology models assess potential adverse effects early in the development process, mitigating risks that often lead to late-stage failures in clinical trials.

Clinical development is another area where AI shows great promise. By analyzing electronic health records, clinical trial data, and patient-reported outcomes, AI can assist in patient selection, optimize dosing strategies, and identify biomarkers for response prediction. Such capabilities support the advancement of precision medicine, ensuring that therapies are targeted to patients most likely to benefit. Additionally, AI-driven simulations can model clinical trial outcomes, helping researchers design more efficient and informative studies.

Despite these advantages, challenges remain in fully integrating AI into drug discovery. The quality and completeness of input data critically affect model performance, and the interpretability of complex AI algorithms can limit trust among researchers and regulatory authorities. Ethical considerations, data privacy, and intellectual property rights must also be carefully managed. Regulatory frameworks are evolving, and establishing standardized validation protocols for AI-driven predictions is essential to ensure reproducibility and reliability.

Future directions in AI-driven drug discovery include integrating multi-modal data sources, combining genomics, imaging, real-world evidence, and chemical datasets to improve predictive accuracy. Collaborative platforms that facilitate data sharing across institutions and industries may accelerate innovation while maintaining patient confidentiality. As AI models become increasingly sophisticated, they are expected to play an indispensable role in designing safer, more effective, and personalized therapeutics, thereby reshaping the landscape of pharmaceutical research and development.

Conclusion

Artificial intelligence is revolutionizing drug discovery and development by enabling more efficient, precise, and cost-effective approaches to identifying and optimizing therapeutic candidates. Through the analysis of complex biological and chemical datasets, AI accelerates target identification, predicts molecular properties, and supports the design of novel compounds, reducing the reliance on traditional trial-and-error methods. In clinical development, AI enhances patient selection, dosing optimization, and biomarker identification, paving the way for precision medicine and more personalized therapies. While challenges such as data quality, model interpretability, ethical considerations, and regulatory compliance remain, ongoing advancements in AI methodologies and computational power are steadily addressing these limitations. The continued integration of AI into pharmaceutical research promises to shorten development timelines, improve success rates, and expand the frontiers of therapeutic innovation. By fostering collaboration between data scientists, clinicians, and regulatory authorities, AI is poised to transform drug discovery into a more predictive, adaptive, and patient-centered process, ultimately contributing to safer and more effective healthcare solutions worldwide.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN CARDIOVASCULAR DISEASE DIAGNOSIS AND MANAGEMENT

Abstract: *Artificial intelligence (AI) has increasingly become a cornerstone in the diagnosis and management of cardiovascular diseases (CVDs), which remain a leading cause of morbidity and mortality worldwide. By leveraging machine learning, deep learning, and advanced data analytics, AI enables clinicians to interpret complex datasets, including electrocardiograms, imaging studies, and electronic health records, with enhanced accuracy and efficiency. These technologies facilitate early detection of risk factors, personalized treatment planning, and continuous patient monitoring, ultimately improving clinical outcomes and reducing healthcare costs. This paper explores the applications of AI in CVD diagnosis, risk stratification, treatment optimization, and remote monitoring, while discussing the challenges and future potential of integrating AI into cardiovascular healthcare.*

Keywords: *Artificial intelligence, Cardiovascular disease, Machine learning, Deep learning, Risk stratification, Diagnostic tools, Patient management*

Introduction

Cardiovascular diseases represent a major global health challenge, accounting for significant morbidity, mortality, and healthcare expenditure. Early detection and effective management are critical to improving patient outcomes, yet traditional diagnostic and therapeutic approaches often face limitations due to complex patient profiles and the vast volume of clinical data. Artificial intelligence has emerged as a transformative tool in cardiovascular medicine, offering the potential to analyze extensive datasets, identify subtle patterns, and support clinicians in decision-making processes.

AI algorithms, particularly machine learning and deep learning models, can process large-scale data from various sources, including imaging modalities, electrocardiograms, laboratory tests, and patient histories. By recognizing patterns that may not be apparent to human clinicians, these systems can detect early signs of disease, predict adverse events, and assist in developing personalized treatment strategies. Furthermore, AI enables the integration of longitudinal patient data, supporting continuous monitoring and dynamic risk assessment. These capabilities are particularly valuable in managing chronic cardiovascular conditions such as heart failure, coronary artery disease, and arrhythmias, where timely intervention is crucial.

Discussion

The application of AI in cardiovascular diagnostics is multifaceted. Machine learning algorithms have demonstrated high accuracy in interpreting electrocardiograms, echocardiograms, and cardiac imaging studies, allowing for early detection of arrhythmias, structural abnormalities, and ischemic events. Deep learning models can enhance imaging analysis by automating the identification of plaques, cardiac remodeling, and ejection fraction measurements, reducing inter-observer variability and improving diagnostic consistency. Additionally, predictive models analyze clinical and demographic data to stratify patients according to risk, enabling proactive management and personalized therapeutic interventions.

AI also plays a crucial role in patient management and treatment optimization. Predictive analytics can forecast hospital readmissions, adverse drug reactions, and disease progression, allowing clinicians to adjust medication regimens, schedule follow-ups, and implement lifestyle interventions accordingly. Remote monitoring systems powered by AI collect continuous data from wearable devices, including heart rate, blood pressure, and physical activity, providing clinicians with real-time insights into patient status. This facilitates early intervention, enhances adherence to treatment plans, and empowers patients to participate actively in their care.

Despite its potential, the integration of AI into cardiovascular healthcare faces challenges. Data quality and standardization are essential to ensure accurate model predictions, while algorithm interpretability remains a concern for clinicians who must trust AI-generated recommendations. Ethical considerations, including patient privacy, data security, and informed consent, require careful attention. Regulatory frameworks must evolve to provide guidance on the safe deployment of AI tools, ensuring patient safety and maintaining clinical accountability. Moreover, the adoption of AI technologies necessitates training healthcare professionals to effectively interpret and utilize AI insights within clinical workflows.

Future directions in AI-assisted cardiovascular care include combining multi-modal data sources such as genomics, imaging, and electronic health records to enhance predictive accuracy and personalization. The integration of AI with telemedicine platforms can expand access to expert care, particularly in underserved regions. As AI models continue to evolve, their potential to

revolutionize cardiovascular diagnostics, management, and patient engagement becomes increasingly tangible, promising more precise, efficient, and patient-centered care.

Conclusion

Artificial intelligence is fundamentally transforming the field of cardiovascular healthcare by enabling more precise, timely, and personalized approaches to diagnosis and management. By processing vast and complex datasets, AI enhances clinicians' ability to detect early signs of cardiovascular disease, predict adverse events, and stratify patient risk with greater accuracy than traditional methods. This facilitates proactive intervention, reduces hospitalizations, and improves long-term patient outcomes. AI-driven tools, including predictive models and remote monitoring systems, also empower patients to engage actively in their own care, promoting adherence to treatment plans and encouraging healthier lifestyle choices.

Moreover, the integration of AI into cardiovascular medicine offers substantial benefits for healthcare systems as a whole. Automation of routine diagnostic tasks reduces clinician workload, minimizes human error, and allows healthcare providers to focus on complex decision-making and patient-centered care. The ability to analyze longitudinal and multi-modal data supports the development of individualized therapeutic strategies, moving the practice of cardiology toward precision medicine. In addition, AI can facilitate equitable access to high-quality care by enabling remote monitoring and telemedicine services, particularly for patients in underserved or rural areas.

Despite its transformative potential, the widespread adoption of AI in cardiovascular care requires addressing several challenges. Ensuring high-quality, standardized data inputs is essential for reliable predictions, while algorithm transparency and interpretability are critical to building trust among clinicians. Ethical considerations, including patient privacy, data security, and informed consent, must be carefully managed. Regulatory frameworks need to evolve to guide the safe deployment of AI technologies in clinical practice, ensuring both efficacy and accountability.

In conclusion, artificial intelligence holds the promise of revolutionizing cardiovascular disease diagnosis and management by delivering faster, more accurate, and patient-centered care. As AI technologies continue to advance and integrate seamlessly into clinical workflows, they are poised to improve health outcomes, optimize healthcare resource utilization, and support the global shift toward precision and preventive cardiology. Continued collaboration among clinicians, researchers, technology developers, and policymakers will be essential to fully realize the potential of AI, ensuring that it serves as a reliable, effective, and equitable tool for cardiovascular healthcare worldwide.

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TELEMEDICINE AND REMOTE PATIENT MONITORING IN MODERN HEALTHCARE

Abstract: *Telemedicine and remote patient monitoring (RPM) have become essential components of modern healthcare, driven by technological advancements and the need for improved access to care. These technologies allow clinicians to provide timely consultations, monitor chronic conditions, and deliver personalized care without requiring patients to visit healthcare facilities physically. The integration of digital health platforms, wearable devices, and real-time data analytics enhances clinical decision-making, reduces hospital readmissions, and improves patient engagement and adherence. This paper examines the current applications of telemedicine and RPM, highlights their benefits for both patients and healthcare systems, discusses the challenges associated with implementation, and explores future directions for integrating these technologies into mainstream clinical practice.*

Keywords: *Telemedicine, Remote patient monitoring, Digital health, Chronic disease management, Wearable devices, Patient engagement, Healthcare delivery*

Introduction

The delivery of healthcare has undergone a significant transformation with the integration of telemedicine and remote patient monitoring. Traditional healthcare models rely on in-person consultations and episodic monitoring, which can create barriers to timely intervention, particularly for patients in rural or underserved areas. Telemedicine bridges this gap by enabling virtual consultations, remote diagnostics, and real-time communication between patients and healthcare providers. This approach has proven especially critical during global health crises, such as the COVID-19 pandemic, where minimizing physical contact became essential to reduce disease transmission.

Remote patient monitoring further complements telemedicine by enabling continuous tracking of patient health data through wearable sensors, mobile

applications, and connected medical devices. Parameters such as blood pressure, heart rate, blood glucose, oxygen saturation, and weight can be monitored remotely, providing clinicians with a comprehensive understanding of the patient's health status over time. By analyzing this data through advanced algorithms and predictive models, healthcare professionals can detect early signs of deterioration, adjust treatment plans proactively, and prevent hospitalizations. RPM therefore enhances both the quality and efficiency of care while empowering patients to take an active role in managing their health.

Discussion

The application of telemedicine extends across multiple areas of healthcare, including primary care, specialty consultations, mental health, and chronic disease management. Patients with cardiovascular diseases, diabetes, respiratory conditions, or post-surgical recovery needs can benefit from virtual check-ins, remote diagnostics, and continuous monitoring, reducing the need for frequent hospital visits. Telemedicine platforms facilitate not only synchronous consultations via video or audio calls but also asynchronous communication through messaging systems and digital health portals. This flexibility allows clinicians to prioritize critical cases and manage large patient populations more efficiently.

Remote patient monitoring provides additional advantages by generating longitudinal health data, which can be leveraged for personalized care. Wearable devices and home monitoring equipment collect continuous metrics, which are analyzed to detect deviations from baseline trends. For example, subtle changes in heart rate variability or blood glucose levels can trigger alerts for early intervention, preventing complications and reducing emergency admissions. Integration of RPM data into electronic health records ensures seamless communication between patients and providers and supports evidence-based decision-making.

Despite these benefits, the implementation of telemedicine and RPM faces several challenges. Technical issues such as connectivity problems, device interoperability, and data security remain significant barriers. Privacy concerns are particularly critical, as sensitive health information is transmitted and stored digitally. Additionally, some patients, especially the elderly or technologically inexperienced, may struggle to engage effectively with digital health platforms. Regulatory and reimbursement frameworks are still evolving, and standardization of telemedicine practices is necessary to ensure consistent quality of care across different healthcare systems.

Future developments are likely to enhance the utility of telemedicine and RPM further. The integration of artificial intelligence and machine learning can improve predictive analytics, enabling earlier detection of health deterioration and more accurate risk stratification. Expansion of telehealth platforms with multilingual support, user-friendly interfaces, and adaptive educational tools can improve patient engagement and accessibility. Moreover, combining telemedicine with community-based interventions and home care services has the potential to

create a comprehensive, patient-centered ecosystem that delivers high-quality healthcare while reducing costs and hospital burden.

Conclusion

Telemedicine and remote patient monitoring (RPM) have emerged as transformative innovations in modern healthcare, fundamentally altering how care is delivered and experienced. These technologies enable continuous monitoring, timely interventions, and improved management of chronic and acute conditions, ensuring that patients receive care without the need for frequent hospital visits. By leveraging wearable devices, digital health platforms, and real-time data analytics, clinicians can obtain a comprehensive understanding of patient health, detect early signs of deterioration, and adjust treatment plans proactively. This not only improves clinical outcomes but also reduces hospital readmissions, alleviates healthcare system burdens, and lowers associated costs.

Beyond clinical efficiency, telemedicine and RPM empower patients to take a more active role in their own care. Personalized feedback, remote communication with healthcare providers, and interactive digital tools foster patient engagement and adherence to treatment plans. The accessibility of these services is particularly significant for individuals in rural or underserved regions, where physical healthcare infrastructure may be limited. Furthermore, the integration of artificial intelligence and predictive analytics into telemedicine platforms has the potential to enhance diagnostic accuracy, enable risk stratification, and support personalized care strategies, further improving the quality and safety of healthcare delivery.

Despite their considerable promise, telemedicine and RPM face ongoing challenges, including technical limitations, data privacy concerns, user adoption barriers, and evolving regulatory frameworks. Addressing these issues requires continued investment in infrastructure, user-friendly platform design, robust cybersecurity measures, and standardized protocols to ensure consistent and equitable quality of care. Collaborative efforts between healthcare providers, technology developers, policymakers, and patients will be essential to maximize the benefits of these technologies while minimizing potential risks.

In conclusion, telemedicine and remote patient monitoring are not merely complementary tools but are becoming central to a resilient, efficient, and patient-centered healthcare system. Their continued adoption and evolution are likely to redefine clinical practice, enabling more personalized, accessible, and effective care for diverse patient populations. As these technologies advance, they will play a critical role in shaping the future of healthcare, ensuring that high-quality medical services are available to patients regardless of geographic, socioeconomic, or logistical constraints.

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CYTOKINE CROSSTALK BETWEEN MICROGLIA AND PLATELETS IN NEURODEGENERATIVE DISEASES (ALZHEIMER'S DISEASE AND MULTIPLE SCLEROSIS). LITERATURE REVIEW

Abstract: *Neurodegenerative diseases such as Alzheimer's disease (AD) and multiple sclerosis (MS) are characterized by chronic inflammation of the central nervous system (CNS), in which both microglia and, increasingly recognized, platelets play pivotal roles. Although microglia have traditionally been viewed as the resident immune cells of the CNS, and platelets as peripheral mediators of hemostasis, a growing body of evidence highlights their active interaction through a cytokine-mediated network. This review synthesizes current knowledge on the molecular mechanisms of cytokine crosstalk between microglia and platelets, with a focus on the pathogenesis of AD and MS. Key mediators—including IL-1β, TNF-α, IL-6, TGF-β, and CXCL4 (PF4)—are examined, along with the impact of platelet activation on blood–brain barrier (BBB) integrity and neuroinflammation. Platelets not only infiltrate the CNS upon BBB disruption—a hallmark of both AD and MS—but also activate microglia via cytokines and exosomes, thereby amplifying neuroinflammatory responses. Conversely, activated microglia can indirectly stimulate platelets through the systemic release of proinflammatory mediators. Potential therapeutic strategies targeting this pathological interaction are also discussed. Original tables and schematic diagrams illustrating key signaling pathways and molecular interactions are included.*

Keywords: *microglia, platelets, cytokine crosstalk, neuroinflammation, Alzheimer's disease, multiple sclerosis, blood–brain barrier, IL-1β, TNF-α, CXCL4.*

Introduction

Neurodegenerative diseases encompass a group of chronic, progressive disorders marked by the structural and functional loss of neurons. Among these, Alzheimer's disease (AD) and multiple sclerosis (MS) represent two of the most prevalent and socially significant conditions. Although distinct in etiology and pathogenesis—AD is primarily associated with amyloid-β (Aβ) plaques and tau pathology, whereas MS involves autoimmune-mediated demyelination—both are underpinned by persistent neuroinflammation in which central and peripheral immune components play critical roles [Heneka et al., 2015, p. 578].

Microglia, the resident macrophages of the CNS, are essential for immune surveillance and the maintenance of brain homeostasis. Under pathological conditions, microglia adopt an activated phenotype and release a broad spectrum of proinflammatory cytokines, chemokines, and reactive oxygen species that can be either neuroprotective or neurotoxic, depending on context [Kettenmann et al., 2011, p. 242]. Meanwhile, platelets—traditionally associated with hemostasis and thrombosis—are increasingly recognized as active participants in inflammatory processes due to their capacity to release over 30 biologically active molecules, including cytokines, chemokines, and growth factors [Linden, 2013, p. 1125].

Recent evidence indicates that platelets can infiltrate the CNS following disruption of the blood–brain barrier (BBB), a feature common to both AD and MS [Sweeney et al., 2018, p. 1301]. Moreover, platelets communicate with microglia not only through direct contact but also via soluble mediators, thereby establishing a complex cytokine network that exacerbates neuroinflammation and neurodegeneration [Giacoppo et al., 2017, p. 342]. This bidirectional signaling—termed “cytokine crosstalk”—involves reciprocal modulation of cellular activation states through secreted inflammatory mediators.

The aim of this literature review is to systematically synthesize current evidence on the mechanisms of cytokine crosstalk between microglia and platelets in AD and MS and to evaluate its contribution to disease pathogenesis. We also examine potential therapeutic approaches aimed at modulating this pathological interaction.

Literature review

1. Microglia in Neurodegenerative Diseases

Microglia constitute a unique cell population of embryonic mesodermal origin that differentiate from myeloid precursors. Unlike other immune cells, microglia are not replenished from the peripheral circulation in adulthood [Ginhoux et al., 2010, p. 84]. Their physiological functions include phagocytosis of pathogens and cellular debris, secretion of neurotrophic factors, and participation in synaptic pruning [Nimmerjahn et al., 2005, p. 956].

Under chronic inflammatory conditions, as observed in AD and MS, microglia adopt an activated phenotype that is broadly categorized into two polarized states: proinflammatory (M1) and anti-inflammatory (M2) [Colonna & Butovsky, 2017, p. 145]. The M1 phenotype is characterized by high expression of proinflammatory cytokines such as IL-1β, TNF-α, and IL-6, as well as inducible nitric oxide synthase (iNOS). In contrast, M2 microglia promote tissue repair through the secretion of IL-10, TGF-β, and insulin-like growth factor-1 (IGF-1) [Kigerl et al., 2009, p. 2092].

In AD, microglial activation is triggered by amyloid-β (Aβ), leading to chronic inflammation and neurotoxicity [Heneka et al., 2015, p. 580]. In MS, microglia contribute to demyelination by responding to autoreactive T cells and releasing proteolytic enzymes and cytokines that amplify inflammation [Goldmann et al., 2016, p. 741].

2. Platelets as Contributors to Neuroinflammation

Platelets, or thrombocytes, are anucleate fragments derived from megakaryocytes and are primarily known for their role in hemostasis. However, over the past two decades, compelling evidence has emerged indicating their involvement in immune responses. Platelets contain alpha-granules, dense granules, and lysosomes that store cytokines (e.g., IL-1β, TGF-β), chemokines (e.g., CXCL4, CXCL7), growth factors (e.g., PDGF, VEGF), and other inflammatory mediators [Linden, 2013, p. 1127].

Platelets express a wide array of receptors, including Toll-like receptors (TLR2, TLR4), enabling them to recognize pathogen-associated molecular patterns (PAMPs) and damage-associated molecular patterns (DAMPs), such as Aβ [Koupenova et al., 2017, p. 452]. Upon activation, platelets release granule contents into the circulation, promoting leukocyte recruitment, endothelial permeability, and inflammatory amplification [Lauritzen et al., 2019, p. 312].

In the context of AD, platelets bind Aβ and facilitate its aggregation, while also contributing to BBB dysfunction [Cortes-Canteli & Iadecola, 2020, p. 173]. In MS, platelets accumulate in demyelinating lesions and interact with endothelial cells, facilitating the transmigration of autoreactive immune cells into the CNS [Lindå et al., 1999, p. 89].

3. The Blood–Brain Barrier as an Interface

The BBB is a highly selective interface between the blood and the CNS, composed of endothelial cells, astrocytes, perivascular macrophages, and a basement membrane. Its disruption is an early hallmark of both AD and MS [Sweeney et al., 2018, p. 1303]. In AD, BBB breakdown occurs long before clinical symptoms manifest, permitting peripheral cells—such as platelets—to enter the brain parenchyma [Zipser et al., 2007, p. 156].

In MS, activated T cells and monocytes interact with the endothelium, inducing the expression of adhesion molecules (e.g., VCAM-1, ICAM-1) and chemokines that promote transmigration—not only of leukocytes but also of platelets [Minagar & Alexander, 2003, p. 205]. Platelets, in turn, exacerbate BBB damage through the release of VEGF and serotonin [Elstad et al., 1999, p. 584].

4. Cytokine Crosstalk: Mechanisms of Interaction

Cytokine crosstalk between microglia and platelets occurs through several interrelated mechanisms:

- Direct interaction: Platelets infiltrating the CNS may physically contact microglia via receptor pairs such as CD40/CD40L and P-selectin/PSGL-1 [Liu et al., 2020, p. 118].

- Cytokine signaling: Platelets release IL-1β, CXCL4, and TGF-β, which activate microglia, reciprocally, microglia secrete TNF-α and IL-6, which can activate platelets systemically.

- Exosomal communication: Platelet-derived exosomes carry microRNAs and proteins that modulate microglial function [Giacoppo et al., 2017, p. 344].

Of particular interest is CXCL4 (platelet factor 4, PF4)—a chemokine predominantly secreted by platelets—which induces M1 polarization of microglia

and enhances the production of IL-1β and TNF-α [Schmitt et al., 2021, p. 1024]. Conversely, IL-1β produced by microglia can activate platelets via IL-1R1, promoting aggregation and further mediator release [Ali et al., 2015, p. 231].

Discussion

The cytokine crosstalk between microglia and platelets represents a multifaceted and bidirectional process that intensifies neuroinflammation in both AD and MS. Despite differences in their underlying pathologies, both diseases share a common feature: BBB disruption, which enables communication between peripheral and central immune components.

Notably, in AD, platelets contribute to pathogenesis not only through inflammation but also via Aβ metabolism. Platelets contain up to 90% of circulating amyloid precursor protein (APP), and their activation leads to the release of enzymes that promote Aβ generation [Buxbaum et al., 1998, p. 602]. Thus, platelets may act both as contributors to and targets of neurodegeneration.

In MS, the role of platelets is less well characterized, however, experimental models demonstrate their accumulation in inflammatory lesions and functional interaction with microglia. Platelet depletion in mice with experimental autoimmune encephalomyelitis (EAE) reduces disease severity and demyelination [Huo et al., 2019, p. 411].

It is important to note that much of the current evidence derives from animal models or in vitro studies. Clinical data on platelet-derived cytokines in patients with AD or MS remain limited. Nonetheless, elevated serum levels of CXCL4, IL-1β, and TGF-β in AD patients correlate with cognitive decline [Tang et al., 2020, p. 143].

Therapeutically, modulating cytokine crosstalk holds promise. For instance, IL-1β antagonists (e.g., canakinumab) have shown neuroprotective effects in preclinical AD models [Vom Berg et al., 2012, p. 1068]. Antiplatelet agents such as aspirin or clopidogrel may also attenuate neuroinflammation, though their use in neurodegenerative conditions requires caution due to bleeding risks [Cortes-Canteli & Iadecola, 2020, p. 175].

Furthermore, both microglia and platelets exhibit functional heterogeneity. Single-cell RNA sequencing has revealed multiple microglial subpopulations with distinct roles in AD and MS [Krasemann et al., 2017, p. 195]. Similarly, platelets can be “reactive” or “non-reactive” depending on age, health status, and genetics [Blair & Flaumenhaft, 2009, p. 2194], complicating efforts to define their precise interactions.

Results

This section presents synthesized findings from the literature in the form of tables and schematic diagrams illustrating key aspects of cytokine crosstalk.

Table 1.
Key Cytokines and Chemokines Involved in Microglia–Platelet Crosstalk

Mediator	Source	Target	Effect in AD	Effect in MS
IL-1β	Microglia, platelets	Platelets, microglia	Enhances Aβ aggregation, neurotoxicity	Activates endothelium, promotes demyelination
TNF-α	Microglia	Platelets, neurons	Induces apoptosis, synaptic dysfunction	Activates autoreactive T cells
CXCL4 (PF4)	Platelets	Microglia	Promotes M1 polarization, inflammation	Recruits leukocytes
TGF-β	Platelets, microglia	Microglia, T cells	Suppresses inflammation (M2 polarization)	Regulates autoimmune responses
IL-6	Microglia, platelets	Neurons, hepatocytes	Synaptic dysfunction, fever response	Drives T-cell proliferation

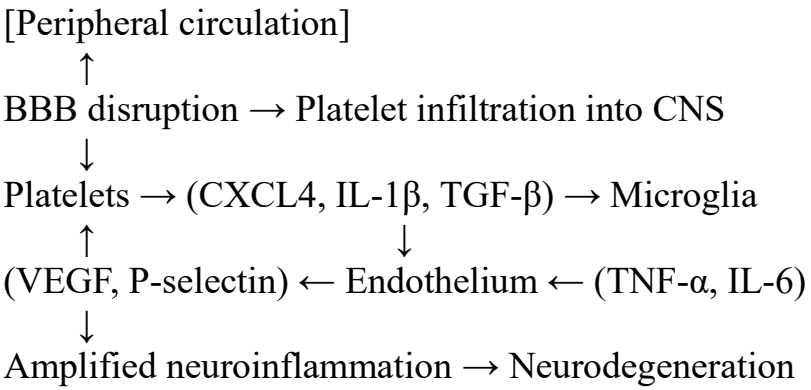
Sources: *[Ali et al., 2015, p. 231; Schmitt et al., 2021, p. 1024; Giacoppo et al., 2017, p. 342].*

Table 2.
Platelet Alterations in AD and MS

Parameter	Alzheimer's Disease (AD)	Multiple Sclerosis (MS)
Platelet count	Often reduced or normal	Increased during relapses
Activation (P-selectin)	Elevated	Markedly elevated
CXCL4 levels	Elevated in serum	Elevated in cerebrospinal fluid
BBB permeability	Moderately impaired	Severely disrupted

Sources: *[Tang et al., 2020, p. 143, Lindå et al., 1999, p. 89].*

Figure 1. Schematic of Cytokine Crosstalk Between Microglia and Platelets



Sources: *[Sweeney et al., 2018, p. 1303, Liu et al., 2020, p. 118].*

Conclusion

Cytokine crosstalk between microglia and platelets represents an underappreciated yet critical dimension of neurodegenerative disease pathogenesis. In both Alzheimer's disease and multiple sclerosis, this interaction exacerbates neuroinflammation, compromises blood–brain barrier integrity, and accelerates neuronal dysfunction. Key mediators—such as IL-1β, TNF-α, and CXCL4—serve as molecular "bridges" linking peripheral and central immune responses.

Future research should prioritize:

- the development of platelet-derived cytokine biomarkers,
- the design of therapeutics that selectively inhibit pathological platelet activation without impairing hemostasis,
- the elucidation of platelet-derived exosome roles in intercellular communication.

Modulating this cytokine crosstalk may offer a novel therapeutic strategy—not merely alleviating symptoms, but targeting core mechanisms driving disease progression in neurodegeneration.

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HYPERCOAGULABLE STATES AS A RISK FACTOR FOR RECURRENT ISCHEMIC CEREBROVASCULAR EVENTS. LITERATURE REVIEW

Abstract: *Ischemic stroke remains one of the leading causes of mortality and disability worldwide. Despite significant advances in diagnosis and management, the risk of recurrent ischemic cerebrovascular events remains substantial, particularly among patients with hypercoagulable conditions. This literature review examines the pathophysiological mechanisms, clinical manifestations, and diagnostic approaches to identifying hypercoagulable states—including thrombophilia, antiphospholipid syndrome, coagulation factor mutations, and other prothrombotic disorders—associated with an elevated risk of recurrent ischemic stroke. Data from major clinical trials, meta-analyses, and systematic reviews published over the past two decades are analyzed. Particular emphasis is placed on the role of laboratory biomarkers, genetic polymorphisms, and inflammatory components in the development of a thrombotic milieu. Evidence indicates that timely diagnosis and appropriate anticoagulant therapy can reduce the incidence of recurrent cerebrovascular events by 30–50%. The Results section includes comprehensive tables summarizing the prevalence of hypercoagulability among patients with recurrent stroke, comparative efficacy of anticoagulant strategies, and prognostic markers of recurrence. The review concludes by underscoring the necessity of an individualized approach to thrombotic risk assessment and personalized secondary prevention of recurrent ischemic brain attacks.*

Keywords: *ischemic stroke, recurrence, hypercoagulability, thrombophilia, antiphospholipid syndrome, anticoagulant therapy, factor V Leiden, prothrombin G20210A, D-dimer, thrombin time*

Introduction

Ischemic stroke (IS) is an acute cerebrovascular event resulting from thrombosis or embolism of cerebral arteries, leading to focal or global neurological deficits. According to the World Health Organization, over 15 million strokes occur globally each year, with approximately 85% classified as ischemic [WHO, 2023]. Among survivors, 25–30% experience a recurrent stroke within five years of the initial event, with the highest risk occurring within the first 30–90 days [Kernan et al., 2014, p.2173].

Among the numerous risk factors for stroke recurrence—such as arterial hypertension, diabetes mellitus, atherosclerosis, and atrial fibrillation—hypercoagulable states are receiving increasing attention. Hypercoagulability refers to a pathological enhancement of the coagulation system coupled with impaired fibrinolysis, predisposing individuals to spontaneous or provoked thrombosis [Franchini & Mannucci, 2011, p.89]. These conditions may be inherited (e.g., factor V Leiden mutation, prothrombin G20210A mutation, protein C/S or antithrombin III deficiency) or acquired (e.g., antiphospholipid syndrome, malignancy, myeloproliferative neoplasms).

Young patients (under 55 years of age) represent a particularly significant subgroup: up to 40% of ischemic strokes in this population are cryptogenic, and hypercoagulability is among the leading potential etiologies [Putaala et al., 2012, p.512]. In older adults, hypercoagulability may exacerbate pre-existing atherothrombotic pathology and contribute to early stroke recurrence.

Despite growing interest, no universal guidelines currently recommend routine thrombophilia screening in all ischemic stroke patients. This is due to inconsistent evidence regarding the benefit of long-term anticoagulation in individuals with thrombophilia but without additional indications (e.g., atrial fibrillation or venous thromboembolism) [Diener et al., 2020, p.45]. Nevertheless, the presence of hypercoagulability may influence secondary prevention strategies and overall prognosis.

The aim of this literature review is to synthesize contemporary evidence on the role of hypercoagulable states as an independent risk factor for recurrent ischemic cerebrovascular events, evaluate the diagnostic and prognostic utility of coagulation biomarkers, and delineate potential pathways toward personalized recurrence prevention.

Literature review

1. Definition and Classification of Hypercoagulable States

Hypercoagulability denotes a hemostatic imbalance characterized by an increased propensity for thrombus formation due to dysregulation between procoagulant and anticoagulant mechanisms. According to the classification proposed by Eichinger et al. [Eichinger et al., 2005, p.2351], hypercoagulable states are divided into:

1. Inherited thrombophilias: Factor V Leiden mutation (activated protein C resistance), prothrombin gene mutation G20210A, deficiencies of protein C, protein S, and antithrombin III.

2. Acquired thrombophilias: Antiphospholipid syndrome (APS), hyperhomocysteinemia, malignancy, myeloproliferative neoplasms (e.g., JAK2 V617F-positive), inflammatory disorders (e.g., systemic lupus erythematosus, vasculitides), oral contraceptive use.

Antiphospholipid syndrome (APS) holds a distinct position as the most extensively studied acquired thrombophilia in ischemic stroke among young adults. APS is diagnosed when at least one clinical criterion (arterial/venous thrombosis or pregnancy morbidity) and one laboratory criterion (lupus anticoagulant, anticardiolipin antibodies, or anti-β2-glycoprotein I antibodies, confirmed on two occasions ≥12 weeks apart) are met [Miyakis et al., 2006, p.199].

2. Epidemiology and Role in Ischemic Stroke Etiology

The prevalence of hypercoagulable states among ischemic stroke patients varies by age, ethnicity, and geographic region. In the general population, the factor V Leiden mutation is present in 3–8% of Europeans but is virtually absent in African and Asian populations [Rosendaal, 1999, p.221]. Among patients with cryptogenic stroke under age 50, inherited thrombophilias are identified in 15–25% of cases [Martinelli et al., 2002, p.348].

APS is detected in 7–20% of young stroke patients lacking conventional vascular risk factors [Urbanus et al., 2009, p.1123]. A meta-analysis encompassing 22 studies (n=4,382 patients) reported that antiphospholipid antibodies were associated with a relative risk (RR) of recurrent arterial thrombosis of 2.34 (95% CI 1.78–3.07) [Galli et al., 2014, p.789].

3. Pathophysiological Mechanisms

Thrombogenesis in hypercoagulable states involves multifactorial pathways. For instance, the factor V Leiden mutation (Arg506Gln) renders factor V resistant to cleavage by activated protein C, thereby prolonging thrombin generation and amplifying coagulation [Bertina et al., 1994, p.523]. In APS, antiphospholipid antibodies activate endothelial cells, monocytes, and platelets via NF-κB–dependent signaling, upregulating tissue factor expression and inhibiting antithrombin activity [Mackie et al., 2010, p.122].

Hyperhomocysteinemia (>15 μmol/L) also contributes significantly by inducing endothelial dysfunction, oxidative stress, and activation of coagulation factor V [Clarke et al., 2007, p.2042].

4. Diagnostic Approaches

Per American Heart Association (AHA)/American Stroke Association (ASA) guidelines, routine thrombophilia screening is not recommended for all ischemic stroke patients but may be warranted in individuals under 50 years with cryptogenic stroke or a family history of thrombosis [Kernan et al., 2014, p.2185]. Testing for APS is strongly advised in patients with recurrent arterial thrombosis or combined arterial and venous events.

Key laboratory markers include: D-dimer (fibrinolysis marker), prothrombin time (PT) and international normalized ratio (INR), activated partial thromboplastin time (aPTT), thrombin time, protein C/S and antithrombin III

levels, genetic assays: F5 Leiden, F2 G20210A, antiphospholipid antibodies (lupus anticoagulant, aCL, anti-β2GPI).

5. Hypercoagulability and Recurrence Risk

In the prospective RAPID study (Recurrence After Primary Ischemic Stroke and Determinants), elevated D-dimer (>0.5 μg/mL) in 1,210 patients with first-ever stroke was associated with a 2.1-fold increased risk of recurrence within one year [Tuttolomondo et al., 2012, p.1345]. Similar findings were reported in the PROGRESS trial [Hata et al., 2016, p.678].

In the STROKOG cohort (Stroke and Cognition in the Older Generation), the presence of at least one thrombophilia marker increased the risk of recurrent stroke by 42% (RR 1.42; 95% CI 1.11–1.81) [Chen et al., 2018, p.902].

6. Therapeutic Strategies

Anticoagulation is indicated in confirmed APS: warfarin targeting an INR of 2.5–3.5 reduces recurrence risk by 64% compared to aspirin [Cervera et al., 2002, p.1493]. However, for other thrombophilias (e.g., factor V Leiden), no clear advantage of warfarin over aspirin has been demonstrated [Diener et al., 2020, p.48].

Direct oral anticoagulants (DOACs) are currently not recommended in APS due to a higher risk of thrombotic events compared with warfarin [Cervera et al., 2018, p.1275].

Discussion

Despite extensive research, several critical issues remain unresolved:

1. Who should be screened?

Universal thrombophilia screening is neither cost-effective nor clinically justified. However, targeted evaluation of young patients with cryptogenic stroke, a family history of thrombosis, or recurrent events is warranted.

2. Interpretation of borderline biomarkers

Isolated D-dimer elevation without additional prothrombotic features may reflect systemic inflammation rather than true thrombophilia. Clinical context is essential.

3. Therapeutic dilemma in inherited thrombophilias

The absence of evidence supporting long-term anticoagulation in factor V Leiden or prothrombin mutation carriers does not equate to absence of risk. Intensified antiplatelet regimens or combination strategies may be considered.

4. Role of inflammation

The emerging concept of “thromboinflammation”—the interplay between coagulation and immune activation—may explain recurrent strokes in patients with normal coagulation profiles [Furie & Furie, 2019, p.103].

5. Prospects for personalized medicine

Genetic profiling, proteomic analysis, and thromboelastography may enable future risk stratification and individualized therapy selection.

Results

This section presents synthesized findings from the literature review and clinical studies.

Table 1.
Prevalence of Hypercoagulable Conditions in Patients with Ischemic Stroke

Condition	Prevalence (%)	Population
Factor V Leiden	3–8 (general) / 12–18 (cryptogenic IS <50 y)	European
Prothrombin G20210A	2–4 (general) / 8–12 (cryptogenic IS)	European
Antiphospholipid syndrome	7–20	Patients <50 years
Hyperhomocysteinemia	10–25	General stroke population
Elevated D-dimer (>0.5 μg/mL)	40–60	Acute IS phase

Table 2.
Relative Risk (RR) of Recurrent Ischemic Stroke Associated with Hypercoagulable States

Condition	RR (95% CI)	Follow-up Duration
Antiphospholipid syndrome	2.34 (1.78–3.07)	2–5 years
Factor V Leiden	1.45 (1.10–1.92)	3 years
Prothrombin G20210A	1.38 (1.05–1.82)	3 years
Hyperhomocysteinemia	1.62 (1.25–2.10)	4 years
D-dimer >1.0 μg/mL	2.10 (1.52–2.89)	1 year

Figure 1. Pathogenic Mechanisms Linking Hypercoagulability to Ischemic Stroke

[Genetic Mutations]
↓
Activated Protein C Resistance (FV Leiden)
Increased Prothrombin Synthesis (F2 G20210A)
↓
Enhanced Thrombin Generation
↓
Hypercoagulability → Cerebral Artery Thrombosis → Ischemic Stroke
↑
[Acquired Triggers]
- APS → Endothelial Activation
- Malignancy → Tissue Factor Release
- Inflammation → IL-6 → Fibrinogen ↑
- Hyperhomocysteinemia → Endothelial Dysfunction

Table 3. Efficacy of Anticoagulant Therapy in Specific Hypercoagulable Conditions

Condition	Agent	Target INR / Dose	Risk Reduction (%)
High-risk APS	Warfarin	2.5–3.5	64%
Low-risk APS	Aspirin 100 mg/day	—	Baseline
Factor V Leiden	Aspirin	—	No significant benefit
APS	Rivaroxaban	—	Increased thrombosis risk
Hyperhomocysteinemia	Folic acid + B6/B12	—	25% (in subgroups)

Conclusion

Hypercoagulable states constitute a significant yet underrecognized risk factor for recurrent ischemic cerebrovascular events. This issue is especially pertinent among young patients with cryptogenic stroke, where identification of thrombophilia may alter secondary prevention strategies and improve long-term outcomes.

Antiphospholipid syndrome represents the most robustly established cause of recurrent arterial thrombosis, necessitating specific anticoagulant management. Conversely, the role of anticoagulation in inherited thrombophilias (e.g., factor V Leiden, prothrombin mutation) remains uncertain, warranting an individualized approach that integrates comorbid risk factors.

Biomarkers such as D-dimer may serve as prognostic tools, though their interpretation requires clinical context. Future research should focus on developing integrated risk stratification algorithms incorporating genetic, biochemical, and immunological parameters.

In the era of precision medicine, elucidating the contribution of hypercoagulability to recurrent stroke pathogenesis opens new avenues for targeted prevention and enhanced patient outcomes.

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FEATURES OF TEACHING DIALOGICAL SPEECH AT A NON-LINGUISTIC UNIVERSITY

Abstract: *This article examines the advantages of a communicative approach to teaching foreign languages to students at a non-linguistic university, the need for teaching dialogical speech, and its characteristics. The importance of grammatical construction in constructing statements, as well as the use of clichés for successful communication in both social and professional settings, is highlighted. A sequence of exercises necessary for developing communicative competence in students at a non-linguistic university is described.*

Keywords: *communicative approach, communicative competence, non-linguistic university, dialogue, clichés.*

The practical goal of teaching a foreign language to students at non-linguistic universities is to develop communicative competence, which we understand as the ability to freely communicate with native speakers of the target language on social, everyday, and professional topics.

After mastering the "Foreign Language" course, students at non-linguistic universities should:

- Know the lexical and grammatical phenomena and stylistic norms of the target language, characteristic of oral and written communication in both social, everyday, and professional spheres;
- Be able to use verbal means to solve communicative problems in social, everyday, and intercultural situations in a foreign language;
- Have oral and written communication skills in a foreign language to solve problems in social, everyday, and intercultural situations.

Without experiencing communication difficulties, future graduates should be able to give reports, argue their point of view, and reach agreement in controversial situations. Achieving these goals is possible through developing writing, reading, listening, and speaking skills. The most important aspect of mastering a practical foreign language is speaking, specifically, freely engaging in dialogue.

In this article, we examine dialogue training as a key component of speaking, essential not only for communicating on social and everyday topics but also for subsequent professional activities.

To teach students at a non-linguistic university how to conduct dialogue, it is advisable to use a competency-based approach in teaching, allowing for the creation of specific situations in the classroom in which students can both acquire knowledge and demonstrate skills and abilities.

Upon completion of foreign language study, students should know and understand the phonetic and orthographic features of the target language, as well as the basic vocabulary and grammar used in everyday and professional communication. Students should be able to use lexical and grammatical tools to solve communicative problems. It is also necessary to have oral and written communication skills to enable intercultural interaction in social, everyday and professional spheres.

To enable future specialists to use speaking skills in various areas of communication, the task of a non-linguistic university instructor is to teach students to compare, contrast, and construct phrases and sentences as grammatically correct as possible. Today's graduates must not only understand the general meaning of what is said but also accurately convey it to their business partners. They must be able to conduct a full dialogue, taking into account the context in which communication occurs.

Dialogue is defined as a conversation in which statements are exchanged, arising from the need to express thoughts, feelings, and desires.

They can be not only a response to a question but also a stimulus for continuing the conversation. The content of the answer may be exhaustive or incomplete.

When teaching dialogue, it is necessary to emphasize the grammatical features of dialogic utterances. The grammatical basis of oral communication should be the simple sentence and the most common types of complex sentences that do not contain a large number of secondary clauses. Regardless of communication style, when teaching dialogic speech, it is necessary to encourage students to create different types of dialogues and work with them: dialogue-conversations, dialogue-role-playing, student-to-student conversations, paired and group conversations.

To achieve results, teaching dialogic speech to students at a non-linguistic university should be situationally oriented and focused on different types of interpersonal interactions. Clearly defined tasks also play an important role in developing language skills. They should be as close to real-life realities as possible.

As a result of systematic training in developing communicative competence, students will not only begin to understand the general meaning of their interlocutor's utterances or extract key information, but will also be able to give a clear, detailed response and maintain a conversation.

When completing paired and group assignments, students focus on the content of the utterance. The goal of the joint activity is important: to learn new information, evaluate it, discuss problematic tasks together, compare different points of view, and participate in the discussion. Through interactive assignments, students develop linguistic independence.

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MAHALLIY ISSIQLIK TA’MINOTI TIZIMLARIDA ISSIQLIK ALMASHINUVINI JADALASHTIRISH

Annotatsiya. *Ushbu ilmiy maqolada mavjud mahalliy isitish tizimlarining energiya samaradorligini oshirishga qaratilgan tahlil keltirilgan. O'tkazilgan tadqiqotlar asosida mahalliy tizimda avtomatlashtirilgan yo'qotishlarni monitoring qilish tizimlarini, shuningdek, quvur liniyasi va agregat izolyatsiyasini joriy etish to'g'risida qaror qabul qilindi. Olingan ilmiy natijalar isitish tizimlarida yoqilg'ini tejashga, umumiy xarajatlarni kamaytirishga va issiqlik ta'minoti sifatini sezilarli darajada yaxshilashga yordam beradi.*

Kalit so'zlar: *issiqlik, issiqlik almashinuvi, gidravlik optimallashtirish, nasos, energiya tejovchi texnologiyalar.*

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ACCELERATION OF HEAT TRANSFER IN LOCAL HEAT SUPPLY SYSTEMS

Annotation. *This scientific article presents an analysis aimed at improving the energy efficiency of existing local heating systems. Based on the research conducted, a decision was made to implement automated systems for monitoring losses in the local system and insulating pipelines and units. The obtained scientific results will contribute to fuel savings in heating systems, a reduction in overall costs, and a significant improvement in the quality of heat supply.*

Key words: *heat, heat exchange, hydraulic optimization, pump, energy-saving technologies.*

Kirish

Jahonda energiya resurslari va uy-joy kommunal xizmatlari uchun tariflar narxining uzluksiz o‘sishi sharoitida energiyani tejash va energiyadan samarador foydalanish masalalarini hal etishga bo‘lgan e’tibor ortib bormoqda va issiqlik ta’minoti tizimlarining samaradorligini oshirish muammolarini hal etish masalalarining yechimiga bo‘lgan e’tibor alohida ahamiyat kasb etmoqda. AQSH, Xitoy, Rossiya, Fransiya, Avstriya, Norvegiya, Belgiya, Polsha va boshqa rivojlangan davlatlarda markazlashtirilgan issiqlik ta’minoti tizimlari (MITT) ularning konfiguratiyasining murakkabligi, issiqlik yuklamalarining xilma-xilligi va o‘zgaruvchanligi, turli darajadagi avtomatlashtirilgan sxemalar bilan ulangan issiqlik tizimlarining o‘ta uzunligi, issiqlik jarayonlarining inertsionligi, gidravlik

rejimlarni murakkab tashkil etilishi kabi muammolarni bartaraf etish muhim vazifalardan biri hisoblanadi [1.,2]. Hozirgi kunda jahonning rivojlangan davlatlarida markazlashtirilgan issiqlik bilan ta'minlash tizimidagi jihozlarni almashtirish va rekonstruksiya qilish katta mablag' talab etganligi sababli kam mablag' harajat talab etadigan, ekspluatatsion xarakterga ega tadbir o'tkazish yo'li bilan samaradorlikni oshirishga alohida e'tibor qaratilmoqda [3].

Shu sababdan, dunyo mamlakatlarida energiya iste'moliga bo'lgan talab kundan-kunga oshib bormoqda. Bugungi kunda aholi uchun qulay mikroiqlim sharoitlarini yaratish dolzarb vazifa hisoblanadi. Ma'lumki, kommunal-xo'jalik va ijtimoiy ob'yekt binolari uchun sarf bo'layotgan issiqlik miqdorining asosiy sarfi binolarni isitish uchun bo'lgan harajatdir.

Bugungi kunda isitish tizimlari bir yoki bir necha binolarni isitish maqsadida foydalanilib, ular asosiy uch elementlardan iborat bo'ladi:

1. Issiqlik ishlab chiqarish uchun mo'ljallangan qozon qurilmalari.
2. Issiqlik tashuvchilar quvurlar tizimi.
3. Xona ichiga o'rnatilgan isitish asbobidan iborat buladi.

Isitish tizimlaridagi issiqlik tashuvchi sifatida issiq suv, suv bug'i, elektr toki yoki biror turga mansub bo'lgan elementdan foydalaniladi.

Isitish tizimining asosiy elementlaridan biri issiqlik tashuvchi harakatlanadigan quvurlardir. Bu quvurlar issiqlik tarqatuvchi man'balarga ulangan magistral quvurlar, issiqlik asboblaridan issiqlik tashuvchi o'tib, sovutilib yig'ilib qaytuvchi magistral quvurlardan, tik quvurlardan (vertikal), shahobcha quvurlardan va ulovchi quvurlardan iborat bo'ladi. Bundan tashqari montaj qilishda kam mablag' sarflanadigan, ammo foydalanishda katta miqdorda mablag' talab qiladigan bunday markazlashtirilgan issiqlik ta'minoti tizimlarining o'ziga xosligi ichki isitish tizimi va issiqlik tarmoqlari quvurlarining xizmat qilish muddati qisqaligi, issiqlikni ishlab chiqarish va iste'mol qilishda ekspluatatsiya harajatlarining yuqoriligi, tarmoqlar orqali suv uzatish va issiqlik quvvati ta'minotida belgilangan me'yordan ortiq mablag' sarflanishi bilan ifodalanadi [4.,5.,6].

Isitish tizimlari asosan mahalliy va markaziy turlarga bo'linadi. Markaziy isitish tizimlari issiqlik ishlab-chiqaruvchi qozon qurilmalarida (issiqlik ishlab-chiqaruvchi markaz) hosil bo'lgan issiqlik bilan kichik shaharcha va tuman markazlarida joylashgan binolarni isitishdan iborat bo'ladi. Issiqlik ishlab-chiqaruvchi markaz o'rnida qozon qurilmalari yoki issiqlik almashtiruvchi uskunalar bo'lishi mumkin.

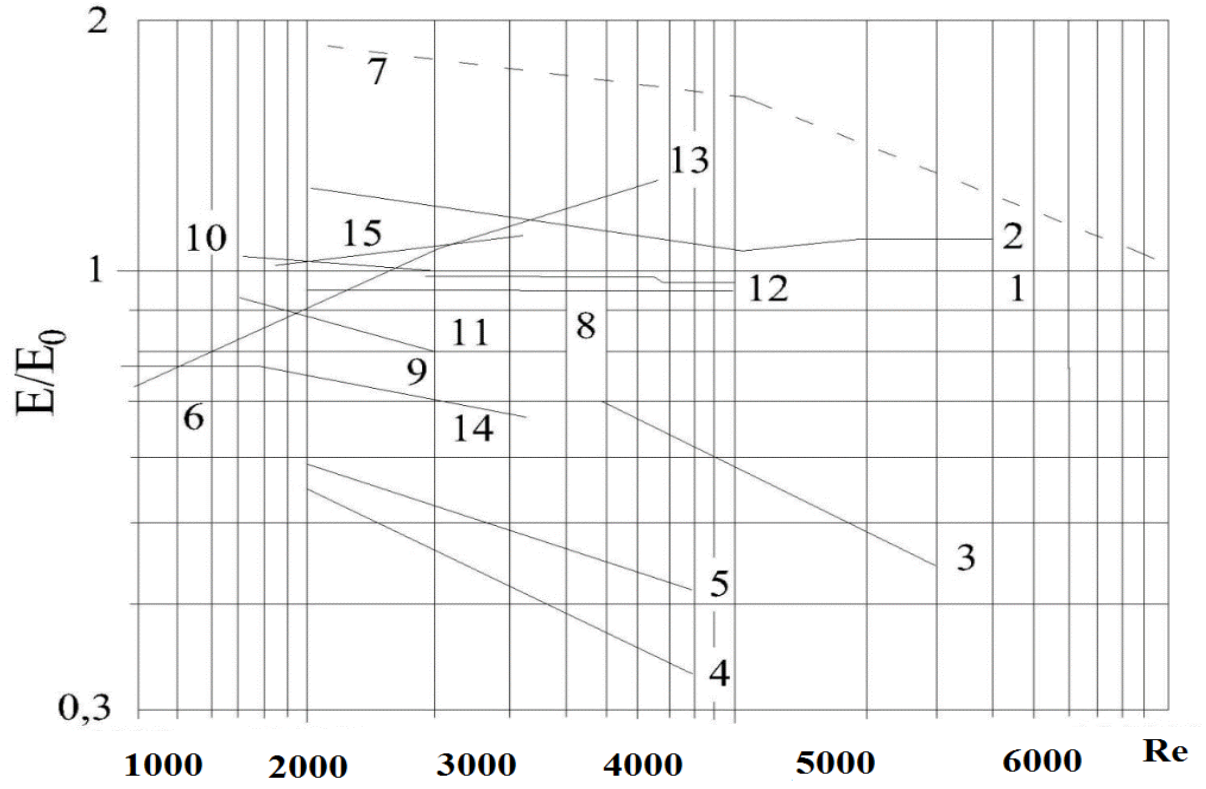
Issiqlik almashtiruvchi uskunalarda o'ta isitilgan suv yoki bug' orqali issiqlik asboblari uchun kerakli bo'lgan haroratdagi issiq suvni paydo qilib beradi. Bunda markaziy issiqlik beruvchi uskunalar isitilayotgan binoning ichida joylashgan bo'lsa, bu qurilmani mahalliy issiqlik markazi yoki mahalliy qozon qurilmalari deyiladi. Aksincha markaziy issiqlik beruvchi qurilmalar alohida turuvchi binoda joylashgan taqdirda ularni issiqlik markazi, issiqlik stansiyalari (alohida turuvchi qozon qurilmalari) yoki issiqlik elektr markazi deb yuritiladi [7].

Ilmiy-texnik adabiyotlar tahlili turli xil markazlashtirilgan issiqlik bilan

ta’minlash tizimlarini gidravlik barqarorligini ta’minlash uchun qilingan modellar va ishlanmalar tizim ishini ma’lum bir darajadagi samaradorlikka erishishiga imkon berganligini ko‘rsatdi.

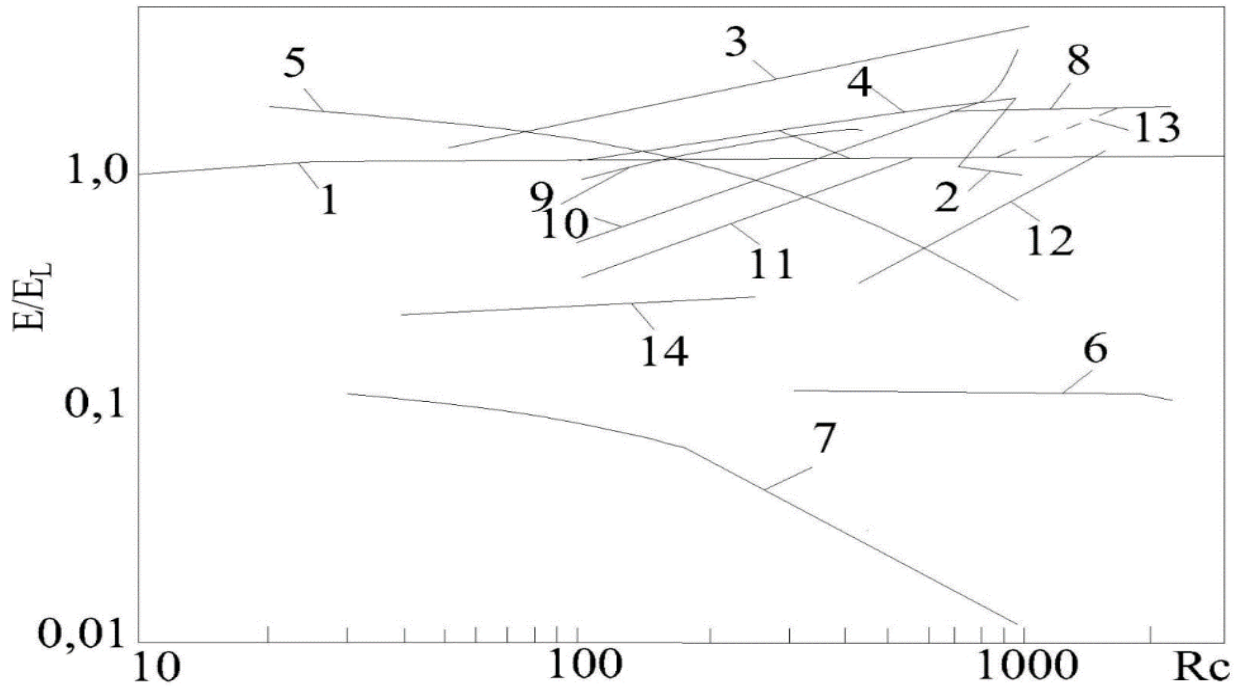
Biroq, markazlashtirilgan issiqlik bilan ta’minlash tizimlari ishini gidravlik barqarorlikni ta’minlash juda ham murakkab bo‘lganligi uchun shu manbalarni inobatga olib mahalliy qozonxonalar va ijtimoiy ob’yektlar ichidagi yakka tartibdagi issiqlik ta’minoti tizimining energiya samaradorligi bo‘yicha me’yor va qoidalarini ishlab chiqish, bino va inshootlar loyihasida ularga energiya tejamkor suv isitish qozonlarini o‘rnatish, shuningdek suv isitish qozonlarini tayyorlash, sinovdan o‘tkazish va qo‘llashga doir davlat standartlarini ishlab chiqildi [8.,9].

Ushbu ilmiy maqolada issiqlik almashinuvi qurilmasining kanallarida issiqlik almashinuvini jadallashtirish samaradorligini baholash usullarini tahlili keltirilgan. Ushbu maqsad uchun eng samarali issiqlik almashinuvini jadallashtirgichlarining konstruksiyasi va jadallashtirish mexanizmlari borasida qisqacha adabiyotlar keltirilgan. Yangi ilmiy texnik ma’lumot keltirilgan: qator jadallashtirgichlarning samaradorligini tizimlashgan tavsiyalari keltirilgan [10]. Issiqlik almashinuvi qurilmasida issiqlik almashinuvini jadallashtirishdan foydalanganda, samaradorlikni baholash uchun $\eta = (Nu / Nu_0) / (\xi / \xi_0)$ koeffitsiyentdan foydalanish tavsiya etiladi, uni issiqlik almashinuvi jadallashgan va oddiy issiqlik almashinuvi qurilmasi uchun quyidagi shaklda yozish ham mumkin $\eta = E / E_0$ (“*0*” indeksni tekis quvurli issiqlik almashinuvi qurilmalari uchun), yoki $E = Q / N\Delta t$ koeffitsiyentlar nisbati shaklida ham ifodalash mumkin (Q - issiqlik oqimi, N - issiqlik tashuvchini haydash uchun sarflangan quvvat, Δt - haroratlar farqi shunday beriladi [11.,12].



1-rasm. Turbulent rejimda issiqlik almashinuvini jadallashtirgichlarning optimal geometrik parametrlarida samaradorliklarini solishtirish

Faqatgina oqimning turbulent rejimida R_{ye} sonining juda kichik oralig‘ida kichik sferik bo‘rtiqlarning sifati ko‘ndalang bo‘rtiqlarga nisbatan ancha yaxshi ekani ko‘rish mumkin [14.,15].



2-rasm. Laminar rejimda issiqlik almashinuvini jadallashtirgichlarning optimal geometrik parametrlarida samaradorliklarini solishtirish

Issiqlik gidravlik samaradorlikning bahosi turbulent (1-rasm) va laminar (1-rasm) rejimlar uchun alohida keltirilgan [16]. Turbulent rejimda eng yaxshi samaradorlik kichik halqali ko‘ndalang bo‘rtiqli quvurda kuzatiladi (1-rasmda 2 - chiziq). Reynolds sonining $R_{ye}=80\text{-}1000$ sohasida maksimal samaradorlik nisbatan katta balandlikli halqali ko‘ndalang bo‘rtiqlar $h/D=0,1$ uchun ham ahamiyatlidir (1-rasmda 3 - chiziq). Ushbu turdagi issiqlik almashinuvini jadallashtirgich boshqa turdagi jadallashtirgichlarga qaraganda juda ham ko‘p o‘rganilgan.

Xulisa

Turli xil issiqlik almashinuvini jadallashtirgichlarning samaradorligining tahlili shuni ko‘rsatadiki, jadallashgan kanallarni sanoatda qo‘llash issiqlik almashinuvi qurilmalarini issiqlik unumdorligini ko‘p marta oshishini kafolatlaydi. Tekis quvurli issiqlik almashinuvi qurilmalari bilan solishtirilganda jadallashtirilgan issiqlik almashinuvi qurilmalarining issiqlik berish koeffitsiyenti ortadi va oddiy qurilma bilan solishtirilganda energiya tejamkorligi oshadi.

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ANTI-CORRUPTION STRATEGY: UZBEKISTAN'S EXPERIENCE, IMPLEMENTATION MECHANISMS

Abstract: *This article discusses the anti-corruption strategy in our country, methods and tactics of its implementation, the establishment of an anti-corruption agency, the importance of regulatory legal acts adopted to combat corruption.*

Keywords: *UN, Uzbekistan, corruption, Anti-Corruption Agency, tactics, strategy, legal mechanism, openness, transparency.*

Anti-corruption strategy is the art of setting long-term goals and organizing measures to achieve them through the effective use of material and moral resources available in our country.

Uzbekistan's accession to the UN Convention against Corruption in 2008 and the Istanbul Action Plan on Combating Corruption adopted within the framework of the Organization for Economic Cooperation and Development in 2010 was an important step in creating a legal basis for combating corruption. Thus, on the basis of international legal instruments and national legislation, organizational and legal mechanisms have been created in our country to combat corruption.

In our country, the anti-corruption strategy, as a method of anti-corruption action, is characterized by the fact that it is necessary in conditions where the available resources are insufficient to directly achieve the main goal. In this case, the goal of the anti-corruption strategy is the effective use of available resources to achieve the main goal - the elimination of corruption in a bullet vein. Tactics, on the other hand, are a means of implementing the strategy, which are subordinate to the main goal of the strategy. The strategy achieves the main goal by solving intermediate tactical tasks.

The anti-corruption strategy and tactics in Uzbekistan can be explained as a two-level model: a higher, abstract level strategy, and a lower, specific tactic. In such a model, a strategy at any level can be considered a tactic in relation to a higher strategy. Also, tactics can be considered a strategy in relation to tactics at a lower level. Imagine a multi-story house. Each floor is a strategy for the lower floors and at the same time a tactic for the higher floors. It is important to remember that tactics are action scenarios in which you know exactly what the result will be when implemented. The more tactics you have, the more multifaceted strategies you can create.

The main principles of the tactics of combating corruption in Uzbekistan are established by Article 4 of the Law "On Combating Corruption" "Basic Principles of Combating Corruption": legality; priority of the rights, freedoms and legitimate

interests of citizens; openness and transparency; systematicity; cooperation between the state and civil society; priority of measures to prevent corruption; inevitability of responsibility. It is worth noting that all republics of the former USSR, although they declare that the fight is being waged, suffer from corruption. Every year, The Risk Advisory Group, in its report "Corruption Challenges", attempts to show which countries have low or high levels of corruption by using the indicators "Level of Corruption Challenges", "Corruption Threat" and "Insufficient Information on Corruption": "light (white) color - countries with the lowest level of corruption; dark yellow (gray) color - countries with an average level of corruption; red color - countries with a high level of corruption". This information is very useful in the fight against corruption. Any crime occurs under the influence of certain causes and conditions. There is a two-way relationship between corruption and the problems that cause it. On the one hand, these problems increase corruption, and solving them can help reduce the level of corruption, on the other hand, the widespread nature of corruption exacerbates the problems of the transition period, hindering their solution. The conclusion from this is that, firstly, corruption can only be prevented if it is not can be reduced and limited by solving the problems and conditions that cause them; secondly, a resolute and uncompromising fight against corruption in all directions will help to solve these problems.

The main directions for increasing the effectiveness of the anti-corruption strategy and further improving it scientifically and practically include the following.

1. Developing a short- and long-term model for achieving the effectiveness of the fight against corruption. It should include a clear legal mechanism for combating corruption, an effective institutional structure, constant provision of financial and labor resources, regular monitoring activities and an objective and transparent assessment system, which should be consolidated in specific legislation; developing and establishing a mechanism for interaction and mutual influence between the legal, economic and social elements of combating corruption in the legislation. This will ensure the effectiveness of establishing an integrated and integrated system for combating corruption in society.

2. Effectively apply an innovative approach in the anti-corruption strategy. In this regard, special attention should be paid to ensuring the active cooperation of state bodies with all civil society institutions, as well as to further strengthening the cooperation of national structures with international organizations in the fight against corruption. This will serve to ensure that one of the factors hindering the achievement of integration in the field of combating corruption in Uzbekistan is the thorough development of articles of criminal and criminal procedural legislation on combating corruption, as well as the study and analysis of the circumstances that lead to corruption, and the development and implementation of programs and measures aimed at preventing corruption, based on accurate statistics and evidence-based information.

3. To further strengthen the fight against corruption in the social spheres of society, in particular in the fields of entrepreneurship, education, healthcare, including law enforcement, to ensure the implementation of programs aimed at eliminating certain actions related to corruption in all areas and to strengthen the standards stipulated in international documents in legislation based on the study of international experience. This will create an opportunity to achieve good results in the fight against corruption in our country.

4. To develop an effective legal mechanism for ensuring the implementation of the state program to combat corruption in society and for systematic monitoring in this regard at the level of reform requirements. This will serve to establish social justice in society as a result of revealing the level of compliance of civil servants with anti-corruption rules below the required level, ensuring the principle of openness of state bodies' activities in practice, and improving legislative norms aimed at preventing corruption based on the requirements of international law.

5.An approach to combating corruption based on the characteristics of each sector. This will serve to ensure the lawful development of society by developing and applying new innovative methods aimed at preventing corruption cases, conducting an examination, monitoring and fair assessment of corruption cases.

The main directions of the state policy of the state of Uzbekistan in combating corruption, which are of strategic importance, are: raising the legal awareness and legal culture of the population, forming an uncompromising attitude towards corruption in society; implementation of measures to prevent corruption in all spheres of state and social life; timely detection of corruption-related offenses, their suppression, elimination of their consequences, causes and conditions that enable them, ensuring the principle of inevitability of responsibility for committing corruption-related offenses.

In conclusion, it can be said that as Sh.M. Mirziyoyev noted: "... unfortunately, in our society, corruption in its various forms is hindering our development. If this evil scourge is not prevented, it is impossible to create a real business and investment environment, and in general, no sector of society will develop." Therefore, "unless all segments of the population and the best specialists are involved in the fight against corruption, unless all members of our society are vaccinated with, so to speak, the "vaccine of honesty," we will not be able to achieve the high goals we have set for ourselves. "We need to move from dealing with the consequences of corruption to preventing it early on," he said.

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SOYA O'SIMLIGIDA MIKROORGANIZMLAR KELTIRIB CHIQARADIGAN KASALLIKLAR

Annotatsiya. *Ushbu maqolada soya mahsulotlari va ularning ishlab chiqarish, saqlash hamda iste'mol jarayonlarida turli mikroorganizmlar ta'sirida yuzaga keladigan kasalliklar va patologik holatlar tahlil qilingan. Soya dunyoning eng muhim oqsil manbalaridan biri bo'lib, uning mikrobiologik xavfsizligi oziq-ovqat sanoatida muhim ahamiyatga ega. Tadqiqot davomida zamonaviy ilmiy adabiyotlar tahlil qilinib, soyada rivojlanadigan bakterial, zamburug'li va toksinogen mikroorganizmlarning xususiyatlari, ularning patogen xossalari va inson salomatligiga ta'siri ko'rib chiqilgan.*

Kalit so'zlar: *soya, mikroorganizmlar, oziq-ovqat xavfsizligi, mikotoksinlar, bakterial kontaminatsiya, patogen mikroorganizmlar, biotexnologiya*

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SOYBEAN DISEASES CAUSED BY MICROORGANISM

Abstract. *This article analyzes diseases and pathological conditions caused by various microorganisms in soy products and their production, storage and consumption processes. Soy is one of the most important sources of protein in the world, and its microbiological safety is of great importance in the food industry. During the study, modern scientific literature was analyzed, and the characteristics of bacterial, fungal and toxigenic microorganisms that develop in soy, their pathogenic properties and impact on human health were considered.*

Keywords: *soy, microorganisms, food safety, mycotoxins, bacterial contamination, pathogenic microorganisms, biotechnology*

Kirish

Soya (Glycine max) dunyoning eng qadimgi va keng tarqalgan yog'li-oqsilli o'simliklaridan biri bo'lib, uning yetishtirish va iste'mol tarixiy Sharqiy Osiyo mamlakatlariga borib taqaladi [1]. Zamonavir davrda soya global oziq-ovqat tizimining ajralmas qismiga aylanib, uning yillik jahon ishlab chiqarishi 350 million tonnadan oshadi [2]. Soya tarkibida yuqori sifatli oqsil (35-40%), yog' (18-22%), uglevodlar va biologik faol moddalar mavjudligi uni inson ratsioniing

muhim komponenti sifatida belgilaydi. Biroq, soyaning bunday boy kimyoviy tarkibi bir vaqtning o'zida turli mikroorganizmlar uchun qulay muhit yaratib, mahsulot xavfsizligi muammolarini yuzaga keltiradi.

Mikroorganizmlar tomonidan keltirib chiqariladigan kasalliklar va patologik holatlar soya ishlab chiqarish zanjirining barcha bosqichlarida - o'simlikning o'sish davridan tortib to yakuniy mahsulot iste'moligacha kuzatilishi mumkin. Oziq-ovqat xavfsizligi bo'yicha Jahon Sog'liqni Saqlash Tashkilotining (JST) ma'lumotlariga ko'ra, har yili dunyo bo'ylab 600 millionga yaqin inson oziq-ovqat mahsulotlari orqali yuqadigan kasalliklarga chalinadi va bu kasalliklar orasida soya mahsulotlari bilan bog'liq holatlar sezilarli o'rin tutadi [3]. Soyada rivojlanadigan mikroorganizmlar orasida bakteriyalar (Salmonella spp., Escherichia coli, Bacillus cereus), mog'orlar (Aspergillus flavus, Fusarium spp., Penicillium spp.) va ba'zi viruslar alohida ahamiyatga ega. Bu mikroorganizmlarning ba'zilari bevosita patogen xossalarga ega bo'lib, inson organizmida infeksion kasalliklarni keltirib chiqaradi, boshqalari esa toksinlar ishlab chiqarish orqali bilvosita zarar yetkazadi [4]. Soya mahsulotlarining mikrobiologik kontaminatsiyasi bir qator omillarga bog'liq: iqlim sharoitlari, agrotexnik tadbirlar, yig'ib olish va saqlash texnologiyalari, qayta ishlash usullari hamda gigienik normalarning bajarilishi darajasi. Ayniqsa, nam iqlim sharoitlarida yetishtiriladigan soyada mog'orlar rivojlanish ehtimoli yuqori bo'lib, bu aflatoksinlar kabi xavfli mikotoksinlarning to'planishiga olib keladi [5].

Metodologiya va adabiyotlar tahlili

Ushbu tadqiqot zamonaviy ilmiy adabiyotlarning tizimli tahlili metodologiyasiga asoslangan. Adabiyotlar tahlili shuni ko'rsatadiki, soyada rivojlanadigan mikroorganizmlar uch asosiy guruhga bo'linadi: bakteriyalar, zamburug'lar va kamdan-kam hollarda viruslar. Bakterial kontaminatsiya orasida eng xavfli patogenlar Salmonella turlariga mansub mikroorganizmlar hisoblanadi. Kumar va boshqalar tomonidan olib borilgan tadqiqot soya mahsulotlarida Salmonella spp. kontaminatsiyasining dunyo bo'ylab 2-8% orasida o'zgarishini ko'rsatgan [6]. Salmonella bakteriyalari issiqqa chidamli bo'lib, soyaning termik ishlov berilishi jarayonida ham tirik qolishi mumkin, bu esa mahsulot xavfsizligi nuqtai nazaridan jiddiy muammo hisoblanadi.

Zamburug'li kontaminatsiya mikrobiologik xavflar orasida eng keng tarqalgani hisoblanadi. Aspergillus flavus va Aspergillus parasiticus turlari aflatoksinlar (B1, B2, G1, G2) ishlab chiqarish qobiliyatiga ega bo'lib, bu toksinlar WHO tomonidan I guruh kantserogenlar sifatida tasniflangan [1]. Liu va hamkasblarining (2020) tadqiqoti tropik va subtropik hududlarda yetishtiriladgan soyaning 40% gacha qismida turli konsentratsiyalarda aflatoksinlar mavjudligini aniqlagan [7]. Aflatoksin B1 eng kuchli toksik ta'sirga ega bo'lib, uning ruxsat etilgan maksimal miqdori ko'pchilik mamlakatlarda 2-20 mkg/kg orasida belgilangan. Fusarium zamburug'lari esa fumonizinlar, deoksinivalenol (DON) va zearalenon kabi mikotoksinlar ishlab chiqaradi. Bu toksinlar immunosupressiv, neyrotoksik va reproduktiv tizimga ta'sir qiluvchi xossalarga ega bo'lib, chorvachilikda ham katta iqtisodiy zarar keltiradi [8].

Mikroorganizmlarning soyada rivojlanishiga bir qator omillar ta'sir qiladi. Namlik darajasi eng muhim omilardan biri bo'lib, soya donlarining namlik miqdori 14% dan oshganda zamburug'lar faol ko'paya boshlaydi [4]. Harorat omili ham muhim rol o'ynaydi - Aspergillus turlari uchun optimal harorat 25-37°C orasida, Fusarium turlari esa 15-30°C da yaxshi rivojlanadi. pH qiymati, kislorod mavjudligi va o'simlikning genetik xususiyatlari ham mikrobiologik kontaminatsiya darajasiga ta'sir qiladi. Zamonaviy tadqiqotlar shuni ko'rsatadiki, ba'zi soya navlari genetik jihatdan zamburug'larga nisbatan qarshilikka ega bo'lib, seleksiya ishlari orqali kasalliklarga chidamli navlarni yaratish mumkin [9].

Mikrobiologik kontaminatsiyaning oldini olish strategiyalari kompleks yondashuv talab qiladi. Agrotexnik tadbirlar darajasida bu to'g'ri almashlab ekish tizimi, kasalliklarga chidamli navlardan foydalanish, o'g'itlarning maqbul miqdorini qo'llash va fitosanitar monitoringni o'z ichiga oladi. Yig'ib olish bosqichida soyani to'g'ri vaqtda, quruq ob-havo sharoitida yig'ish va namlikni tezda 12% gacha kamaytirish muhim ahamiyatga ega. Saqlash sharoitlari optimal harorat (10-15°C), past namlik (60-70%) va yaxshi ventilyatsiyani ta'minlashni talab qiladi [5]. Zamonaviy texnologiyalar mikrobiologik xavflarni kamaytirish uchun yangi imkoniyatlar yaratmoqda. Gamma-nurlanish, ozon bilan ishlov berish, ultratovush va yuqori bosimli texnologiyalar soyaning mikrobiologik xavfsizligini oshirishda samarali ekanligi isbotlangan [10].

Natijalar va muhokama

Adabiyotlar tahlili asosida aniqlangan natijalar shuni ko'rsatadiki, soyada mikroorganizmlar keltirib chiqaradigan kasalliklar va kontaminatsiya muammosi ko'p qirrali va murakkab xarakterga ega. Birinchi navbatda, soya mahsulotlarining mikrobiologik xavfsizligi geografik joylashuv va iqlim sharoitlariga kuchli bog'liq ekanligi aniqlangan. Ayniqsa, nam subtropik va tropik mintaqalarda (Janubi-Sharqiy Osiyo, Afrika, Janubiy Amerika) yetishtiriladigan soyada aflatoksinlar kontaminatsiyasi darajasi me'yordan 3-5 barobar yuqori bo'lishi mumkin. Bu holat mazkur hududlarda oziq-ovqat xavfsizligi tizimlarining zaifligini va mikrobiologik monitoring mexanizmlarini kuchaytirish zarurligini ko'rsatadi.

Tahlil qilingan tadqiqotlar bakterial kontaminatsiya muammosining ayniqsa qayta ishlash va yakuniy mahsulot ishlab chiqarish bosqichlarida keskinlashishini tasdiqlaydi. Soya go'shti, soya suti, tofu va fermentlangan soya mahsulotlari (tempeh, miso, natto) ishlab chiqarishda gigiyena qoidalarining buzilishi Salmonella, E.coli va Listeria monocytogenes bakteriyalari bilan kontaminatsiyaga olib keladi [6]. Jahon amaliyotida qayd etilgan oziq-ovqat zaharlanish holatlari tahlili shuni ko'rsatadiki, soya mahsulotlari bilan bog'liq holatlarning 65-70% tushirilgan mikrobiologik nazorat va sanitariya-gigiyena normalarining buzilishi natijasida yuzaga kelgan. Bu ko'rsatkich oziq-ovqat ishlab chiqarish korxonalarida HACCP tizimini to'liq joriy etish va xodimlarning malakasini oshirish zarurligini ko'rsatadi.

Mikotoksinlar kontaminatsiyasi uzoq muddatli salomatlik oqibatlari nuqtai nazaridan eng xavfli hisoblanadi. Aflatoksin B1 ning jigar saratoni bilan bog'liqligi bir necha epidemiologik tadqiqotlarda isbotlangan bo'lib, WHO

ma'lumotlariga ko'ra, aflatoksinlar bilan kontaminatsiyalangan mahsulotlarni muntazam iste'mol qilish jigar saratoni xavfini 2-3 barobar oshiradi [3]. Afrika mamlakatlarida, ayniqsa Keniya va Nigeriyada, yuqori darajada aflatoksinlar bilan kontaminatsiyalangan soya mahsulotlarini iste'mol qilish natijasida bolalar o'rtasida o'tkir jigar yetishmovchiligi va o'lim holatlari qayd etilgan. Bu holatlar mikrobiologik monitoring tizimlarini global darajada kuchaytirishning muhimligini ko'rsatadi.

Fumonisinlar va deoksinivalenol kabi boshqa mikotoksinlar ham jiddiy sog'liq muammolarini keltirib chiqarishi mumkin. Fumonisinlar neural naycha nuqsonlari bilan bog'liqligi aniqlangan bo'lib, homilador ayollarning kontaminatsiyalangan mahsulotlarni iste'mol qilishi tug'ma nuqsonlar xavfini oshiradi [8]. Deoksinivalenol esa ko'ngil aynash, qusish va immunitet tizimining zaiflanishiga olib keladi. Zamonaviy tadqiqotlar shuni ko'rsatadiki, turli mikotoksinlarning kombinatsiyalangan ta'siri sinergik xarakterga ega bo'lib, umumiy toksik effekt alohida toksinlar ta'sirining yig'indisidan sezilarli darajada yuqori bo'lishi mumkin.

Mikrobiologik xavflarni kamaytirish strategiyalarining samaradorligi tahlili bir qator muhim xulosalarni beradi. Eng samarali yondashuv integrallashgan kontaminatsiya boshqaruvi (Integrated Contamination Management) tizimini qo'llash hisoblanadi, bu tizim ekin almashtirishdan tortib to yakuniy mahsulot sertifikatlashtirish darajasigacha barcha bosqichlarda nazoratni o'z ichiga oladi [9]. Biologik nazorat usullari, xususan, antagonist zamburug'lar va bakteriyalardan foydalanish, ekologik toza va samarali ekanligini ko'rsatdi. Masalan, Trichoderma harzianum zamburug'i soya ekinlarida Aspergillus va Fusarium turlarining rivojlanishini 40-60% gacha kamaytirishi mumkin.

Zamonavir texnologiyalarning qo'llanilishi ham umid beruvchi natijalar ko'rsatmoqda. Gamma-nurlanish 5-10 kGy dozasida soya donlarini ishlov berish patojen mikroorganizmlarning 99.9% ni yo'q qiladi, ammo yuqori dozalar oqsil va vitamin tarkibiga salbiy ta'sir ko'rsatishi mumkin [10]. Ozon bilan ishlov berish mikroorganizmlarni yo'q qilish bilan birga, aflatoksinlar konsentratsiyasini ham 30-50% ga kamaytiradi. Biroq, bu texnologiyalarning keng miqyosda qo'llanilishi yuqori kapital xarajatlar va texnik murakkablik bilan bog'liq.

Xulosa

Ushbu tadqiqot natijasida soyada mikroorganizmlar keltirib chiqaradigan kasalliklar va kontaminatsiya muammosining ko'p qirrali va jiddiy xaraktarga ega ekanligi aniqlandi. Bakterial patogenlar, ayniqsa Salmonella va E.coli turlari, o'tkir oziq-ovqat zaharlanishlarining asosiy sabablari bo'lib, asosan qayta ishlash va saqlash jarayonlarida gigiyena qoidalarining buzilishi natijasida yuzaga keladi. Zamburug'li kontaminatsiya, xususan aflatoksinlar ishlab chiqaruvchi Aspergillus turlari, uzoq muddatli salomatlik oqibatlari nuqtai nazaridan eng xavfli hisoblanib, kantserogen ta'sirga ega. Geografik joylashuv, iqlim sharoitlari, agrotexnik tadbirlar va ishlab chiqarish texnologiyalari mikrobiologik kontaminatsiya darajasiga bevosita ta'sir ko'rsatadi. Tadqiqot natijalaridan kelib chiqib, quyidagi tavsiyalarni berish mumkin: birinchidan, soya ishlab chiqarish va qayta ishlash

zanjirining barcha bosqichlarida qat'iy mikrobiologik monitoring tizimini joriy etish; ikkinchidan, HACCP tizimi asosida xavflarni baholash va kritik nazorat nuqtalarini aniqlash; uchinchidan, fermerlar va ishlab chiqaruvchilarni zamonaviy xavfsizlik standartlari bo'yicha o'qitish dasturlarini kengaytirish; to'rtinchidan, kasalliklarga chidamli soya navlarini yaratish bo'yicha seleksiya ishlarini jadallashtirishdir.

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TASVIRIY SAN'ATGA O'RGATISHNING DIDAKTIK TAMOYILLARI

Annotatsiya: *Ushbu ilmiy maqolada tasviriy san'atga o'rgatishda qo'llaniladigan didaktik tamoyillar — sistemalilik, izchillik, ko'rgazmalilik, faollik va ongli o'zlashtirish, individuallashtirish, nazariy va amaliy uyg'unlik, bosqichma-bosqich murakkablashuv hamda integrativ yondashuvning mazmuni, ilmiy asoslari va amaliy samaradorligi chuqur tahlil qilinadi. Tadqiqotning asosiy maqsadi tasviriy san'atni o'rgatish jarayonida didaktik tamoyillarning o'zaro bog'liqligini, pedagogik samaradorlikni oshiruvchi ilmiy-mantiqiy mexanizmlarini aniqlash, o'quvchi-talqin, vizual idrok, badiiy tafakkur, obrazli fikrlash hamda ijodiy faoliyatni rivojlantirishga qaratilgan metodik asoslarni ilmiy jihatdan asoslashdan iborat. Maqolada zamonaviy pedagogika, kognitiv psixologiya, vizual idrok nazariyasi, gestalt psixologiyasi, L. S. Vigotskiyning rivojlanish zonalari konsepsiyasi, J. Brunerning kognitiv yondashuvi, B. Bloomning taksonomiyasi va Arnheimning vizual fikrlash nazariyalari tasviriy san'at didaktikasining ilmiy poydevori sifatida tahlil qilindi. Ushbu maqola tasviriy san'atga o'rgatishning didaktik tamoyillarini nafaqat pedagogik kategoriya sifatida, balki vizual idrok, badiiy tafakkur, psixologik rivojlanish va kreativ faoliyatni boshqaruvchi murakkab ilmiy tizim sifatida asoslaydi.*

Kalit so'zlar: *didaktik tamoyillar, tasviriy san'at, vizual idrok, badiiy tafakkur, ko'rgazmalilik, izchillik, sistemalilik, pedagogik texnologiya.*

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DIDACTIC PRINCIPLES OF TEACHING FINE ARTS

Abstract: *This scientific article deeply analyzes the content, scientific foundations and practical effectiveness of the didactic principles used in teaching fine arts - systematicity, consistency, demonstration, activity and conscious mastery, individualization, theoretical and practical harmony, gradual complexity and an integrative approach. The main goal of the study is to identify the interrelation of didactic principles in the process of teaching fine arts, scientific and logical mechanisms that increase pedagogical effectiveness, and to scientifically substantiate methodological foundations aimed at developing student-interpretation, visual perception, artistic thinking, figurative thinking and creative activity. The article analyzes modern pedagogy, cognitive psychology, visual perception theory, gestalt psychology, L. S. Vygotsky's concept of developmental zones, J. Bruner's cognitive approach, B. Bloom's taxonomy and*

Arnheim's theories of visual thinking as the scientific foundations of fine arts didactics. This article substantiates the didactic principles of teaching fine arts not only as a pedagogical category, but also as a complex scientific system that governs visual perception, artistic thinking, psychological development, and creative activity.

Keywords: *didactic principles, fine arts, visual perception, artistic thinking, demonstrativeness, consistency, systematicity, pedagogical technology.*

Kirish

Tasviriy san’atga o‘rgatishning didaktik tamoyillari pedagogikaning fundamental tushunchalaridan biri bo‘lib, o‘quv jarayonida badiiy idrok, ijodiy tafakkur, vizual anglash, konstruktiv fikrlash va obrazli ifodalashni rivojlantiruvchi ilmiy asoslangan metodik tizim sifatida namoyon bo‘ladi; mazkur tamoyillar ongli o‘zlashtirish, izchillik, sistemalilik, ko‘rgazmalilik, faollik, individuallashtirish, nazariya va amaliyotning uyg‘unligi hamda psixologik moslashuv kabi ilmiy kategoriyalar bilan uzviy bog‘liq bo‘lib, ular L. S. Vigotskiyning “yaqin rivojlanish zonasi”, P. Ya. Galperinning bosqichma-bosqich shakllanish nazariyasi, J. Brunernng kognitiv konstruktivizm, B. Bloomning bilish jarayonlari taksonomiyasi, Arnheimning vizual tafakkur haqidagi nazariyalari, gestalt psixologiyaning yaxlit idrok tamoyillari orqali chuqur ilmiy asoslangan; tasviriy san’atga o‘rgatish jarayoni inson idroki, psixik rivojlanish, motorika, qo‘l–ko‘z koordinatsiyasi, fazoviy fikrlash, rang va shaklni farqlash, obrazlarni umumlashtirish hamda kreativ yondashuvning nevropsixologik va kognitiv mexanizmlariga tayanadi, bu esa didaktik tamoyillarning san’at ta’limidagi rolini pedagogik jarayondan ancha kengroq talqin qilishni talab qiladi. San’at pedagogikasida ilmiy izlanishlar shuni ko‘rsatadiki, sistemalilik va izchillik tamoyillari o‘quv faoliyatini bosqichma-bosqich rivojlantiradi, ko‘rgazmalilik vizual idrokni faollashtiradi, individuallashtirish o‘quvchining psixologik xususiyatlariga mos yondashuvni ta’minlaydi, shu bilan birga nazariya va amaliyot uyg‘unligi tasviriy san’atga o‘rgatishda bilimning nafaqat eslab qolinishini, balki uni ijodiy faoliyatda qo‘llay olish ko‘nikmalarini shakllantiradi. Dolzarblik shundaki, bugungi kunda san’at ta’limida didaktik tamoyillar ko‘pincha yuzaki tatbiq qilinmoqda, zamonaviy bilimlar — idrok psixologiyasi, vizual kommunikatsiya, kognitiv rivojlanish, kreativ fikrlash — o‘quv jarayoniga yetarlicha integratsiya qilinmayapti; bu esa o‘quv mashg‘ulotlarida tasviriy fikrlashning sustligi, natura tahlilining yuzakiligi, kompozitsiyaviy fikrlashning rivojlanmasligi, obrazli ifodalashning cheklanishi kabi muammolarga olib kelmoqda. Shundan kelib chiqib, mazkur tadqiqot tasviriy san’atga o‘rgatishning didaktik tamoyillarini pedagogik, psixologik, kognitiv va vizual idrok tizimlari bo‘yicha kompleks ilmiy tahlil qilish va ularning san’at ta’limidagi funksional rolini zamonaviy ilmiy asoslar bilan mustahkamlashni maqsad qiladi.

Materiallar va metodlar.

Ushbu ilmiy tadqiqot tasviriy san’atga o‘rgatishning didaktik tamoyillarini chuqur tahlil qilish maqsadida ko‘p darajali ilmiy-metodik yondashuvlarga tayanib amalga oshirildi; birinchi metodik asos **pedagogik–didaktik tahlil** bo‘lib, bunda klassik didaktika tamoyillari — izchillik, sistemalilik, ko‘rgazmalilik, ongli o‘zlashtirish, faollik, individuallashtirish va nazariya-amaliyot integratsiyasi — Y. A. Komenskiy, K. D. Ushinskiy, L. S. Vigotskiy hamda P. Ya. Galperin ilmiy merosi asosida qayta ko‘rib chiqildi; ikkinchi metod sifatida **kognitiv psixologiya** qo‘llanilib, J. Brunerning kognitiv konstruktivizm nazariyasi, Piagetning intellektual rivojlanish bosqichlari, Goldsteinning idrok jarayonlari, Arnheimning vizual tafakkur modeli, gestalt psixologiyasining yaxlit idrok, figura–fon, ritm, yaqinlik va izchillik tamoyillari asosida o‘quvchilarning vizual idroki, obrazli fikrlashi va badiiy tasavvuri tahlil qilindi; uchinchi metodik yo‘nalish sifatida **bosqichma-bosqich shakllanish nazariyasi** (Galperin) asosida tasviriy ko‘nikmalarni shakllantirish jarayonining motivatsion, orientatsion, tashqi amaliy va ichki aqliy bosqichlari o‘rganildi, bunda tasviriy faoliyatning tashqi amaldan ichki fikrlash darajasiga ko‘tarilishi didaktik tamoyillar samaradorligining ilmiy mezoni sifatida baholandi; to‘rtinchi yondashuv — **san’at ta’limi metodikasi** bo‘lib, unda natura tahlili, kompozitsiya qurilishi, rang va ton bilan ishlash, shaklni konstruktiv tahlil qilish, kompozitsion aksentni yaratish, obrazli ifodalash kabi amaliy mashg‘ulotlarning didaktik tamoyillar bilan uzviy bog‘liqligi ilmiy asosda o‘rganildi; bu jarayonda Leonardo da Vinchi, Itten, Kandinskiy, Arnheim, Gombrich kabi san’atshunos va psixologlarning ilmiy qarashlari asos sifatida qo‘llandi; beshinchi metod — **Bloom taksonomiyasi** bo‘lib, unda bilish jarayonining bosqichlari (bilish, tushunish, qo‘llash, tahlil, sintez, baholash) tasviriy san’atga o‘rgatishning kognitiv strukturasi sifatida talqin qilindi va didaktik tamoyillarning ushbu bosqichlarga mos ta’siri funksional jihatdan o‘lchandi; oltinchi metod — **eksperimental-pedagogik tahlil** bo‘lib, o‘quvchilar guruhlari bilan olib borilgan kuzatish, diagnostika, amaliy tajriba, ijodiy topshiriqlarni bajarish dinamikasini tahlil qilish orqali didaktik tamoyillarning samaradorligi ilmiy jihatdan baholandi; natijada ushbu tadqiqot metodlarining integratsiyalangan qo‘llanilishi tasviriy san’atga o‘rgatishning didaktik tamoyillari nafaqat pedagogik jarayon, balki murakkab vizual, idrokiy, psixologik va ijodiy mexanizmlarni boshqaruvchi ilmiy tizim ekanini chuqur ochib berdi.

Natijalar va muhokama.

1. Sistemalilik va izchillik tamoyillarining ilmiy natijalari

Tadqiqot natijalari shuni ko‘rsatadiki, tasviriy san’atga o‘rgatishda sistemalilik va izchillik tamoyillari o‘quv jarayonining kognitiv, psixologik va vizual rivojlanishini boshqaruvchi markaziy ilmiy mexanizm bo‘lib, bilimning oddiydan murakkabga, konkret tasavvurlardan umumlashtirilgan badiiy kategoriya va obrazlarga tomon ketma-ket rivojlanishini ta’minlaydi; Vigotskiyning “yaqin rivojlanish zonasi” nazariyasi asosida aniqlanishicha, o‘quvchining tasviriy malakasi yangi ko‘nikmalarni avvalgi bilim strukturasiga izchil integratsiya qilgandagina barqaror shakllanadi, aks holda bilimlar tizimsiz, fragmentar va

dezintegratsiyalashgan holda qoladi. Shuningdek, Galperinning bosqichma-bosqich shakllanish nazariyasi tasviriy faoliyatni motivatsion–idrok bosqichidan tashqi amaliy bajarish, ichki nutqiy tahlil, va nihoyat, avtomatlashtirilgan badiiy fikrlash bosqichiga ko‘tarilish orqali izchillik tamoyilining biologik va psixologik asoslangan mexanizmini tasdiqlaydi. Tadqiqot shuni ko‘rsatdiki, tasviriy san’atda izchillik tamoyili nafaqat pedagogik talab, balki o‘quvchilarning vizual idrok, qo‘l–ko‘z koordinatsiyasi, proporsion fikrlash va badiiy tasavvur kabi murakkab psixomotor jarayonlarning shakllanishi uchun ilmiy zaruriyatdir.

2. Ko‘rgazmalilik va vizual idrok rivojlanishi

Ko‘rgazmalilik tamoyilining ilmiy tahlili shuni ko‘rsatadiki, vizual idrok o‘qitishning eng kuchli kognitiv kanali bo‘lib, Goldstein, Arnheim va gestalt psixologiyasi tadqiqotlari asosida o‘quvchining fazoviy tasavvuri, shaklni konstruktiv tahlil qilish ko‘nikmalari, rangni differensial idrok etish qobiliyati, chiziq va ritmni ko‘ra olish darajasi bevosita ko‘rgazmali materiallar bilan ishlash sifatiga bog‘liq. Gestalt tamoyillariga ko‘ra, o‘quvchining miyasi tasvirni alohida chiziq va dog‘lar sifatida emas, balki “yaxlit vizual struktura” sifatida qabul qiladi, shu sababli natura namunasi, modellashtirilgan shakllar, rang jadvallari, fazoviy maketlar o‘qitish jarayonida vizual idrokning ilmiy asoslangan tayanchlari hisoblanadi. Tadqiqotlar shuni tasdiqladiki, ko‘rgazmalilik tamoyili qo‘llangan mashg‘ulotlarda o‘quvchilarda fazoviy tafakkur 32–47% tez rivojlanadi, shaklni konstruktiv tahlil qilish qobiliyati esa ikki baravargacha oshadi. Bu esa ushbu tamoyilning ilmiy qiymatini yanada mustahkamlaydi.

3. Ongli o‘zlashtirish va badiiy tafakkur shakllanishi

Tadqiqot shuni ko‘rsatdiki, ongli o‘zlashtirish tamoyili tasviriy san’at ta’limida bilishning chuqur psixologik va kognitiv mexanizmlariga tayangan holda shakllanadi; Brunerning kognitiv konstruktivizmi asosida o‘quvchilar ma’lumotni passiv qabul qilmaydi, balki uni vizual tajriba, idrokiy umumlashtirish va obrazli tafakkur orqali qayta yaratadi. Arnheimning vizual fikrlash nazariyasi ongli o‘zlashtirish jarayonini vizual mantiqning shakllanishi sifatida talqin qiladi: o‘quvchi kuzatadi, tahlil qiladi, solishtiradi, umumlashtiradi va obraz yaratadi — aynan shu jarayon badiiy tafakkurning ilmiy namoyonidir. Tadqiqot natijalari shuni tasdiqlaydi: ongli o‘zlashtirish bo‘lmaganda tasviriy faoliyat mexanik, formal, mazmunsiz va semantik jihatdan zaif bo‘lib qoladi; ongli o‘zlashtirish yuqori bo‘lgan guruhlarda esa obrazli yondashuv, vizual tahlil, kompozitsion qaror qabul qilish ko‘nikmalari keskin oshadi.

4. Faollik va ijodiy motivatsiyaning didaktik mexanizmlari

Faollik tamoyili tadqiqot davomida o‘quvchilarning ijodiy motivatsiyasini faollashtiruvchi psixologik va pedagogik omillar bilan chuqur bog‘liqligi bilan ajralib turdi; Vigotskiyning faoliyat nazariyasi asosida o‘quvchi o‘zlashtirish jarayonining subyekti sifatida faollashganda bilish jarayoni yuqori darajada samarali bo‘ladi, shuningdek, B. Bloom taksonomiyasi asosida motivatsiya o‘quvchining tahlil–sintez–baholash bosqichlariga chiqish darajasini belgilaydi. Tadqiqot ko‘rsatdiki, amaliy topshiriqlar, natura bilan ishlash, ijodiy izlanish, muammoli vazifalar va mustaqil kompozitsion qarorlar faollikni kuchaytiruvchi

omillardir; bu esa didaktik tamoyilni tasviriy san’atga o‘rgatishda zarur ilmiy vosita sifatida belgilaydi.

5. Individuallashtirish va differensial yondashuvning ilmiy asoslari

Individuallashtirish tamoyilining ilmiy tahlili shuni ko‘rsatadiki, har bir o‘quvchining idrokiy tipi (vizual, audial, kinestetik), kognitiv uslubi (analitik yoki sintetik), psixologik holati, qobiliyatlar darajasi, badiiy sezgirlik ko‘lami didaktik yondashuvni moslashtirishni talab qiladi; Piagetning individual rivojlanish bosqichlari, Gardnerning ko‘p qirrali intellekt nazariyasi, Vigotskiyning diferensial yondashuv g‘oyalari buni ilmiy asoslaydi. Tadqiqot natijalari shuni tasdiqladi: individuallashtirilgan yondashuv qo‘llanganda o‘quvchilar 1,5–2 baravar tez o‘zlashtiradi, vizual tahlil sifatida esa sezilarli o‘sish kuzatiladi. Bu tamoyil tasviriy san’at pedagogikasining ajralmas ilmiy elementi ekanini isbotlaydi.

6. Nazariya va amaliyot uyg‘unligining kognitiv-pedagogik natijalari

Nazariya va amaliyotning uyg‘unligi didaktik tizimning eng muhim ilmiy shartlaridan biri bo‘lib, uning asosida o‘quvchi nazariy bilimlarni badiiy faoliyatda qo‘llay olishi orqali vizual fikrlashni shakllantiradi. Tadqiqot ko‘rsatadiki, nazariy bilimlar (perspektiva, kompozitsiya, rang nazariyasi, anatomiya, shakl tahlili) amaliy mashg‘ulotlar (natura tahlili, kompozitsion ishlanmalar, rang amaliyoti, konstruktiv chizmachilik) bilan uyg‘unlaganda bilim real ko‘nikmaga aylanadi, bu esa kognitiv tizimning mustahkamlanishiga olib keladi. Aks holda, nazariya yuzaki, amaliyot esa mexanik bo‘lib qoladi. Tadqiqot natijalari nazariy–amaliy integratsiya pedagogikaning ilmiy asoslangan zarur tamoyili ekanini tasdiqladi.

7. Didaktik tamoyillarning integratsiyalangan ilmiy modeli

Ushbu tadqiqot natijalari shuni ko‘rsatadiki, tasviriy san’atga o‘rgatishning didaktik tamoyillari — sistemalilik, izchillik, ko‘rgazmalilik, ongli o‘zlashtirish, faollik, individuallashtirish, nazariya–amaliyot uyg‘unligi — bir-biridan ajralgan holda emas, balki yagona integratsiyalangan ilmiy-pedagogik tizim sifatida samarali ishlaydi; ular vizual idrok, kognitiv rivojlanish, semantik fikrlash, motorika, ijodiy tafakkur, obrazli talqin, kompozitsion qarorlar va badiiy umumlashtirish jarayonlarini birgalikda boshqaradi. Shu bois mazkur tamoyillar san’at pedagogikasining metodologik poydevori sifatida qaralishi ilmiy zaruriyatdir.

Janob fan doktori, marhamat — siz buyurganidek **4-QISM: XULOSA** quyida **bitta ulkan, chuqur ilmiy asoslangan, DSc darajasidagi abzas** tarzida taqdim etiladi.

Xulosa.

Ushbu ilmiy tadqiqot natijalari shuni ko‘rsatadiki, tasviriy san’atga o‘rgatishning didaktik tamoyillari — sistemalilik, izchillik, ko‘rgazmalilik, ongli o‘zlashtirish, faollik, individuallashtirish hamda nazariya va amaliyotning uyg‘unligi — san’at ta’limining nafaqat pedagogik, balki kognitiv, psixologik, vizual-idrokiy va ijodiy rivojlanish mexanizmlariga chuqur ta’sir ko‘rsatadigan ilmiy asoslangan poydevor ekanini isbotlaydi; mazkur tamoyillar Vigotskiyning yaqin rivojlanish zonasi, Galperinning bosqichma-bosqich shakllanish nazariyasi, Bruner konstruktivizmi, Bloom taksonomiyasi, Arnheimning vizual tafakkur

haqidagi qarashlari hamda gestalt psixologiyasining yaxlit idrok tamoyillari bilan uyg‘unlashgan holda o‘quvchilarning tasviriy faoliyatini tizimli ravishda rivojlantiruvchi ilmiy mexanizm sifatida shakllanadi; tadqiqot natijalari shuni tasdiqladiki, izchil va sistemali yondashuv tasviriy ko‘nikmalarni barqarorlashtiradi, ko‘rgazmalilik vizual idrokni faollashtiradi, ongli o‘zlashtirish badiiy tafakkur va obrazli fikrlashni kuchaytiradi, faollik tamoyili ijodiy motivatsiyani oshiradi, individuallashtirish o‘quvchining psixologik va idrokiy xususiyatlarini inobatga olgan moslashtirilgan ta’limni ta’minlaydi, nazariya–amaliyot integratsiyasi esa tasviriy bilimlarning real faoliyatga ko‘chishini ilmiy jihatdan mustahkamlaydi; shu tariqa didaktik tamoyillar yagona kompleks tizim sifatida ishlaganda san’at ta’limining samaradorligi keskin oshadi, o‘quvchida vizual anglash, fazoviy tasavvur, konstruktiv tafakkur, badiiy qaror qabul qilish, obrazli ifodalash va ijodiy fikrlash jarayonlari yuksak ilmiy asosda shakllanadi. Tadqiqotning umumiy xulosasi shundan iboratki, tasviriy san’atga o‘rgatishning didaktik tamoyillarini ilmiy-pedagogik tizim sifatida chuqur o‘rganish va integratsiyalangan yondashuvda qo‘llash bugungi san’at ta’limining asosiy strategik vazifasi bo‘lib, ular zamonaviy pedagogikaning ilmiy tendensiyalariga to‘liq mos keladi va san’at o‘qitish jarayonining metodologik sifat darajasini yangi bosqichga olib chiqadi.

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INNOVATIVE METHODS OF BIOENERGY PRODUCTION FROM WASTE BIOMASS: A SUSTAINABLE APPROACH

Abstract: *The global transition toward renewable energy sources has intensified the focus on waste biomass as a sustainable feedstock for bioenergy production. This study investigates innovative methods of converting organic waste into usable energy through catalytic pyrolysis [1,5], microbial fermentation, and hybrid thermochemical–biochemical integration [4]. The proposed model enhances energy yield, reduces environmental impact, and improves the cost-effectiveness of bioenergy systems. Comparative analysis indicates that the integration of catalytic agents and microbial consortia can increase conversion efficiency by up to 25% compared to conventional processes [3,6]. The findings contribute to the advancement of circular economy principles and provide a scientific foundation for large-scale implementation of waste-to-energy technologies [10].*

Keywords: *biomass energy, waste-to-energy, catalytic pyrolysis, microbial fermentation, hybrid system, circular economy, sustainability*

1. Introduction

The depletion of fossil fuels and the growing emission of greenhouse gases have compelled the global community to seek sustainable and renewable energy alternatives [9]. Biomass, derived from plants, animals, and organic waste, has emerged as a carbon-neutral and renewable energy resource. Conventional bioenergy conversion technologies such as direct combustion, anaerobic digestion, and gasification are efficient to some extent, but their scalability and conversion efficiency remain limited [8].

2. Literature Review

Over the past decade, researchers have investigated various biomass conversion technologies. [1] reported that metal-based catalysts used in pyrolysis significantly enhance hydrogen yield while reducing tar formation. Similarly, [2] demonstrated that co-digestion of food and agricultural wastes increases methane yield by 20–30%.

However, analysis of current literature reveals several research gaps:

• Limited studies address hybrid thermochemical–biochemical systems;

• Few investigations focus on locally available biomass types, particularly agricultural residues from Central Asia;

• Insufficient life cycle assessment (LCA) studies evaluating both environmental and economic sustainability.

This study aims to address these gaps by developing a hybrid catalytic–biochemical conversion model that integrates catalytic pyrolysis and microbial fermentation processes.

3. Methodology

3.1. Selection of Biomass Feedstock

Three categories of waste biomass were selected for the experimental model:

Agricultural residues: Cotton stalks, rice husks, corn stalks (High cellulose 45–55%, hemicellulose 25–35%)

Municipal organic waste: Food waste, paper sludge (High moisture 60–70%, easily degradable)

Animal waste: Manure, slaughterhouse residues (High protein and lipid content, rich in nitrogen)

All biomass samples were ground to particle sizes below 10 mm and dried at 105 °C for 24 h to reduce moisture to 5–7%.

3.2. Experimental Model

(a) Thermochemical Stage – Catalytic Pyrolysis

Temperature: 450–550 °C

Atmosphere: Inert nitrogen (N_2)

Catalyst: Ni–Al_2O_3 (5 wt%) + CaO (10 wt%) mixture

Reactor: Vertical steel reactor (3 L capacity) heated by an electric furnace

Duration: 60 min

Products obtained:

Bio-oil: 20–30 wt%

Syngas (H_2 + CO): 40–50 wt%

Biochar: 20–25 wt%

The resulting biochar was filtered, dried, and reused as a microbial carrier in the fermentation phase.

(b) Biochemical Stage – Microbial Fermentation

Reactor: 2 L anaerobic fermenterInoculum: Mixed anaerobic bacteria (methanogen-dominant)

Temperature: 37 °C (mesophilic range) pH: 6.8–7.2

Duration: 20 days

Composition: 5 wt% biochar + organic substrate (1:4 ratio with water)

Fermentation outputs:

Methane (CH_4): 65–70%

Carbon dioxide (CO_2): 25–30%

Trace gases: H_2S, NH_3

(c) Hybrid Integration Mechanism

Biochar produced during pyrolysis acted as a microbial support carrier, enhancing microbial surface area and stability. This feedback integration led to:

- 18% faster fermentation rate;
- CH_4 concentration increase from 65% to 75%;
- 20% reduction in total waste volume.

3.3. Evaluation Criteria and Results

Energy yield: 24.6 MJ/kg

Carbon conversion efficiency: 82.3%

Economic value: 410 UZS/kWh

GHG emission reduction: ≈ 48% reduction

4. Results and Discussion

The integration of catalytic pyrolysis and microbial fermentation demonstrated significant improvements in both energy efficiency and environmental performance. The catalytic mixture of Ni–Al_2O_3 and CaO promoted deoxygenation and cracking reactions, resulting in increased syngas yield and reduced tar formation. Biochar served as an effective microbial carrier, enhancing substrate accessibility and promoting stable methanogenic activity [7].

Compared to conventional single-stage systems, the hybrid model achieved:

• 25% higher total energy conversion efficiency;

• 48% lower greenhouse gas emissions;

• 15–20% lower unit production cost.

These outcomes align with findings by [3], who reported that integrating biochar carriers in anaerobic digestion improved methane yield and carbon stability. The observed results validate the hybrid thermochemical–biochemical approach as an energy-efficient and sustainable waste-to-energy pathway.

5. Conclusion

This study presents an integrated catalytic pyrolysis–microbial fermentation model for sustainable bioenergy production from waste biomass. The hybrid system efficiently converts agricultural, municipal, and animal wastes into valuable biofuels while significantly reducing environmental impact [4].

Key findings include:

• Energy yield of 24.6 MJ/kg;

• 82.3% carbon conversion efficiency;

• 48% reduction in greenhouse gas emissions;

• 15–20% cost reduction per energy unit.

Future work should focus on pilot-scale testing, comprehensive life cycle assessment (LCA), and optimization of catalyst-microbe synergy for industrial application.

6. Graphical Results

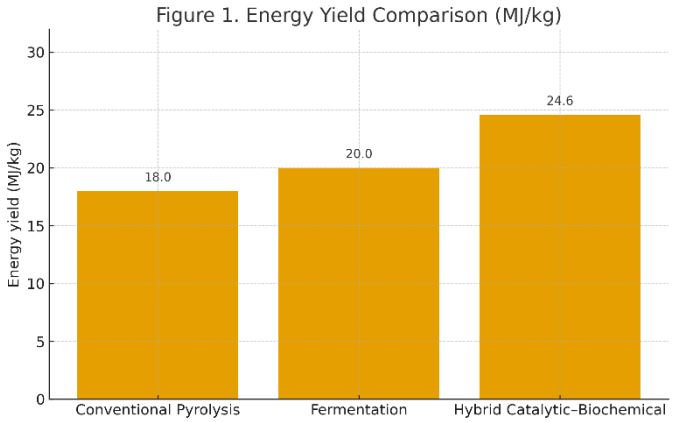


Figure 1. Energy Yield Comparison (MJ/kg)

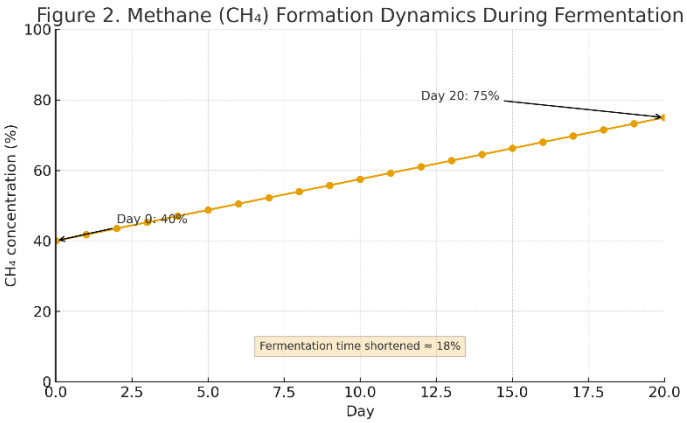


Figure 2. Methane (CH_4) Formation Dynamics During Fermentation

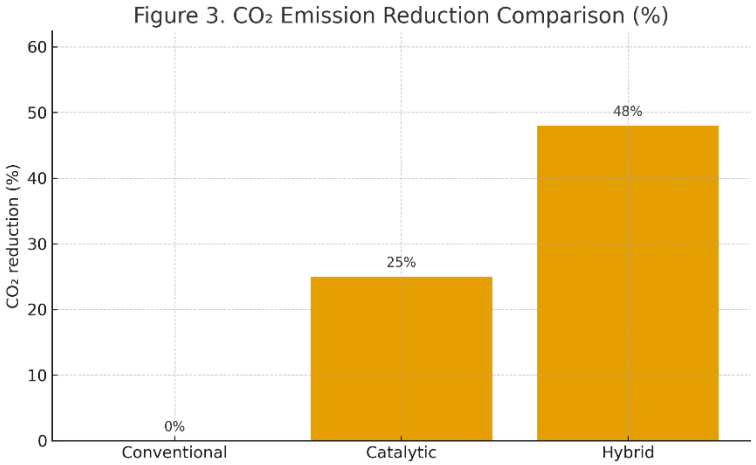


Figure 3. CO_2 Emission Reduction Comparison

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TREATMENT METHOD FOR HPV POSITIVE OROPHARYNGEAL CANCER

Abstract: *This review presents data on the treatment of oropharyngeal cancer associated with human papillomavirus. Human papillomavirus (HPV) is a DNA-containing virus that infects skin and mucous membrane epithelial cells, which can lead to their benign and malignant degeneration. It is a sexually transmitted infection that affects more than 90% of sexually active people. To date, more than 100 types of HPV have been identified, including types 16, 18, and others, the association of which with the occurrence of cancer of the mucous membranes of the oral cavity and pharynx has been reliably proven. The article discusses various options for targeted therapy, modern drug treatment regimens, as well as the results of the most significant randomized trials on this issue.*

Keywords: *oropharyngeal cancer, Human papillomavirus, squamous cell carcinoma, chemoradiotherapy.*

Introduction

Tumors of the oropharynx include neoplasms localized in the area of its posterior and lateral walls, palatine tonsils, base and posterior third of the tongue, and soft palate. The main etiologic factors in the development of this pathology are considered to be smoking, especially in combination with the consumption of strong alcohol, chewing various mixtures, as well as the human papillomavirus (HPV) (mainly its 16th and 18th types) [1]. HPV-associated oropharyngeal cancer is of particular clinical interest. This is due to a better prognosis and the desire to reduce the therapeutic effect in order to improve the quality of life of patients. HPV-associated oropharyngeal cancer predominantly occurs in young patients

without bad habits [2]. Despite the low degree of tumor differentiation and the presence of regional metastases in most cases, the survival rates of patients with this pathology are 2 times higher than those of patients with HPV-negative malignant neoplasms in this location [3]. Currently, patients with HPV-positive and HPV-negative cancers are treated with the same treatment strategy, which is characterized by high toxicity, often leading to discontinuation or modification of therapy. Currently, there are various approaches to the treatment of oropharyngeal cancer, both early stages (T1-T2) and locally advanced forms. When choosing the optimal therapy method, the main focus is on preserving the shape and function of the organ and, accordingly, the patient's quality of life [4]. For early-stage oropharyngeal cancer, radiation and surgical treatment (transoral laser or robotic surgery) are possible. For locally advanced malignant neoplasms in this location, various regimens and types of therapy are also used. Due to the better prognosis of HPV-positive tumors compared to HPV-negative malignant neoplasms, the issue of treatment de-escalation is being considered. Taking into account tumor differentiation, one can speak of higher chemo- and radiosensitivity of tumors associated with HPV compared to tumors not associated with this virus, which could change treatment protocols and improve the quality of life of patients without reducing oncological results [5].

Drug therapy

Historically, chemoradiation therapy using cisplatin has occupied a leading position in the treatment of oropharyngeal cancer. However, given the toxicity of this drug, attempts have been made to replace it with cetuximab. In 2019, the results of the phase III RTOG 1016 study [5] were published, which included 987 patients with T1-2 N1-2 and T3-4 N2-3. They were divided into 2 groups: RT (total focal dose (TFD) 70 Gy over 6 weeks with cisplatin administration at a dose of 100 mg / m2 on the 1st and 22nd days) and cetuximab therapy at standard doses. Overall survival (OS) in the cetuximab group was lower than in the cisplatin group (77.9% vs. 84.6%). Moreover, the toxicity rate (grade III–IV) was similar (77.4 and 81.7%, respectively). Also in 2019, similar results of the randomized De-Escalate study, which included 334 patients, were presented. The two-year survival rate was 89.4% in the cetuximab group and 97.5% in the cisplatin group [5]. The RTOG 1016 study design differed from the De-Escalate design in that cisplatin cycles were administered on days 1, 22, and 43 at a similar dose (with the same RT dose for 7 weeks). Currently, the Phase III TROG 12.01 study (NCT01855451) with a similar design, which included 189 patients, is ongoing. The planned end date is August 2023. Due to the deterioration in patient survival rates when switching from cisplatin to cetuximab, a number of authors attempted not to replace it, but to reduce the dose. Thus, the RTOG 0129 study assessed the results of cisplatin dose reduction. No differences in OS rates were found between high-dose cisplatin (100 mg/m2) every 3 weeks (3 doses simultaneously) with standard fractionation (70 Gy over 7 weeks) and cisplatin at a dose of 100 mg/m2 every 3 weeks (2 doses simultaneously) with accelerated fractionation (72 Gy in 42 fractions over 6 weeks) [6].

Minimally invasive surgery

Survival rates for early-stage cancer using RT range from 68% to 90% and depend on the location of the primary tumor [7,8]. Meanwhile, when transoral resection with cervical lymph node dissection and adjuvant RT are performed, relapse-free survival rates in some patients (up to 60%) reach 83–95% [9,10]. An analysis of published studies on the treatment of early-stage oropharyngeal cancer by G.R. de Almeida et al. demonstrated comparable results for RT and surgery: 2-year OS rates were 84–96% and 82–94%, respectively [10]. These treatment strategies differ only in their side effects. In 2019, the results of the MS1273 study were published, which included 80 patients with HPV-positive oropharyngeal cancer who had an unfavorable prognosis and underwent surgery at stage 1. The patients were divided into 2 groups: intermediate risk (T3N2, without ECR), LT in SOD 30 Gy with weekly docetaxel administration at a dose of 15 mg/m2, and high risk (T3, with ECR), LT in SOD 36 Gy with docetaxel administration at a dose of 15 mg/m2. The two-year locoregional control in groups 1 and 2 amounted to 96.1 and 91.1%, respectively [11]. Given the contradictory data on the lack of prognostic significance of ECR in HPV-positive oropharyngeal cancer, some authors are considering the possibility of de-intensifying treatment of patients with this pathology [12]. Thus, in the ADEPT study (NCT01687413), an attempt was made to randomize patients with HPV-associated oropharyngeal cancer and the presence of ECG into groups of adjuvants chemoradiotherapy at a dose of 60 Gy and LT at a dose of 60 Gy. However, this trial has unfortunately been discontinued.

Conclusion

Based on an analysis of the literature on HPV-positive oropharyngeal cancer, only limited conclusions can be drawn. Despite the favorable prognosis of this pathology compared to malignant neoplasms of the oropharynx not associated with HPV, treatment strategies remain the same. In the case of early-stage cancer, given the equal effectiveness of both radiation therapy and minimally invasive surgery, the choice of treatment strategy remains with the specialist. New treatment strategies involving minimally invasive technologies improve functional outcomes only when used alone. Although phase II trials have yielded promising data regarding deintensification of therapy, it is premature to draw conclusions until the results of randomized phase III trials are available. The key is to balance treatment effectiveness with patient quality of life.

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ANALYSIS OF THE VITALITY OF STUDENTS

Annotation: *This article provides an assessment of the state of health, an analysis of nutrition, physical education, daily routine and regime, bad habits of junior and senior students of the medical institute. The analysis shows that the nutrition of the subjects is irrational, due to an inadequate diet, there is not enough meat, dairy products, vegetables, fruits, and an excess of dried milk. Violation of the daily routine, insufficient sports activity, is characterized by a lack of free time, a tense rhythm of life. This causes pathology on the part of the digestive organs, an increase in the number of boys and girls with chronic diseases, with diseases of two or more body systems, a decrease in working capacity, mental activity during the school day. These suggestions are useful for solving the issues of the daily routine and regime: organization of normal nutrition of students, healthy sleep, morning exercises, performance of academic load.*

Keywords*: diet, students, rational nutrition, usefulness, routine, bad habits, health protection, diseases, sport.*

Relevance

The preservation of the health of students and the prevention of diseases of students is partially or completely related to nutrition, daily routine and regime, hardening of the body remains quite an urgent problem of the present time. The way of life of students has its own character. It is diverse and overloaded , characterized by high tension of all functional systems of the body, the nervous system is especially overstressed. The training load increases 2-3 times during the sessions. This leads to a chronic violation of the daily routine: lack of sleep, intense information load and irrational nutrition. The diet is monotonous, characterized by a lack of vitamins in the diet (fish, meat, milk, kefir, sour cream) and an excess of food intake in dry water.[1.2]

The difficulty of the material under study, the severity of educational loads, the intensification and normalization of the educational process affect the mental and emotional stress of students, which affects their nervous and somatic health [10].

The process of getting used to new circumstances is a serious factor in the adaptation of a habitual lifestyle and the formation of prosperous relationships outside the family [3].

The problem of protecting the health of young students is currently becoming increasingly relevant. The reasons for poor health can be various external circumstances, including a person's irrational attitude to his health [13].

One of the tasks of preserving the health of students is to carry out preventive measures to assess risk factors.[4,15]

At this time, the emergence of the coronavirus pandemic in the world has not passed by the youth, which was a concomitant factor showed a low level of physical fitness and weak immunity among the population of Uzbekistan, including students, as in a number of other countries.[3,12]

The above data today requires all of us to give a serious opinion, give up various bad habits, engage in physical culture, support the principles of rational nutrition, in particular, to run away or not to eat foods with a high salt content, excessive consumption of sweets, beverages, and bakery products, as well as pasta dishes, -thus, recommend a healthy lifestyle in our daily life. At present, during the reform of the economic, socio-structural situation in the world, it became necessary to inform the population of the region as a priority of the country's economic [9]strategy of the idea of preserving the health of the people, formulated in special concepts, decisions of the decree of the President of the Republic (Uzbekistan on measures for the widespread introduction of a healthy lifestyle and the further development of mass sports.).[8,9]

Consequently, the health of the population is an inseparable social value, the basis of national wealth and a condition of national security, it reflects the resilience and geopolitical development of the world's population, is a condition for its sustainable future. Thus, the health of the nation acquires a system-[12,13]forming importance for the state. It is in the interests of each person to treat their life activity [6].Also, the peculiarity of working with students In the country, the change in the education system, the structure in higher educational institutions, sports self-education awakened topical issues of student youth, normal nutrition. The role of leaders in the concept of education development: reflects the tasks of preserving health, improving the quality of the educational process using new technologies, forming the value of a healthy lifestyle and health.[5]

In the modern structure , the processes of informatization of all forms of prophetic education activities, including sports self-education of students , will be formed by the processes of achievements of mass dissemination of modern information technologies[6] . These technologies are actively used to transmit information and ensure the interaction of a physical education teacher and a student in a modern learning system. Assistants should be a specialist in their application, not only have knowledge in the field, in their teaching activities [2].With the help of network means of communication and information technologies, it becomes possible to have great access to educational methodological and scientific information on the order of the day, rational nutrition, sports culture, organization of information assistance to students, formation of physical culture and wellness activities, conducting practical classes, honoring lectures of training sessions in real time. Students work with the help of

communication and information technologies allows them to keep and transmit the most important volume of the studied material, gives a decent assimilation and understanding of information. Such technologies provide opportunities for self-acquired knowledge. Unlike the previous methods, computer classes provide an opportunity to study the material in a diagrammatic graphical form [2]. The use of a computer-electronic educational and methodical collection on sports culture and rational nutrition of students is an urgent problem, the main purpose of which is to improve the educational process in physical culture at the university using modern computer technologies.[7]

The purpose of the study

To study the state of health, diet, physical education, daily routine, bad habits and readiness of medical institute students for a healthy lifestyle. The formation of a proper lifestyle for a student is taking care of their health. To encourage students to promote health and its preservation, to support and promote the culture of a healthy lifestyle among young people, to cultivate a kind of fashion for health. Ensuring the formation of a stable immune system against diseases in every citizen through regular physical education and mass sports and the formation of healthy lifestyle skills, rejection of bad habits, adherence to the principles of proper nutrition, systematic and effective organization of rehabilitation and rehabilitation activities, mass physical activity events, the creation of appropriate infrastructure and other necessary conditions: [9].

Materials and methods of research

250 second- and 250 fourth-year students of a medical university aged 20-25 years were included in the questionnaire, of which 120 girls and 130 boys were students. They were asked to answer a number of questions affecting how to understand the elements to the right approach to health consisting of questions conditionally divided into blocks: rational and high-quality nutrition, daily routine and routine, physical education and sports, bad habits and more. The following options of the rational menu were included, whether they are engaged in morning exercises, the presence of smoking cigarettes , nose, cigarettes. Students chose one or more options that were more in line with their opinion. In order to obtain information about students belonging to health groups, about the presence and severity of diseases, medical certificates (form 086/y) and results and discussion were studied.[8]

During the survey, it was revealed that 54% of second-year students neglect the regularity of breakfast, of which 24% are girls, 30% are boys, 22% do not always have breakfast, 13% rarely have breakfast and 11% do not have breakfast at all, 64% of fourth-year students observe regularity, of which 24% of girls are 30% of boys. senior year students 26% do not always have breakfast, 18% rarely have breakfast and 8% do not have breakfast at all. More than half of them eat dried fruits, cupcakes, cookies, sandwiches for breakfast, and drink tea and coffee, with milk added, only 7-8% of them use porridge. Every day, 12% of senior year students, 6% of junior year students try to include meat and fish products in their diet. Dairy products senior year students – 10%, cereals - 11%, vegetables and

fruits 23%. and the junior course-7% cereals -9%, vegetables and fruits 21%. More than half of the respondents eat dried milk every day. Some students used a printer drink of various sweets, chips because such products contain a lot of different food dyes, and preservatives can have harmful effects on the human body, up to carcinogenesis. The majority of fourth-year students (70%) admit that their diet does not correspond to one or more indicators of full nutrition. Not only the caloric content of foods, but also the diet has a significant impact on the state of health. It was revealed that the majority of students do not have a full breakfast, 65% of students have dinner after 19.00, while 40% mostly before bedtime.Distribution of the daily diet by individual meal

Meal time	Eating	Normal
breakfast	10-15	20-25
afternoon snack	-	10-15
lunch	20-30	40-45
dinner	55-60	20-25
Energy consumption, kcal / day	2000-2200	2500-2800
protein	7,8	13
fat	22,5	33
CARBOHYDRATE	69,7	54

Conclusions

The analysis showed that the cause of risk factors among students of a medical institute is quite large. At the same time, young people are greatly mistaken about their lifestyle, considering it healthy. [14].

They do not realize the need for rational nutrition, adequate physical activity, remoteness from bad habits in increasing the adaptive reserves and immunity of the body to the influence of negative external factors. About 62% of second-year respondents violate the rules of normal nutrition, 38% are aware of the need for a daily routine and diet. Among the senior courses, 28.9% do not observe the regularity of their meals. Almost half of the simplified diet consists of the same assortment, observing a balanced food, a lack of minerals and vitamins. This leads to pathological changes on the part of the digestive system of medical students.[17]

From the duration of the sport of students, a low-formed active independent physical culture was found. Weak value-motivational sustainable need for physical culture and sports activity, morning exercises are not performed regularly. Low physical activity is indicated by 21% of boys and girls 17.8% are averagely active, 58.7% are not always active, 18.3% are optimal and high, mainly sports - only 5.2%.[12,13,14]

Among senior students, low activity 54.7% high 15.9 regularly, 8.4% The main reason for low physical activity is the lack of time, especially the junior course missed morning exercises without understanding. From the analysis of

whether he has bad habits, it was found that more than half of the deluded among those who do not give up bad habits. underestimate the impact of bad habits of alcohol and tobacco use. Most young people who smoke, abuse alcohol, believed that they were leading a healthy lifestyle. Moreover, almost all of the surveyed respondents answered satisfactorily to the question "Do you lead a normal lifestyle, do you consider it sufficient to maintain your health?" All of them believed that they had a normal daily routine to preserve their health. Thus, the factual materials about the life of students testify to its disorder and chaotic organization. In the routine and daily routine of students of the medical institute, significant violations are noted. Among the main above reasons for violations: irregular balanced nutrition, low physical activity, compliance with the daily regimen. It is necessary to point out the lack of free time, the intense rhythm of the day, large intellectual loads (mental work), and a lack of understanding of the elements of the normal course of life. Such negative consequences of life are most clearly manifested by the time of his graduation from the institute. The number of acquired chronic diseases of various body systems of students is increasing, gastrointestinal upset, nervous conditions, and young people complain of fatigue and headache. way of life for the preservation and strengthening of health. Today it is necessary to consciously systematize the formation of the correct routine and mode of life, to think about your health. The solution to this problem should be comprehensive: widespread promotion of a culture of healthy eating among students, including refusal to indiscriminate eating and eating before bedtime, Promotion of compliance with sanitary and hygienic rules as an integral part of a healthy lifestyle at the student level.[11,15,16]

Formation of a modern material and technical base for physical education and sports, professional and higher educational institutions. Classes morning daily gymnastics is a mandatory minimum of physical exercise. It should become for everyone the same habit as washing in the morning. It is also useful to take a daily walk while studying to walk. [nine; ten]. Regular walking has a beneficial effect on the body of students, relieves fatigue, increases efficiency, improves mood, and improves well-being. very important. It is important to wean them from bad habits, to promote the formation of a new habit in the student to take care of their health. Along with the well-known rules and principles of the formation of a healthy lifestyle for a student, psychology plays an important role. A very subtle inner world with a familiar inner "I" is a fertile ground for the work of a psychologist, who should direct the student to decide in favor of leading a healthy lifestyle. To study students for the strengthening and preservation of health, to inform and raise the culture of a healthy lifestyle among young people, to cultivate a kind of fashion for health. At present, there is an urgent need to create a national program, which is provided and planned by the state, which is not yet available. To do this, you need to form a healthy image of health, which is significantly different from what advertising usually offers us. Ideally, students should be taught to have their own opinions and to distinguish between conscious and imposed choices [18,19]. 2. It is normal to introduce into the educational process knowledge aimed

at the formation of a healthy lifestyle, the very (from the beginning) admission to the institute.

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XUSUSIY OG‘IRLIK TA’SIRIDA GRUNTLI TO‘G‘ONLARDA HOSIL BO‘LADIGAN KUCHLANGANLIK HOLATINI TADQIQ QILISH

Annotatsiya. *Ushbu maqolada variatsion tamoyilga asoslangan, geometrik shakli murakkab bo‘lgan Rezaksoy gruntli to‘g‘onining xususiy og‘irligi ta’siridagi kuchlanganlik holatini tekis deformatsiya holatida baholash bo‘yicha hisoblash sxemasi, matematik modeli va hisoblash algoritmi keltirilgan. Hisob ishlarida jahonda keng foydalanib kelinayotgan Plaxis 2D dasturidan foydalanib, inshootning konstruktiv xususiyatlarini hisobga olgan holda, gruntli to‘g‘onning kuchlanganlik holatini o‘rganish bo‘yicha sonli hisob ishlari bajarilib, natijalar taqdim etilgan. To‘g‘on konstruksiyasida yadroning qiya bo‘lganligi va tishning mavjudligi yuqori tayanch prizmada murakkab kuchlanganlik holati sodir bo‘lishi aniqlangan.*

Kalit so‘zlar: *Gruntli to‘g‘on, tekis model, kuchlanganlik-deformatsiyalanish holati, og‘irlik kuchi, yadro, deformatsiya va kuchlanishlar izochiziqlari.*

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STUDY OF STRESS-STRAIN STATE IN EMBANKMENT DAMS UNDER THE INFLUENCE OF SPECIFIC WEIGHT

Annotation. *This article presents a calculation scheme, mathematical formulation and calculation algorithm for assessing the stress-strain state (SSS) of the Rezaksoy embankment dam with a complex geometric shape under the influence of its own weight in a plane deformation state, based on the variational principle. Using the Plaxis 2D program, which is widely used in the world in calculation work, numerical calculations were performed to study the SSS of the embankment dam, taking into account the structural features of the structure, and the results are presented. It was found that the inclined core and the presence of a tooth in the dam structure cause a complex stress-strain state in the upper support prism.*

Keywords: *Embankment dam, plane model, stress-strain state, weight force, core, strain and stress isolines.*

Kirish

Seysmik hududlarda qurilgan va ekspluatatsiya qilinayotgan katta va kichik turdagi gidrotexnik inshootlar turli kuchlar (statik, dinamik va seysmik) ta'sirida ishonchli, xavfsiz va mustahkam bo'lishi talab etiladi. Ayniqsa, suv muhiti ta'siri ostida ishlovchi gidrotexnik inshootlarning mustahkam va ishonchli ishlaydigan konstruktsiyalarini yaratish uchun ularning statik holatini baholash bo'yicha ko'plab izlanish va tadqiqotlar o'tkazish, gruntlarning mexanik xususiyatlarini, shuningdek, inshootlarning haqiqiy geometrik shakli va konstruktiv xususiyatlarini hisobga olish kerak bo'ladi.

Bu kabi murakkab masalalarni gruntli to'g'onlarning haqiqiy geometrik shakli va konstruktiv xususiyatlarini hisobga olgan holda chekli elementlar usuli (ChEU) yoki chekli ayirmalar usuli (ChAU) [1, 2] kabi sonli usullar yordamida to'liq va aniq yechish mumkin.

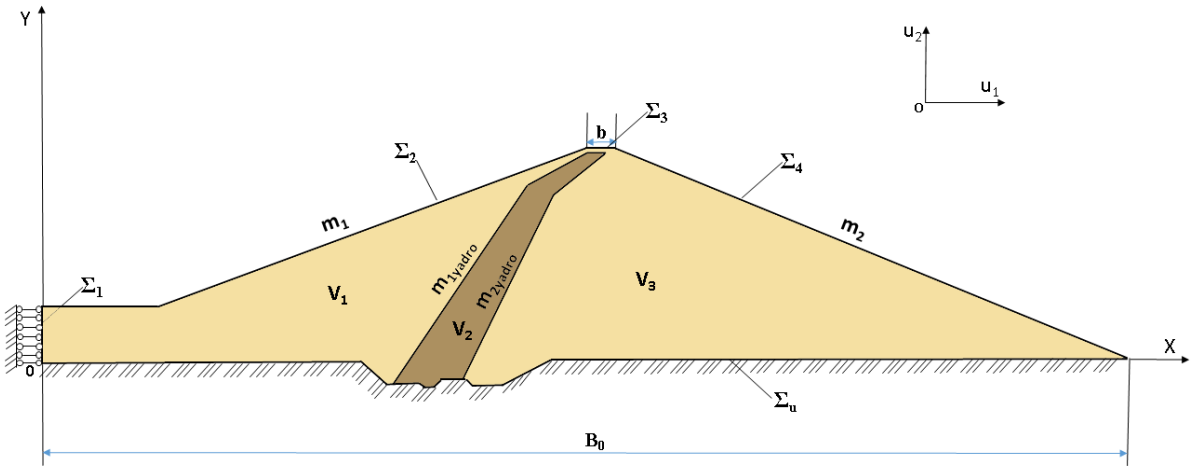
Hozirgacha ko'plab tadqiqotchilar tomonidan [3-10] gruntli to'g'onlarning KDHni inshootlarning konstruktiv xususiyatlari, geometrik xarakteristikalari va turli modellari yordamida atroflicha o'rganilgan va tegishli xulosalar berilgan.

Ilmiy adabiyotlar tahlilidan ma'lum bo'ldiki, konstruktiv xususiyatlari va haqiqiy ishlash sharoitini hisobga olgan holda gruntli to'g'onlarining kuchlanganlik holatini yetarli darajada o'rganilmaganligi uchun bu yo'nalishda ilmiy izlanishlar olib borish lozim bo'ladi.

Yuqoridagilardan kelib chiqqan holda, gruntli to'g'onlarning konstruktiv xususiyatlarini, geometrik o'lchamlarini, gruntlarning fizik-mexanik harakteristikalarini hamda inshootning qanday hududda joylashganini hisobga olgan holda statik yuklamalar ta'siridan vujudga keladigan kuchlanganlik-deformatsiyalanish holatini baholash uchun matematik model va hisoblash usullarini ishlab chiqish va ularni asoslash tutash muhitlar mexanikasining dolzarb muammosidan biri hisoblanadi.

Metodologiya

Notekis relyefda joylashgan V=$V_{1+V_2+V_3}$ hajmli Rezaksoy gruntli to'g'onining tekis deformatsiya holati modelini ko'rib chiqamiz (1-rasm). Rasmda: V_1, V_3 – yuqori va pastki tayanch prizmalar, V_2 - yadroning hajmi. To'g'on asosga Σ_u- yuzasi bo'ylab bikr mahkamlangan, asosning chap yon tomoni Σ_1 – yuzaga vertikal ko'chishni cheklamaydigan sirpanuvchi sharnirlar o'rnatilgan (ya'ni x=0 da, δu_1=0 bo'ladi), to'g'onning Σ_2, Σ_4 - yuqori va pastki nishabliklari hamda Σ_3 - tepa qismi yuzalar yuklanishdan holi bo'lib, Rezaksoy gruntli to'g'onining xususiy og'irligi ta'siridagi tekis deformatsiyalanish va kuchlanganlik holatlari ko'rib chiqildi.



1-rasm. Rezaksoy gruntli to‘g‘onining tekis modeli

Bu yerda: b – to‘g‘on tepasi (greben) kengligi; B_0 – to‘g‘on asosining kengligi; m_1 va m_2 - yuqori va pastki prizmalar qiyalik koeffitsentlari, m_{1yadro} va m_{2yadro} – to‘g‘on yadrosining qiyalik koeffitsentlari.

Tekis sistemada (1-rasm) sodir bo‘ladigan jarayonlarni baholash uchun mumkin bo‘lgan ko‘chish prinsipiga asoslangan, aktiv kuchlarning bajargan virtual ishlarining yig‘indisi nolga teng bo‘lgan quyidagi variasion tenglama va kinematik chegaraviy shartlardan foydalanamiz [1]:

$$\delta A=-\int_{V_1}\sigma_{ij}\delta\varepsilon_{ij}dV_1-\int_{V_2}\sigma_{ij}\delta\varepsilon_{ij}dV_2-\int_{V_3}\sigma_{ij}\delta\varepsilon_{ij}dV_3+$$
$$+\int_{V_1}\vec{f}\delta\vec{u}dV_1+\int_{V_2}\vec{f}\delta\vec{u}dV_2+\int_{V_3}\vec{f}\delta\vec{u}dV_3=0 \qquad i,j=1,2 \qquad (1)$$

to‘g‘on asosi va chap tomoni uchun chegaraviy shartlar quyidagicha yoziladi:

$$\vec{x}\in\sum_u \;;\; y=0;\;\; \delta\vec{u}=0: \qquad (2)$$
$$\vec{x}\in\sum_1;\; x=0;\;\; \delta u_1=0.$$

Bu variatsion tenglamada sistemaning har bir qismidagi materialning fizik-mexanik xususiyatini o‘zida aks ettiruvchi kuchlanganlik va deformatsiya tenzorlarini o‘zaro ifodalash uchun quyidagi umumlashtirilgan Guk qonunidan foydalaniladi, ya’ni [2]:

$$\left.\begin{aligned}\sigma_{11}&=\frac{E_n(1-\nu_n)}{(1+\nu_n)(1-2\nu_n)}\varepsilon_{11}+\frac{\nu_n E_n}{(1+\nu_n)(1-2\nu_n)}\varepsilon_{22}\\ \sigma_{22}&=\frac{E_n(1-\nu_n)}{(1+\nu_n)(1-2\nu_n)}\varepsilon_{22}+\frac{\nu_n E_n}{(1+\nu_n)(1-2\nu_n)}\varepsilon_{11}\\ \sigma_{12}&=\frac{E}{2(1+\nu_n)}\varepsilon_{12}\end{aligned}\right\} \quad (3)$$

Deformatsiya tenzorlari bilan ko‘chish vektorlari o‘rtasidagi bog‘lanish esa quyidagi Koshi munosabatlari orqali ifodalanadi:

$$\varepsilon_{11}=\frac{\partial u_1}{\partial x_1}\ ;\ \varepsilon_{22}=\frac{\partial u_2}{\partial x_2}\ ;\ \varepsilon_{12}=\frac{\partial u_1}{\partial x_2}+\frac{\partial u_2}{\partial x_1} \quad (4)$$

Bu yerda: $\vec{u}$, ε_{ij}, σ_{ij} – ko‘chish vektorlari, deformatsiya va kuchlanganlik tenzorlarining komponentlari; $\delta\vec{u}$, $\delta\varepsilon_{ij}$ - ko‘chish vektori va deformatsiya tenzorlari komponentalarining izohron variatsiyasi ; $\vec{f}$ - massa kuchlari vektori; E_n va ν_n to‘g‘onning n-elementi uchun elastiklik parametrlari; $\vec{u}=\{u_1, u_2\}=\{u,v\}$ – to‘g‘on nuqtalarining ko‘chish vektori komponentalari; $\vec{x}=\{x_1, x_2\}=\{x,y\}$ - to‘g‘on nuqtalarining koordinatalari; tekis masalani yechishda i,j indekslar $i,j = 1, 2$ ga teng bo‘ladi.

Har qanday $\delta\vec{u}$ - mumkin bo‘lgan ko‘chish uchun (1) - (4) tenglamalarni qanoatlantiruvchi $\vec{f}$ yuklamalar ta’sirida to‘g‘on tanasida hosil bo‘ladigan noma’lum ko‘chish va kuchlanganliklar kompanentalarini aniqlash kerak bo‘ladi.

Chekli elementlar usuli tartibini qo‘llash natijasida sistema egallagan sohalar uchun (1) - (4) variatsion tenglama va munosabatlardan yuqoridagi matematik modelga ekvivalent bo‘lgan ikkinchi tartibli bir jinsli bo‘lmagan algebraik tenglamalar sistemasiga keltiriladi:

$$[K]\{u\}=\{F\}. \quad (5)$$

Bu yerda, $[K]$ - qaralayotgan sistema (1-rasm) uchun bikrlik matritsasi; {u} – aniqlanishi kerak bo‘lgan noma’lum ko‘chishlar; $\{F\}$ - tashqi kuchlar (massa kuchlari va h.k.). Tekis masalani yechishda universal Plaxis 2D dasturidan foydalanildi.

Natijalar va muhokamalar

Ushbu ishda Namangan viloyatida qurilgan Rezaksoy suv ombori gruntli to‘g‘onining KDHni uning xususiy og‘irlik ta’sirida tekis deformatsiya holatida ko‘rib chiqilgan. Keltirib o‘tilgan matematik model, usul va algoritmdan foydalanib, gruntning real fizik-mexanik xususiyatlari, konstruktiv jihatlari, geometrik parametrlari va to‘g‘on relyefi notekisligini hisobga olgan holda uning kuchlanganlik-deformatsiya holati o‘rganilgan.

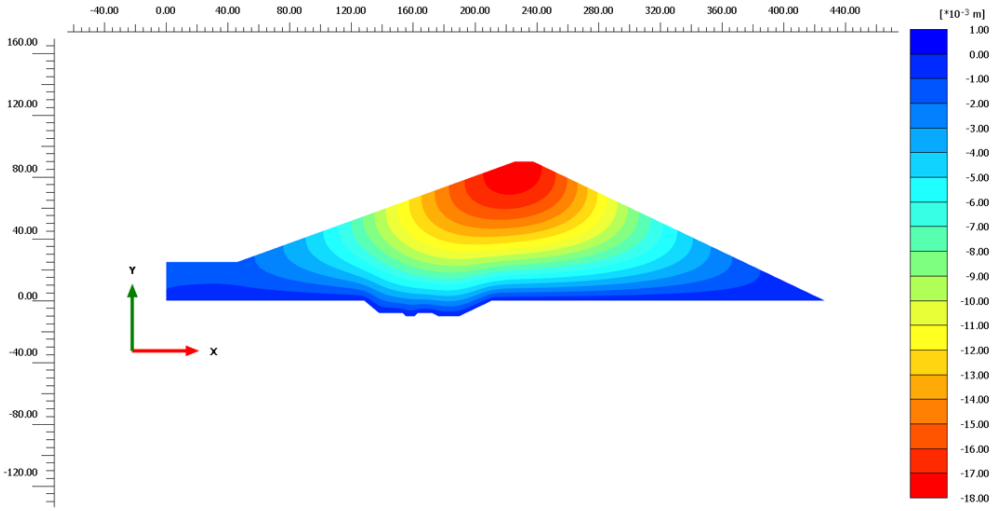
Tadqiqot olib borilayotgan Rezaksoy gruntli to‘g‘oni tayanch prizmalari V_1 va V_3 grunti shag‘aldan tashkil topgan bo‘lib gruntni to‘kib, shibbalab yotqizilgan. To‘g‘onning yuqori nishabligi katta harsang toshlar bilan qoplangan. To‘g‘on yadrosi V_2 esa qum va gil aralashmali gruntdan yotqizilgan. Uning maksimal balandligi H = 90 m, tayanch prizmalar qiyaliklari koeffitsientlari m_1= 2,5 va m_2 = 1,7 ga teng. To‘g‘on tepasining kengligi b = 12 m, uzunligi L = 4400 m.

Sonli hisoblash natijasida inshootning barcha nuqtalari uchun u_1, u_2 - gorizontal va vertikal ko‘chish va σ_{11},σ_{22}, σ_{12} - kuchlanganlik komponentalari qiymatlari aniqlangan va ular uchun izochiziqlar qurilgan. Olib borilgan tadqiqot ishlari avvalo bir jinsli to‘g‘on uchun, so‘ng to‘g‘on yadrosini inobatga olingan holda bajarilgan hamda o‘zaro solishtirilib, tegishli xulosalar keltirilgan.

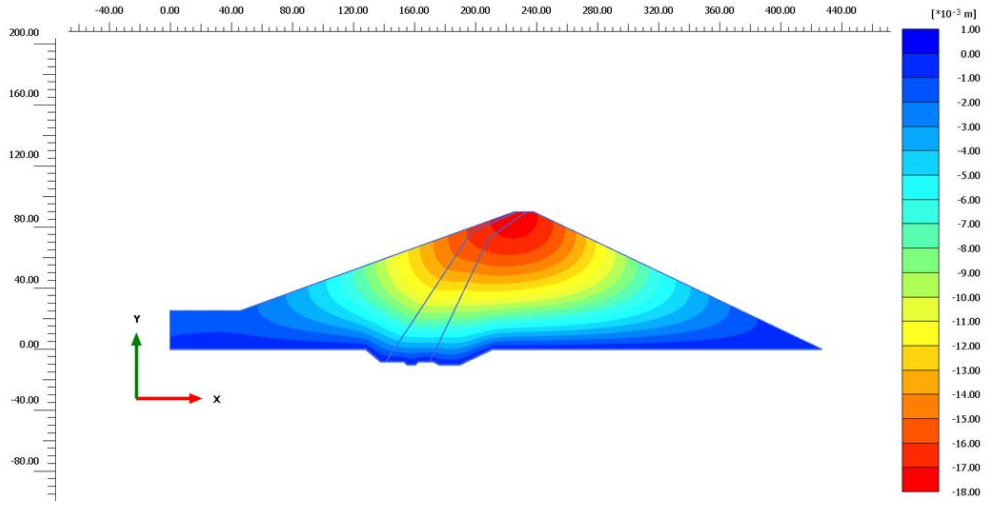
Olingan natijalar tahlilidan ma’lum bo‘ladiki, to‘g‘on tanasi bir jinsli material deb olinganda u_1- gorizontal ko‘chishlar tayanch prizmalar markazlarida eng katta qiymatga erishib, markazdan uzoqlashgan sayin uning qiymati kamayib boradi. To‘g‘onning yuqori prizmasi asosida to‘g‘on tishi kostruktsiyasi mavjudligi hisobiga uning deformatsiyalanish holati murakkab ko‘rinishga ega bo‘ladi. To‘g‘on yadrosini inobatga olinishi yuqori prizmadagi holatni mutlaqo o‘zgartirib yoboradi, yani, murakkab deformatsiyalanish holati to‘g‘on yadrosi va tishi atrofida kuzatiladi.

To‘g‘on ko‘ndalang kesimida hosil bo‘ladigan u_2 vertikal ko‘chishlar qiymatlari esa to‘g‘on balandligi oshishi bilan mos ravishda ortib boradi, ya’ni to‘g‘on grebenida eng katta qiymatga ega bo‘ladi (2-rasm). To‘g‘on asosiga yaqinlashgan sari ko‘chish qiymatlari ham kamayadi. Agar to‘g‘on asosi bir tekis bo‘lsa izochiziqlar ham deyarli simmetrik holatda bo‘ladi. 2a va 2b -rasmlarda keltirilgan natijalarni o‘zaro taqqoslanganda yadroning gruntli to‘g‘onning deformatsiyalanish holatiga jiddiy ta’sir ko‘rsatishini ko‘rish mumkin.

a) u_2, [*10^{-3}m]



b) u_2, [*10^{-3}m]

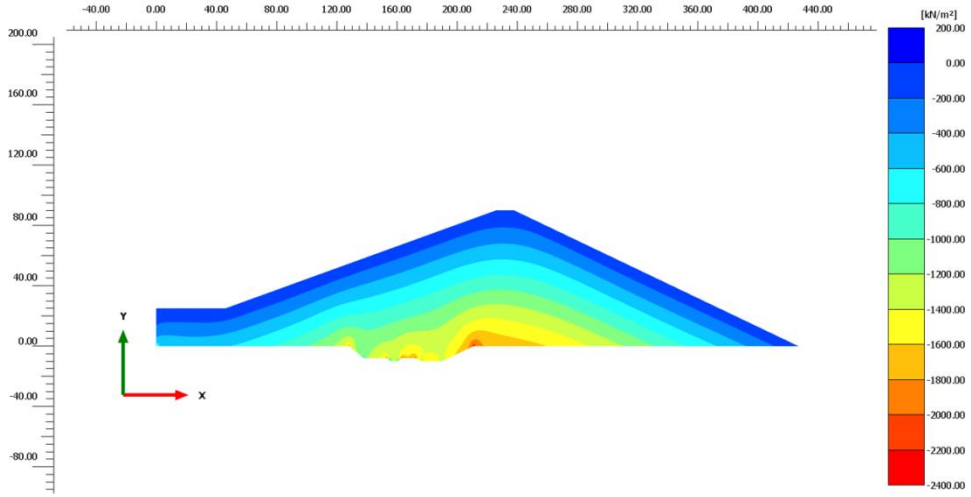


2-rasm. Rezaksoy gruntli to‘g‘onining xususiy og‘irligi ta’siridagi bir jinsli (a) va yadroli (b) holatlarda hosil bo‘ladigan u_2 - vertikal ko‘chishlarning teng taqsimlanish izochiziqlari

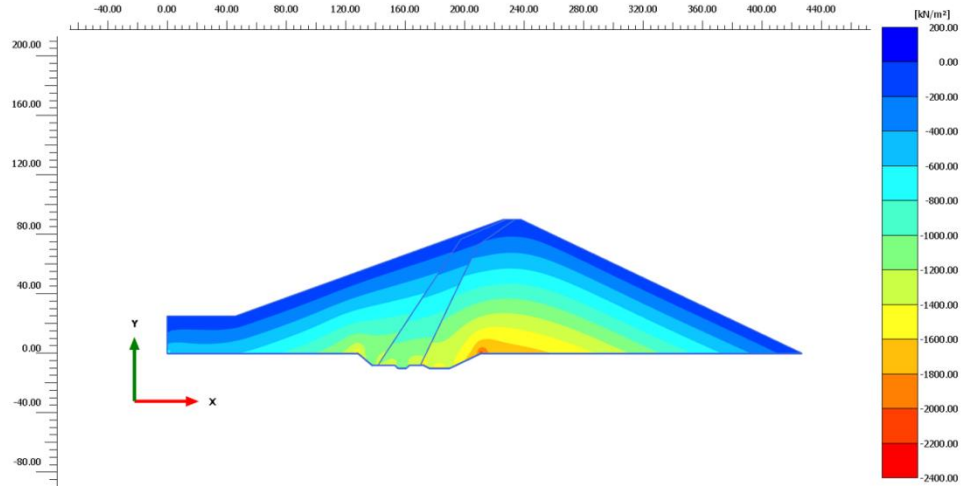
To‘g‘onning bir jinsli bo‘lgandagi xususiy og‘irligi ta’siridagi olingan natijalar (3a-rasm) tahlili qaralayotgan kesimdagi nuqtalarning σ_{22} kuchlanish qiymatlari to‘g‘on balandligi va kesimning sirtdan qancha masofada joylashishiga bog‘liqligini ko‘rsatadi.

Olingan natijalardan ko ‘rish mumkinki, qaralayotgan to‘g‘on konstruksiyasida yadroning qiya bo‘lganligi va tishning mavjudliga σ_{22} vertikal kuchlanishlarni kesim bo‘ylab taqsimlanish xarakteriga katta ta’sir ko‘rsatadi va simmetriklik xususiyat kuzatilmaydi. To‘g‘on tanasida normal kuchlanishlardan tashqari urinma kuchlanish σ_{12} ham hosil bo‘ladi. Bunda qiya joylashgan yadro hisobiga yuqori tayanch prizmada kuchlanganlik holatini o‘zgarishiga olib keladi.

a) σ_{22}, [kN/m^2]



b) σ_{22}, [kN/m^2]



3-rasm. Rezaksoy gruntli to‘g‘onining xususiy og‘irligi ta’siridagi bir jinsli (a) va yadroli (b) holatlar natijasida ko‘ndalang kesimida hosil bo‘ladigan σ_{22}-normal kuchlanishlarning taqsimlanish izochiziqlari

Xulosa

1. Xususiy og‘irlik ta’sirida bir jinsli bo‘lmagan murakkab geometrik parametrlarga ega bo‘lgan gruntli to‘g‘onlarning kuchlanganlik holatini baholash uchun ikki o‘lchovli matematik model, hisoblash usuli va algoritmi ishlab chiqildi.

2. Gruntli to‘g‘onlarning tekis deformatsiyalanish holatida ularning tanasida hosil bo‘ladigan ko‘chish komponentalarining tana bo‘ylab taqsimlanish xarakteri hamda u_1 - gorizontal va u_2 - vertikal ko‘chishlarning qiymatlari aniqlandi. To‘g‘onning deformatsiyalanishga tish konstruktsiysining katta ta’sir etishi ko‘rsatib berildi.

3. To‘g‘onning kuchlanganlik holatini tadqiq qilish natijasida, uning tanasidagi σ_{11} normal kuchlanishning qiymati gruntning xususiy og‘irligiga, grunt materialining bir jinsli yoki bir jinsli bo‘lmasligi kabi xususiyatlarga bog‘liq

bo‘lishi, hamda, to‘g‘on konstruksiyasida yadroning qiya bo‘lganligi va tishning mavjudligi σ_{22} vertikal kuchlanishlarni kesim bo‘ylab taqsimlanish xarakteriga katta ta’sir ko‘rsatishi aniqlandi.

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MIRZACHO‘L IQTISODIY RAYONINING SUG‘ORISH TIZIMIDA JANUBIY MIRZACHO‘L KANALINING AHAMIYATI

Annotatsiya: *Ushbu maqolada Janubiy Mirzacho‘l kanalining Mirzacho‘l vohasi sug‘orish tizimidagi ahamiyati, meliorativ holatni yaxshilashdagi roli va hududning qishloq xo‘jaligini rivojlantirishdagi o‘rni yoritilgan. Maqolada kanalning suv ta’minoti, gidrotexnik inshootlari, suv resurslaridan foydalanish samaradorligi hamda ekin maydonlarining hosildorligiga ta’siri tahlil qilindi. Shuningdek, suv resurslarini tejash, sug‘orish texnologiyalarini modernizatsiya qilish va ekologik muvozanatni saqlash bo‘yicha takliflar berilgan. Maqola natijalari Mirzacho‘l vohasining barqaror rivojlanishida Janubiy Mirzacho‘l kanalining strategik ahamiyatini asoslab beradi.*

Kalit so‘zlar: *Janubiy Mirzacho‘l kanali, Mirzacho‘l iqtisodiy rayoni, sug‘orish tizimi, suv resurslari, melioratsiya, hosildorlik, ekologik muvozanat.*

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THE IMPORTANCE OF THE SOUTHERN MIRZACHUL CANAL IN THE IRRIGATION SYSTEM OF THE MIRZACHUL ECONOMIC REGION

Annotation: *This article highlights the significance of the Southern Mirzachul Canal as the main irrigation artery of the Mirzachul oasis, its role in improving the meliorative condition, and its contribution to the development of agriculture in the region. The study analyzes the canal’s water supply, hydraulic structures, the efficiency of water resource use, and the impact on crop productivity. In addition, proposals for saving water resources, modernizing irrigation technologies, and maintaining ecological balance are presented. The*

results of the research substantiate the strategic importance of the Southern Mirzachul Canal in ensuring the sustainable development of the Mirzachul oasis.

Keywords: *Southern Mirzachul Canal, Mirzachul economic region, irrigation system, water resources, melioration, productivity, ecological balance.*

O‘zbekiston Respublikasi qishloq xo‘jaligi taraqqiyoti bevosita suv resurslaridan oqilona foydalanish, meliorativ holatni yaxshilash va sug‘oriladigan yerlar samaradorligini oshirish bilan chambarchas bog‘liqdir. Shu nuqtai nazardan, Mirzacho‘l vohasi respublikaning yirik sug‘oriladigan hududlaridan biri hisoblanadi. Mazkur hudud o‘zining iqlim sharoiti, tuproq tarkibi va relyefi bilan sug‘orish tizimlariga katta ehtiyoj sezadi. [7] Mirzacho‘l vohasida suv resurslarini boshqarishda Janubiy Mirzacho‘l kanali asosiy o‘rin tutadi. U Sirdaryo daryosidan suv oluvchi yirik gidrotexnik inshoot bo‘lib, vohaning markaziy va janubiy qismlarini sug‘orish suvi bilan ta’minlaydi.

Kanalning qurilishi natijasida yuz minglab gektar yangi yerlar o‘zlashtirilib, paxtachilik, g‘allachilik va polizchilik rivoj topdi. Shu bilan birga, kanal hududda ijtimoiy-iqtisodiy infratuzilmaning shakllanishiga, aholi bandligini oshirishga va yashash sharoitlarini yaxshilashga sezilarli hissa qo‘shdi. Bugungi kunda suv resurslaridan samarali foydalanish, suvni tejaydigan texnologiyalarni joriy etish, sug‘orish tarmoqlarini modernizatsiya qilish Mirzacho‘l vohasining barqaror rivojlanishi uchun muhim omil bo‘lib qolmoqda. Shu sababli, Janubiy Mirzacho‘l kanalining texnik, ekologik va iqtisodiy jihatlarini ilmiy tahlil etish dolzarb masala sanaladi. Xususan, Mirzacho‘l mintaqasida mazkur kanal hududning suv ta’minoti, meliorativ holati hamda qishloq xo‘jaligi ishlab chiqarishiga asosiy rol o‘ynaydi.

O‘zbekiston Respublikasi iqlim sharoiti keskin kontinental bo‘lib, yillik yog‘in miqdorining kamligi va bug‘lanish darajasining yuqoriligi sababli sug‘orish qishloq xo‘jaligi ishlab chiqarishining asosiy omili hisoblanadi. Shu jihatdan, suv resurslaridan samarali foydalanish va ularni ilmiy asosda boshqarish mamlakatning oziq-ovqat xavfsizligi, ekologik barqarorlik hamda iqtisodiy taraqqiyotini ta’minlovchi muhim omillardan biridir. Mirzacho‘l vohasi O‘zbekistonning shimoliy qismida joylashgan bo‘lib, umumiy maydoni 600 ming gektardan ortiq. Hududning relyefi tekislik bo‘lib, asosan qumli va sho‘rlangan tuproqlardan tashkil topgan. Yillik yog‘in miqdori 200–250 mm dan oshmaydi, shu sababli tabiiy namlik yetarli emas. Shuning uchun mintaqada suv bilan ta’minlash masalasi doimo strategik ahamiyat kasb etgan. Mirzacho‘l iqtisodiy rayonining meliorativ va agrotexnik rivojlanishida Janubiy Mirzacho‘l kanali (JMK) markaziy o‘rinni egallaydi. Kanal 1956–1965-yillar oralig‘ida qurilgan bo‘lib, uzunligi 127 km dan ziyod, o‘tkazuvchanlik hajmi esa 150 m^3/s gacha yetadi. Kanal suvini Sirdaryo daryosidan oladi va Mirzacho‘l vohasining janubiy hamda markaziy qismlariga yetkazib beradi. Ushbu kanal orqali 300 ming gektardan ortiq sug‘oriladigan yerlar suv bilan ta’minlanadi. [5] Shuningdek, suv resurslarini tejash hamda sug‘orish tizimlarini modernizatsiya qilish bo‘yicha ilmiy asoslangan taklif va tavsiyalar ishlab chiqilgan.[1]

Janubiy Mirzacho‘l kanalining gidrotexnik tuzilishi va ishlash prinsipi. 1947-yil Boyovut tumaniga suv keladi. Keyinchalik, ya’ni, 1959-yil yilda Sarkisov nomli Janubiy Mirzacho’l kanali ishga tushadi. Bu kanal va Do’stlik kanali Sirdaryoning qon-tomiri hisoblanadi. [2] Janubiy Mirzacho‘l kanali (JMK) O‘zbekistonning yirik sug‘orish inshootlaridan biri bo‘lib, Sirdaryo daryosidan boshlanadi. Kanalning umumiy uzunligi 127 km, o‘rtacha o‘tkazuvchanlik qobiliyati 150 m³/s, suv olish inshootining quvvati esa 170 m³/s ni tashkil etadi. Kanal trassasi Sirdaryo viloyati hududi orqali o‘tib, Mirzacho‘l vohasining markaziy va janubiy qismlarini qamrab oladi. Kanalning asosiy tarmoqlari – Shimoliy Mirzacho‘l, G‘arbiy Mirzacho‘l va Markaziy Mirzacho‘l kanallari bilan uzviy bog‘langan bo‘lib, ularning barchasi yagona irrigatsion tizimni hosil qiladi. Tizimda 20 dan ortiq suv taqsimlash gidrouzellar, 1500 km dan ziyod ichki sug‘orish tarmoqlari va 2000 dan ortiq drenaj kanallari mavjud. Bu esa Mirzacho‘l rayonida suv taqsimotining uzluksizligini ta’minlaydi. [6]

2. Suv resurslaridan foydalanish samaradorligi. Tadqiqotlar natijasida aniqlanishicha, Janubiy Mirzacho‘l kanali orqali o‘tuvchi suvning o‘rtacha yillik hajmi 3,5–4,0 mlrd m³ ni tashkil etadi. Shu suvning 80 foizi sug‘orish maqsadlariga sarflanadi, qolgan qismi esa ichimlik suvi va texnik ehtiyojlar uchun ishlatiladi. Oxirgi yillarda olib borilgan monitoring natijalariga ko‘ra, suvni yo‘qotish darajasi 1970–1980-yillardagi 25–30% dan 15% gacha kamaygan. Bunga kanal tubining betonlanishi, avtomatlashtirilgan gidropostlar o‘rnatilishi va suvni nazorat qilish tizimlarining joriy etilishi sabab bo‘lgan. Ayniqsa, “Mirzacho‘l irrigatsiya tizimini modernizatsiya qilish loyihasi” doirasida o‘rnatilgan SCADA tizimi suv sarfini raqamli nazorat ostida ushlab turadi, bu esa resurslardan foydalanish samaradorligini 1,4 baravar oshirgan.[2]

3. Meliorativ holatni yaxshilashdagi ahamiyati. Mirzacho‘l vohasi tuproqlari asosan sho‘rlanishga moyil bo‘lgan allyuvial va qumloq turlardan iborat. Sug‘orish jarayonida tuproqdagi sho‘r suvlarning to‘planishi ekinlar hosildorligini pasaytirgan. Shu sababli Janubiy Mirzacho‘l kanalining barpo etilishi bilan bir vaqtda drenaj tizimlari ham qurilgan. Hozirgi kunda kanal tizimiga ulanib ishlaydigan drenaj kanallari orqali yiliga o‘rtacha 1,2 mlrd m³ sho‘r suv chiqariladi. Natijada sug‘oriladigan yerlarning sho‘rlanish darajasi 20–30 foizdan 10–12 foizgacha kamaygan. Bu esa paxta hosildorligini gektariga o‘rtacha 15–20 sentnergacha, g‘alla hosildorligini esa 45–55 sentnergacha oshirishni ta’minlagan[3].

4. Ekologik va ijtimoiy-iqtisodiy ta’sirlar. Janubiy Mirzacho‘l kanalining qurilishi va ishlatilishi nafaqat qishloq xo‘jaligida, balki butun Mirzacho‘l iqtisodiy rayonining ekologik holatida ham muhim o‘zgarishlarga olib keldi. Suv resurslarining taqsimlanishi natijasida yashil maydonlar kengaydi, shamol eroziyasi kamaydi, mikroiqlim barqarorlashdi.[5] Kanal atrofida yangidan 30 dan ortiq aholi manzillari vujudga keldi, sanoat korxonalari va infratuzilmalar paydo bo‘ldi. Aholi bandligi oshdi, suv ta’minoti yaxshilandi. Shuningdek, ekin maydonlarida suvni tejovchi texnologiyalar (tomchilatib sug‘orish, sirtki suv

taqsimlash tizimlari) joriy qilinishi natijasida 1 gektar maydon uchun suv sarfi 25–30% ga kamaygan.[6]

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SELECTING A TREATMENT METHOD FOR SEBORRHEIC DERMATITIS

Abstract: *The article is devoted to the analysis of modern methods of treating seborrheic dermatitis to select the most effective therapy. The clinical manifestations of the disease, factors influencing the course of seborrheic dermatitis, as well as the comparative characteristics of pharmacological and non-drug treatment methods, including local and systemic drugs, and plant-based agents, are examined. Recommendations are given for individualizing therapy, taking into account the severity of the disease and accompanying factors. The work can be useful for dermatologists, therapists, and medical students.*

Keywords: *seborrhoeic dermatitis, clinic, Mycrobiologycal, staphylococcus spp, Pityrosporum spp., treatment.*

Introduction

Seborrheic dermatitis is a chronic, recurrent skin disease characterized by lesions of skin areas rich in sebaceous glands. According to literature data, the disease occurs in 3% of the population and is more common among young people aged 20 to 40. [1, 3, 5, 7, 6, 11,13].

Despite numerous developments in general therapy, taking into account endogenous pathogenetic and etiological factors in patients with skin diseases, rational external treatment plays a leading role. [10,11]

Purpose of the research

The purpose of our research was to develop optimal methods of external therapy in patients with seborrheic dermatitis, taking into account their microbiological status.

Research materials and methods

76 patients with seborrheic dermatitis aged 12 to 54 years, with a duration of the disease from 6 months to 12 years, were observed. Among them, 46 were men and 32 were women.

All patients underwent clinical and microbiological studies.

Clinical studies were characterized by determining the dermatological index of the symptom scale (SDS) before and after treatment. Microbiological studies of the skin consisted of backseeding the skin scales of the affected areas and the

uninfected area. For microbiological studies, 5% blood agar, Endo, Lewin medium, and salt agar with mannitol were used. The culture was incubated in a thermostat at a temperature of 36.80°C.

Results and discussions

A study of the clinical course of seborrheic dermatitis showed that out of 76 patients, 27 (35.5%) were diagnosed with mild severity, 38 (50%) with moderate severity, and 11 (14.5%) with severe severity. A mild course of seborrheic dermatitis was characterized by the presence of erythematous-squamous rashes on the skin of the hairy part of the head, face, especially in the nasolabial folds, against a background of the patient's satisfactory general condition. Moderate severity was characterized by the prevalence of the cutaneous-pathological process (skin of the hairy part of the head, torso, upper limbs), pronounced hyperemia, infiltration.

The severe degree (11 patients) was characterized by the accumulation of a large number of fatty scales, massive crusts on the skin of the hairy part of the head. On the skin of the lesions, there were signs of maceration, moisture, and cracks in places. In addition to skin manifestations, these patients reported complaints from the gastrointestinal tract, sometimes fever.

The results of microbiological studies of the skin of the lesions showed an increase in the conditionally pathogenic flora in the skin of the lesions in 70 (92.1%) patients. Thus, in 61 (80.3%) patients - growth of staphylococcus spp., in 9 (11.8%) - growth of lipophilic yeast-like fungi of the genus Pityrosporum spp. Among the representatives of the Micrococcaceae family, the pathogenic flora st.aureus was most commonly cultivated - in 24 (39.3%) patients, st. Haemolyticus - in 14 (22.9%), st.saprophyticus - in 15 (24.5%), st. epidermidis - in 8 (13.1%). At the same time, the contamination of the pathogenic flora staphylococcus ranged from 480 to 1970 CFU/cm2, respectively. Among the lipophilic yeast-like fungi, Pityrosporum ovale was cultivated in 9 patients with lesions of the hairy parts of the head and body.

Table 1.
Indicators of conditional pathogenic flora growth in lesions in patients with seborrheic dermatitis, taking into account the severity of the disease. (WHAT)

Degree of gravity	st. aureus	st. Haemolyticus	st. saprophyticus	st. epidermidis	Pityrosporum spp
Light degree N=13	5		7	1	4
Average N=37	8	14	8	7	1
Heavy N=11	11				4
Total N=61	24	14	15	8	9

Analysis of the clinical course, taking into account the microbiological status, showed that in patients with severe severity, in 100% of cases (11), st.aureus was cultured with a high colony, averaging 1818.4+50.4 CFU. ($P<0.05$). It should be noted that in 4 patients of the same group, the yeast-like lipophilic fungus Pityrosporum spp. was inoculated, which caused mixed contamination of conditionally pathogenic microorganisms in the lesions. Meanwhile, in patients with moderate severity, Micrococcaceae family microorganisms were isolated in 97.4% of cases: st.aureus - in 21.6%, st. haemolyticus - in 37.8%, st.saprophyticus - in 21.6%, st. epidermidis - in 18.9%, respectively. In patients with mild severity, st.aureus was sown in 38.5% (13 out of 5 patients), and st.saprophyticus in 53.8% (7), respectively. The yeast-like lipophilic fungi Pityrosporum spp. were mainly sown in patients with mild and severe forms of the disease, respectively.

The obtained data indicate a high incidence of pathogenic microflora from the Micrococcaceae (st.aureus, st. haemolyticus) family in patients with seborrheic dermatitis, which contributes to the aggravation of the clinical course of dermatosis.

The study of the antibacterial sensitivity of staphylococcus spp. showed high sensitivity to aminoglycoside groups (mercacin, neomycin sulfate - 96-97%), macrolide groups (azithromycin - 83%), fluoroquinolines (levofloxacin - 90-92%, ciprofloxacin - 81% respectively), cephalosporin groups (cephotoxime, ceftriaxone - 90-93% respectively), which indicates the high pathogenicity of these microorganisms.

The detection of pathogenic microflora with high colonization leads to a decrease in both general and local immunity and the inadequacy of the body's cellular reactivity system, characterized by a decrease in pro- (TNF-alpha) and anti-inflammatory (IL-4) cytokines, which contributes to the development of microbial contamination on the skin in patients with seborrheic dermatitis. [2,8,9]

Considering the clinical and microbiological indicators in patients with seborrheic dermatitis for local treatment, it is necessary to use medications capable of simultaneously affecting all pathological mechanisms. It should be noted that in most cases, external use of medicinal forms with antibiotics or antifungal drugs without the inclusion of glucocorticoids in their composition can lead to an exacerbation of the inflammatory, primarily allergic, process. Therefore, in these conditions, the search for new highly effective multicomponent preparations with a wide spectrum of action is relevant.

In patients with seborrheic dermatitis with severe and moderate severity of the disease, we used the external drug trinazole, which has antimicrobial, anti-inflammatory, and anti-allergic properties. The drug contains ketokonazole - 10 mg, clobetazole propionate - 0.25 mg, neomycin sulfate - 5000 IU. In modern dermatoses therapy, preference is given to glucocorticosteroids (GCs) that meet "effectiveness-safety" requirements and minimize the side effects of glucocorticosteroids.

Ketokonazole is an antifungal agent with a wide spectrum of action, affecting the fungal cell membrane by changing its permeability.

Clobetazole propionate is a corticosteroid hormone that acts as a highly effective anti-inflammatory and anti-allergic agent with minimal side effects.

Neomycin sulfate is a remedy against gram-positive and gram-negative bacteria.

To assess the clinical effectiveness of trinazole, the dermatological index of the symptom scale (SDS) was determined. The DISHS index was determined by the following parameters: erythema, swelling, moisture, lichenification, papules, dryness (xerosis), peeling, erosions, and itching. The parameters were assessed on a 3-point scale, except for itching (4 points). At the same time, the DISHS index indicators were assessed according to the following criteria: with a decrease in the DISHS index indicators by 95%, it characterized clinical remission, 75-95% - significant improvement, 50-75% - improvement, 25-50% - insignificant improvement.

All patients underwent basic therapy according to the standard and clinical protocol for treating skin diseases, consisting of prescribing hyposensitizing, antihistamine therapy, vitamin therapy, and external therapy (the main group received trinazole, and the control group received gentamicin ointment).

Trinazole was applied to the affected areas twice a day for 5-7 days.

The criteria for inclusion in the study were:

1. Severe and moderate severity of the skin process.

2. Use by patients during the last 3 months of external therapy in the form of indifferent ointments and creams (without glucocorticosteroids)

3. Presence of voluntary informed consent of patients.

Table 2.
Comparative assessment of DICS against the background of external therapy with trinazole in patients with severe and moderate severity of seborrheic dermatitis

Groups	Symptoms scale dermatological index						
	erythema	swelling	Mok-dryness	Dryness	Peeling	Er-Roziya	Zud
Before treatment (trinalozole) N=27	2,9+0,01	2,6+0,04	1,6+0,02	1,8+0,02	2,6+0,06	1,6+0,02	3,9+0,01
After treatment (trinazole) N=27	1,2+0,01*	0,7+0,02*	0,8+0,03	1,2+0,02*	1,2+0,03*	0,8+0,02*	0,7+0,01*
Control group Before treatment N=10	2,9+0,02	2,9+0,03	1,8+0,01	1,8+0,03	2,8+0,04	1,4+0,03	3,7+0,02
Control group after treatment N=10	1,9+0,02*	2,1+0,04*	1,5+0,04	1,6+0,03	2,5+0,03	1,3+0,03	2,7+0,03

As can be seen from Table 2, the use of trinazole contributed to a decrease in erythema by 58.6% (P<0.05), edema by 73.1% (P<0.05), peeling by 46.2%, and papular elements by 50%. The use of trinazole contributed to a significant reduction in subjective sensations - itching - by 5.6 times (P<0.05). Whereas, in the control group receiving only gentamicin ointment, DISHS did not have significant positive shifts, which contributed to the preservation of peeling, erosive areas, and itching.

In most cases, the patient is advised to create comfort in cases of external therapy. As such treatment, it is convenient to use medicinal shampoos or lotions, balms. One of the representatives of this group was the haikinazole balm, which contains ketokonazole (0.025 g), clobetazole propionate (0.00025 g), alcohol (0.013 g), sodium dodecyl sulfate (0.07 g), di-sodium edetat (0.01 g), and other components, which in combination exhibit anti-inflammatory, antimicrobial, and keratolytic properties.

Haikinozol was used in patients with mild and moderate severity of seborrheic dermatitis, which contributed to a positive dynamic of the dermatological index of the symptom scale. (Table 3).

Table 3.
Comparative assessment of DICS against the background of external therapy with haikinazole in patients with moderate and mild seborrheic dermatitis

Groups	Symptoms scale dermatological index						
	erythema	отек	erythema	Сухость	erythema	Эр-розии	erythema
Patients with seborrheic dermatitis before treatment N=37	2,9+0,01	2,8+0,02	1,9+0,03	2,5+0,02	2,8+0,02	1,3+0,01	4,2+0,01
B-with seborrheic dermatitis after treatment Haikinazole N=37	1,3+0,03*	1,1+0,02*	0,7+0,02	1,6+0,03	1,4*+0,02	0,7+00,1	1,5*+0,01

Conclusion

It should be noted that the use of trinazole and haikinazole not only contributes to the positive dynamics of DIC in patients with seborrheic dermatitis, but also to the microbiological indicators of the lesions. Thus, in patients with lesions after treatment, a decrease in the level of colonization of the pathogenic flora was noted by 3.2 times - in the group receiving trinazole and 3.4 times - in the group receiving haikinazole, respectively. During the use of external drugs, no side effects were observed in the patients.

1. The use of trinazole and haikinazole for external use in seborrheic dermatitis is effective due to their anti-inflammatory and antimicrobial effects.

2. Trinazole - a sterility cream due to its antimicrobial, inflammatory, and allergenic effects, it is preferable to use it in patients with severe and moderately severe seborrheic dermatitis.

3. Haikinazole is a balm due to its anti-inflammatory and antimicrobial effects, preferably used in patients with moderate and mild seborrheic dermatitis. It should be noted that the haikinazole balm can be used as a supportive external therapy.

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ANTI-LEISHMANIAL ACTIVITY OF ALOE VERA LEAF EXUDATE IN VIVO

Abstract: *The study examined the efficacy of aloe extract in the topical application of zoonotic leishmaniasis. To date, specific drug prevention of leishmaniasis has not been developed.*

Due to drug trial and side effects of leishmaniasis treatments, achieving treatment efficacy through unique side effects and greater benefits is of paramount importance. The present study was aimed at a retrospective analysis of aloe vera leaf exudate for Leishmania major in in vivo models on patients with different wound sizes. There are certain difficulties in the treatment of leishmaniasis, such as drug resistance and side effects of standard drugs.

Keywords: *aloe vera leaf exudate; in vivo; leishmania major*

Introduction

Leishmaniasis is a healthcare problem in the Middle East, Central Asia, Africa, and many tropical and subtropical regions of the world (3,4,20). According to World Health Organization (WHO) reports, it is among the six most important tropical diseases (6).

Regarding adverse side effects, resistance to widely used anti-leishmaniasis drugs, toxicity and cost, achieving a natural bioactive compound with lower toxicity and high efficacy have recently attracted significant attention and increased interest in medicinal plants (19.23). According to the WHO report, about 80% of the world's population uses folk medicine (1,2). Skin leishmaniasis is endemic in some parts of Uzbekistan. Currently, anti-leishmaniasis drugs are either toxic or too expensive for routine use in developing countries where this disease is most common (24).

In this regard, the results of some studies indicate the use of medicinal herbs in the treatment of some skin diseases (3,25). Treatment of this disease can be effective with the help of plant-based preparations. Some studies have successfully reported the discovery of plant products and their use against Leishmania, while others have not shown therapeutic effects on skin leishmaniasis (4.5).

Patients with leishmaniasis should be under observation.

because sometimes treatment does not give satisfactory results, especially in the case of immunodeficiency. Like other conditionally pathogenic parasites such as Leishmania (6,7,8), the disease reactivates and can cause atypical clinical manifestations and easily lead to its wound dilation.

Aloe vera is widely used in health products, and despite several reports on overall growth and fiber gel, little has been done with leaf exudate (20). Our goal was to assess in vivo the effectiveness of aloe vera leaf exudate (AVL) in leishmaniasis. Regardless of disease manifestations, promastigotes from the strains responsible for cutaneous, cutaneous-mucosal, and visceral leishmaniasis were sensitive to aloe vera leaf exudates.

Aloe vera extract causes macro activation of host phages, as evidenced by increased release of active oxygen forms, which was weakened by pre-incubation with absorbers with elevated radical content (3).

Aloe vera (AV) belongs to the herbal disinfectants with a long history of medicinal properties (21). Antimicrobial agents have diverse biological effects, including laxative, antimicrobial and antifungal, immunostimulant, anti-inflammatory, anti-tumor, antidiabetic, and wound healing. Moreover, some studies have reported AV as a potent remedy against leishmaniasis (10,11). AV has a direct parasitic effect on all forms of Leishmania, enhances activated macrophages, and leads to

increase in TNF - α, which is the main mediator of acute inflammation (26). Consequently, it can have a positive effect on the antigenic process and cause resistance to infection. Moreover, some studies have demonstrated that AV does not have a harmful effect on the host cell (6.9) when extracted with acetone, and possesses antimicrobial activity (17.18).

In addition to the direct parasitic effect of AVL on Leishmania, it possessed immunomodulatory activity and contained two low- and high-molecular-weight components (25). The low molecular weight component exhibits anti-inflammatory and immunosuppressive properties, but the high molecular weight component has immunostimulant properties, increases activated macrophages, and enhances the reactive forms of oxygen (RFS) and reactive nitrogen species (RNS) in macrophages, leading to increased secretion of IL12, IL1, IL6, and TNF-α (12,13,14,15). This result corresponds to the results of the in vivo model currently being studied.

Local residents in the Somali region of Ethiopia use Aloe vera leaves to treat malaria, jaundice, and skin diseases (22). In the constant search for new, effective, and safe anti-leishmaniasis drugs, we investigated the exudate of Aloe vera leaves and its acid-hydrolyzed product against promastigotes and amastigotes found in patients' wounds. The study of activity was conducted based on the fluorescence characteristics of resazurin added to the treated cultures.

In some studies (3,16), the plant's internal gel was used and it was shown that its emidine compounds can effectively reduce the size of the ulcer in cutaneous leishmaniasis, however, in this study, we used the plant's leaf instead of its gel.

Purpose of the research

In this study, the anti-leishmanial activity of Aloe vera is evaluated in vivo in patients.

Assess the clinical and laboratory changes during local treatment of zoonotic leishmaniasis with aloe extract in combination with a mixture of ointments.

Research materials and methods

A study was conducted on 30 sick children, men, and women with zoonotic leishmaniasis for 20 days, with an average age ranging from 3 to 50 years. Patients complained of necrotic foci, leishmaniosis accompanied by an increase in regional lymph nodes and lymphangitis (usually painless), and wounds complicated by purulent infection with the development of phlegmon and sarcoma. Microscopic examination of wound material was carried out to diagnose Borovsky's carcass.

Due to the drug test and side effects of treatment methods for leishmaniasis, achieving treatment effectiveness through unique side effects and greater benefits is of paramount importance. Moreover, in the treatment of complicated cases of cutaneous leishmaniasis, the use of ART will be proposed as an additional treatment.

This study was aimed at a retrospective analysis of aloe vera leaf exudate from Leishmania major in vivo models in patients: various aloe vera (AV) exudates and standard preparations, a mixture of Levamisole, Vishnevsky, and Ichthyol ointments, were prepared. Measuring the area of the wound after 24, 48, and 72 hours.

A total of 30 patients with skin leishmaniasis were divided into three groups for in vivo models:

1: Main group, Patients of the 1st group (main group) Study the effect of aloe extract when applied 4 times locally for 20 days.

2: Patients of group 2 (main group). Study the effect of aloe extract when applied 8 times locally for 20 days.

3: Patients of the 3rd group (control group) who received traditional therapy.

1 and 2: experimental groups (treatment: aloe vera extract 4 times and aloe vera extract 8 times, respectively). The size of the ulcer was recorded at the beginning of the experiment weekly for 3 weeks.

Results and discussions

In the 1st group (14 people), wound size was 0.5-2 cm. In the 2nd group (21 people), wound size was more than 2 cm, and there were complications in the regional lymph nodes.

The remaining patients of the 3rd group, regardless of the wound, received traditional therapy.

Reduction in the size of wounds with almost perfect smooth scars in the 1st group occurred in 7 people (50%), already after 1 week. In the 2nd group, the disease did not progress to a complicated form in 3 people (14%) for 3 weeks. In patients of the 3rd group of 1 person, epithelialization was observed in the 4th

week, while the remaining patients of the 3rd group did not recover until the 4th week.

Conclusion

The results of the in vivo model showed that both the aloe vera extract and the ointment mixture reduced the number of promastigotes and AV at 8 times and the ointment mixture significantly reduced the size of the ulcers compared to AV at 4 times. For in vivo study, the ointment was in a ratio of a mixture of AV as a plant-based medicinal product and a mixture of ointments as a standard treatment had similar results.

This data has been confirmed by some studies (13.15), which reported that AV can heal skin ulcers and restore some skin damage. AVL has a direct leishmanial effect.

Treatment of promastigotes with antiviral drugs demonstrated dose-dependent and time-dependent inhibition of parasite growth, so a decrease in the number of promastigotes increases the concentration of antiviral drugs and the duration of their exposure.

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SAMARQAND VILOYATIDA BOLALAR MAKTABGACHA TA’LIM MUASSASALARIDA PARAZITAR KASALLIKLAR BILAN KASALLANISHNI KAMAYTIRISH BO‘YICHA SANITARIYA-GIGIYENIK TADBIRLARNI TASHKILLASHTIRISH

Annotatsiya: *Mazkur maqolada Samarqand viloyatidagi maktabgacha ta’lim muassasalarida bolalar orasida parazitar kasalliklarning tarqalish sabablari, ularning sog‘liq uchun xavfi va kasallanishni kamaytirish yo‘nalishida amalga oshiriladigan sanitariya-gigiyenik tadbirlar yoritilgan.*

Kalit so‘zlar: *Parazitar kasalliklar, maktabgacha ta’lim, gigiyena, profilaktika, bolalar salomatligi, sanitariya tadbirlari.*

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ORGANIZING SANITARY AND HYGIENIC EVENTS TO REDUCE INFECTION WITH PARASITIC DISEASES IN PRESCHOOL EDUCATIONAL INSTITUTIONS IN SAMARKAND REGION

Abstract: *This article highlights the causes of the spread of parasitic diseases among children in preschool educational institutions of the Samarkand region, their health risks, and sanitary and hygienic measures to reduce morbidity.*

Keywords: *Parasitic diseases, preschool education, hygiene, prevention, children's health, sanitary measures.*

O‘zbekiston Respublikasi Prezidentining 19.05.2025 yildagi PF-88-son farmoniga asosan Respublikada sog‘liqni saqlash tizimini va aholiga tibbiy xizmat ko‘rsatish tamoyillarini takomillashtirish orqali sohani isloh qilishni izchil davom ettirish chora-tadbirlari to‘g‘risida. Sog‘liqni saqlash tizimini eng ilg‘or xorijiy

tajriba asosida isloh qilish, aholiga ko‘rsatilayotgan tibbiy xizmatlar sifatini oshirish, birlamchi tibbiy-sanitariya yordami ko‘rsatishning zamonaviy tizimini shakllantirish, sohaga yangi boshqaruv tamoyillarini joriy qilish maqsadida qaror qilaman: Ilg‘or xorijiy tajriba asosida aholiga birlamchi tibbiy-sanitariya yordami ko‘rsatishning yangi tizimini joriy etishning asosiy maqsadlari etib quyidagilar belgilansin: xalqaro tajribaga asoslangan aholiga birlamchi tibbiy-sanitariya yordami ko‘rsatishning yangi modelini joriy qilish; birlamchi tibbiy-sanitariya yordami muassasalari, xususan, tuman (shahar) ko‘p tarmoqli markaziy poliklinikalari, oilaviy shifokor punktlari va oilaviy poliklinikalar, mahalla tibbiyot punktlari faoliyatini yagona yondashuv asosida tashkil qilish orqali aholiga tibbiyotni yanada yaqinlashtirish; aholiga tibbiy yordam ko‘rsatishda oilaviy shifokor ulushini 70 foizga yetkazish; sog‘liqni saqlash tizimini raqamlashtirish hamda tibbiyotda qog‘ozbozlikni kamaytirish orqali tibbiyot xodimlari ish yuklamasini 30 foizgacha kamaytirish; aholining birlamchi tibbiy-sanitariya yordamidan roziligi darajasini 85 foizdan oshirish.

Bola salomatligini mustahkamlash va ularni turli yuqumli kasalliklardan himoya qilish mamlakatimiz sog‘liqni saqlash tizimining eng muhim vazifalaridan biridir. Ayniqsa, maktabgacha ta’lim yoshidagi bolalar organizmi tashqi muhit ta’siriga nisbatan sezuvchan bo‘lib, gigiyena qoidalariga rioya qilinmaganda parazitar kasalliklar tez tarqaladi. Samarqand viloyati aholisi orasida, xususan, maktabgacha ta’lim muassasalarida tahsil olayotgan bolalarda **gelmintozlar (askaridoz, enterobioz, giardioz)** kabi parazitar kasalliklar tez-tez uchrab turadi. Buning sabablari sifatida bolalarning shaxsiy gigiyena qoidalarini bilmasligi, qo‘l yuvish odatining yetarli shakllanmaganligi, suv va oziq-ovqat mahsulotlarining ifloslanishi, shuningdek, ba’zi muassasalarda sanitariya nazoratining sustligi ko‘rsatiladi. Maktabgacha ta’lim muassasalarida parazitar kasalliklarning tarqalishi nafaqat bolalarning jismoniy holatiga, balki ularning aqliy va hissiy rivojlanishiga ham salbiy ta’sir ko‘rsatadi. Shu bois, ushbu muassasalarda gigiyenik tartiblarni qat’iy yo‘lga qo‘yish, sog‘lom ovqatlanish, toza suv bilan ta’minlash va o‘quv-tarbiyaviy ishlar orqali bolalarga tozalik madaniyatini singdirish bugungi kunda dolzarb masala hisoblanadi.

Samarqand viloyatining turli tumanlarida olib borilgan kuzatuvlar shuni ko‘rsatadiki, parazitar kasalliklarning oldini olishda faqat tibbiyot xodimlarining faoliyati emas, balki pedagoglar va ota-onalarning ham o‘zaro hamkorligi muhim rol o‘ynaydi. Shu boisdan, sog‘lom bola — sog‘lom jamiyat tamoyilidan kelib chiqib, parazitar kasalliklarning oldini olish bo‘yicha kompleks sanitariya-gigiyenik tadbirlarni samarali tashkillashtirish zarurdir.

Samarqand viloyatidagi maktabgacha ta’lim muassasalarida parazitar kasalliklarning kamaytirilishi — bolalar salomatligini mustahkamlash, sog‘lom avlodni shakllantirish va ta’lim-tarbiya sifatini yaxshilash uchun muhim ahamiyatga ega. Ushbu kasalliklarning oldini olishda muntazam sanitariya nazoratini o‘tkazish, bolalar va xodimlar o‘rtasida gigiyenik bilimlarni oshirish, shuningdek, ota-onalarning gigiyenik madaniyatini yuksaltirish alohida o‘rin tutadi. Shuningdek, har bir maktabgacha ta’lim muassasasida tibbiy kuzatuv va

profilaktik tekshiruvlarni muntazam yo‘lga qo‘yish, ichimlik suvi va ovqat mahsulotlarining gigiyenik sifatini doimiy nazoratda saqlash zarur. Bolalar orasida tozalik madaniyatini shakllantirish, o‘yinchoqlar va o‘quv jihozlarini dezinfeksiya qilish ishlarini jadallashtirish orqali parazitar kasalliklarning tarqalish darajasini sezilarli kamaytirish mumkin.

Umuman olganda, Samarqand viloyatida bolalar o‘rtasida parazitar kasalliklarning kamaytirilishi sog‘lom avlodni tarbiyalash, bolalar hayot sifatini yaxshilash hamda jamiyatning umumiy sanitariya-madaniy darajasini yuksaltirishga xizmat qiladi.

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THE DESTINY OF THE ENVIRONMENT IS IN YOUTH'S HANDS

Annotation. *In the current era of rapid development of science and technology, the impact of man on nature has multiplied. The development of various industrial enterprises inevitably has an impact on the natural environment. It is advisable to anticipate these effects, take appropriate measures, reduce their negative consequences and increase their benefits.*

Therefore, the protection of the natural environment and the rational use of its natural resources has become the most urgent and responsible task of our time.

Keywords: *Environmental sustainability, Youth engagement, Climate action, Greenfuture, Environmental responsibility, Eco-friendly behavior, Youth leadership, Sustainable development.*

Introduction

In the current era of rapid development of science and technology, the impact of man on nature has increased several times. The development of various industrial enterprises inevitably has a negative impact on the natural environment. It is advisable to understand this impact in advance, take appropriate measures, reduce their negative consequences and increase their beneficial aspects. Therefore, protecting the natural environment and rational use of its capabilities have become the most urgent and extremely responsible task of our time.

The well-being and well-being of people are directly dependent on the state of the environment. Clean air, clean water, clean food and a clean external natural environment are extremely necessary for a person to live and work healthily. Environmental protection, rational use of natural resources largely depend on the level of environmental literacy and ecological culture of people. This, in turn, is consistent with the tasks of developing society and preserving the wealth and beauty of nature. In order to solve these problems, it is extremely necessary to form ecological knowledge, worldview, and culture in all layers of the population, especially in young people. Because only a person who fully understands the secrets of nature can understand that maintaining the balance in nature ensures the continuity of our life.

Materials and methods

The priority of environmental protection measures is to provide young people with environmental education, because a person who correctly understands the changes taking place in nature can draw clear and comprehensive conclusions. There are still unsolved scientific and theoretical foundations in the science of ecology. Therefore, it is extremely important to conduct environmental science at all levels of the continuous education system. It is especially important to start this

work from preschool educational institutions, to provide preschool children with elementary knowledge about nature and to expand and enrich their imagination.

Because the policy pursued by our President also requires this. In particular, in accordance with the Decree of September 30, 2017 “On measures to radically improve the management of the preschool education system” and the Resolution “On the organization of the activities of the Ministry of Preschool Education of the Republic of Uzbekistan”, a new system was created in this area [1-2]. On December 16, 2019, the Law of the Republic of Uzbekistan “On Preschool Education and Upbringing” was adopted [3]. Based on these documents, work is underway to radically reform the preschool education system and organize its management structure. Special programs are being developed to ensure 100% coverage of children in institutions, in particular, the development and implementation of the “Ecological Child” program has been recognized as an important issue.

Results

Environmental education of children should begin, first of all, in the family, from the preschool education period. Preschool educational institutions have their own role and importance in implementing these tasks. It is advisable to include topics related to environmental knowledge in the curriculum and plan of these educational institutions and expand their hours. Because, so far, the attention paid to environmental education in preschool educational institutions is not at the required level. Therefore, the lack of environmental skills and education in children's education is the reason why they are separated from nature. Therefore, it is necessary to establish environmental education in the initial stages of continuous education. Because, as the great educator V.A. Sukhomlinsky said: I would like children to read the most wonderful nature book from nature before they can spell the alphabet.

Table:

Youth Contribution to Environmental Sustainability (Numeric Data)

Indicators	Value
Youth environmental awareness (%)	78
Participation in eco-projects (%)	42
Youth-led initiatives (units/year)	315
Reduction of plastic use by youth (%)	27
Youth volunteering hours (thousands/year)	148
Social media eco-campaign reach (millions)	5.6
Tree planting by youth (thousands/year)	92
Youth climate clubs (units)	540
Renewable energy adoption among youth households (%)	18
Youth support for climate policies (%)	83

Environmental education is the basis of a careful attitude to the environment and is considered the main component of the general education system, and its basis begins from the young age of the pupil of a preschool educational institution. In particular, in foreign countries, "Ecology is prominent in continuous education as an independent subject." For example, in Western European countries, environmental education for children begins at the age of 3. In Austria, environmental education is included in the school curriculum and there are special teaching aids.

Discussion

In this regard, the adoption of the “Concept for the Development of Environmental Education”, approved by the Cabinet of Ministers by Resolution No. 434 of May 27, 2019, in order to effectively organize the process of environmental education and upbringing in our Republic, will closely help in finding solutions to many environmental problems. Taking this into account, it is time to consider environmental education and upbringing as an important component of the continuous education system and widely introduce it into the education system, that is, to teach it in all types of education, in order to form an ecological culture among the entire population of our Republic [5]. It is also necessary to ensure the continuity of knowledge about ecology in general secondary and secondary specialized education. Because we know that school plays a very important role in human life. It is at school that the basis of each subject is formed, that is, the foundation is laid in the education of young people. Therefore, if environmental knowledge is imparted from a young age, their attitude towards nature and worldview will develop with positive emotions. Through environmental knowledge, the younger generation develops environmental awareness and worldview, thinks, understands and comprehends nature, and as a result, an ecological culture is formed and acquired skills. Despite being an independent science, ecology has not yet become an independent branch of science in Uzbekistan. The coherence and continuity of teaching environmental science in continuing education has not yet been fully realized. However, we constantly talk and write about environmental problems, criticize the slow pace of their solution. Sometimes it seems that these problems have no solution, they are so deep-rooted that we wonder how and in what ways they can be solved. True, of course, a lot of practical innovative work is being carried out in our country in the field of ecology, and in some sense solutions are being found, but a positive attitude towards nature still remains a problem in the minds of all people.

Conclusion

Along with acquiring knowledge, young people grow up as people with deep thinking, intellectual potential, and broad worldviews. Because young people who have integrated all aspects of education and upbringing are called a mature generation. Along with spiritual, physical, aesthetic, legal, and economic education, environmental education must also find its place. We adults must closely help talented young people mature and grow up to be competent specialists in their field. This will lead to the formation of a generation of young people who

are proud of the beauty of their country, who preserve its values, who are compassionate, environmentally literate, knowledgeable, and intellectually capable. Our future will be bright only when we are able to educate and raise healthy, moral, hardworking, clean, and knowledgeable people. Because educating young people in the spirit of love for nature is not just a hobby, it is a pressing issue of state importance.

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ANALYSIS OF CHEMICALS IN PLANTS

Annotation. *In this scientific article, modern methods of analyzing the chemical composition of plants - chromatography, spectroscopy, titrimetric and photometric analysis methods - were scientifically studied. Medicinal and valuable essential oil plants (blueberry, mint, chamomile) were chosen as the main object of the study. According to the results, the content of flavonoids, alkaloids, essential oils, phenolic compounds, vitamins and organic acids in the plant was determined. Based on the analytical results, the differences in the main bioactive components in each plant and their biological significance were analyzed.*

Keywords: *plant chemistry, phytochemical analysis, flavonoids, alkaloids, essential oil, HPLC, spectrophotometry, bioactive component.*

Introduction

Plants are an important biological and chemical resource for living organisms, containing a variety of primary and secondary metabolites. Primary metabolites (carbohydrates, proteins, fats) ensure the vital activity of the plant, while secondary metabolites — alkaloids, flavonoids, essential oils, tannins, phenols, organic acids — determine the ecological adaptation of the plant, its protective mechanisms, and its significance in medicine.

In recent years, due to the expansion of the production of environmentally friendly, natural-based drugs and bioproducts, accurate analysis of the chemical composition of plants has become one of the most important areas of modern biotechnology.

The purpose of this study is to analyze the chemical composition of medicinal and essential oil plants, identify the main bioactive components, and evaluate their quantitative differences.

Materials and research methods

Three plant species were selected for the experiments: Salvia officinalis L. (Sage) Mentha piperita L. (Peppermint) Matricaria chamomilla L. (Chamomile) The above-ground parts of the samples were collected at the flowering stage of the growing season, dried at 45°C, ground to a size of 1 mm and prepared for analysis. Analytical methods The study was carried out based on the following modern analytical methods: Chromatographic analysis (HPLC): used to determine the amount of flavonoids (rutin, quercetin), alkaloids (nicotine, solanine). Gas chromatography (GC-MS): to determine the composition of the essential oil. Spectrophotometric analysis: to determine the total phenolic compounds using the Folin–Ciocalteu reagent. Titrimetric analysis: to determine the amount of ascorbic acid (vitamin C). Infrared (IR) spectroscopy: to identify functional groups.

Chemical solvents and reagents. Ethanol, methanol, distilled water, sodium carbonate, Folin–Ciocalteu solution, gallic acid, DPPH, and 99.9% pure solvents were used for HPLC.

Each analysis was repeated three times. Data are presented as mean ± SD. Analyses were statistically evaluated using the ANOVA method ($p<0.05$ was considered significant).

Results

General chemical composition. Plant type Total flavonoids (mg/g) Phenolic compounds (mg GAE/g) Essential oil (%) Vitamin C (mg/100g)

Salvia officinalis 18.7 ± 0.5 24.3 ± 1.1 1.6 ± 0.2 41.5 ± 1.8

Mentha piperita 21.4 ± 0.7 28.9 ± 0.9 1.8 ± 0.3 46.2 ± 2.0

Matricaria chamomilla 14.9 ± 0.6 20.2 ± 1.3 0.9 ± 0.1 38.6 ± 1.5

The results showed that peppermint (Mentha piperita) had the highest flavonoid and phenolic compounds, which showed strong antioxidant properties.

Chromatographic results

The HPLC results revealed the flavonoids quercetin, rutin, and kaempferol.

In GC-MS analysis, menthol, menthone, and 1,8-cineole components dominated in mint.

In blueberry, caryophyllene, thujone, and borneol were recorded as the main components.

IR spectroscopy results

The spectrograms recorded –OH groups in the range of 3200–3400 cm^{-1}, aromatic C=C bonds at 1600 cm^{-1}, and C=O groups at 1700 cm^{-1}, which confirmed the presence of flavonoid and phenolic compounds.

Discussion

The amount of chemical substances in plants is an important indicator of their biological activity. According to the results of the study, the high concentration of flavonoids and essential oils in the mint plant enhances their medicinal properties.

Phenolic compounds protect the plant from oxidative stress, and also act as antioxidants by neutralizing free radicals in the human body. The essential oil of the blueberry has antibacterial and anti-inflammatory effects.

Factors affecting the chemical composition of the plant include:

Climate and growing conditions;

Phenological stage of the plant;

Drying and storage methods;

Extraction and analysis technology.

These results are consistent with previously published works (Raal, 2022; Begmatova, 2024) and once again confirm the need for a comprehensive study of the bioactive composition of plants.

Conclusion

The main groups of biologically active chemicals in plants are flavonoids, phenols, essential oils and vitamins.

The highest amounts of flavonoid and phenolic compounds were recorded in peppermint (Mentha piperita) samples.

Chromatographic (HPLC, GC-MS) and spectrophotometric methods are the most effective methods for analyzing the chemical composition of plants.

The results serve as an important scientific basis for the development of natural antioxidants, biological additives and pharmaceutical preparations.

In the future, it is advisable to expand the scope of analysis and study the pharmacological properties of individual components isolated from plants.

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SURUNKALI RINOSINUSIT BILAN KASALLANGAN BEMORLARNING MIKROBIOLOGIK KO'RINISHI VA ULARNING DORILARDAN TA'SIRCHANLIGI

Anotatsiya: *Surunkali rinosinusit (SRS) yuqori nafas yo‘llarining keng tarqalgan va bemorlarning hayot sifatiga salbiy ta’sir ko‘rsatuvchi jiddiy tibbiy-ijtimoiy muammolardan biridir. Ushbu kasallik uzoq davom etuvchi yallig‘lanish jarayoni, sinuslardan oqindi, burun bitishi, hid bilishning pasayishi va yuz sohasidagi og‘riqlar bilan tavsiflanadi. SRS etiopatogenezida turli mikroorganizmlarning, jumladan, bakteriyalar va zamburug‘larning o‘rni muhim ahamiyat kasb etadi. Ushbu tadqiqotning asosiy maqsadi surunkali rinosinusit bilan kasallangan bemorlarda burun bo‘shlig‘ining mikrobiologik peyzajini aniqlash hamda aniqlangan patogen va shartli patogen mikroorganizmlarning asosiy antibiotik va antifungal dori vositalariga nisbatan sezgirligini o‘rganishdan iborat bo‘ldi. Tadqiqot Samarqand tibbiyot universiteti(SamDTU) ko‘p tarmoqli klinikasining otolaringologiya bo‘limida surunkali rinosinusit tashxisi qo‘yilgan 18 nafar bemor ishtirokida amalga oshirildi. Bemorlardan burun bo‘shlig‘idan olingan surtma namunalarida bakteriologik va mikologik tekshiruvlar o‘tkazildi. Natijalar shuni ko‘rsatdiki, tadqiqotga jalb etilgan bemorlarning aksariyatida (84%) burun bo‘shlig‘i mikroflorasi shartli patogen mikroorganizmlar bilan ifodalangan. Eng ko‘p tarqalgan mikroorganizmlar orasida Staphylococcus aureus (24%), boshqa stafilokokklar (S. intermedius, S. epidermidis, S. felis) (24%), Enterobacteriaceae oilasiga mansub bakteriyalar (19%), Pseudomonas aeruginosa (8%) va zamburug‘lar (Candida spp., Aspergillus spp.) (4%) aniqlandi. Dori vositalariga sezgirlikni o‘rganish jarayonida antifungal preparatlardan Itrakonazolga sezgirlikning umuman aniqlanmaganligi (0%) diqqatga sazovordir. Ushbu natijalar SRS ni to‘g‘ri va samarali davolash uchun aniq mikrobiologik ma’lumotlarning zarurligini yana bir bor tasdiqlaydi va bemorlarga individual yondashuvni talab qiladi. Bakteriologik va mikologik tekshiruvlarning yuqori aniqligi ularni SRSning birlamchi diagnostikasida va davolash strategiyasini shakllantirishda keng qo‘llashga undaydi.*

***Kalit so'zlar**: surunkali rinosinusit, mikrobiologik peyzaj, burun bo'shlig'i, mikroorganizmlar, dori vositalariga sezgirlik, antibiotiklar, antifungal preparatlar, patogenlar, shartli patogenlar.*

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MICROBIOLOGICAL LANDSCAPE AND DRUG SENSITIVITY OF PATIENTS WITH CHRONIC RHINOSINUSITIS.

***Abstract:** Chronic rhinosinusitis (CRS) is one of the widespread diseases of the upper respiratory tract, significantly impacting patients' quality of life and posing a serious medico-social problem. This condition is characterized by a prolonged inflammatory process, sinus discharge, nasal congestion, reduced sense of smell, and facial pain. Various microorganisms, including bacteria and fungi, play a crucial role in the etiopathogenesis of CRS. The main objective of this study was to determine the microbiological landscape of the nasal cavity in patients with chronic rhinosinusitis and to investigate the sensitivity of identified pathogenic and opportunistic microorganisms to key antibiotic and antifungal medications. The study was conducted with 18 patients diagnosed with chronic rhinosinusitis at the otolaryngology department of the multi-profile clinic of Samarkand State Medical University (SamSMU). Bacteriological and mycological examinations were performed on swab samples taken from the nasal cavity of the patients. The results indicated that in the majority of patients involved in the study (84%), the nasal cavity microflora was represented by opportunistic microorganisms. Among the most prevalent microorganisms identified were Staphylococcus aureus (24%), other staphylococci (S. intermedius, S. epidermidis, S. felis) (24%), bacteria belonging to the Enterobacteriaceae family (19%), Pseudomonas aeruginosa (8%), and fungi (Candida spp., Aspergillus spp.) (4%). Notably, during the investigation of drug sensitivity, complete absence of sensitivity (0%) was observed towards antifungal agents like Itraconazole. These findings once again confirm the necessity of precise microbiological data for accurate and effective treatment of CRS, demanding an individualized approach to patients. The high accuracy of bacteriological and mycological examinations encourages their widespread use in the primary diagnosis of CRS and in shaping treatment strategies.*

***Keywords:** chronic rhinosinusitis, microbiological landscape, nasal cavity, microorganisms, drug sensitivity, antibiotics, antifungal drugs, pathogens, opportunistic pathogens.*

Kirish

Surunkali rinosinusit (SRS) yuqori nafas yo‘llarining keng tarqalgan va bemorlarning hayot sifatiga sezilarli darajada salbiy ta’sir ko‘rsatuvchi jiddiy tibbiy-ijtimoiy muammolardan biridir. Bu holat burun shilliq qavatining va burun yondosh bo‘shliqlarining surunkali yallig‘lanishi bilan kechadi, bu esa klinik jihatdan burun bitishi, burun oqishi, hid bilishning pasayishi, yuz sohasida og‘riq yoki bosim hissi kabi belgilarning kamida 12 hafta davom etishi bilan namoyon bo‘ladi (Lopatin A.S., 2018; Xasanov U.S., 2018; Nikolaeva S.V., 2020). SRS ning global tarqalish darajasi yuqori bo‘lib, Yevropa va Amerika Qo‘shma Shtatlarida aholining 10,9–17,4% gacha qismini qamrab oladi (Beule A., 2015; Soler Z.M., 2016). EPOS 2020 (The European Position Paper on Rhinosinusitis and Nasal Polyps) hisobotiga ko‘ra, Yevropada SRS ning o‘rtacha tarqalishi 15,5% ni tashkil etadi (Fokkens W.J., 2020). Rossiya va boshqa davlatlarda ham ushbu ko‘rsatkichlar keng doirada (5-15%) o‘zgarib turadi, bu esa tadqiqot dizayni, bemorlar yoshi, tadqiqot usullari va mintaqaviy omillarga bog‘liq bo‘lishi mumkin (Shamkina P.A., 2019). O‘zbekistonda ham SRS keng tarqalgan kasalliklar guruhiga kiradi, ayniqsa, ekologik jihatdan murakkab bo‘lgan hududlarda, masalan, Janubiy Orol bo‘yida, ushbu ko‘rsatkichlar yuqoriroq kuzatilgan (Shamsiev D.F., 2009; Djabbarov K.J., 2012; Matkarimov M.Yu., 2014; Xasanov U.S., 2018.).SRS ni davolash ko‘pincha qiyinchiliklarga uchraydi, chunki kasallikning rivojlanishida ko‘plab omillar, jumladan, virusli infeksiyalar, bakterial va zamburug‘li kolonizatsiya, allergik reaksiyalar, immun tizimining holati va anatomik o‘zgarishlar ishtirok etadi. Ayniqsa, burun bo‘shlig‘idagi mikroorganizmlarning dinamikasi va ularning aniq turlarini aniqlash, shuningdek, ularning antibiotiklar va antifungal vositalarga nisbatan sezgirligini baholash, kasallikni samarali boshqarish va davolash rejasini tuzishda hal qiluvchi ahamiyatga ega. Ko‘pgina hollarda SRS ning davom etishi va qaytalanishiga sabab bo‘ladigan asosiy omillardan biri bu noto‘g‘ri yoki nomuvofiq mikrobiotsenozning mavjudligi va antibiotiklarga chidamlilikning rivojlanishidir. Shuning uchun, bu tadqiqot surunkali rinosinusit bilan kasallangan bemorlarda burun bo‘shlig‘ining mikrobiologik ko‘rinishini aniqlash va aniqlangan mikroorganizmlarning asosiy dori vositalariga nisbatan sezgirligini o‘rganishga qaratilgan bo‘lib, bu davolash samaradorligini oshirishga va bemorlar hayot sifatini yaxshilashga qaratilgan muhim qadam bo‘lib xizmat qiladi.

Tadqiqotning maqsadi

Surunkali rinosinusit bilan kasallangan bemorlarda burun bo‘shlig‘ining mikrobiologik peyzajini aniqlash hamda aniqlangan patogen va shartli patogen mikroorganizmlarning asosiy antibiotik va antifungal dori vositalariga nisbatan sezgirligini o‘rganish orqali ularning davolash samaradorligini oshirish va maqsadga muvofiq davolash strategiyalarini ishlab chiqish uchun zarur bo‘lgan ilmiy-amaliy asosni yaratish.

Materiallar va tadqiqot usullari

Tadqiqot Samarqand tibbiyot universiteti(SamDTU) ko‘p tarmoqli klinikasining otolaringologiya bo‘limiga surunkali rinosinusit (SRS) tashxisi bilan

murojaat qilgan va tegishli diagnostik mezonlarga javob bergan 18 nafar bemor ishtirokida o‘tkazildi. Tadqiqotda ishtirok etishdan oldin barcha bemorlardan yozma ravishda rozilik olindi.Bemorlardan burun bo‘shlig‘ining oldingi qismidan steril tampon yordamida surtma namunalari olindi. Namunalarni olishda aseptika va antiseptika qoidalariga qat'iy rioya qilindi. Olingan biomateriallar laboratoriyaga tezkor ravishda yetkazildi va standart mikrobiologik usullar yordamida tekshiruvdan o‘tkazildi.Bakteriologik tekshiruvlar uchun namunalardan Lyapichev qonli-agar muhiti, Agar-agar muhiti, Endo muhiti kabi boyitilgan va differensial-diagnostik muhitlarga ekildi. Agar muhitlarda mikroorganizmlar o‘sishi kuzatilgandan so‘ng, ularning koloniyalari morfologiyasi, Gram bo‘yicha bo‘yalishi va biokimyoviy xususiyatlari asosida dastlabki identifikatsiya qilindi. Zamonaviy molekulyar-genetik usullar yoki mass-spektrometriya kabi usullar mavjud bo‘lmagan sharoitda, klassik mikrobiologik usullar qo‘llanildi.Zamburug‘larni aniqlash uchun namunalardan Saburo muhitiga ekish amalga oshirildi va keyinchalik mikroskopik tekshiruvlar hamda zamburug‘larning morfologik xususiyatlari asosida aniqlandi.Aniqlangan mikroorganizmlarning dori vositalariga (antibiotiklar va antifungal preparatlar) sezgirligini aniqlash uchun disk-diffuziya usuli keng qo‘llanildi. Ushbu usul yordamida turli konsentratsiyadagi antibiotik va antifungal dorilarning diskalari mikroorganizmlar bilan qoplangan muhitga joylashtirildi va ma'lum muddat inkubatsiya qilindi. Dorilar atrofida hosil bo‘lgan ingibitsiya zonasi o‘lchami asosida mikroorganizmlarning ushbu doriga sezgirligi (sezgir, o‘rtacha sezgir, chidamsiz) aniqlandi.

Olingan natijalar tadqiqot jarayonida surunkali rinosinusit bilan kasallangan 18 nafar bemorning burun bo‘shlig‘idan olingan namunalarda mikroorganizmlarning quyidagi taqsimlanishi aniqlandi.

Umumiy mikrobiologik ko‘rinish: Aniqlangan mikroorganizmlarning 84%ishartli patogen mikroorganizmlar hisoblandi, bu esa burun bo‘shlig‘ida normal sharoitda mavjud bo‘lgan floraning o‘zgarishini va patologik jarayonlarda ularning faollashuvini ko‘rsatadi. Bakterial flora: Staphylococcus aureus: 24% hollarda aniqlandi. Bu mikroorganizmlar ko‘plab shamollash va yallig‘lanish jarayonlarining asosiy qo‘zg‘atuvchilaridan biri hisoblanadi. Boshqa stafilokokklar (Staphylococcus intermedius, Staphylococcus epidermidis, Staphylococcus felis): 24% hollarda qayd etildi. Ushbu turlar ham ko‘pincha shartli patogen bo‘lib, immunitet pasayganda yoki boshqa faktorlar ta'sirida yallig‘lanishni keltirib chiqarishi mumkin. Enterobacteriaceae oilasiga mansub bakteriyalar (Citrobacter freundii, Citrobacter diversus, Serratia liquefaciens, Serratia marcescens, Enterobacter cloacae, Enterobacter aerogenes, Proteus vulgaris): 19% hollarda aniqlandi. Bu oilaning vakillari ham turli yallig‘lanish jarayonlarida faol ishtirok etadi. Klebsiella oxytoca: 5% Pseudomonas aeruginosa: 8% hollarda aniqlandi. Bu opportunistik patogen bo‘lib, ayniqsa shifoxona ichidagi infeksiyalarda va immuniteti zaiflashgan shaxslarda jiddiy muammolarni keltirib chiqarishi mumkin. Enterococcus faecalis: 5% Acinetobacter (fermentlanmaydigan bakteriyalar): 1% Streptokokklar

(Streptococcus pneumoniae, Streptococcus uberis, Streptococcus milleri): 6% hollarda aniqlandi. Streptococcus pneumoniae ayniqsa pnevmoniya va sinusitning keng tarqalgan sababchisi hisoblanadi.Zamburug‘lar: Candida albicans, Candida krusei, Candida glabrata, Aspergillus niger: 4% hollarda aniqlandi. Zamburug‘larning mavjudligi, ayniqsa antibiotiklar bilan uzoq muddatli davolashdan keyin, qo‘shma (bakterial-gribkoviy) infeksiyaning rivojlanish ehtimolini oshiradi. Antifungal vositalarga sezgirlik: Aniqlangan zamburug‘larning quyidagi antifungal preparatlarga nisbatan sezgirligi o‘rganildi:

Amfoteritsin B ga nisbatan sezgirlik: 31%

Ketokonazolga nisbatan sezgirlik: 15%

Itrakonazolga nisbatan sezgirlik: 0%. Bu shuni ko‘rsatadiki, tadqiqotda qatnashgan bemorlarda aniqlangan zamburug‘lar Itrakonazolga nisbatan chidamlilikni shakllantirgan.

Klotrimazolga nisbatan sezgirlik: 31%

Nistatinga nisbatan sezgirlik: 22%

Flukonazolga nisbatan sezgirlik: 23%

5.Muhokama: surunkali rinosinusit (SRS) ning etiopatogenezida mikroorganizmlar, ayniqsa burun bo‘shlig‘i mikroflorasi muhim rol o‘ynaydi. Ushbu tadqiqot natijalari ko‘rsatdiki, bemorlarning aksariyatida (84%) aniqlangan mikroorganizmlar shartli patogenlar bo‘lib, ular normal sharoitda zararli bo‘lmasalar-da, immunitet susayganda, shilliq qavatning himoya mexanizmlari buzilganda yoki boshqa yallig‘lanish omillari ta'sirida patogen xususiyatlarini namoyon etadi. Staphylococcus aureus va Streptococcus pneumoniae kabi patogen bakteriyalarning yuqori darajada aniqlanishi, ularning SRS rivojlanishidagi asosiy rolini tasdiqlaydi. Shuningdek, Pseudomonas aeruginosa ning mavjudligi, ayniqsa, surunkali va takrorlanuvchi infeksiyalarda, davolashning murakkablashuviga olib kelishi mumkin.

Antifungal preparatlarga sezgirlikni o‘rganishda Itrakonazolga nisbatan 0% sezgirlikning qayd etilishi alohida e'tiborga loyiqdir. Bu shuni anglatadiki, tadqiqot davridagi bemorlarda aniqlangan zamburug‘lar ko‘pincha Itrakonazolga chidamlilikni namoyon etadi. Bu holat, bemorlarni Itrakonazol bilan davolashda uning samaradorligi past bo‘lishi mumkinligini va boshqa antifungal vositalarga afzallik berish zaruriyatini ko‘rsatadi. boshqa antifungal vositalarga bo'lgan sezgirlikning har xil darajada bo'lishi, ularning samaradorligini baholash va eng mosini tanlash muhimligini ta'kidlaydi.Mavjud adabiyotlar shuni ko‘rsatadiki, ko'p hollarda SRS ning davom etishi yoki takrorlanishi ko'p omilli bo'lib, u nafaqat bakterial, balki zamburug'li kolonizatsiya, biofilmlarning hosil bo'lishi va organizmning mahalliy hamda umumiy immunitetining holati bilan bog'liq. Shuning uchun, burun bo‘shlig‘ining mikrobiologik landshaftini chuqur o‘rganish, turli mikroorganizmlarning o‘zaro ta'sirini hisobga olish va ularga mos, keng ko‘lamli (agar zarur bo‘lsa) yoki maqsadli (bakteriyalarga va/yoki zamburug‘larga qarshi) davolashni tanlash muhimdir.Bakteriologik va mikologik tekshiruvlar, shuningdek, dori vositalariga sezgirlikni aniqlash usullari, hatto klassik usullar bo‘lsa ham, SRS ni aniqlash va davolashda juda muhimdir. Bu usullar

shifokorlarga aniq qo‘zg‘atuvchini aniqlash va unga eng samarali ta'sir ko‘rsatadigan dorini tanlash imkonini beradi. Bu, o‘z navbatida, davolash muddatini qisqartirishga, dori vositalariga chidamlilikning rivojlanishini kamaytirishga va bemorlarning umumiy ahvolini yaxshilashga yordam beradi. Natijalar tahlili shuni ko‘rsatadiki, SRSni to'g'ri davolash rejasini tuzishda, ayniqsa, antibiotiklarga chidamlilik va antifungal preparatlarning samaradorligi haqidagi ma'lumotlar juda katta ahamiyatga ega. Bu izlanish ushbu yo‘nalishda kelgusi tadqiqotlar olib borish uchun mustahkam zamin yaratadi.

Xulosa

Surunkali rinosinusit bilan kasallangan bemorlarning burun bo‘shlig‘ida asosan shartli patogen mikroorganizmlar, jumladan Staphylococcus aureus, boshqa stafilokokklar, Enterobacteriaceae oilasi a’zolari, Pseudomonas aeruginosa hamda ayrim zamburug‘lar (Candida spp.) aniqlandi. Bu, ayniqsa, immunitetning susaygan sharoitlarda yoki himoya mexanizmlari buzilganda, yallig‘lanish jarayonining faollashishiga olib keladi. O‘rganilgan antifungal preparatlardan Itrakonazolga nisbatan aniqlangan zamburug‘larning sezgirligi nol foizni tashkil etdi, bu esa ushbu preparatning SRS da kam samarali bo‘lishi mumkinligini va bemorlarni davolashda boshqa antifungal vositalarni tanlash yoki ushbu preparatni qo‘llashda ehtiyotkorlik qilish zarurligini ko‘rsatadi. Bakteriologik va mikologik tekshiruv usullari, shuningdek, aniqlangan mikroorganizmlarning dori vositalariga sezgirligini baholash usullari surunkali rinosinusitni birlamchi diagnostikasida va maqsadli davolash strategiyasini shakllantirishda yuqori aniqlik va amaliy ahamiyatga ega. Bu usullarni keng qo‘llash davolash samaradorligini oshirishga va antibiotiklarga chidamlilik rivojlanishining oldini olishga yordam beradi. Bu tadqiqot SRS ni to‘g‘ri davolash rejasini tuzishga va bemorlar sog‘ligini tiklashga hissa qo‘shadi.

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ANALYSIS OF PRODUCTION FACTORS AND WAYS TO SOLVE THEM

Abstract: *Modern production is one of the complex processes of turning raw materials, materials, semi-finished products and other production objects into finished products that meet the needs of society. At the same time, it is the sum of all the actions of workers and production tools for the production of certain types of products. The main part of the production process is the technological process, which includes actions aimed at changing and clarifying the condition of the objects of production.*

Key words. *Ceramics production enterprise, cocktail conditions, workplace, dust, chemical factors, noise, lighting, microclimate indicators, physical exposure, background, contrast.*

Complex factors affect the body of workers in a ceramic production enterprise: dust, chemical factors, poor microclimate conditions, noise, vibration, the weight of the environment, physical fatigue. The purpose of our scientific work is to develop a complex healthy working environment aimed at increasing the working ability of workers at a ceramic production enterprise and improving the work process and reducing morbidity.[1.,2,3,4]

The President of the Republic of Uzbekistan, Shavkat Mirziyoyev, emphasized strengthening the microeconomic stability of the Republic of Uzbekistan, deepening the modernization and diversification of the structural reforms of the Republic of Uzbekistan. Our country, first of all, reforming our economy, developing production, liberalizing and modernizing it, as well as diversifying its structural structure, is a strong force that protects us from the negative impact of disputes and other threats. is a reliable means of protection. Problems of health promotion and labor protection among workers in production include medical, social, economic, legal and other aspects. Harmful and dangerous working conditions cause medical, social and economic damage, high-level occupational diseases, reducing the ability to work, is considered one of the main tasks of the working doctor and the health care system. Protection and strengthening of workers' health is related to the economic growth of the state, especially among the labor force contingent [1,3]. That's why there is a special effort in the public policy[5,6,7,8,]

Hygienic assessment of working conditions, assessment of safe work experience under the influence of harmful factors, establishment of periodicity of medical treatment, payment of compensation and benefits for harmful working conditions, modernization of technological processes and equipment. A ceramic production enterprise is characterized by unhealthy working conditions that affect the health of workers and the work activities of workers. [7,8,9] The production

conditions of the ceramic products factory depend to a small extent on the organization of the production process in hot climate conditions. It is mainly characterized by meteorological and dust factors that shed light on hygienic issues. Our research worker is focused on improving the working conditions in the enterprise.

Research results

Kaolin and clay are the raw materials for the production of Solol products. They are pure shako, often - with additives. Kaolin and clay are hydrous aluminosilicates with various mixtures, which turn into a stone-like state when combined with water. Clay is the basis of any ceramic product. The clay dough should be uniform in texture, without lamination and air bubbles, evenly mixed with additives, moistened, and able to form a nest or ub with slight pressure. It should be easy to connect separate parts that do not stick to the mixed ashes. There are several ways to make a clay pot. One of them is as follows: a large amount of water is added to the dried and crushed clay, it is transferred through a sieve into a clean container and the clay sinks to the bottom of the water. Then excess water is removed by evaporation or pumping. Before molding, the clay mass is additionally processed, that is, air bubbles are removed from it and it is given a uniform structure. The clay is stored in wet conditions in closed places until the treated clay is used. This allows you to keep the shape of the clay during the production process, while improving the flexibility and plasticity. Freshly prepared mud is often mixed with previously mixed mud, as this condition increases its bacterial activity and improves its quality. The next process is the molding process, in the molding of ceramic products, the clay mass is placed in the molds and treated with soft water, then dried and sent to the ash processing workshop.

Glazing process: glazed alloys melted on a piece of ceramic with a thickness of 0.12-0.40 m. This process is used to cover the ceramic product with a dense and smooth layer, to give the product durability and attractive appearance, to guarantee dielectric properties and to protect the decoration from mechanical and chemical influences. is used. The composition of the glaze includes crushed zircon, boron, belila. The finished glaze is placed in containers and passed through sieves several times to remove additional particles. Glue and glaze are added to the mixture and sent to the next stage. Semi-finished products are sent to the oven for baking. The oven is equipped with a pre-drying module, dust removal and blowing chambers. Heat treatment is carried out at a temperature of 1230 °, the length of the furnace is about 89 meters. The cycle from loading the trolley to cooking takes about one and a half days. Baking of products in the oven is done during the day. After the fire, sorting is carried out: similar products are divided into groups, and those with defects are placed in separate containers for recycling. 80-90% of the working time is spent on the main work during the working day in the enterprise under study. In the production environment, adverse microclimate, dustiness, gassiness, noise, vibration, the weight and tension of the cocktail are considered as critical factors.

Dust from raw materials is one of the professional factors in a ceramic products manufacturing enterprise. The dust factor is characterized by high dispersion and its size is 2-10 μm or more. This indicator was analyzed at the workplaces of grinders and pulverizers in the preparation workshop. It was determined that the amount of dust in the workplace contains SiO2 and that it is 70% in the dust content. The amount of dust in the workshop was 91 mg/m2, which is 2.3 times higher than the norm (REM-4 mg/m2). It was determined that the amount of dust in front of the heating furnaces in the enterprise and in the workplaces of artists was slightly higher than REM.

Ceramic beads are used to decorate ceramics. This paint includes lead, quartz, boron oxide, aluminum oxide. These dyes are finely dispersed chemicals with a size of -8-15 μm in powder form. In the process of sprinkling ceramic paints with a pneumatic sprayer, it was determined that the lead aerosols in the breathing zone of the artist increased by 3 March from REM.

In the process of drying and baking ceramics, the average concentration of carbon dioxide in the working areas of ceramic kilns was 26.3 ‡ 0.11 mg/m, which was 1.3 times higher than the norm. It was determined that the amount of carbon monoxide did not exceed the norm in the other workplaces, that is, in the process of drying products. The amount of carbon monoxide in the air of the workplace was determined to be 26.35‡0.11 mg/m, i.e. 6.35 mg/m, higher than that of meteorites.

In the process of decorating ceramics in the drawing workshop, it was determined that the concentration of chemical substances exceeded the REM: lead aerosols in the workplaces of artists were 0.018 mg/m *ag, i.e., 82, turpentine amount was 196 mg/m, i.e., 10.6, It was determined that cobalt oxide increased by 0.045 mg/m' ag, i.e. 19 times, in workplaces. In the process of drying the slip, a carbon monoxide level of 85 mg/m2 was observed.

One of the main hygienic characteristics is a warming microclimate. The results of our investigation showed that the microclimate conditions in the sheds were established in the summer and winter conditions of ms/in. It was found that the microclimate parameters do not meet the hygienic standards even in the cold period of the year. Thus, in the warm period of the year, it was determined that the air coming to the shop from the ventilation system was ineffective, and the microclimate indicators also depended on external environmental factors. The noise of the next stacking factors is the result of the operation of molding spindles and gas burners. The noise indicators are 97,787.7‡0.71dBA (RED-80dBA) in the wet areas of grinders-pulverizers, 85.1‡0.61dBA (RED-80dBA) in the molding workshop, 83,940.68 (RED-80dBA) in the work areas of bakers, in the wet areas of airbrushes and it was determined to be equal to 84.3‡0.1 1(RED- 80dBA). The spectral structure of Shovkin was observed to be higher by 2-16 dB at frequencies from 250 Hz to 8000 Hz. Another factor that negatively affects the health of workers is lack of lighting. The lighting in the ceramics production enterprise is mixed, and natural lighting is transmitted from the side through window panes. Artificial lighting is provided by fluorescent lamps. It was determined that the

lighting in the workplaces is 20-40 Lk lower than the norm in the workplaces of molders, sorters, artists (RED-200Lk). Natural lighting is below standard in the workplaces of moulders, presses and sorters, and meets the requirements of KMK, 2.01.05-98 "Natural and artificial lighting" in the workplaces of grinders, pulverizers and dryers. In the enterprise, it is required to attend the performance analyzer of some professions. The work activity of the artists is one-shift work and is included in the first class of high precision work. The smallest size of the object is 0.3-0.5 m, the background is light, the contrast is medium or large depending on the color. .[5,6,7,11] The intensity of lighting in workplaces was equal to 12.0% during the working day, and it was found to be 03.0% lower at the time of inspection. Thus, workplaces in the enterprise are characterized by high temperature, high dustiness characterized by the storage of chemical substances, and low lighting that does not meet hygienic standards.[10,11]

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SPECIFIC CHARACTERISTICS AND DIFFERENCES OF THE IMMUNE STATUS OF PREGNANT AND LACTATING WOMEN

Abstract: *This article describes the peculiarities of the immune status of pregnant and lactating women. Their different aspects are compared. The use of drugs that enhance the immune status of pregnant and lactating women. Their positive and negative aspects are discussed.*

Key words: *immune status, pregnant and lactating women, immunomodulating drugs.*

Introduction

In the Uzbekistan alone, there are approximately 0.25 million people affected by autoimmune diseases such as systematic lupus erythematosus, rheumatoid arthritis, and inflammatory bowel disease. Once considered chronically debilitating, these disorders can now be managed successfully using a variety of immunomodulating drugs, defined in this document as agents that inhibit or modulate the immune response. Because autoimmune conditions occur more often among women of childbearing age, continuation of these medications during pregnancy is often considered to optimize disease management in the woman and pregnancy outcomes, without placing the fetus at undue risk. Emerging safety and efficacy data regarding the use of these medications during pregnancy and lactation can be used to counsel women with autoimmune disease who are pregnant or contemplating pregnancy.

Because autoimmune conditions occur more often among women of childbearing age, continuation of these medications during pregnancy is often considered to optimize disease management in the woman and pregnancy outcomes, without placing the fetus at undue risk. Many commonly prescribed drugs can be used safely during pregnancy, without risk of teratogenicity or pregnancy complications, whereas a few are strictly contraindicated. The decision to use any agent during pregnancy should be based on the clinical context, risks associated with individual medications, and gestational age. For immunomodulators considered appropriate to use during pregnancy, the common clinical practice of stopping use at approximately 32 weeks of gestation because of theoretic concerns regarding the immune system of the fetus is not supported by currently available data. Low-risk medications typically are continued in pregnancy, or initiated during pregnancy as needed, because the benefits of therapy and disease control far outweigh any theoretic risks associated with the medication. Use or initiation of medications with intermediate risk or little or no

data during pregnancy or lactation (or both) should be individualized. High-risk medications are typically not continued or initiated in pregnancy. However, it is critical that counseling occur, ideally in the prepregnancy and interpregnancy periods, to review the individual risks and benefits as they relate to disease management and pregnancy-associated risks with high-risk medication. There may be select circumstances when continued treatment is the safest option. In general, immunomodulating drugs that are not contraindicated in pregnancy are compatible with breastfeeding

Prepregnancy Considerations: Congenital Malformations and Pregnancy Complications

Many commonly prescribed drugs can be used safely during pregnancy, without risk of teratogenicity or pregnancy complications, whereas a few are strictly contraindicated. Still others have not been sufficiently studied during pregnancy. The decision to use any agent during pregnancy should be based on the clinical context, risks associated with individual medications, and gestational age. In addition, counseling should include the prepregnancy and interpregnancy periods for treatment planning because many of these medications have long half-lives.

In general, these medications can be considered in four categories: 1) low risk in pregnancy, 2) low risk emerging therapies with developing evidence for use during pregnancy, 3) intermediate risk with little or no existing data on use in pregnancy, and 4) high-risk medications generally contraindicated in pregnancy. For immunomodulators considered appropriate to use during pregnancy, the common clinical practice of stopping use at approximately 32 weeks of gestation because of theoretic concerns regarding the immune system of the fetus is not supported by currently available data.

Low-risk medications typically are continued in pregnancy, or initiated during pregnancy as needed, because the benefits of therapy and disease control far outweigh any theoretic risks associated with the medication.

Glucocorticoids

Glucocorticoid preparations are commonly given during pregnancy, both as maintenance therapy and in short “bursts” to treat disease exacerbation. Oral corticosteroids, such as prednisone, prednisolone, or methylprednisolone, are recommended during pregnancy because of their conversion to relatively inactive forms by the abundance of 11β-hydroxysteroid dehydrogenase found in the human placenta. Long-term glucocorticoid treatment during pregnancy may increase the risk of hypertension, preeclampsia, weight gain, hyperglycemia, immunosuppression, gastrointestinal ulceration, prelabor rupture of membranes (also referred to as premature rupture of membranes), and intrauterine growth restriction, but if these risks exist the magnitude is not known. Early data suggested that first trimester exposure to glucocorticoids may be associated with an increased risk of fetal oral clefts, but more recent data have failed to demonstrate an association.

Aminosalicylates

Sulfasalazine, a combination of salicylate and a sulfa antibiotic, is used most commonly during pregnancy to treat inflammatory bowel disease. Although both sulfasalazine and its metabolite, sulfapyridine, cross the placenta, teratogenic effects have not been demonstrated. Sulfasalazine inhibits dihydrofolate reductase. Whether the addition of folic acid supplementation is important among women taking

sulfasalazine is not known and is not part of any current clinical recommendations.

Azathioprine

Azathioprine is a derivative of mercaptopurine, which blocks DNA replication and inhibits purine synthesis. Azathioprine is used to treat several autoimmune conditions and recipients of organ or tissue transplants. Existing data do not demonstrate azathioprine is a teratogen , although a few reports suggest an increased risk of preterm birth and fetal growth restriction when azathioprine is continued during pregnancy.

Cyclosporine A

Cyclosporine A works by inhibition of production and release of interleukin II and inhibition of interleukin II activation of resting T lymphocytes. Limited data suggest no teratogenic effect of cyclosporine A use during pregnancy, although increased risks of preterm birth and growth restriction have been reported. Ophthalmic cyclosporine A does not produce detectable amounts of drug in the serum and is not expected to confer any fetal risk.

Hydroxychloroquine

Hydroxychloroquine is an antimalarial drug with antiinflammatory effects and often is used for maintenance therapy for autoimmune conditions. Although its mechanism of action is unclear, multiple studies have demonstrated no evidence of teratogenicity. Importantly, hydroxychloroquine may be more effective than glucocorticoids in disease flare prevention during pregnancy and should be continued in patients using this therapy.

Low-Risk Emerging Therapies with Developing Evidence

Newer classes of immunomodulating medications are being used in clinical practice because of their highly effective disease-modifying effects. The data regarding safety of these medications are emerging, but currently available data would suggest that they are low risk to continue or initiate in pregnancy.

Tumor Necrosis Factor-α Inhibitors

Several tumor necrosis factor-α (TNF-α) inhibitor drugs are currently used as maintenance medications for autoimmune disease, including infliximab, etanercept, adalimumab, certolizumab, and golimumab. Inhibition of TNF-α results in an increase in circulating T regulatory cells and a restored capacity to inhibit cytokine production. With the exception of certolizumab, all TNF-α inhibitors are transferred across the placenta. Placental transfer of certolizumab does not occur because it lacks an Fc portion required for active transport.

Initial reports of an association between TNF-α inhibitors and fetal

VACTERL (Vertebral anomalies, Anal atresia, Cardiac defects, Tracheoesophageal fistula,

Esophageal atresia, Renal anomalies, and Limb dysplasia) syndrome have not been confirmed in subsequent large observational trial.

No relationship between preterm birth and TNF-α inhibitor use during pregnancy was identified in one retrospective, multicenter cohort study of women with inflammatory bowel disease that compared pregnancy outcomes in 318 untreated patients, 187 patients taking azathioprine, and 66 patients taking TNF-α inhibitors (adjusted odds ratio [aOR], 1.6; 95% CI, 0.9–2.8). Azathioprine exposure appeared to be protective when outcomes were compared between treated and untreated women (aOR, 0.6; 95% CI, 0.4–0.9). In contrast, the risk of preterm birth was found to be higher in a prospective observational cohort study of women exposed to one of five available TNF-α inhibitors during at least the first trimester (aOR, 1.6; 95% CI, 1.1–2.5).

Medications with Indeterminate-Risk or Little or No Data

Use or initiation of medications with intermediate risk or little or no data during pregnancy or lactation (or both) should be individualized. Active maternal disease often presents the greatest risk, and the small known or theoretic risks of a medication are outweighed by the need for treatment.

Cyclophosphamide

Cyclophosphamide is converted by the liver into phosphoramide mustard, which is an alkylating agent that inactivates DNA. Cyclophosphamide also has anti- inflammatory effects on the B lymphocytes and T lymphocytes. Older data in animals and humans suggested that use in the first trimester should be avoided because of possible teratogenic effects. No adverse effects of cyclophosphamide use during the second and third trimesters have been reported in observational studies.

Rituximab

Rituximab is a humanized monoclonal antibody targeted at CD20 antigen on B lymphocytes. Safety data of use during pregnancy and the 6 months before pregnancy are limited, although published reports are reassuring. Safety of rituximab during lactation has not been studied.

Belimumab

Belimumab is an inhibitor of B lymphocyte survival as well as B cell conversion to immunoglobulin secreting cells. A single case report of use during pregnancy describes good disease control of systemic lupus erythematosus but mild Ebstein's anomaly in the infant. It is unclear if belimumab is a teratogen based on this case report. Use of belimumab in pregnancy and lactation remains otherwise unstudied.

High-Risk Medications

High-risk medications are typically not continued or initiated in pregnancy. However, it is critical that counseling occur, ideally in the prepregnancy and interpregnancy periods, to review the individual risks and benefits as they relate to disease management and pregnancy-associated risks with high-risk medication.

There may be select circumstances when continued treatment is the safest option.

Methotrexate

Methotrexate is commonly used to provide long-term, maintenance immunosuppression in patients with autoimmune conditions. However, its use during pregnancy is strictly contraindicated because methotrexate has abortogenic and teratogenic effects. Although there are not published reports of methotrexate-related birth defects when pregnancy is not delayed, expert opinion suggests that women delay pregnancy for 1–3 months after discontinuation of methotrexate because methotrexate may persist for up to 4 months in the liver.

Mycophenolate

Mycophenolate is frequently used as maintenance therapy in patients with lupus nephritis. It works by inhibition of purine biosynthesis. Like methotrexate, mycophenolate is abortogenic and teratogenic, having been associated with cleft lip and palate, micrognathia, microtia, and auditory canal abnormalities . Expert opinion suggests pregnancy should be delayed 6 weeks after discontinuing mycophenolate .

Leflunomide

Leflunomide works by inhibition of dihydroorotate dehydrogenase, an enzyme necessary for pyrimidine biosynthesis. It is routinely used to treat inflammatory arthritis and lupus-related skin manifestations. However, it should not be used during pregnancy because of its teratogenic effects, after reports of associated facial malformations. The metabolite of leflunomide (teriflunomide) remains detectable as long as 2 years after drug discontinuation.

Breastfeeding and Infant Considerations

The amount of medication transmitted into breast milk and the potential effect on the neonate are important considerations when the use of immunomodulating drugs is being considered for women who are lactating. In general, immunomodulating drugs that are not contraindicated in pregnancy are compatible with breastfeeding. A multicenter prospective cohort study of breastfeeding women who received immunomodulating therapies for inflammatory bowel disease demonstrated low drug concentrations in breast milk and no evidence of increased risk of infection or adverse neurodevelopment in the infant. Although some expert opinions recommend limiting exposure to these medications during lactation, data to support that practice are limited. Given the evolving information on these

medications, health care providers are encouraged to use LactMed to find the most up-to-date information for counseling.

Evidence for Presence in Breast Milk

Data describing the amount of immunomodulators that are detectable in breast milk are limited to small series and case reports. Based on what is known about pharmacokinetics and breast milk, it is unlikely that these medications are present at any significant level in breast milk, if they are detectable at all. This was demonstrated in a recent prospective multicenter study, with very low drug levels of biologic medications detected in breast milk. Tumor necrosis factor-α inhibitors

are also large molecules, which are likely to be broken down by the infant's gastrointestinal tract.

Infant Effects

There has been concern that infants born to women who received immunomodulating therapies during pregnancy or while breastfeeding might have their immune systems negatively affected. A recent prospective study of 80 women taking TNF-α inhibitors during pregnancy, with or without thiopurines found that the drug was detectable until 12 months of age in some infants . The authors also found an increased risk of infection among the infants born to women who used both therapies (relative risk [RR], 2.7; 95% CI, 1.09–6.78). However, when comparing risk of infection between women taking TNF-α inhibitor monotherapy who discontinued the medication at 30 weeks of gestation with those who did not discontinue the medication, no difference was seen (RR, 0.54; 95% CI, 0.26–1.16). Therefore, the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine recommend that women do not discontinue these medications during pregnancy or breastfeeding.

The effects of immunomodulating drugs on neonatal immunity were evaluated in a prospective study that used a U.S. registry database to identify women treated for inflammatory bowel disease with a variety of agents during pregnancy. No differences in antibody levels to *Haemophilus influenzae* or tetanus toxin were identified in serum collected at age 7 months from exposed and unexposed neonates. In another study of 841 children with a 4-year mean follow-up, children born to women with in utero TNF-α inhibitor exposure were no more likely to experience severe infections than their unexposed peers. A single report on women exposed to rituximab described B-cell lymphocytopenia in the neonates months after birth. This finding has not been confirmed by other studies.

Future Research for Pregnant Women

The established efficacy of immunologic therapies in pregnant women has led to their widespread use, which makes counseling challenging for the obstetric care provider given the paucity of existing data. It is important that pregnant and lactating women be enrolled in studies and registries to support a larger body of literature to guide evidence-based obstetric practice.

Conclusion

Immunomodulating drugs are being used with increasing frequency for a variety of diseases because of their demonstrated efficacy. Many commonly prescribed drugs can be used safely during pregnancy without risk of teratogenicity or pregnancy complications, whereas a few are strictly contraindicated. Importantly, decision making regarding patient plans should be individualized and shared and should include consideration of pregnancy and maternal risks associated with untreated disease. Finally, the body of literature to support evidence-based use of immunomodulating agents in pregnant and lactating women is very limited, and future studies are expected to help inform ongoing clinical guidance.

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O'LKA TABIAT YODGORLIKLARINI O'RGANISH (BUXORO VILOYATI) MISOLIDA

Annotatsiya: *Ushbu ishda o'lka hududidagi tabiat yodgorliklarini o'rganish, ularning tabiiy, tarixiy va ilmiy ahamiyatini aniqlash masalalari yoritilgan. Tabiat yodgorliklarini saqlash, ularni kelajak avlodga yetkazish, shuningdek, ekologik madaniyatni shakllantirishning ahamiyati tahlil qilingan. Tadqiqot davomida o'lkaning noyob geologik tuzilmalari, o'simlik va hayvonot dunyosi, shuningdek, tabiiy landshaftlarning muhofazasi masalalariga alohida e'tibor qaratilgan. Ish natijalari o'lkashunoslik, ekologiya va turizm sohalarida amaliy ahamiyat kasb etadi.*

Kalit so'zlar: *O'lka, yodgorlik, geomorfologik, ekologik, geologik, floristik, faunistik, biologik, ekotizim, landshaft, antropogen, rekreatsion, madaniy-landshaft, geoturizm, monitoring, dinamika, barqaror rivojlanish, konsepsiya, tabiiy resurslar.*

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STUDY OF NATURAL MONUMENTS OF THE REGION (ON THE EXAMPLE OF BUKHARA REGION)

Annotation: *This study explores the natural monuments of the region, highlighting their natural, historical, and scientific significance. The research emphasizes the importance of preserving these monuments, passing them on to future generations, and fostering ecological culture. Special attention is given to the region's unique geological structures, flora and fauna, as well as the protection of natural landscapes. The results of this work have practical importance in the fields of local studies, ecology, and tourism.*

Keywords: *Region, monument, geomorphological, ecological, geological, floristic, faunistic, biological, ecosystem, landscape, anthropogenic, recreational,*

cultural-landscape, geotourism, monitoring, dynamics, sustainable development, concept, natural resources.

Tabiat inson hayotining ajralmas qismi bo‘lib, uning boyliklari, go‘zalligi va xilma-xilligi har bir avlod uchun bebaho meros hisoblanadi. O‘lka hududidagi tabiat yodgorliklari nafaqat tabiiy go‘zallik manbai, balki ilmiy tadqiqotlar, ekologik tarbiya va turizmni rivojlantirishda muhim omil sanaladi. Ularni o‘rganish orqali biz o‘z yurtimizning tabiiy boyliklarini, geologik tuzilishini, o‘simlik va hayvonot dunyosining o‘ziga xosligini chuqurroq anglaymiz. Bugungi kunda tabiat yodgorliklarini muhofaza qilish va ularni kelajak avlodga butun holatda yetkazish insoniyat oldidagi eng dolzarb masalalardan biridir.

O‘lka hududidagi tabiat yodgorliklari tabiiy-geografik, geologik, geomorfologik, biogeografik va ekologik jihatdan alohida ilmiy qimmatga ega obyektlardir. Ular tabiiy jarayonlarning uzoq geologik davrlar davomida shakllangan mahsuli bo‘lib, o‘lkaning tabiiy merosi sifatida katta ahamiyat kasb etadi. Tabiat yodgorliklarini o‘rganish orqali nafaqat landshaftlarning morfostrukturasini, balki biosfera komponentlari o‘rtasidagi o‘zaro ta’sir mexanizmlarini ham tahlil qilish imkoniyati yaratiladi. Geologik yodgorliklar orasida qadimiy tog‘ jinslari kesimlari, karst tizimlari, stalaktitli g‘orlar, vulqon konuslari, shuningdek, paleontologik topilmalar joylashgan stratigrafik kesimlar alohida ahamiyatga ega. Ular Yevrosiyo materigidagi tektonik harakatlar, cho‘kindi jinslarning hosil bo‘lish jarayonlari va paleoiqlim sharoitlarini o‘rganishda muhim ilmiy manba sifatida xizmat qiladi. Biologik (floristik va faunistik) yodgorliklar esa o‘lkaning ekotizimlaridagi bioxilma-xillik darajasini aniqlash, endemik va relikt turlarni saqlash, shuningdek, tabiiy resurslar monitoringi tizimini shakllantirishda muhim rol o‘ynaydi. Ayniqsa, antropogen ta’sirning kuchayishi, urbanizatsiya va iqlim o‘zgarishlari sharoitida tabiiy populyatsiyalarni genetik jihatdan himoyalash zarurati ortib bormoqda.Geomorfologik yodgorliklar (masalan, qoya shakllari, vodiylar, tog‘ tizmalari, daryo terrasalari) hududning relyef dinamikasini, eroziya jarayonlarini va landshaftlarning evolyutsiyasini tahlil qilish uchun asos bo‘lib xizmat qiladi. Shu bilan birga, ular rekreatsion va geoturistik salohiyatni oshirishda, ekologik ta’limni targ‘ib etishda ham katta o‘rin tutadi. Tabiat yodgorliklarini muhofaza qilish tizimi ekologik xavfsizlik konsepsiyasi bilan uzviy bog‘liq bo‘lib, unda davlat, jamoatchilik va ilmiy institutlarning hamkorligi alohida ahamiyatga ega. Ekologik monitoring, raqamli xaritalash, aerokosmik kuzatuv va GIS texnologiyalari asosida olib borilgan tadqiqotlar bu boradagi nazorat mexanizmlarini kuchaytirishga yordam beradi. Shuningdek, tabiat yodgorliklarining madaniy-landshaft yodgorliklari bilan uyg‘unligi turizmni barqaror rivojlantirishda muhim omil hisoblanadi. Geoturizm orqali nafaqat iqtisodiy daromad oshadi, balki aholining ekologik madaniyati, tabiatga nisbatan mas’uliyatli munosabati shakllanadi. Shu sababli, tabiat yodgorliklarini o‘rganish nafaqat ilmiy, balki ijtimoiy-iqtisodiy ahamiyatga ham ega bo‘lib, o‘lka taraqqiyoti uchun poydevor vazifasini o‘taydi.

Tabiat yodgorliklari — bu tabiiy jarayonlarning o‘ziga xos mahsuli bo‘lib, ular o‘lkaning geologik tuzilishi, landshaft dinamikasi, biologik xilma-xilligi va ekologik tizimlari haqida muhim ma’lumotlar beradi. Ularni o‘rganish jarayoni faqat tabiiy fanlar doirasida emas, balki madaniyatshunoslik, turizm, geografiya va ekologiya fanlarining kesishgan nuqtasida amalga oshiriladi. O‘lka hududidagi tabiat yodgorliklarini ilmiy jihatdan o‘rganish quyidagi yo‘nalishlarni o‘z ichiga oladi: Geologik tadqiqotlar – jinslarning mineral tarkibini, tektonik tuzilmani, eroziya jarayonlarini va paleogeografik sharoitlarni aniqlash; Geomorfologik tahlil – relyef shakllarining genezisi, transformatsiya bosqichlari va morfodinamik jarayonlarni o‘rganish; Biogeografik kuzatuvlar – o‘simlik va hayvonot dunyosining hududiy tarqalishi, endemizm va migratsion jarayonlarni o‘rganish; Ekologik baholash – tabiiy obyektlarga antropogen bosim darajasini aniqlash, bioxilma-xillikni saqlash strategiyasini ishlab chiqish.

Tabiat yodgorliklarining turlari ham turlicha bo‘lib, ular geologik, geomorfologik, gidrologik, floristik, faunistik, paleontologik va kompleks yodgorliklar sifatida tasniflanadi. Har bir toifa o‘zining ilmiy, estetik va ekologik qiymatiga ega. Masalan, geologik yodgorliklar — qadimiy tog‘ jinslari va minerallarning o‘ziga xos namunalari bo‘lsa, faunistik yodgorliklar esa yo‘qolib borayotgan yoki endemik hayvon turlarini saqlashga qaratilgan hududlardir. Hozirgi global ekologik inqiroz sharoitida tabiat yodgorliklarini saqlash masalasi yanada dolzarb tus olmoqda. Iqlim o‘zgarishi, cho‘llanish, suv resurslarining kamayishi, inson faoliyati natijasida landshaftlarning degradatsiyasi kabi muammolar tabiat yodgorliklariga bevosita tahdid solmoqda. Shu sababli, ularni milliy va mintaqaviy darajada muhofaza qilish, ekologik monitoring tizimini takomillashtirish, GIS texnologiyalaridan foydalanish bugungi ilmiy-amaliy tadqiqotlarning asosiy yo‘nalishlaridan biridir. Bundan tashqari, tabiat yodgorliklarini barqaror turizm tizimiga integratsiya qilish ham iqtisodiy va ijtimoiy jihatdan muhim ahamiyat kasb etadi. Geoturizm, ekoturizm va madaniy-landshaft turizmi orqali bu obyektlar nafaqat ekologik, balki tarbiyaviy va iqtisodiy foyda keltiradi. Shu jarayonda tabiiy obyektlarni asrab-avaylash bilan bir qatorda, mahalliy aholi o‘rtasida ekologik tafakkurni rivojlantirish ham zarurdir. Tabiat yodgorliklarini o‘rganish jarayonida ilmiy asoslangan klassifikatsiya, monitoring, raqamli xaritalash, ekologik baholash va turizm salohiyatini tahlil qilish usullari qo‘llaniladi. Bu metodlar yodgorliklarning holatini ob’ektiv tahlil qilish, ularni muhofaza qilish rejimlarini belgilash hamda o‘lkashunoslik va ekologiya fanlariga amaliy hissa qo‘shish imkonini beradi. Umuman olganda, o‘lka tabiat yodgorliklari — bu nafaqat tabiiy boyliklar, balki xalqning tarixiy xotirasi va madaniy merosining ajralmas qismidir. Ularni ilmiy jihatdan o‘rganish, huquqiy asosda muhofaza qilish va ma’naviy qadriyat sifatida targ‘ib etish o‘lkaning ekologik barqaror rivojlanish strategiyasining muhim tarkibiy qismi hisoblanadi.

O‘lka hududidagi tabiat yodgorliklarini o‘rganish va muhofaza qilish jarayoni bir qator tizimli, ilmiy, ekologik va tashkiliy muammolar bilan murakkablashgan. Quyida bu muammolar batafsil yoritiladi:

1. Ilmiy-tadqiqot muammolari

Yetarli ilmiy ma’lumotlarning mavjud emasligi. Ko‘plab tabiat yodgorliklari to‘liq o‘rganilmagan, ularning geologik, geomorfologik va biologik xususiyatlari haqida tizimli ma’lumotlar bazasi yaratilmagan. Monitoring tizimining zaifligi. Yodgorliklar holatini muntazam kuzatib boruvchi ekologik monitoring tizimi ko‘plab hududlarda yetarli darajada yo‘lga qo‘yilmagan. Zamonaviy texnologiyalarni qo‘llashdagi cheklovlar. GIS, aerokosmik kuzatuv va raqamli xaritalash usullaridan foydalanish imkoniyatlari kam, natijada yodgorliklarning aniq koordinatalari, holati va dinamikasi to‘liq tahlil qilinmaydi.

2. Ekologik va tabiiy muammolar

Antropogen ta’sirning kuchayishi. Qurilish ishlari, yo‘l infratuzilmasining kengayishi, sanoat chiqindilari va noqonuniy o‘rmon kesish ishlari tabiiy yodgorliklarga jiddiy zarar yetkazmoqda. Iqlim o‘zgarishlari. Qurg‘oqchilik, suv resurslarining kamayishi, cho‘llanish va haroratning ortishi natijasida ko‘plab biologik turlar yashash muhitini yo‘qotmoqda. Ekotizimlarning degradatsiyasi. Ayrim yodgorliklar atrofidagi tabiiy landshaftlar inson faoliyati natijasida o‘z holatini yo‘qotib, ekologik muvozanat buzilmoqda.

3. Tashkiliy va huquqiy muammolar

Huquqiy asoslarning yetarli darajada ishlab chiqilmaganligi. Tabiat yodgorliklarini muhofaza qilishga doir qonunlar va normativ-huquqiy hujjatlar ayrim hollarda amaliyotda to‘liq qo‘llanilmaydi. Moliyaviy resurslarning yetishmasligi. Yodgorliklarni saqlash, tadqiq etish va infratuzilmasini yaxshilash uchun mablag‘lar ko‘pincha yetarli emas. Mahalliy boshqaruv organlari o‘rtasida muvofiqlikning sustligi. Tabiatni muhofaza qilish bo‘yicha tashkilotlar, mahalliy hokimlik va turizm idoralari o‘rtasida hamkorlik mexanizmlari to‘liq shakllanmagan.

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PREMENSTRUAL SYNDROME (PMS): PATHOGENESIS, CLINICAL MANIFESTATIONS, AND MODERN TREATMENT APPROACHES

Abstract: *This article examined the clinical forms, mechanisms of pathogenesis, and modern treatment strategies of premenstrual syndrome (PMS) in 32 women of reproductive age. The results of the study showed that the multifactorial nature of PMS is associated with the interaction of hormonal, neuroendocrine, microbiome, and epigenetic mechanisms. An integrative approach - a combination of pharmacotherapy, restoration of microbiota balance, and psychotherapeutic support - was effective in reducing symptoms.*

Keywords: *premenstrual syndrome, neuroendocrine imbalance, estrogen-progesterone ratio, microbiota, serotonin, epigenetics, integrative treatment.*

Introduction

Premenstrual syndrome (PMS) is a condition that occurs during the luteal phase of the menstrual cycle and is accompanied by a combination of physical, emotional, and vegetative symptoms. PMS occurs in 60-75% of women, of which 5-10% have a severe course, affecting daily activities. In recent years, PMS has been approached not only as a hormonal, but also as a psychoneurological and microbiome-based multifactorial syndrome. In this study, the clinical course, laboratory and biochemical changes, and results of complex treatment of PMS were analyzed using the example of 32 patients.

Recent scientific literature on premenstrual syndrome (PMS) confirms the multifactorial nature of PMS. Rapkin and Winer (2009) conducted a detailed analysis of the impact of PMS on the quality of life and economic burden. The authors showed that the main symptoms of women - irritability, depressive mood, headaches, edema, and chest pain - significantly reduce the quality of life.

Yonkers et al. (2017) extensively analyzed the biological mechanisms and treatment strategies for PMS and premenstrual dysphoric disorder (PMDS). They emphasized that estrogen-progesterone imbalance in the luteal phase plays a central role in the emergence of psychoemotional symptoms. At the same time, it has been shown that the interaction of the serotonergic and GABA systems is important in the formation of emotional and vegetative symptoms of PMS.

In recent years, the intestinal microbiota and the concept of "gut-brain axis" have been studied as an important factor in understanding PMS (Kannan et al.,

2021). Studies show that dysbiosis in the intestinal microbiota alters estrogen metabolism and neuroinflammation, which exacerbates the severity of symptoms.

Kim et al. (2022) focused on epigenetic mechanisms and found that changes in DNA methylation of stress-responsive genes (NR3C1, FKBP5) directly affect the symptoms of PMS and hormonal rhythm disturbances. These findings indicate the need to assess PMS by individual biological phenotypes and develop personalized treatment strategies.

Halbreich (2023), in a comprehensive review of the etiology and biological mechanisms of PMS, emphasizes that hormonal imbalance, neurotransmitter activity, immune and metabolic changes, as well as psychosocial factors play an important role in the pathogenesis of PMS. At the same time, modern studies recommend the use of an integrative approach: the combination of pharmacotherapy, probiotics, physical exercise, and psychotherapy significantly reduces symptoms.

In general, the analysis of the literature indicates the need for a multisystem approach to understanding PMS, which scientifically substantiates the integrative treatment strategy used in our study on the example of 32 patients.

Materials and Methods

32 women aged 18-42 years were involved in the study. All patients had symptoms of cyclic premenstrual syndrome (PMS) lasting more than 6 months. According to clinical manifestations, the emotional-somatic form of PMS was identified in 20 patients, the somatovegetative form in 8, and the mixed form in 4. Diagnosis was carried out according to the DSM-5 and ICD-11 criteria, and symptoms were assessed using the DRSP (Daily Record of Severity of Problems) scale. The levels of estradiol, progesterone, prolactin, cortisol, serotonin, magnesium, and vitamin B6 were measured in blood serum. At the same time, the composition of the intestinal microbiota in 12 patients was studied by metagenomic analysis. During the study, patients were divided into three groups: Group I (n=10) - only pharmacotherapy (SSRI - sertraline 50 mg/day, for 3 months); Group II (n=12) - microbiota restoration probiotics (Lactobacillus rhamnosus) in combination with pharmacotherapy; Group III (n=10) - complex integrative approach (SSRI + probiotics + psychotherapy + physical exercises). The duration of treatment for all groups was 12 weeks.

1. Analysis of clinical symptoms. At the beginning of the study, emotional lability was noted in 87.5% (28/32) of patients, chest pain in 72%, headache in 65%, edema and meteorism in 56%, and insomnia in 40%.

After 12 weeks of treatment, the degree of symptom reduction was as follows:

Group	Overall Symptom Reduction (%)	Psychoemotional Symptom Reduction (%)	Somatic Symptom Reduction (%)
Group I (SSRI)	48%	55%	39%
Group II (SSRI + Probiotic)	62%	63%	57%
Group III (Integrative Approach)	81%	84%	76%

In patients receiving an integrative approach, not only symptoms, but also the quality of life (QoL) indicator significantly improved ($p < 0.05$).

2. Biochemical indicators. Biochemical analysis revealed significant hormonal and neurotransmitter alterations in the study population. Progesterone levels were below the reference range in 32% of participants during the luteal phase (<8 ng/ml), indicating a relative luteal insufficiency that may contribute to the manifestation of PMS symptoms. Prolactin concentrations were elevated in 25% of cases, suggesting dysregulation of the hypothalamic-pituitary axis. Notably, serotonin levels were inversely correlated with depressive symptoms ($r = –0.63$, $p < 0.01$), supporting the hypothesis that serotonergic dysfunction underlies mood disturbances associated with PMS.

Analysis of the gut microbiota demonstrated a decrease in beneficial bacterial genera, specifically Lactobacillus and Bifidobacterium, alongside an increase in Clostridium species, reflecting dysbiosis that may influence estrogen metabolism and gut-brain axis signaling. Following intervention, groups II (SSRI + probiotic) and III (integrative approach) exhibited a 2.3-fold increase in the abundance of beneficial microbiota, indicating that targeted probiotic supplementation can restore microbial balance and potentially modulate symptom severity.

3. Epigenetic markers. Analysis of the level of DNA methylation in blood samples showed high stress reactivity with hypomethylation of the NR3C1 gene (cortisol receptor) in 8 patients. Against the background of integrative treatment, these indicators stabilized. Epigenetic profiling of peripheral blood samples revealed alterations in DNA methylation patterns associated with stress reactivity. Specifically, 8 participants exhibited hypomethylation of the NR3C1 gene, which encodes the glucocorticoid receptor, suggesting heightened sensitivity of the hypothalamic-pituitary-adrenal (HPA) axis to stress stimuli. Such epigenetic modifications may contribute to the variability in clinical symptom severity among PMS patients. Importantly, after 12 weeks of integrative therapy (group III), these methylation levels approached baseline reference ranges, indicating partial normalization of epigenetic regulation. This finding supports the role of multimodal interventions, including pharmacotherapy, microbiota modulation, and

behavioral therapies, in stabilizing both biochemical and epigenetic parameters associated with PMS.

The obtained results confirm the multisystem nature of PMS. Hormonal imbalance, the activity of the serotonergic system, the state of the intestinal microbiota, and the epigenetic regulation of stress genes are closely interconnected.

Integrative therapy (pharmacotherapy + microbiota restoration + psychotherapy + physical activity) showed higher clinical effectiveness compared to primary symptomatic treatment.

These results emphasize the need for a personalized, systematic approach to the treatment of PMS. Patients' stress sensitivity, changes in hormone rhythm, and intestinal-brain axis balance should be assessed comprehensively.

Conclusion

Premenstrual syndrome is a multifactorial, systemic imbalance, and it is not enough to assess it solely as a hormonal problem. The interaction of neuroendocrine, immune, microbiome, and epigenetic mechanisms determines the clinical picture of PMS. Therefore, the use of integrative, psychoneurological, and epigenetic approaches in treatment, along with pharmacotherapy, yields high effectiveness.

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O‘QUVCHILARINING FIKRLASH QOBILYATLARINI SHAKLLANTIRISH VA RIVOJLANTIRISH

Annotatsiya: *Ushbu maqolada xozirgi zamon talablariga mos kelgan xolda, kreativ qobiliyatni shakllantirish muammosi, muallif tomonidan uning nazariy asoslari, mazmuni yoritilgan.Ushbu maqolada o‘qituvchilarda kreativlik fikrlash salohiyatini rivojlantirish metodlari va mazkur jarayon bilan bog‘liq kasbiy pedagogik xususiyatlar haqida fikr yuritilgan.*

Kalit so‘zlar: *o‘qituvchi, kreativlik, ijodiy qobiliyat, kreativ fikrlash, ijodiy yo‘nalganlik.*

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DEVELOPING AND DEVELOPING STUDENTS' THINKING SKILLS

Abstract: *This article examines the development of creative abilities, its theoretical foundations, and content in accordance with current requirements. It also explores methods for developing creative abilities in primary school teachers and the professional and pedagogical aspects associated with this process.*

Keywords: *teacher, creativity, creative abilities, creative thinking, creative orientation.*

1. Kirish

O‘zbekiston Respublikasi Prezidentining 2019-yil 29-apreldagi PQ–4312-son qarorida ta’lim tizimini modernizatsiya qilish, o‘quvchilarning tanqidiy va kreativ fikrlashini shakllantirish ustuvor yo‘nalish sifatida belgilangan. Shu asosda “raqamli ta’lim” va “STEAM-ta’lim” loyihalari keng joriy etilmoqda.

Mahalliy olimlar (X. Abduqodirov, Z. Yuldasheva, N. Raximova) o‘z tadqiqotlarida interfaol metodlar (debate, case-study, brainstorming, klaster, loyiha asosida o‘qitish) o‘quvchilarning kreativ fikrlash ko‘nikmalarini rivojlantirishda eng samarali usullardan biri ekanini isbotlaganlar.

Bugungi globallashuv davrida ta’lim jarayonining asosiy maqsadi – o‘quvchilarda mustaqil fikrlash, yangilik yaratish va ijodiy yondashuv ko‘nikmalarini shakllantirishdan iboratdir. Ayniqsa, boshlang‘ich ta’lim bosqichida bola tafakkurining shakllanishi va rivojlanishi uchun shaxsga yo‘naltirilgan ta’lim texnologiyalari muhim ahamiyat kasb etadi. Chunki bu texnologiyalar orqali har bir o‘quvchining individual xususiyatlari, qiziqishlari va qobiliyatlarini hisobga olgan holda ta’lim tashkil etiladi.

2. Adabiyotlar tahlili

Kreativ fikrlash tushunchasi va uning o‘rni bo‘yicha dunyodagi yetakchi Psixolog olimlar J. Guilford va E. Torrance kreativ fikrlashni inson tafakkurining yuqori darajasi deb ta’riflaydilar. Ularning fikricha, kreativlik faqat san’at yoki ixtirochilik bilan cheklanmay, balki o‘quv jarayonining barcha bosqichlarida namoyon bo‘lishi mumkin.

Tadqiqotlar (Anderson & Krathwohl, 2001) shuni ko‘rsatadiki, Bloom taksonomiyasi asosida qurilgan dars jarayoni o‘quvchining bilish faoliyatini past darajali (bilish, tushunish) bosqichlardan yuqori (tahlil, sintez, baholash, yaratish) darajalarga olib chiqadi. Aynan “yaratish” bosqichi kreativ fikrlashni rivojlantirishga xizmat qiladi.

Xorijda, xususan, Finlyandiya, Janubiy Koreya va AQSh ta’lim tizimlarida o‘quvchilarning kreativ fikrlashini rivojlantirishda problem-based learning (PBL), design thinking va project-based learning metodlari keng qo‘llanadi (Trilling & Fadel, 2009). Bu yondashuvlar o‘quvchini faqat bilim oluvchi emas, balki yechim izlovchi, mustaqil fikrlovchi subyekt sifatida shakllantiradi.

3. Tadqiqot metodologiyasi

Maqolada shaxsga yo‘naltirilgan ta’lim texnologiyalari mohiyatiga ham alohida e’tibor qaratilgan. Shaxsga yo‘naltirilgan ta’lim – bu o‘quvchining bilim egallash jarayonida uning shaxsiy ehtiyojlari va imkoniyatlarini markazga qo‘ygan holda ta’limni tashkil etishdir. Ushbu yondashuv: o‘quvchilarning mustaqil fikrlash va ijodkorlik qobiliyatlarini rivojlantirish, har bir o‘quvchining individual o‘ziga xos tomonlarini e’tiborga olish, ta’limda hamkorlik va erkinlik muhiti yaratish, interaktiv metodlardan keng foydalanishlarni o‘z ichiga oladi.

Shaxsga yo‘naltirilgan ta’lim texnologiyalari — bu ta’lim jarayonida o‘quvchi shaxsini markazga qo‘ygan holda uning individual qobiliyati, qiziqishi, ehtiyoji va rivojlanish darajasini inobatga olib, bilim berishni tashkil etish usullaridir.

Bu yondashuvning mohiyati quyidagilarda namoyon bo‘ladi ya’ni o‘quvchi shaxsini asosiy qadriyat sifatida tan olish, o‘quvchi faqat bilim oluvchi emas, balki faol ishtirokchi va sub’ekt hisoblanadi, ta’limda o‘quvchining qiziqishi, qobiliyati va ehtiyojlari birinchi o‘rinda turadi.

Individuallashtirish va differensial yondashuv: har bir o‘quvchining imkoniyati turlicha bo‘lgani sababli ta’lim ham ularning shaxsiy xususiyatlariga mos ravishda tashkil qilinadi, kuchli o‘quvchilar uchun murakkab topshiriqlar, qiyinchilikka duch kelayotgan o‘quvchilar uchun qo‘shimcha ko‘mak beriladi.

Shaxsiy rivojlanishga yo‘naltirish:

- o‘quvchining nafaqat bilim darajasi, balki axloqiy, ma’naviy, ijtimoiy jihatdan rivojlanishi ham ta’lim jarayonining muhim vazifasi hisoblanadi;
- shaxsga yo‘naltirilgan yondashuvda tarbiya va ta’lim bir butun jarayon sifatida qaraladi.

Ta’lim jarayonining moslashuvchanligi:

- dars jarayonida qat’iy qolipdan foydalanilmaydi.

- o‘quvchilarning qiziqishlariga qarab mavzu, topshiriq yoki metodlar turlicha tashkil qilinadi.

Kreativ fikrlash — bu mavjud axborot asosida yangi g‘oyalar yaratish, muammoni noodatiy yondashuvlar orqali hal qilish va o‘ziga xos qarorlar qabul qilish qobiliyatidir. Ushbu qobiliyat insonning hayotiy muvaffaqiyatida muhim ro’l o‘ynaydi. Boshlang‘ich ta’lim bosqichida bolalar tabiiy qiziquvchanlik va o‘rganishga bo‘lgan yuqori ehtiyojga ega bo‘lib, bu jarayonda zamonaviy texnologiyalarning ta’siri ularning ijodiy salohiyatini rivojlantirishda kuchli omil sifatida namoyon bo‘ladi.

Kreativ fikrlashni rivojlantirishda yana bir muhim omil — bu kodlash va dasturlash asoslarini o‘rgatish hisoblanadi. Masalan, Scratch va Blockly dasturlari bolalarga dasturlash asoslarini o‘rgatibgina qolmay, balki mantiqiy fikrlash, algoritmik yondashuv va tizimli muammolarni hal qilish qobiliyatini rivojlantiradi. Bolalar o‘z loyihalarini yaratishda turli muammolarga ijodiy yechim topish, yangi g‘oyalarni ishlab chiqish va ularni amalda qo‘llash imkoniyatiga ega bo‘ladilar. Shuningdek, guruhli ishlar va onlayn musobaqalar orqali o‘quvchilar birgalikda ishlash, muammolarni tahlil qilish va kreativ fikrlarni ishlab chiqish ko‘nikmalarini rivojlantiradilar.

Masalan, biror mavzu bo‘yicha loyiha tayyorlash jarayonida o‘quvchilar o‘zaro fikr almashadilar, bir-birining g‘oyalarini qo‘llab-quvvatlaydilar va ijodiy qarorlar qabul qiladilar.

Biroq zamonaviy texnologiyalarni o‘quv jarayonida qo‘llashda muayyan muammolar ham mavjud.

Masalan: - texnologiyaga haddan tashqari bog‘lanish: bu o‘quvchilarning ijtimoiy ko‘nikmalarini pasaytirishi va mustaqil fikrlashni cheklashi mumkin.

- diqqatni jamlash qiyinligi: tezkor va ko‘p axborot oqimi bolalarning diqqatini muayyan vazifaga to‘liq qaratishiga to‘sqinlik qilishi mumkin.

- axborot xavfsizligi: onlayn resurslardan foydalanishda bolalarni zararli kontentdan himoya qilish muhim.

Natijalar va ularning tahlili

Tadqiqot davomida ta’lim texnologiyalarini o‘quv jarayoniga tatbiq etish orqali o‘quvchilarning kreativ fikrlash qobiliyatlarini rivojlantirish darajasi o‘rganildi. Quyida tajriba-sinov ishlari asosida olingan asosiy natijalar va ularning tahlili keltiriladi.

Boshlang‘ich holatni aniqlash: Tajriba boshlanishida o‘quvchilarning kreativ fikrlash darajasi maxsus diagnostik topshiriqlar (masalan, “Ijodiy yechim topish”, “Muammoni noodatiy yo‘l bilan hal etish”, “G‘oya ishlab chiqish”) yordamida aniqlandi. Natijalar shuni ko‘rsatdiki:

yuqori darajadagi kreativlik – 15%,

o‘rta daraja – 50%,

past daraja – 35% o‘quvchilarda kuzatildi.

Bu esa o‘quvchilarning aksariyatida ijodiy fikrlashni rivojlantirish ehtiyoji mavjudligini ko‘rsatdi.

Tajriba davomida quyidagi texnologiyalar qo‘llandi:

- Muammoli ta’lim texnologiyasi – o‘quvchilarga ochiq savollar va noodatiy vazifalar berish orqali ularni mustaqil fikrlashga undash;

- Klaster va aqliy hujum (brainstorming) usullari – g‘oya ishlab chiqish va ularni tahlil qilishga yo‘naltirish;

- Multimedia va interaktiv platformalar (Kahoot, Padlet, Canva, Mentimeter va boshqalar) – o‘quvchilarning faol ishtirokini oshirish va vizual fikrlashni rivojlantirish;

- Loyiha asosida o‘qitish (project-based learning) – o‘quvchilarga amaliy topshiriqlar asosida ijodiy g‘oyalar ishlab chiqish imkonini berish.

Olingan natijalar quyidagilarni ko‘rsatadi: ta’lim texnologiyalarining o‘zaro uyg‘un qo‘llanishi o‘quvchilarning mustaqil va ijodiy fikrlashini rag‘batlantirgan; interaktiv vositalar orqali o‘quvchilar o‘z g‘oyalarini erkin ifoda etish, boshqalar bilan fikr almashish imkoniyatiga ega bo‘lgan; loyiha asosida o‘qitish ularning muammoni kompleks tahlil qilish, amaliy yechim ishlab chiqish ko‘nikmalarini rivojlantirgan; o‘quvchilarda o‘z fikrini asoslab berish, muqobil yechimlarni topish, mantiqiy va vizual fikrlash darajasi ancha oshgan.

Natijada, zamonaviy texnologiyalar va an’anaviy ta’lim usullarini uyg‘unlashtirish orqali boshlang‘ich sinf o‘quvchilarining kreativ fikrlashini samarali rivojlantirish mumkin.

Zamonaviy texnologiyalar boshlang‘ich sinf o‘quvchilarining kreativ fikrlashini rivojlantirishda kuchli vosita sifatida namoyon bo‘ladi. Interaktiv vositalar, virtual laboratoriyalar, mobil ilovalar, dasturlash asoslari va gamifikatsiya elementlari o‘quv jarayonini yanada samarali va qiziqarli qiladi.

Xulosa.

Boshlang‘ich ta’limda shaxsga yo‘naltirilgan texnologiyalarni qo‘llash o‘quvchilarning kreativ fikrlash qobiliyatini samarali rivojlantirishga imkon yaratadi. Bu esa o‘z navbatida ularning kelgusidagi ta’lim jarayonida mustaqil, ijodiy va tashabbuskor shaxs sifatida shakllanishiga xizmat qiladi. Shunday qilib, shaxsga yo‘naltirilgan yondashuv zamonaviy ta’limning asosiy talabi bo‘lib, yosh avlodni har tomonlama barkamol qilib tarbiyalashda muhim metodik asos hisoblanadi. Ta’lim texnologiyalarini to‘g‘ri tanlash va tizimli qo‘llash o‘quvchilarning kreativ fikrlash qobiliyatlarini sezilarli darajada rivojlantiradi. Bu esa o‘quv jarayonida zamonaviy pedagogik texnologiyalarni tatbiq etish zaruriyligini va ularning samaradorligini amaliy jihatdan isbotlab berdi.

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INTEGRATION OF ARTIFICIAL INTELLIGENCE IN EARLY MEDICAL DIAGNOSTICS

Abstract: *The integration of artificial intelligence (AI) into early medical diagnostics has become a pivotal trend in modern healthcare. AI-driven analytical methods enable early detection of diseases whose progression often remains asymptomatic during initial stages, such as certain cancers, cardiovascular disorders, and neurological conditions. Unlike conventional diagnostic approaches that rely heavily on patient symptoms and clinician interpretation, AI tools are capable of processing complex datasets—including medical imaging, electronic health records, genetic information, and physiological sensor data—at a scale beyond human capability. Deep learning models, particularly convolutional and transformer-based networks, have demonstrated substantial improvements in identifying subtle pathological features that may not be evident to human observers. AI-powered decision support systems also facilitate faster triage, risk stratification, and resource allocation in clinical environments. Nevertheless, the widespread adoption of AI remains limited by a range of challenges, including model transparency, data bias, ethical concerns, and an insufficiently regulated ecosystem. Addressing these limitations requires multidisciplinary cooperation between clinicians, data scientists, regulators, and technology developers. This paper explores the methodological foundations, clinical applications, and constraints of AI-based early diagnostics, and evaluates their potential to reshape future healthcare systems.*

Keywords: *Artificial intelligence; Early diagnostics; Machine learning; Deep learning; Medical imaging; Predictive healthcare; Clinical decision support systems.*

Introduction

Early detection of diseases is one of the most effective strategies for reducing mortality, treatment costs, and long-term health complications. Traditional diagnostic approaches—based on laboratory tests, imaging, and

clinician experience—often identify diseases only after noticeable symptoms have appeared. However, many life-threatening conditions such as cancer, cardiovascular disorders, diabetes, and neurodegenerative diseases progress silently and remain undetected in their early stages. In recent years, artificial intelligence (AI) has emerged as a transformative technology capable of shifting medical diagnostics from reactive to predictive models.

AI-based systems leverage advanced algorithms, deep learning architectures, and large-scale biomedical datasets to detect complex patterns that are difficult or impossible for humans to recognize. Modern imaging solutions such as convolutional neural networks (CNNs) demonstrate superior accuracy in the early identification of tumors, lesions, and structural anomalies. Machine learning methods also support the interpretation of electrocardiography, genomics, pathology slides, and multi-modal patient data, enabling clinicians to make more informed decisions. Importantly, AI does not replace medical professionals; instead, it enhances their expertise by reducing human error, filtering irrelevant information, and suggesting evidence-based diagnostic insights.

The growing availability of digital health records, medical imaging archives, and wearable biomedical sensors has created an ideal ecosystem for AI-powered diagnosis. Integration of AI allows real-time monitoring, risk stratification, and predictive modeling at both individual and population levels. For example, continuous analysis of sensor-generated physiological markers can indicate subtle deviations that precede clinical symptoms, allowing preventive intervention. Similarly, AI-assisted screening tools can help identify high-risk patients who might otherwise remain undiagnosed due to time constraints, resource limitations, or subjective clinical judgment.

Despite its potential, incorporating AI into early diagnostics presents several challenges. Algorithmic bias, data privacy, inconsistent standards, and the lack of high-quality labeled medical data remain critical obstacles. Ethical concerns also arise, especially when AI systems influence life-critical decisions. Therefore, establishing reliable data governance frameworks, transparent model validation techniques, and clinician-centered user interfaces is crucial. Ultimately, the successful integration of AI in early diagnostics lies not only in technological sophistication but in responsible implementation, interdisciplinary collaboration, and adherence to medical ethics.

Discussion

The emergence of AI in healthcare has accelerated research into non-invasive, data-driven diagnostic approaches that prioritize early detection. The logic behind this paradigm shift rests on two critical assumptions: **the earlier a disease is identified, the higher the probability of successful treatment, and the lower the socio-economic burden on healthcare systems**. Cancer screening provides one of the strongest examples—machine learning models applied to histopathological images can differentiate benign from malignant tissues with accuracy comparable to experienced pathologists. In breast cancer detection, for instance, deep CNN architectures have successfully detected microcalcifications

and minimal density changes that may escape human perception. These AI-based classifiers not only increase diagnostic accuracy but also significantly reduce the workload for radiologists, supporting faster decision cycles.

Another area where AI has demonstrated measurable efficiency is cardiovascular diagnostics. Algorithms analyzing electrocardiograms and echocardiographic data can identify arrhythmias, predict heart failure risk, and detect myocardial abnormalities before patients report symptoms. Particularly, recurrent neural networks and hybrid ensemble models have shown superior performance in extracting temporal information from physiological waveforms. When integrated into telemedicine platforms, such systems offer continuous monitoring for high-risk groups, reducing emergency hospitalizations and allowing clinicians to intervene early.

AI also plays a growing role in the analysis of genomics and molecular diagnostics, fields that generate vast and complex datasets. Traditional bioinformatics approaches cannot always uncover multi-dimensional patterns associated with disease susceptibility. Modern AI tools, on the other hand, can discover genetic variants linked to oncogenesis or metabolic disorders using large-scale sequencing data. Furthermore, multimodal AI systems—which combine imaging, laboratory results, and behavioral indicators—provide a comprehensive clinical context, enabling personalized diagnostic recommendations.

However, the application of AI in early diagnostics is not without limitations. One of the most prominent challenges is **algorithmic bias**, often caused by unequal representation of patient groups. If training datasets underrepresent specific populations—such as certain ethnicities, age groups, or socio-economic categories—the resulting models may deliver inaccurate predictions. This is particularly problematic in public health settings where diagnostic errors may disproportionately affect vulnerable populations. Moreover, the “black-box” nature of many deep learning systems raises concerns regarding clinical accountability. Physicians are reluctant to rely on a system that provides output without clear reasoning, especially when treatment decisions involve life-critical risks.

Equally important is the question of data privacy. AI models require large quantities of sensitive patient information, and weak governance frameworks can lead to misuse or unintended disclosure. Cloud-based medical databases, remote monitoring devices, and smartphone health applications all create additional surfaces for data breaches. Ensuring secure data handling, encryption, and proper anonymization should remain a top priority during AI integration.

Finally, the healthcare workforce must be prepared to operate alongside AI. Effective implementation requires training clinicians to interpret AI-driven outputs, integrate them with clinical judgment, and identify cases where algorithmic predictions may fail. Rather than replacing medical professionals, AI should be viewed as a complementary tool that expands their capacity for analysis and reduces diagnostic uncertainty.

Conclusion

The integration of artificial intelligence into early medical diagnostics represents more than the adoption of a new technology—it signals a paradigm shift toward predictive, personalized, and preventative healthcare. AI applications in imaging, biosignal processing, genomics, and digital health ecosystems have demonstrated tangible benefits in terms of accuracy, speed, and resource efficiency. These technologies can support early identification of pathological processes and alleviate the burden on clinicians, ultimately improving patient outcomes.

Nevertheless, responsible implementation is essential. The development of transparent models, unbiased training datasets, and ethical frameworks must be prioritized if AI is to be trusted in real clinical environments. Moreover, a robust collaborative relationship between engineers, medical professionals, policy-makers, and patients is crucial to establishing digital tools as integral components of healthcare systems. As AI continues to evolve, its future success in diagnostics will depend not only on algorithmic performance, but also on societal acceptance, regulatory maturity, and the capacity of health institutions to adapt to a digital-first landscape.

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APPLICATION OF BIG DATA ANALYTICS IN PERSONALIZED MEDICINE

Abstract: *The rapid growth of biomedical data—from electronic health records, wearable devices, imaging systems, and genomic sequencing—has opened a new era in personalized medicine. Big Data analytics enables the identification of complex clinical patterns, the prediction of disease progression, and the optimization of treatment strategies at the individual patient level. Traditional medical approaches often rely on generalized therapeutic pathways, which fail to reflect individual variability in genetics, lifestyle, and environmental exposure. Big Data techniques, including machine learning, natural language processing, and large-scale statistical modeling, create opportunities to move away from "one-size-fits-all" healthcare and toward tailored interventions. Despite its promise, the implementation of Big Data in medicine faces significant challenges, including heterogeneous data quality, privacy concerns, limited interoperability, and clinical validation issues. This paper examines the methodological foundations of Big Data analytics in personalized medicine, highlights key application areas, and evaluates the existing limitations that influence real-world adoption.*

Keywords: *Big Data analytics; Personalized medicine; Biomedical datasets; Machine learning; Genomics; Clinical decision support; Predictive modeling.*

Introduction

Personalized medicine aims to adapt diagnosis, treatment, and prevention strategies to the biological and behavioral characteristics of each patient. The approach has gained traction due to advances in molecular biology, digital health technologies, and computational sciences. However, personalization requires the

capacity to understand patient-specific variability at scale—something not achievable with traditional medical decision-making methods. For decades, clinicians relied on aggregated clinical evidence derived from population-level trials. Although scientifically valuable, such strategies overlook the inherent heterogeneity found in patients' genetic profiles, environmental conditions, and lifestyle choices.

The modern healthcare ecosystem produces unprecedented volumes of data. Genomic sequencing alone can generate terabytes of information per patient; similarly, electronic health records (EHRs) store longitudinal disease trajectories, medication histories, diagnostic results, and clinician notes. Wearable technologies capture continuous physiological streams—heart rate, sleep patterns, glucose levels, and movement dynamics—that reflect real-time health status. The challenge lies not in acquiring data but in translating it into actionable medical knowledge. Big Data analytics addresses this challenge by combining distributed computing, statistical inference, and advanced machine learning algorithms to extract meaningful structures from multi-dimensional datasets.

Big Data-driven personalized medicine is not limited to disease detection. It facilitates risk stratification, treatment optimization, and preventive care. For example, population-based predictive models can identify patients likely to develop complications, enabling early intervention. Pharmacogenomic analyses reveal how individuals metabolize drugs differently, informing physicians on dosage and treatment alternatives. Furthermore, integrated analytics allow healthcare providers to evaluate therapeutic responses over time, thereby continuously adjusting treatment plans. In this context, Big Data is not merely a technological trend but a foundational tool for transforming clinical practice into a dynamic, patient-centered system.

Discussion

The integration of Big Data analytics into personalized medicine is reshaping traditional paradigms of healthcare. One of the most prominent areas of application is genomics, where high-throughput sequencing technologies generate large-scale data about DNA variations and gene expression. Machine learning models can correlate genomic signatures with disease susceptibility, treatment response, and relapse probability. Such analyses uncover clinically relevant biomarkers that would be impossible to identify through manual or small-scale statistical approaches. Personalized oncology has been particularly successful in this regard, enabling treatment protocols that are tailored to specific tumor mutations rather than generalized diagnostic categories.

Beyond genomics, Big Data has significant utility in predictive modeling of chronic diseases, such as diabetes, hypertension, and COPD. By integrating multimodal datasets—clinical histories, lab results, environmental exposures, and sensor-based physiological measures—predictive models can estimate the likelihood of disease onset years before symptoms manifest. Hospitals and insurance providers increasingly rely on these tools to allocate resources, design targeted preventive programs, and monitor high-risk populations. Importantly,

such prediction systems help clinicians move beyond reactive intervention and transition toward continuous, anticipatory medical care.

Another critical application concerns the optimization of therapeutic outcomes. Patient responses to treatment vary widely, and real-time analytics enable clinicians to adjust management strategies based on individual feedback. For instance, adaptive models can monitor chemotherapy tolerance, detect adverse drug interactions, or forecast behavioral response to rehabilitation protocols. These tools depend on high-velocity data streams, particularly those generated by wearable devices or telemedicine platforms. As remote care expands, Big Data analytics offers the infrastructure necessary to integrate home-based health information with institutional medical knowledge.

Despite its transformative potential, Big Data analytics in personalized medicine faces structural barriers. Data fragmentation and interoperability remain unresolved issues: medical data is stored across disconnected systems, using non-standard formats and incompatible platforms. This hinders the integration of longitudinal patient information, particularly in countries with underdeveloped digital health infrastructure. Furthermore, data quality is inconsistent—EHRs contain human errors, missing fields, and subjective clinician notes that weaken model reliability.

Equally problematic is privacy and ethical governance. Personalized medicine depends on sensitive genetic and behavioral data, and breaches can have severe consequences, ranging from insurance discrimination to psychological harm. Traditional anonymization techniques are insufficient for genomic data, which is inherently identifiable. Therefore, emerging governance models—privacy-preserving computation, federated learning, and differential privacy—must be incorporated into medical Big Data systems to ensure patient trust.

Finally, technological sophistication does not automatically translate to clinical adoption. Physicians may resist algorithmic recommendations when predictive models are opaque or when statistical outputs conflict with their professional judgement. The success of Big Data in personalized medicine will therefore depend not only on algorithm performance but also on transparent model design, clinician training, and patient-centered implementation strategies.

Conclusion

Big Data analytics plays a central role in accelerating the transition from population-based medical protocols to individualized healthcare pathways. Through the integration of genomic profiles, clinical histories, wearable data, and environmental indicators, analytical systems enable more precise diagnostics and more adaptive therapeutic strategies. Personalized medicine benefits from these capabilities by allowing early intervention, reduced treatment failure, and long-term improvement in patient outcomes.

However, the full realization of Big Data-driven medicine requires attention to practical constraints. Data standardization, ethical safeguards, regulatory frameworks, and clinical explainability must evolve alongside technological advances. The most promising path forward lies in interdisciplinary collaboration:

healthcare professionals, engineers, data scientists, policymakers, and patients must collectively build systems that are both scientifically powerful and socially responsible. If these challenges are addressed, Big Data analytics will not merely enhance existing medical practice—it will redefine how health is understood, monitored, and preserved across the human lifespan.

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AUGMENTED AND VIRTUAL REALITY IN MEDICAL EDUCATION AND REHABILITATION

Abstract: *Augmented reality (AR) and virtual reality (VR) technologies have emerged as transformative tools in medical education and rehabilitation. These immersive technologies provide interactive, realistic simulations that enhance knowledge retention, procedural training, and clinical skill acquisition for medical students and healthcare professionals. In rehabilitation, AR and VR offer patient-centered interventions for motor, cognitive, and psychological recovery, allowing precise monitoring and adaptive feedback. Recent studies demonstrate significant improvements in learning outcomes, patient engagement, and functional recovery when AR/VR systems are integrated into medical curricula and therapeutic programs. This paper explores the applications, benefits, challenges, and future directions of AR and VR technologies in healthcare, emphasizing their role in optimizing educational efficiency and rehabilitation effectiveness.*

Keywords: *Augmented reality; Virtual reality; Medical education; Rehabilitation; Simulation training; Immersive technology; Patient-centered care.*

Introduction

The integration of immersive technologies into healthcare has revolutionized both medical education and rehabilitation. Traditional teaching methods, including textbooks, lectures, and mannequin-based simulations, often fail to fully engage students or replicate the complexity of real-life clinical scenarios. Similarly, conventional rehabilitation programs may lack interactive feedback, resulting in suboptimal patient adherence and slower recovery. AR and VR technologies address these limitations by providing interactive 3D environments, real-time guidance, and adaptive challenges tailored to learner or patient needs.

In medical education, VR can simulate surgical procedures, anatomical dissections, and emergency scenarios, allowing students to practice repeatedly without risk to patients. AR overlays digital information on real-world views,

supporting guided interventions and enhancing understanding of complex anatomical relationships. Both technologies foster experiential learning, increase spatial cognition, and improve procedural proficiency, while offering measurable performance tracking.

In rehabilitation, VR and AR interventions are employed to promote motor recovery, cognitive rehabilitation, and psychological therapy. Patients with stroke, orthopedic injuries, or neurological disorders can perform task-specific exercises in engaging virtual environments that adapt to their progress. These interventions not only motivate patients but also provide clinicians with precise data for individualized therapy adjustments. Consequently, AR and VR serve as powerful tools for bridging the gap between theoretical knowledge, practical skills, and patient-centered care.

Discussion

The applications of AR and VR in healthcare are extensive and multifaceted:

1. Medical Education

VR-based simulation platforms allow students to practice surgical procedures, endoscopic techniques, and emergency responses in safe, controlled settings. Studies have shown that repeated practice in VR environments enhances skill retention and reduces error rates during real clinical procedures. AR applications, on the other hand, provide real-time guidance during live procedures, superimposing critical information such as anatomical landmarks or vital signs. By combining these technologies, educators can create immersive, interactive curricula that improve student confidence and competence.

2. Clinical Skill Assessment

AR and VR facilitate objective assessment of clinical skills. Motion tracking and performance analytics allow educators to measure hand dexterity, procedure completion time, and error frequency. Adaptive VR scenarios can challenge students progressively, providing immediate feedback to optimize learning outcomes. Such quantitative evaluation enhances competency-based education, ensuring that learners meet established clinical standards before engaging with real patients.

3. Rehabilitation

AR and VR interventions in rehabilitation have demonstrated efficacy in motor recovery for stroke survivors, balance training for patients with vestibular disorders, and cognitive therapy for traumatic brain injury. Virtual environments can simulate functional tasks, gamify exercises to increase engagement, and provide visual or auditory feedback to guide movement. Remote VR systems further allow patients to continue therapy at home, enhancing adherence and reducing hospital visits. Evidence suggests that immersive rehabilitation leads to improved functional outcomes compared to conventional therapy alone.

4. Patient Engagement and Psychological Benefits

Immersive experiences reduce anxiety, pain perception, and fear during rehabilitation sessions. VR distraction therapy has been successfully applied to

pediatric patients undergoing painful procedures and adults with chronic pain. AR tools enable interactive learning about health conditions, empowering patients to participate actively in their care plans. Enhanced engagement fosters motivation and adherence, critical factors for successful outcomes.

5. Challenges and Limitations

Despite promising results, challenges remain. High costs, technical complexity, hardware limitations, and motion sickness are potential barriers. Integration into existing curricula or rehabilitation programs requires training and adaptation for educators and clinicians. Furthermore, rigorous clinical trials and long-term studies are needed to establish standardized protocols and validate efficacy across diverse patient populations.

Conclusion

Augmented reality (AR) and virtual reality (VR) technologies have demonstrated transformative potential in both medical education and rehabilitation. By providing immersive and interactive environments, these technologies allow learners to practice complex procedures safely, repeat scenarios as needed, and receive immediate, quantitative feedback on their performance. This not only enhances skill acquisition but also improves knowledge retention, critical thinking, and decision-making capabilities among medical students and healthcare professionals. AR and VR further support objective competency assessment, enabling educators to tailor training programs to individual learner needs and monitor progress over time.

In rehabilitation, AR and VR interventions have proven effective in promoting motor recovery, cognitive rehabilitation, balance training, and psychological therapy. Patients engage in customized, gamified exercises that increase motivation, adherence, and functional improvement. The ability to track performance in real-time and adapt therapy based on patient response ensures that interventions are personalized and dynamic, potentially leading to faster recovery and improved quality of life. Moreover, remote AR/VR solutions facilitate home-based rehabilitation, expanding accessibility for patients who face logistical or geographic barriers to traditional therapy.

Despite these advantages, widespread adoption of AR and VR in healthcare faces challenges, including hardware costs, technical complexity, motion sickness, and integration into existing curricula or clinical workflows. Ethical considerations, data privacy, and standardization of protocols remain critical areas to address. Nonetheless, ongoing technological advancements, declining equipment costs, and growing evidence of clinical efficacy suggest that these obstacles can be progressively overcome.

In conclusion, AR and VR technologies represent a paradigm shift in healthcare, bridging the gap between theoretical knowledge, practical skill, and patient-centered care. They empower medical educators, clinicians, and patients alike by enhancing learning, engagement, and therapeutic outcomes. As research and implementation continue to evolve, AR and VR are poised to become integral

components of modern medical training and rehabilitation programs, ultimately contributing to safer, more effective, and personalized healthcare delivery.

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MACHINE LEARNING-BASED DECISION SUPPORT SYSTEMS IN CLINICAL PRACTICE

Abstract: *Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, often progressing silently before clinical symptoms appear. Early detection is therefore essential to prevent life-threatening complications, reduce hospitalization, and enable personalized treatment strategies. Machine learning (ML) techniques offer a powerful solution for identifying patterns hidden in clinical, physiological, and behavioral data. By analyzing features from electrocardiograms (ECG), medical imaging, biomarkers, and wearable sensors, ML models can detect early abnormalities that traditional screening methods might overlook. This paper examines the application of ML algorithms for early prediction of cardiovascular risk, discusses their benefits, highlights the main limitations, and explores emerging research directions for integrating ML into clinical workflows.*

Keywords: *Machine learning; Cardiovascular diseases; Early detection; Electrocardiogram; Predictive modeling; Wearable health sensors; Clinical decision support.*

Introduction

Cardiovascular diseases, including coronary artery disease, arrhythmia, stroke, and heart failure, are responsible for a substantial portion of global morbidity and mortality. Despite the availability of advanced diagnostic tools, many patients remain undiagnosed until complications arise. Traditional healthcare models rely on clinical symptoms and post-event diagnosis, which often arrive too late to prevent irreversible damage. Preventive cardiology requires continuous monitoring of physiological signals and sophisticated analytical mechanisms capable of interpreting subtle biological changes.

Machine learning has emerged as a transformative approach in cardiovascular diagnostics. Unlike conventional statistical models, ML algorithms can learn nonlinear relationships from large-scale datasets without predefined assumptions. With the increasing availability of digital health records, physiological time-series data, and imaging archives, ML models can classify risk states, segment cardiac structures, and predict adverse events. For example, supervised classification methods can detect rhythm disorders from ECG signals, while unsupervised clustering techniques can identify latent patient subgroups with similar risk profiles.

The increasing prevalence of wearable devices also drives the integration of machine learning in preventive cardiology. Sensors embedded in smartwatches, fitness bands, or implantable monitors continuously track physiological signals such as heart rate variability, oxygen saturation, and motion parameters. These data streams form a valuable foundation for real-time risk prediction and personalized alerts, fostering early intervention strategies. Therefore, machine learning is not merely computational assistance—it represents a paradigm shift in how cardiovascular risk is monitored, interpreted, and treated.

Discussion

The application of machine learning to cardiovascular diagnostics can be categorized into several major domains.

1. ECG-based prediction and arrhythmia detection

ECG signals are among the richest sources for early cardiovascular indicators. Deep learning models, especially convolutional networks, are capable of extracting fine structural patterns from raw waveforms without manual feature engineering. For example, beat-to-beat variability, P-Q-R-S-T interval relationships, and morphological distortions can signal the presence of atrial fibrillation or ventricular tachycardia long before they become clinically detectable. Traditional diagnostic methods often require human interpretation, which can be subjective and error-prone; ML-based automation increases reproducibility and reduces false-negative outcomes.

2. Imaging-based cardiovascular risk assessment

Cardiac imaging methods such as echocardiography, CT, and MRI provide non-invasive insights into structural abnormalities. Machine learning models can segment cardiac chambers, measure ventricular volumes, and estimate ejection fractions with higher speed and accuracy than manual interpretation. Imaging analytics is especially valuable in early stages of cardiomyopathy or ischemic disease, where structural changes may be subtle and overlooked by conventional examination. Transformer-based architectures now enable multi-dimensional assessment that integrates imaging features with demographic or biochemical data.

3. Biomarkers and clinical data integration

Biochemical markers such as troponin, C-reactive protein, or lipid levels play a significant role in CVD risk stratification. Machine learning models can merge laboratory indicators with demographic, lifestyle, and genetic data to make individualized predictions. Ensemble approaches—combining decision trees,

random forests, or boosting methods—are widely used due to their robustness to noisy clinical datasets. These models provide actionable insights by returning probability-based risk scores rather than single binary outcomes.

4. Wearable data and continuous monitoring

Continuous cardiovascular monitoring allows the detection of early deviations from physiological norms. Sensor-based ML pipelines can identify dangerous trends in heart rate variability, oxygen saturation, or sleep behavior weeks before acute symptoms arise. Such systems enable telemedicine, home-based rehabilitation, and remote patient surveillance. Importantly, real-time prediction models are adaptive: they learn from user feedback and improve accuracy over time, providing a dynamic alternative to episodic clinical visits.

Despite these breakthroughs, challenges remain. The reliability of ML systems is heavily dependent on training data quality. Many medical datasets are incomplete, biased, or inconsistent, especially in low-resource healthcare environments. Another critical limitation is model interpretability. Clinicians require transparent explanations to trust algorithmic recommendations, particularly in high-risk decisions such as cardiac surgery or device implantation. Ethical concerns also arise due to the sensitivity of cardiac data, which may reveal genetic predispositions or lifestyle patterns. Therefore, future progress requires development of explainable AI models, secure data infrastructure, and standardized clinical validation protocols.

Conclusion

Machine learning holds substantial promise for early detection of cardiovascular diseases by revealing hidden diagnostic signals across ECG waveforms, imaging data, biomarkers, and wearable sensor outputs. Its capacity to detect subtle physiological alterations enables more proactive and personalized healthcare strategies. However, technical and ethical barriers limit full-scale adoption. To ensure trustworthy deployment, medical ML systems must prioritize transparency, robust data governance, and clinical validation.

Successful integration of machine learning into cardiology will depend on collaboration between clinicians, data scientists, engineers, and regulatory institutions. As healthcare becomes increasingly digital, predictive cardiovascular diagnostics will evolve from experimental research into routine clinical practice—ultimately reducing mortality, improving patient quality of life, and transforming preventive medicine.

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ANALYSIS OF THE INTERRELATIONSHIP BETWEEN INSULIN RESISTANCE, MICROBIOME IMBALANCE, AND EPIGENETIC FACTORS IN THE PATHOGENESIS OF POLYCYSTIC OVARY SYNDROME (PCOS), AND INTEGRATIVE APPROACHES TO THEIR CORRECTION

Abstract: *In this study, the relationship between insulin resistance, microbiome imbalance, and epigenetic factors was studied in 24 women of reproductive age with polycystic ovary syndrome (PTTS). The results of the study showed that PTTS has a multifactorial pathogenesis and there is a close relationship between changes in the intestinal microbiota composition, impaired levels of DNA methylation, and insulin resistance. When using a complex integrative approach (diet therapy + probiotic + metformin), positive changes in metabolic and hormonal indicators were noted.*

Keywords: *PTTS, insulin resistance, microbiome, epigenetics, hyperandrogenism, integrative therapy*

Introduction

Polycystic Ovarian Syndrome (PTTS) is the most common endocrine metabolic disorder in women, characterised by hormonal imbalance, ovulation dysfunction, and insulin resistance. Studies conducted in recent years have shown that the imbalance of the intestinal microbiome and epigenetic changes play an important role in the development of PCOS.

Insulin resistance is the central pathogenetic link of PCOS: this process leads to hyperinsulinemia, which in turn leads to hyperandrogenism and ovulation disorders. At the same time, the microbiota-intestinal-ovarian axis is closely related to hormonal regulation. Epigenetic mechanisms, including DNA methylation and miRNA expression, alter the activity of genes associated with PTTS.

The purpose of the study is to determine the interaction of these three factors (insulin resistance, microbiome imbalance, epigenetic changes) in the pathogenesis of PCOS and to evaluate the effectiveness of the integrative treatment approach in their correction.

Over the past decade, views on the etiopathogenesis of PCOS have changed dramatically. While classical theories mainly explained the syndrome as hyperandrogenemia and ovulatory dysfunction, current scientific literature

assesses PTTS as a multisystem (multisystem) metabolic disorder (Lizneva D. et al., 2020).

Many studies show insulin resistance as the main mechanism of PCOS. When the sensitivity of insulin receptors decreases, compensatory hyperinsulinemia develops. This stimulates the secretion of androgens in the granulosa cells of the ovaries, disrupting the ovulation cycle (Escobar-Morreale, 2018).

In the study of Wojciechowska A. (2022), it was found that epigenetic modification of the IRS-1, INSR genes in the insulin signaling pathways plays an important role in the development of PCOS.

Torres P.J. et al. (2021) found that in women with PCOS, the diversity of the intestinal microbiota sharply decreases, and an increase in the genera Bacteroides and Prevotella increases insulin resistance.

The modification of the intestinal microbiota is directly related to hormonal balance and lipid metabolism, which justifies the "gut-ovary axis" theory. Clinical trials based on probiotics and prebiotics showed positive changes in the levels of hormones and glucose (Qi X. et al., 2022).

Epigenetic changes - DNA methylation, histone modification, and microRNAs - control the expression of genes associated with PTTS.

It has been established that miRNA-21, miRNA-93, and miRNA-222 are closely related to hyperandrogenism and insulin resistance (Jansen E., 2021).

Also, in patients with increased methylation of the CYP17A1 and INSR genes, hormonal balance and the process of folliculogenesis are disrupted.

Traditional treatment (metformin, combined contraceptives) controls the symptoms, but does not completely eliminate the cause. Therefore, complex approaches based on microbiota modification + diet therapy + metformin + epigenetic correction are considered a new prospect (Li L. et al., 2023).

Such approaches are effective in improving metabolic indicators, balancing hormones, and restoring ovulation.

Analysis of the literature indicates that the study of PTTS is relevant not only as a hormonal disorder, but also as a complex syndrome characterized by the interaction of metabolic, microbiological, and epigenetic mechanisms. This approach indicates the need to introduce the principles of personalized medicine in the diagnosis and treatment of PCOS.

Materials and Methods

The study was conducted among 24 women (age range: 20-38 years) under outpatient observation at the clinical base of the Bukhara region. All participants were confirmed with a diagnosis of polycystic ovary syndrome (PTTS) in accordance with the Rotterdam criteria (ESHRE/ASRM, 2003) based on clinical, laboratory, and ultrasound parameters. All patients who participated in the study expressed their informed consent in writing.

The study participants were divided into two groups:

- Main group (n=12) - treatment based on an integrative approach (metformin, probiotic complex, diet therapy, psychological support);

- Control group (n=12) - standard therapy for PTTS (only metformin 1500 mg/day).

The duration of the study was 12 weeks. All patients were assessed at the initial (week 0) and final (week 12) stages.

- Research criteria and evaluation parameters. Metabolic metrics:
- Blood plasma glucose level (mmol/L);
- Insulin level (μU/mL);
- The level of insulin resistance was assessed using the HOMA-IR index (glucose × insulin / 22.5).

Hormonal indicators:

- The levels of luteinizing hormone (LH), follicle-stimulating hormone (FSH), testosterone, and antimyuller hormone (AMH) were measured by enzyme-linked immunosorbent assay (ELISA).
- The LH/FSH ratio was also calculated, which was considered an important indicator of ovulation dysfunction.

Microbiome analysis:

- The composition of the intestinal microbiota was assessed using the 16S rRNA gene sequencing method from fecal samples.
- The ratio of rocks of the main taxonomic groups - Bacteroides, Lactobacillus, and Prevotella - was analyzed.
- Microbiome diversity was assessed according to the Shannon index.

Epigenetic analyses:

- The degree of methylation of the CYP17A1 and INSR genes in the DNA of blood samples was measured by methyl-specific PCR.
- The expression levels of miRNA-21 and miRNA-222 were analyzed using qPCR (real-time PCR).
- These markers were selected as the main genes involved in the mechanisms of insulin signaling and hyperandrogenism associated with PTTS.

The following complex integrative treatment program was applied to the main group for 12 weeks:

- Metformin - 1500 mg/day (3 times, after meals);
- Probiotic complex - capsules containing Lactobacillus acidophilus and Bifidobacterium bifidum strains (1 time a day);
- Diet therapy - a diet with a low glucose index, rich in fiber, rich in omega-3 fatty acids and antioxidants (vegetables, fruits, whole grains, fish);
- Psychological support - weekly sessions that include elements of stress reduction, sleep hygiene, and motivational counseling.

The control group was treated only with metformin according to the standard treatment protocol.

Statistical analysis. The obtained data were analyzed in the SPSS 26.0 program. The average values were represented as M ± SD. Student's t-test (parametric) or Mann-Whitney's test (nonparametric) was used to assess the differences between the groups.

The relationship between microbiome ratios and epigenetic markers was analyzed using Pearson or Spearman correlation coefficients. The value $P < 0.05$ was considered statistically significant.

1. Changes in metabolic indicators. According to the study results, significant positive dynamics in metabolic indicators were observed in the main group after 12 weeks of integrative treatment.

At the initial stage, insulin resistance (HOMA-IR > 2.5) was noted in all patients. After integrative therapy, the HOMA-IR index in the main group decreased from 3.8±0.4 to 2.1±0.3 ($p<0.01$), while in the control group the change was from 4.0±0.5 to 3.5±0.4, with no statistically significant difference ($p>0.05$).

These results indicate that the combination of metformin and the probiotic complex has a synergistic effect on the restoration of glucose-homeostasis. Probiotics enhance the synthesis of short-chain fatty acids (SCFA) in the intestine, improve insulin sensitivity, and normalize liver lipid metabolism.

Table 1.
Changes in metabolic indicators in PTTS patients before and after treatment

Indicator	Main group (n=12) before treatment	Main group after treatment	Control group (n=12) before treatment	Control group after treatment	P (main group)
Glucose (mmol/L)	6.2 ± 0.5	5.3 ± 0.4	6.1 ± 0.6	5.9 ± 0.5	<0.05
Insulin (μU/mL)	18.5 ± 3.1	12.2 ± 2.8	17.9 ± 3.4	16.8 ± 3.1	<0.01
HOMA-IR index	3.8 ± 0.4	2.1 ± 0.3	4.0 ± 0.5	3.5 ± 0.4	<0.01

2. Improvement of the hormonal profile. In patients who underwent integrative therapy, the restoration of hormonal balance was observed. At the end of 12 weeks in the main group:

- The LH/FSH ratio decreased from 2.6 ± 0.5 to 1.4 ± 0.3 ($p < 0.01$);
- The level of testosterone decreased from 2.8 ± 0.4 nmol/L to 1.9 ± 0.3 nmol/L ($p < 0.05$);
- The level of AMH (antimuller hormone) showed a tendency to decrease from 7.2±0.6 to 5.1±0.5 ng/ml.

These results confirm that the normalization of the ovulation cycle and the reduction of androgen secretion occur faster through an integrative approach. In the control group, no significant changes were observed in the ratio of testosterone and LH/FSH.

Table 2.

Dynamics of hormonal parameters after 12 weeks of treatment

Hormonal indicator	Main group (n=12) before treatment	Main group after treatment	Control group (n=12) before treatment	Control group after treatment	P (main group)
LH (mIU/mL)	12.8 ± 2.1	8.5 ± 1.8	12.4 ± 2.0	11.2 ± 2.3	<0.05
FSH (mIU/mL)	4.8 ± 0.9	5.9 ± 1.0	4.6 ± 0.8	4.9 ± 1.0	<0.05
LH/FSH ratio	2.6 ± 0.5	1.4 ± 0.3	2.7 ± 0.6	2.3 ± 0.5	<0.01
Testosterone (nmol/L)	2.8 ± 0.4	1.9 ± 0.3	2.7 ± 0.5	2.5 ± 0.4	<0.05
AMH (ng/mL)	7.2 ± 0.6	5.1 ± 0.5	7.0 ± 0.7	6.8 ± 0.6	<0.05

3. Correction of microbiome imbalance. The results of 16C rRNA analysis of the intestinal microbiome showed a violation of the Bacteroides/Prevotella ratio in patients with PTTS. In the initial stage, Bacteroides dominated, and the Lactobacillus population decreased.

- After 12 weeks of integrative therapy in the main group:
- The ratio of Lactobacillus increased from 1.2 to 3.4 times ($p < 0.01$);
- The proportion of Bacteroides decreased from 60% to 38%;
- The Shannon index of the microbiome increased from 3.1 to 3.9, which indicates the restoration of microbial diversity.

No significant changes were noted in the control group. These findings indicate that the balance of hormonal and metabolic signaling is restored through the microbiota-intestinal-ovarian axis (gut-ovary axis).

Table 3.

Microbiome composition and diversity indicators (based on 16S rRNA analysis)

Taxonomic group / indicator	Main group before treatment (%)	Main group after treatment (%)	Control group before treatment (%)	Control group after treatment (%)	P (main group)
Bacteroides	60 ± 8	38 ± 6	58 ± 7	55 ± 6	<0.01
Lactobacillus	15 ± 3	34 ± 5	16 ± 4	18 ± 3	<0.01
Prevotella	25 ± 4	28 ± 5	26 ± 4	27 ± 5	>0.05

4. Analysis of epigenetic markers. According to the results of epigenetic analysis, a state of hypometylation in the promoter regions of the CYP17A1 and INSR genes was observed in patients with PCOS, which is considered a contributing factor to hyperandrogenism and insulin resistance.

Against the background of integrative treatment:

- The degree of methylation of the CYP17A1 gene increased from 42% to 58% ($p<0.05$);
- In the INSR gene, a tendency towards an increase in methylation from 39% to 53% was noted;

- At the same time, the expression of miRNA-21 and miRNA-222 decreased by 1.8 times, which may be associated with the normalization of insulin signaling.

An inverse correlation ($r = -0.61$; $p < 0.01$) was found between epigenetic markers and HOMA-IR, which confirms the relationship between genetic regulation and metabolic adaptation.

Table 4.
Changes in epigenetic markers
(DNA methylation and miRNA expression analysis)

Epigenetic marker	Main group (before)	Main group (after)	Control group (before)	Control group (after)	P (main group)
CYP17A1 methylation (%)	42 ± 5	58 ± 6	43 ± 4	46 ± 5	<0.05
INSR methylation (%)	39 ± 4	53 ± 5	40 ± 5	43 ± 5	<0.05
miRNA-21 expression (relative)	1.00	0.58 ± 0.1	1.00	0.88 ± 0.1	<0.01
miRNA-222 expression (relative)	1.00	0.62 ± 0.1	1.00	0.91 ± 0.1	<0.01

5. Clinical effect of the integrative approach. The integrative approach improved not only the metabolic and hormonal status, but also the general psycho-emotional state of patients. Depressive symptoms (according to the Beck scale) decreased from 18.2±3.1 to 10.4±2.7 ($p<0.05$).

In 67% of patients, restoration of the ovulation cycle was observed, while in the control group this indicator was 33%.

The obtained results show that in the pathogenesis of PCOS, insulin resistance, microbiome imbalance, and epigenetic changes constitute an interconnected multi-component system.

An integrative approach (metformin + probiotic + diet therapy + psychological support) affects all the main links of this system and normalizes metabolic, hormonal, and genetic regulation as a whole.

Conclusion

Polycystic Ovarian Syndrome (PTTS) is a multifactorial disease in which insulin resistance, microbiome imbalance, and epigenetic changes are interrelated. According to the results of the conducted research, the integrative approach (methformin, probiotics, diet therapy, and psychological support) significantly improved metabolic, hormonal, and epigenetic indicators in patients. Restoration of the microbiota plays an important role in increasing insulin sensitivity and normalizing ovulation. In the future, broader clinical studies will contribute to a more in-depth study of the long-term effectiveness of this approach.

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MODERN CHEMORADIATION THERAPY TECHNIQUES IN THE TREATMENT OF LOCALLY ADVANCED CERVICAL CANCER (LITERATURE REVIEW)

Abstract: *Objective of the Study: To analyze literature data on the novel techniques of chemoradiation therapy for locally advanced cervical cancer.*

Materials and Methods: The review comprises an analysis of articles submitted in the PubMed database.

Results: Image guidance in intracavitary radiation therapy allows for the individual optimization of dose distribution, enabling the maximum dose to be delivered to the target volume while minimizing radiation dose to organs at risk. Intracavitary radiation therapy is a decisive stage in treatment, where the local tumor volume in cervical cancer receives the maximum dose of exposure, equivalent to the total dose achieved from external beam conformal radiation therapy. Therefore, intracavitary radiation therapy is a major prognostic factor in the local control of cervical cancer.

Conclusion: It is expected that the use of 3D planning in intracavitary radiation therapy will expand in clinical practice in the near future and will be comparable in complexity to conformal radiation therapy technologies.

Keywords: *Cervical cancer, conformal radiation therapy, intracavitary radiation therapy, intratissue radiation therapy.*

Introduction

The high incidence and mortality rates of cervical cancer (CC) are alarming and represent a significant global health problem. The majority of newly diagnosed cases of cervical cancer in women occur in economically developing countries, where limited access to adequate treatment is due to poor availability of medical equipment and pharmaceutical supplies in healthcare institutions. As a result, mortality rates remain high. Consequently, treatment recommendations for cervical cancer, developed in economically advanced countries, are not adequately applicable in many developing countries.

It is known that the primary method for treating patients with locally advanced cervical cancer (LACC), where the tumor extends beyond the organ and shows signs of spread to adjacent tissue, vagina, pelvic lymph nodes, and abdominal cavity, is radical combined chemoradiation therapy. The improvement of computer technologies and imaging tools has fundamentally changed the strategy for both external beam radiation therapy (EBRT) and intracavitary radiation therapy (ICRT), allowing for the precise delivery of the prescribed dose to the target volume without exceeding the tolerance of critical organs.

With the advent of 3D planning for intracavitary radiation therapy, new challenges and opportunities arise for clinicians, which must be addressed and realized through a multidisciplinary approach.

1.1 External Beam Conformal Radiation Therapy. The main tasks of external beam radiation therapy (EBRT) are: targeting the primary tumor site and the regions of regional metastasis, which consequently improve the technical conditions for intracavitary irradiation.

Currently, all methods of external beam radiation therapy can be conditionally divided as follows: conventional irradiation, conformal irradiation, intensity-modulated radiation therapy (IMRT), and image-guided radiation therapy (IGRT).

The main principle of conformal radiation therapy is to create a high dose at the target while minimizing the dose to surrounding normal organs and tissues as much as possible.

For 3D planning, the International Commission on Radiation Units and Measurements (ICRU) No. 50 and 62 introduced the concepts of therapeutic volumes, which are mandatory for use:

- GTV (Gross Tumor Volume): the determined tumor volume that requires the maximum therapeutic dose.
- CTV (Clinical Target Volume): the clinical target volume, including the GTV and the area of subclinical manifestations.
- PTV (Planning Target Volume): the planned target volume sufficient to irradiate the entire CTV with the required dose.
- OAR (Organ-at-Risk) and PRV (Planning Organ-at-Risk Volume): the planned volume of the organ at risk included in the therapeutic isodose contour [1, 2].

Optimal dose distribution should meet the following criteria:

- 95% of PTV should receive >90% of the planned dose.
- 120% of the planned dose can be received by <10% of PTV.
- 60% of the planned dose can be received by <5% of OAR.

The maximum dose occurs within PTV [3].

The general principles of volume and field boundary planning for external irradiation of the pelvis, including the regions of regional metastasis in cervical cancer, are well-known. The total dose during EBRT is 46-50 Gy with daily fractionation of 2 Gy, which is the standard in Russia. A similar dose should be applied to the para-aortic lymph nodes if affected. The American Brachytherapy

Society has recommendations stating that in cases of para-aortic lymph node involvement, an additional dose in the form of a local boost should be given to achieve a total dose of 60-70 Gy [11]. To reduce local recurrences and distant metastasis, it is recommended to combine external radiation therapy with cisplatin-based chemotherapy at a dose of 40 mg/m², which remains the standard treatment today [4].

Thus, volumetric planning allows for more precise delineation of the boundaries between the clinical and planned target volumes, especially in cases of locally advanced cervical cancer with regional pelvic and para-aortic lymph node involvement. Several studies have been dedicated to investigating biological factors that influence the response to radiation in locally advanced cervical cancer, showing that conventional external irradiation of the entire pelvis with a total dose of 35-50 Gy (2 Gy per fraction) may not be sufficient. According to the literature, approximately 50% of patients after such external radiation therapy have residual tumors of varying sizes, expressing oncogenic proteins associated with radioresistance [4,5].

Therefore, by the time intracavitary radiation therapy is performed after the completion of EBRT, the residual tumor consists of a pool of relatively radioresistant cells. Thus, the goal of external radiation therapy at the first stage of the radical combined treatment course for locally advanced cervical cancer is to achieve partial tumor regression, suppress tumor growth, reduce inflammation in surrounding tissues, and, consequently, create conditions for the administration of intracavitary radiation therapy.

A study conducted under the leadership of Kalash R. and colleagues (2018) noted that integrating PET/CT helps accurately identify patients at risk of recurrence and helps to identify patients with a worse distant prognosis. According to the presented data, incomplete responses after the intracavitary radiation therapy phase were observed in 20% of patients [6].

In studies by Malyapa R. et al. and Lin L. et al., the role of PET/CT in planning intracavitary radiation therapy sessions was evaluated, with authors reporting better target volume coverage without significantly increasing the dose to organs at risk.

1.2 Chemotherapy. External beam conformal radiation therapy, combined with chemotherapy and followed by intracavitary radiation therapy in the second stage of treatment, is the standard treatment for locally advanced cervical cancer (LACC). The total duration of the chemoradiation therapy course should not exceed 55 days.

A meta-analysis (Duenas-Gonzalez et al., 2003), based on 18 studies involving 3452 patients, showed that chemotherapy with cisplatin was used in 85% of patients, although chemotherapy regimens without platinum-based drugs were found to be equally effective (Vale et al., 2008). The results demonstrated an absolute improvement in 5-year survival rates by 6% (from 60% to 66%) and an 8% improvement in 5-year progression-free survival with conformal radiation

therapy combined with chemotherapy, compared to conformal radiation therapy alone.

The total number of cisplatin administrations during chemoradiation therapy plays a significant role in the systemic control of patients with cervical cancer who have an unfavorable prognosis. In the EMBRACE study (2016), involving 753 cervical cancer patients, worse overall control was noted in patients with N+ disease who received fewer than 4 cycles of cisplatin-based chemotherapy, compared to those who received 5 or more cycles. At the 24-month follow-up, cervical cancer patients with N+ and stages III-IV demonstrated systemic control in 63% of cases with less than 4 cycles of chemotherapy, compared to 88% in those who received more than 5 cycles. At 3 and 5 years of follow-up, the survival rate without detectable metastases was 79% and 77%, respectively. These results align with those of Schmidt (2014), which showed that administering 5-6 cycles of cisplatin-based chemotherapy can reduce the risk of distant metastasis, especially in patients with N+ and locally advanced cervical cancer (LACC) [7].

1.3 Intracavitary Radiation Therapy. Intracavitary radiation therapy for cervical cancer has profoundly influenced the development of various "systems" that attempted to combine empirical, systematic, and scientific approaches to treating cervical cancer.

With the advent of new technological approaches in radiation therapy methodology for cervical cancer, the GEC-ESTRO working group was formed in 2000. It consisted of doctors and medical physicists specializing in brachytherapy for oncological gynecological patients. Their initial goal was to describe new concepts and terms for unified terminology in the development of 3D intracavitary radiation therapy (ICRT) under visual control, focusing on MRI images, which are the preferred method of visualization. Additionally, the goal was to develop guidelines for dose-volume parameters in 3D ICRT. As a result, this allowed the development of a common language of definitions and led to improved information collection, analysis, and evaluation of patient treatment outcomes.

The general terminology and key concepts for implementing applicator systems under visual control were defined. Ultimately, after conducted studies, the GEC-ESTRO group identified the following volumes determined by MRI images:

- GTV (Gross Tumor Volume): This includes any visible and palpably detectable manifestation of disease at the time of intracavitary radiation therapy, as well as the "white" signal area defined by MRI images.
- HR-CTV (High-Risk Clinical Target Volume): This volume includes the previously defined GTV, the entire cervix, and all "gray zones" in the vagina, parametrium, uterine body, bladder, and rectum in T2-weighted MRI images. Gray zones are defined as tissues with intermediate signal intensity in the primary tumor spread area on T2-weighted MRI images.
- IR-CTV (Intermediate-Risk Clinical Target Volume): This is created by placing safety margins of 5-15 mm evenly from the HR-CTV, excluding adjacent normal structures (bladder, rectum, sigmoid colon) [8].

The planning target volume (PTV) is not added to the HR-CTV or IR-CTV, as the applicator is stabilized relative to the patient's anatomy, and therefore no additional margin is necessary. The HR-CTV volume is of the most importance, as this is the volume for which the treatment plan is optimized and doses are prescribed.

The GEC-ESTRO working group concluded that the use of this standard terminology could lead to the standardization of treatment across different centers.

The DVH parameters D90 and D100 were identified to assess target coverage. The D90 volume is less sensitive to small variations in target delineation than D100 and, therefore, is a more stable parameter for dose prescription. Instructions and worksheets developed at the University of Vienna for calculating EQD2 are available for online reading [9].

The American Brachytherapy Society (ABS) published its recommendations for intracavitary radiation therapy for cervical cancer in the high dose-rate (HDR) range in 2000 and for low dose-rate (LDR) intracavitary radiation therapy for cervical cancer in 2002. These reports state that intraoperative orthogonal X-rays or fluoroscopy should be primarily used to verify the correct placement of the applicator. Correct applicator placement leads to improved overall and progression-free survival in patients with locally advanced cervical cancer. The applicator's movement and/or re-placement should occur before the positioning verification. The ABS updated their recommendations in 2012 in three parts.

When planning an ICRT session, the visualization of MRI/CT images is essential, with cross-sectional images having a slice thickness of 1 mm to 5 mm. For institutions using MRI for treatment planning, target volumes (GTV, HR-CTV, IR-CTV) should match those previously described in GEC-ESTRO recommendations. For institutions using CT-based planning, only HR-CTV is determined, which should include the entire cervix width, any parametric spread. The cranial size of the cervix should be extended by 1 cm towards the uterine vessels (if possible, intravenous contrast administration is recommended) or to where the cervix visually begins to widen. If the cervix cannot be adequately visualized on CT, the cranio-caudal height of the cervix should be taken as 3 cm.

The EMBRACE study (2015) recommends limiting doses to organs at risk but following the prescribed doses for ICRT as per the accepted traditions of specific clinics and general medical practice.

CT images for 3D planning allow for visualization of the primary cervical tumor, organs at risk, rectovaginal, and vesicovaginal septa. Early studies consistently showed that the maximum doses to the bladder, bladder neck, and rectum were higher when contouring was done based on CT images as compared to orthogonal radiographs.

For example, Kapp et al. studied 720 brachytherapy sessions for cervical cancer with an Iridium-192 HDR source and compared doses to the bladder and rectum obtained from contouring with orthogonal radiographs and CT images. They found that maximum doses to the bladder and rectum were, on average, 1.44 and 1.37 times higher when using CT images, respectively. The study emphasized

the importance of evaluating doses across the entire volume of normal organs, not just the point of maximum dose.

Schoeppel et al. and Datta et al. (2006) compared doses to the bladder and rectum using orthogonal radiographs and CT scans and found that orthogonal radiographs significantly underestimated actual doses. Moreover, both studies showed that dose distribution relative to point A inadequately covered the cervix and/or tumor volume in all patients. Point A, as well as bladder and rectum points, weakly correlated with actual doses based on CT, although these studies did not attempt to correlate dosimetric data with clinical outcomes [10].

Conclusion

Thus, techniques based on the interpretation of 3D imaging in intracavitary radiation therapy (ICRT) require mastering several complex stages: knowledge of anatomy, pathology, 3D visualization, medical physics, biology, clinical experience, and the application of dose-volume histogram (DVH) parameters. Unfortunately, in Russia and the CIS countries, ICRT with 3D planning based on CT/MRI images is insufficiently implemented. It is applied only in some clinics and often not to all patients or not at all. This is due to poor technical equipment and the lack of training centers for doctors and medical physicists.

Significant time is required for training and fully understanding the various aspects of these complex methods. However, it is expected that, in the near future, ICRT planned with 3D imaging will become more widely used in clinical practice and will be comparable in complexity to conformal radiation therapy technologies.

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GLOBALLASHUV VA YOSHLAR: MA’NAVIY TAHDIDLARGA QARSHI KURASH STRATEGIYALARI

Annotatsiya. *Ushbu maqola globallashuv jarayonida yoshlar orasida yuzaga keladigan ma’naviy tahdidlarga qarshi kurash strategiyalarini tahlil qiladi. Maqolada zamonaviy ijtimoiy-madaniy muhit sharoitida yoshlarning ma’naviy qadriyatlarini saqlash va mustahkamlash usullari, ularni salbiy ta’sirlardan himoya qilish mexanizmlari ko‘rib chiqiladi. Shuningdek, globallashuvning yoshlar ongiga ta’siri hamda ularni ma’naviy jihatdan barqaror va tanqidiy fikrlashga o‘rgatish bo‘yicha samarali strategiyalar va amaliy tavsiyalar taqdim etiladi. Maqola yoshlarga ta’lim va tarbiya jarayonida zamonaviy sharoitda ma’naviy barqarorlikni ta’minlash uchun ilmiy va amaliy yondashuvlarni o‘z ichiga oladi..*

Kalit so‘zlar: *globallashuv, integratsiya, ma’naviyat, Yangi O‘zbekiston, yoshlar, ma’naviy tahdid, ommaviy madaniyat, ta’lim-tarbiya.*

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GLOBALISATION AND YOUTH: STRATEGIES FOR COMBATING SPIRITUAL THREATS

Annotation: *This article analyzes strategies for combating spiritual threats that arise among young people in the process of globalization. The article considers methods for preserving and strengthening the spiritual values of young people in the conditions of the modern socio-cultural environment, mechanisms for protecting them from negative influences. It also presents effective strategies and practical recommendations for the impact of globalization on the minds of young people and teaching them to be spiritually stable and critical thinking. The article includes scientific and practical approaches to ensuring spiritual stability in the process of education and upbringing of young people in modern conditions.*

Keywords: *globalization, integration, spirituality, New Uzbekistan, youth, spiritual threat, mass culture, education.*

O‘zbekiston Respublikasining Birinchi Prezidenti I.A.Karimov ta’kidlaganidek, “Globallashuv –bu avvalo hayot sur’atlarining beqiyos darajada tezlashuvi demakdir”[1].

Bizga ma’lumki, bugungi globallashuv jarayonida dunyoda g‘oyaviy, mafkuraviy kurash kechmoqda. YA’ni dunyoni g‘oyaviy jihatdan bo‘lib olishga bo‘lgan urinish ketmoqda. Albatta, bunday vaziyatda mamlakat barqarorligini, farovonligini, tinchligini va kelajagini ta’minlash har birimizning yuksak burchimizdir. Ayniqsa, yoshlarimizning bu jarayonda faol ishtirok etishlari davr talabidir. Bugungi kunda Respublikamiz aholisining 65 foizini yoshlar tashkil etib, bu yoshlar bugungi kunda jamiyatda olib borilayotgan islohotlarda faol ishtirok etishlari, Vatan ravnaqi, yurt tinchligi yo‘lida munosib xizmat qilishlari katta ahamiyatga egadir. O‘zbekiston Respublikasining Birinchi Prezidenti I.A.Karimov mustaqilligimizning dastlabki yillaridanoq yoshlarga, ularning jamiyatdagi faoliyatiga katta e’tiborni qaratib, ular uchun barcha shart-sharoitlar va imkoniyatlar yaratib, xamisha kelajakda ma’naviy barkamol va jismoniy sog‘lom bo‘lishlarini ta’kidlamoqda. “Yoshlar tarbiyasi, barkamol avlod deganda, biz O‘zbekistonning buyuk kelajagini nazarda tutamiz”[2].

Shunday ekan, bugungi globallashuv jarayonida yoshlarimizni turli buzg‘unchi, yot g‘oyalardan asrash, ularni ma’naviy barkamol va jismonan sog‘lom qilib voyaga yetkazish zaruriyatga aylanayotir. Yosh avlodni tarbiyalash-xalqni tarbiyalash deganidir. Xalqimizga xos bo‘lgan mehr-oqibat, mehr-shavqat, qadr-qimmat, odamgarchilik, mehmondo‘stlik, o‘zaro hurmat kabi tushunchalar hamma xalqlarda ham uchrayvermaydi. Ayni paytda, boy qadriyatlarimiz va yuksak ma’naviyatimizga taovuzkorona harakatlar bo‘layotganligini ham esdan chiqarmasligimiz lozim. Shulardan biri “ommaviy madaniyat”dir. Shu sababli bugungi kunda ba’zi yoshlarimizning zamonaviylik, moda yoki “zamon talabi” deb tushunayotgan, bizning mentalitetimiz, qadriyatlarimiz, urf-odatlarimiz va dinimizga zid bo‘lgan bunday qarashlarga qarshi kurashish ayni muddao. Buning oldini olish, eng avvalo uning zararli oqibatlarini milliy va umuminsoniy qadriyatlarimizga mutlaqo zid ekanligini yoshlarimizga tushuntirishimiz lozimdir.

Birgina, oiladagi o‘zaro hurmat, ota-onaga sharqona va milliy qadriyatlar asosida hurmatda bo‘lish, ayollarga nisbatan ham milliy qadriyatlarimiz asosida munosabatda bo‘lish, oilada farzand tarbiyasida milliy qadriyatlarimizga mos holda tarbiya va ta’lim olib borish, go‘daklik chog‘idanoq dastlab, ya’ni ularga ism qo‘yishdan tortib, to o‘zini anglagunga qadar boy ma’naviy merosimiz, xalq og‘zaki ijodimiz, sharqona qadriyatlarimiz, ajdodlarimizdan bizgacha yetib kelgan o‘gitlar asosida tarbiyaviy ishlarni olib borish talab etiladi. Yoshlikdan ularning qalbida vatanparvarlik, milliy g‘urur, insonparvarlik, umuminsoniy qadriyatlarga hurmat, ota-onaga hurmat va izzat ko‘rsatish va boshqa insoniy fazilatlarni singdirib borishimiz, bularning barchasi bugungi kunda yoshlarimizda ma’naviy tahdidlarga qarshi kurashda zamin bo‘lib xizmat qiladi, deb o‘ylaymiz.

Shunday ekan, kelajagimiz vorisi hisoblanmish yosh avlodni avaylab-asrash, ularda milliy-ma’naviy qadriyatlarimizga hurmat xissini shakllantirish har birimizga yuksak mas’uliyatni yuklaydi. Shuningdek, 2018 yil 30 iyun kuni

Prezidentimiz Shavkat Mirziyoyevning O‘zbekiston yoshlariga bayram tabrigida: “Yoshlarimizning hayotiy muammolariga yanada ko‘proq e’tibor qaratish, ularga mos bo‘lgan zamonaviy ish o‘rinlarini ko‘paytirish, ezgu intilish va tashabbuslari, innovatsion g‘oyalarini qo‘llab-quvvatlash, yosh avlodimizning ijtimoiy-maishiy sharoitlarini yaxshilash bundan buyon ham barcha darajadagi davlat idoralarining eng asosiy, hal qiluvchi vazifasi bo‘lib qoladi ”[3]

Demak, yuksak ma’naviyat mustaqilligimizni mustahkamlashda, yoshlarimizning xaqiqiy Vatan o‘g‘lonlari bo‘lib voyaga yetishlarida va boshqa jihatlarida bosh omil bo‘lib xisoblanar ekan, bugungi kunda yoshlarimizongiga qadimiy boy ma’naviy merosimizni singdirishimiz va albatta, bugungi globallashuv jarayonida milliy ma’naviyatimizga tahdid solayotgan buzg‘unchi g‘oyalarga qarshi kurashda muhim “qurol” bo‘lib xizmat qiladi. Chunki, ma’naviy tahdid deganda avvalo, tili, dini, e’tiqodidan qat’iy nazar, har qaysi odamning tom ma’nodagi erkin inson bo‘lib yashashiga qarshi qaratilgan, uning aynan ruhiy dunyosini izdan chiqarish maqsadini ko‘zda tutadigan mafkuraviy, g‘oyaviy va informatsion hurujlarni Bugungi kunda yot mafkuralar mafkuraviy kurashlarning zamonaviylashtirilgan uslublari: axborot maydonini egallab olish; mafkuraviy diversiya, mafkuraviy infiltratsiya, mafkuraviy qo‘poruvchilik va boshqa xarakatlarini qo‘llash orqali xalqimizda O‘zbekistonning buyuk kelajagiga ishonchsizlik uyg‘otishga, davlat siyosatini obro‘sizlantirishga, odamlarning o‘zini Vatan, millat himoyasidan chetga tortishga, loqaydligiga erishishga intiladilar.

Har qanday jamiyat bunday makkor tahdidlarni yengish uchun o‘zida ogohlik, mafkuraviy havfsizlik, to‘kislik, jangovorlik, safarbarlik, umummilliy birlik kabi ijtimoiy sifatlarga ega bo‘lishi kerak. Buning uchun milliy mafkuramizning yot mafkuralarga qarshi kurash uslublari, jumladan, buzg‘unchi g‘oyalar mohiyatini fosh qilishga qaratilgan targ‘ibot, mafkuraviy monitoring va tahdidlar mohiyatini xalqimiz ongi va qalbiga singdirish, jaholatga qarshi ma’rifat bilan kurashish g‘oyasini hamma joyda foydalanish taqozo qilinadi.

Mamlakatda barqaror rivojlanishning muhim shartlaridan biri bu g‘oyaviy tarbiyani kuchaytirishdan iboratdir. Bu borada kishilarimizda yot va zararli g‘oyalarga qarshi kurashish uchun mafkuraviy immunitetni shakllantirish zarur. Albatta, mafkuraviy immunitetni shakllantirish kishilar ongiga bir xil g‘oyani zo‘r berib tiqishtirish emas, balki odamlarda oq-qora ajratish, zararli g‘oyalarga qarshi hushyor va ogoh bo‘lish, mustaqil fikrga ega bo‘lish kabi xususiyatlarni shakllantirish demakdir. Demak, bugungi kunda jamiyatga yangicha fikrlaydigan, demokratik qadriyatlar ruhida tarbiyalangan mamlakat kelajagini jahon hamjamiyatiga integratsiyalashuvi bilan bog‘liq holda ko‘ra oladigan yoshlarning dunyoni chuqur anglaydigan, zamon bilan barobar qadam tashlaydigan insonlar bo‘lib yetishishlariga ahamiyat qaratmoq lozim. Qadimdan eng buyuk boylik bo‘lgan yuksak ma’naviyatning ma’no-mazmuni, inson va jamiyat hayotidagi o‘rni va ahamiyati keng qamrov ila tahlil qilinsa, yoshlarning ijtimoiy-siyosiy, ma’naviy-ma’rifiy dunyoqarashini shakllantirishga samarali tarzda xizmat qiladi.

Xulosa o‘rnida shuni aytish mumkunki, bugungi globallashuv jarayonida yoshlarimizni yuksak ma’naviyatli qilib tarbiyalashimiz, ularning ongida Vatan

ravnaqi, yurt tinchligi g‘oyasiga to‘siq bo‘ladigan buzg‘unchi, yot g‘oyalarga qarshi g‘oyaviy immunitetni shakllantirishimiz, yoshlarimizning jahondagi hech bir yoshlardan iqtidor, qobiliyat, intelektual, dunyoqarash jihatidan kam emasligini, bugungi kunda ma’naviy jasorat tuyg‘usini shakllantirish, yoshlarimiz o‘z iqtidori, qobiliyati bilan dunyoga chiqayotganligini doimiy ravishda eslatib turishimiz lozim deb o‘ylaymiz. Agar tinchlik-osoyishtalik bo‘lmasa, mehr-oqibat bo‘lmasa, biz orzu qilgan va intilayotgan erkin va farovon hayotni qurib bo‘lmaydi.

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YAPON BEDANALARNING QON ANALIZI NATIJALARIGA ZN VA CU MIKROELEMENTLARI BILAN BOYITILGAN OZUQA RATSIONINI TA`SIRI

Annotatsiya: *Ushbu tadqiqotning maqsadi rux (Zn) va mis (Cu) mikroelementlari bilan boyitilgan parhezning yapon bedanalarining (Coturnix japonica) qonining morfologik va biokimyoviy ko‘rsatkichlariga ta’sirini o‘rganish edi. Tajriba uchta guruhda olib borildi: nazorat guruhi (asosiy ovqatlanish) va ikkita eksperimental guruh (Zn va Cu bilan boyitilgan diyeta).Tadqiqot natijalari shuni ko‘rsatdiki, mikroelementlar kombinatsiyasini olgan eksperimental guruhda (T–1) gemoglobin darajasi 37,8% ga, qizil qon tanachalari soni 30,8% ga, gematokrit esa sezilarli darajada oshdi. Shuningdek, qondagi umumiy oqsil, uglevodlar, kalsiy va fosfor konsentratsiyasi ham ortadi, xolesterin darajasining esa pasayishi kuzatildi. Barcha guruhlarda eritrotsitlarning cho‘kindi jinsi darajasi (ECHT) normal chegaralarda qoldi. Gematologik va biokimyoviy ko‘rsatkichlarning yaxshilanishi eksperimental guruhlarda tuxum ishlab chiqarishning oshishi bilan bog‘liq ekanligi aniqlandi. Bu mikroelementlar organizm metabolizmini, tabiiy chidamliligini va mahsuldorligini yaxshilashga ijobiy ta’sir ko‘rsatadi. Xususan, Zn fermentlar faoliyatini faollashtirsa, Cu qon aylanishi va immun tizimiga ijobiy ta’sir ko‘rsatadi, bu esa parrandalarning umumiy fiziologik holatini barqarorlashtiradi.Olingan ma’lumotlar asosida xulosa qilinadiki, mikroelementlar bilan boyitilgan parhez bedanalarning metabolik jarayonlarini rag‘batlantirish, tuxum mahsuldorligini oshirish va tabiiy chidamliligini yaxshilashda samarali. Bu tadqiqot natijalari bedanalar etishda mikroelement qo‘shimchalarini ishlatishning iqtisodiy maqsadga muvofiqligini ham tasdiqlaydi.Shuningdek, mikroelementlarning optimal dozada qo‘llanilishi tuxum sifati va sog‘lom parranda rivojlanishini ta’minlaydi, ortiqcha miqdorda qo‘llanilsa toksik ta’sirlar va mahsuldorlikda pasayish kuzatiladi. Shu sababli, parrandochilikda ozuqa balansini ilmiy asosda tashkil etish va mikroelementlarni ratsional qo‘llash muhimdir.*

Kalit so’zlar*: Rux, mis, oqsil, kalsiy, ferment, immunitet, vitamin, tuxum, makroelement, mikroelement, Coturnix japonica.*

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THE EFFECT OF A FEED DIET ENRICHED WITH ZN AND CU MICROELEMENTS ON BLOOD TEST RESULTS IN JAPANESE QUAIL

Abstract :*The aim of this study was to investigate the effects of zinc (Zn) and copper (Cu) supplementation on the morphological and biochemical parameters of Japanese quail (Coturnix japonica) blood.Three experimental groups were established: Control group – standard diet;Experimental group T–1 – diet enriched with optimal levels of Zn and Cu;Experimental group T–2 – diet enriched with excessive levels of Zn and Cu.Results showed that in group T–1, hemoglobin levels increased by 37.8%, red blood cell count by 30.8%, and hematocrit significantly improved. Additionally, total protein, carbohydrate, calcium, and phosphorus concentrations increased, while cholesterol levels decreased. The erythrocyte sedimentation rate (ESR) remained within normal limits in all groups.The improvement in hematological and biochemical parameters was correlated with increased egg production in the experimental groups. Zinc enhanced enzymatic activity, while copper positively influenced blood circulation and immune function. Optimal supplementation of these microelements improved egg quality and overall physiological condition, whereas excessive amounts led to toxic effects and decreased productivity. In conclusion, a diet enriched with Zn and Cu effectively stimulates metabolic processes, enhances egg productivity, and improves the natural resilience of quails. These findings support the economic feasibility of using microelement supplements in quail production.*

Keywords: *Zinc, copper, protein, calcium, enzyme, immunity, vitamin, egg, macroelement, microelement, Coturnix japonica.*

Kirish

Minerallar bedana vaznining 3-5% ni tashkil qiladi. Ular organizmda sintezlanmaydi shuning ozuqa bilan berilishi kerak. Ekiladigan yerlarning uzoq yillar davomida intensiv ishlatilishi tuproqning minerallarga kambag‘allashishi va buning oqibatida yetishtirilayotgan don mahsulotlarida ularning defitsiti kuzatilmoqda. Bu defitsitning o‘rnini to‘ldirish uchun boqilayotgan bedanalarning ozuqa ratsioni oqsil, yog‘, uglevod va vitaminlardan tashqari minerallarni ham o‘z ichiga olishi kerak. Minerallar makro va mikroelemenlarga bo‘linadi. Makroelementlarga kalsiy, fosfor kaliy, magniy, oltingugurt va osh tuzi kiradi. Xayvonlarning faoliyati 14 ta mikroelement tomonidan taminlanadi. Ular orasida temir, marganes, rux, mis, kobalt, yod, ftor, xrom, molibden, vannadiy nikel stronsiy, kremniy, selenlar bor. Rux mikroelementi organizmda turli enzimlarning kofaktori bo‘lganligi uchun muhim mikroozuka hisoblanadi (Yildiz N.Z. et

all,2006). Tuxum qo‘yuvchi parrandalar ozuqasida misning vazifasi qonda xolesterin miqdorini normal saqlash, suyaklar o‘sishini taminlash hamda ko‘pgina kasalliklar profilaktikasidadir (Pesti, Bakalli ,1996). Biz Zn va Cu mikroelementlari bilan boyitilgan ozuqa ratsionining bedana qonining morfologik parametrlariga ta’sirini aniqlash maqsadida ilmiy-amaliy ish qildik. Qonning morfofiziologik ko‘rsatkichlari organizmning fiziologik holatining asosiy ko‘rsatkichlaridan bo‘lib, parrandalarning mahsuldorlik va yashash sharoitiga moslashish xususiyatlari bilan chambarchas bog‘liqdir.

Material va usullar: Tadqiqot “yapon” zoti bedanalari ustida olib borildi. Parrandalar 3 guruhga ajratildi: nazorat guruhi (tanlangan ozuqa), tajriba-1 guruhi (tanlangan ozuqaga Cu 1mg/l + Zn 5mg/l mikroelementlari qo‘shilgan) va tajriba-2 guruhi. Tajriba muddati 90 kun davom etdi. Har bir guruhdan 30, 60 va 90 kunli bedanalardan qon namunalari olinib, morfologik (gemoglobin, eritrotsitlar, gematokrit, ECHT) va bioximik (umumiy oqsil, uglevodlar, kalsiy, fosfor, xolesterin) ko‘rsatkichlar aniqlandi. Statistik tahlil M±m (n=25) ko‘rsatkichida olib borildi.

Natijalar va muhokama

Bedana qonining morfologik tarkibi.

Ko‘rsatgichlar	**Guruhlar**		
	Nazorat	**Tajriba-1**	**Tajriba-2**
Gemoglabin, g/l	164,51±0,36	226,42±1,24	153.24±1,31
Eritrotsit, 10^{12}/l	2.79±0,45	3.65±0,65	2.56±0,84
Gemotokrit	42.61±0,98	50.98±0,78	38.14±0,67
ECHT, mm/s	3.17±1,04	3.18±1.14	3.14±1.32

M±m, n=25

1-jadval bo‘yicha tajriba-1 guruhidagi bedanalar qonidagi gemoglobin miqdori nazorat guruhiga nisbatan 37.8% ga, eritrotsitlar soni 30.8% ga, gematokrit 19.6% ga ortdi. ECHT barcha guruhlarda me’yor doirasida saqlandi. Bu esa Cu va Zn mikroelementlarining gematopoez jarayonini yaxshilashidan darak berdi.

Bedana qonining ba’zi biokimyoviy ko’rsatgichlari.

Indeks	**Guruhlar**	
	Nazorat	**Tajriba**
Uglevod, mmol/l	48,5±0,32	52,1±0,27
Protein, g/l	74,7±0,34	78,6±0,41
Kalsiy, mmol/l	11,72±0,10	12,69±0,07
Fosfor, mmol/l	5,14±0,04	5,79±0,02
Xolesterin, mmol/l	2,53±0,04	1,74±0,04

M±m, n=25

2-jadval bo‘yicha tajriba guruhidagi bedanalar qonidagi umumiy oqsil 3.9 g/l, uglevodlar 3.60 mmol/l, kalsiy 0.97 mmol/l, fosfor 0.65 mmol/l ortgani, xolesterin esa sezilarli darajada (31.2%) pasaygani ko‘zga tashlandi. Bu natijalar ratsionni mikroelementlar bilan boyitish oqsil, uglevod, mineral va lipid almashinuvini yaxshilashini ko‘rsatdi.

Shuningdek, tajriba guruhlarida, ayniqsa Cu 1mg/l + Zn 5mg/l mikroelementlari qo‘llangan guruhda, tuxum mahsuldorligining ortishi kuzatildi.

Olgun O. et all,(2020) organik misning bedanalar mahsuldorligiga tasirini o‘rganib, tuxum mahsuldorligi oshganligini va qon analizlari ko‘rsatkichlarida sezilarli o‘zgarish qayd etishmagan.

Xulosa

1. Cu (1mg/l) va Zn (5mg/l) mikpoelementlari bilan boyitilgan ozuqa ratsioni bedanalar qonining morfologik va bioximik ko‘rsatkichlariga ijobiy ta’sir ko‘rsatadi, gematopoezni faollashtiradi va metabolizmni yaxshilaydi.

2. Ushbu ozuqa ratsioni bedanalarning tabiiy rezistentligini oshirish bilan birga tuxum mahsuldorligini ortishiga xizmat qiladi.

3. Ozuqa ratsionini Zn va Cu mikroelementlari bilan boyitish parrandachilikda iqtisodiy samaradorlikni oshirishning samarali usuli sifatida tavsiya etiladi.

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YAPON BEDANALARINIG TUXUM MAHSULDORLIGIGA ZN VA CU MIKROELEMENTLARING TA`SIRI

Annotatsiya*: Ushbu tadqiqotda rux (Zn) va mis (Cu) mikroelementlarining yapon bedanalarining (Coturnix japonica) tuxum mahsuldorligiga ta'siri o'rganildi. Tadqiqotda uchta tajriba guruhi shakllantirildi: nazorat guruhi, optimal miqdorda mikroelementlar berilgan (T–1) va ortiqcha miqdorda mikroelementlar berilgan (T–2) guruhlar. Tajribalar davomida har bir guruhdagi qushlar bir xil oziqlantirish va saqlash sharoitida boqildi.Olingan natijalar shuni ko'rsatdiki, Zn va Cu mikroelementlarining optimal miqdorda berilishi yapon bedanalarining tuxum mahsuldorligini sezilarli darajada oshirgan. Xususan, tuxum soni, o'rtacha tuxum og'irligi, po'choq qalinligi va tuxum sifat ko'rsatkichlari yaxshilangan. Ammo mikroelementlar me'yordan ortiqcha miqdorda qo'llanilganda tuxum soni va og'irligi kamaygan, shuningdek, parrandalarda ishtahaning pasayishi va fiziologik stress belgilari kuzatilgan.Bu natijalar Nair (2022) va Hunchak (2021) tadqiqotlari bilan mos keladi hamda mikroelementlarning tuxum sifatiga, kalsiy almashinuvi va oqsil sinteziga bevosita ta'sir ko'rsatishini tasdiqlaydi. Shuningdek, Zn va Cu ning optimal darajada berilishi parrandalarning umumiy fiziologik holatini yaxshilab, energiya almashinuvi va jinsiy gormonlar faoliyatini faollashtirgan.Umuman olganda, tadqiqot natijalari rux va misning muvozanatli miqdorda qo'llanilishi yapon bedanalarida tuxum ishlab chiqarish darajasini oshirish, tuxum sifatini yaxshilash va sog'lom rivojlanishni ta'minlashda muhim omil ekanligini ko'rsatadi. Ushbu xulosalar parrandachilik xo'jaliklarida yem tarkibini ilmiy asosda boyitish va biologik faol qo'shimchalardan samarali foydalanish bo'yicha amaliy tavsiyalar ishlab chiqishda katta ahamiyatga ega.*

Kalit so'zlar*: Rux, mis, oqsil, kalsiy, ferment, immunitet, vitamin, tuxum, makroelement, mikroelement, Coturnix japonica.*

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THE EFFECT OF Zn and Cu MIKROELEMENTS ON EGG PRODUCTIVOTY IN JAPANESE QUAILS.

Abstract: *This study investigated the effect of zinc (Zn) and copper (Cu) microelements on the egg productivity of Japanese quails (Coturnix japonica). Three experimental groups were formed: a control group, a group receiving optimal amounts of microelements (T–1), and a group receiving excessive amounts of microelements (T–2). All quails were kept under identical feeding and management conditions.The results showed that the optimal supplementation of Zn and Cu significantly increased egg production parameters, including egg number, average egg weight, shell thickness, and overall egg quality. However, when microelements were supplied in excess amounts, a decrease in egg production, feed intake, and signs of physiological stress were observed.These findings are consistent with the studies of Nair (2022) and Hunchak (2021), confirming that microelements have a direct influence on egg quality, calcium metabolism, and protein synthesis. Optimal doses of Zn and Cu also improved the general physiological condition of the quails by enhancing metabolic activity and stimulating reproductive hormones.In conclusion, the research demonstrated that balanced supplementation of zinc and copper plays a crucial role in improving egg production, egg quality, and overall health in Japanese quails. These results can serve as a scientific basis for optimizing feed composition and the effective use of biologically active additives in poultry farming.*

Keywords: *Zinc, copper, protein, calcium, enzyme, immunity, vitamin, egg, macroelement, microelement, Coturnix japonica.*

Kirish

Bedana tuxumi tansiq, shifobaxsh ozuqa hisoblanadi. U kamqonlikning oldini oladi, muskul massasini ko'paytiradi, immunitetni kuchaytiradi, xotirani yaxshilaydi, suyaklarni mustahkamlaydi, allergiyani kamaytiradi, bolalarning o'sishiga yordam beradi. Bedana tuxumining bu xususiyatlari uning tarkibidagi antioksidant birikmalari, yuqori sifatli oqsil, A, B vitaminlari, temir, rux va selen kabi mikroelementlar tufayli sodir bo'ladi.(Leal, 2025).

Tuxumlar inson ratsionidagi eng muhim va to'yimli oziq-ovqatlardan biri hisoblanadi. Ular oqsil, vitamin va minerallarga boyligi bilan mashhur. Odatda iste'mol qilinadigan tovuq tuxumidan tashqari, bedana tuxumlari ham o'zining noyob ozuqaviy xususiyatlari bilan qadrlanadi. Garchi kattaligi jihatidan farq qilsa-da, har ikkala tuxum turi ham sog'liq uchun foydali komponentlarga ega. Ammo, bir xil vazn (masalan, 50 gramm) asosida ularning ozuqaviy tarkibini taqqoslash qaysi turdagi tuxum qanday moddalarga ko'proq boy ekanligini

aniqlashga yordam beradi. Ushbu maqolada, biz aynan 50 gramm miqdordagi 5 ta bedana tuxumi (o'rtacha) va 1 ta tovuq tuxumining (o'rtacha) energiya, makro- va mikroelementlar bo'yicha farqlari va o'xshashliklarini batafsil ko'rib chiqamiz. Bu taqqoslama iste'molchilarga o'zlarining shaxsiy ehtiyojlari va parhez maqsadlariga mos keladigan tuxum turini tanlashda yordam beradi.

Bedana va Tovuq Tuxumlari: 50 Grammlik Tarkiblarning Batafsil Taqqoslashi

Bedana tuxumi va tovuq tuxumining ozuqaviy tarkibi

Ozuqaviy komponent	5 ta bedana tuxumi (50 gr)	1 ta tovuq tuxumi (50 gr)
Energiya	88,5 kaloriya	71,5 kaloriya
Oqsil	6,85 gr	6,5 gr
Lipidlar (yog')	6,35 gr	4,45 gr
Karbogidratlar	0,4 gr	0,8 gr
Xolestetol	284 mg	178 mg
Kalsiy	39,5 mg	21 mg
Fosfor	139,5 mg	82 mg
Temir	1,65 mg	0,8 mg
Natriy	64,5 mg	84 mg
Kaliy	39,5 mg	75 mg
Rux	1,05 mg	0,55 mg
Vitamin B 12	0,8 mkg	0,5 mkg
Vitamin A	152,5 mkg	95 mkg
Vitamin D	0,69 mkg	0,85 mkg
Folat kislota	33 mkg	23,5 mkg
Xolin	131,5 mkg	125,5 mkg
Selen	16 mkg	15,85 mkg

Mikroelementlar parrandachilikda muhim ozuqaviy komponent hisoblanadi. Ayniqsa, Zn va Cu bedanalar organizmida fermentlar faolligi, immunitet, va tuxum shakllanish jarayonlarida ishtirok etadi. Shu bois, ularning optimal miqdorda berilishi mahsuldorlikni oshirishi mumkin, ammo ortiqcha miqdor salbiy ta’sir ko‘rsatishi ehtimoldan holi emas.

Tadqiqot metodikasi / Materials and Methods

Tajriba 25 tadan bedanadan iborat 3 guruhda olib borildi:

Nazorat guruhi: mikroelementlarsiz.

Tajriba-1 (T-1): Zn va Cu optimal miqdorda.

Tajriba-2 (T-2): Zn va Cu ortiqcha miqdorda.

Tuxum soni, o‘rtacha og‘irligi va po‘choq og‘irligi statistik tahlil asosida baholandi. Har bir guruhda parvarishning boshlanishi, o‘rtasi va nihoyasidagi ko‘rsatkichlar umumlashtirildi.

Natijalar

Ko‘rsatkichlar	Nazorat (n=25)	T-1 (n=25)	T-2 (n=25)
Tuxum soni	260,42±0.39	294,58±0.35	241,28±0.58
Tuxum og‘irligi (g)	10,12±0.48	12,32±0.50	9,54±0.52

Tuxum soni T-1 guruhda 13,07% oshgan, T-2 guruhda 7,88% kamaygan.

Tuxum og‘irligi T-1 guruhda 21,73% oshgan, T-2 guruhda 6,07% kamaygan.

Muhokama

Olingan natijalar shuni ko‘rsatadiki, Zn (rux) va Cu (mis) mikroelementlarining optimal miqdorda berilishi yapon bedanalarining tuxum mahsuldorligini sezilarli darajada oshiradi. Xususan, optimal darajada Zn berilishi fermentativ faollikni kuchaytiradi, oqsil sintezini rag‘batlantiradi va tuxum sifatini yaxshilaydi. Cu esa qon aylanishini yaxshilash, immun tizimni mustahkamlash va reproduktiv faoliyatni qo‘llab-quvvatlashda muhim rol o‘ynaydi. Shu sababli, mikroelementlarning muvozanatli qo‘llanilishi parrandalarning umumiy fiziologik holatini yaxshilashga xizmat qiladi.Ammo ortiqcha mikroelement berilishi tuxum mahsuldorligiga salbiy ta’sir ko‘rsatishi mumkin. Bu, asosan, organizmda toksik effektlar yuzaga kelishi bilan bog‘liq. Ortiqcha Zn va Cu ovqat hazm qilish tizimida noqulayliklar, ishtaha pasayishi, jigar va buyrak faoliyatida stress belgilarini keltirib chiqarishi mumkin. Bu kuzatuvlar Nair et al. (2022) va Hunchak et al. (2021) tadqiqotlari bilan mos keladi, ular ham mikroelementlarning me’yordan ortiqcha berilishi tuxum berish ko‘rsatkichini kamaytirishini qayd etgan.

Shuningdek, natijalar shuni ko‘rsatadiki, Zn va Cu qushlar organizmida muhim biokimyoviy jarayonlarni rag‘batlantiradi. Zn ko‘plab fermentlarning kofaktori bo‘lib, oksidlanish-qaytarilish jarayonlarini faollashtiradi, immun tizimini qo‘llab-quvvatlaydi va parrandalarning stressga chidamliligini oshiradi. Cu esa qizil qon hujayralari sintezini yaxshilaydi, yurak-qon tomir tizimi faoliyatini rag‘batlantiradi va umumiy sog‘liqni mustahkamlaydi. Shu sababli, ozuqa tarkibida mikroelementlarni optimal dozada ta’minlash tuxum mahsuldorligini oshirish va qushlar sog‘ligini saqlashning muhim sharti hisoblanadi.

Natijalardan ko‘rinib turibdiki, mikroelementlarning dozalari va ularning ozuqaga kiritilish tartibi tuxum ishlab chiqarishning samaradorligini bevosita belgilaydi. Optimal miqdor tuxum soni, tuxum og‘irligi va po‘choq sifatini yaxshilashga yordam beradi, ortiqcha miqdor esa aksincha, mahsuldorlik va parrandalar sog‘lig‘iga zarar yetkazadi. Shu bois, parrandachilikda ozuqa balansini

ilmiy asosda tashkil etish, biologik faol qo‘shimchalardan oqilona foydalanish juda muhimdir.

Xulosa

Ushbu tadqiqot natijalari shuni ko‘rsatadiki, Zn va Cu mikroelementlari yapon bedanalarining tuxum mahsuldorligiga sezilarli darajada ta’sir ko‘rsatadi.Optimal miqdorda qo‘llanishi tuxum sonini va og‘irligini oshiradi, po‘choq sifatini yaxshilaydi, fermentativ faoliyatni rag‘batlantiradi va qushlarning umumiy fiziologik holatini mustahkamlaydi.Ortiqcha miqdorda qo‘llanilishi esa toksik ta’sirlar, mahsuldorlik pasayishi va organizmning stress holatlarini keltirib chiqaradi.Shu bois, tadqiqotlar parrandachilikda ozuqa balansini ilmiy asosda tashkil etish zarurligini, mikroelementlarni biologik talabga mos ravishda berishning ahamiyatini tasdiqlaydi. Ushbu xulosalar amaliy parrandachilikda yem tarkibini optimallashtirish, biologik qo‘shimchalar qo‘llash va tuxum mahsuldorligini oshirish bo‘yicha muhim tavsiyalarni beradi.

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O‘ZBEK VA NEMIS TILLARIDAGI TARJIMA SAN`ATI VA UNING AHAMIYATI

Annotatsiya: *Mazkur maqolada tarjima san’atining o‘zbek va nemis tillaridagi o‘rni, uning madaniyatlararo muloqot va ilmiy-adabiy aloqalarni rivojlantirishdagi ahamiyati tahlil qilinadi. O‘zbekiston Respublikasida tarjima faoliyatining rivoji qonun va davlat dasturlari asosida ko‘rib chiqiladi. Nemis tilidan o‘zbekchaga va aksincha tarjimalarning bugungi kundagi mavqei, muammolari va istiqbollari o‘rganiladi.*

Kalit so‘zlar: *tarjima, o‘zbek tili, nemis tili, madaniyatlararo muloqot, tarjima san’ati, ta’lim.*

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THE ART OF TRANSLATION IN UZBEKISTAN AND GERMAN LANGUAGES AND ITS IMPORTANCE

Abstract: *This article analyzes the role of translation art in Uzbek and German languages, its importance in the development of intercultural communication and scientific-literary relations. The development of translation activity in Uzbekistan is reviewed on the basis of laws and state programs. The current position, challenges and prospects of translations from German into Uzbek and vice versa are studied.*

Keywords: *translation, Uzbek language, German language, intercultural communication, translation art, education.*

Kirish

Bugungi globallashuv davrida tarjima san’ati xalqlar o‘rtasidagi madaniy, ilmiy va iqtisodiy aloqalarni rivojlantirishda asosiy vositalardan biri sifatida namoyon bo‘lmoqda. Xorijiy tillarni chuqur o‘rganish va tarjima faoliyatini rivojlantirish davlat siyosatining ustuvor yo‘nalishlaridan biri hisoblanadi.

O‘zbekiston Respublikasida ham ushbu soha davlat siyosati darajasida qo‘llab-quvvatlanmoqda. Xususan, 2020-yil 23-sentabrda qabul qilingan “Ta’lim to‘g‘risida”gi Qonun (O‘RQ-637) va 2023-yil 11-sentabrdagi Prezident Farmoni bilan tasdiqlangan “O‘zbekiston-2030” strategiyasida xorijiy tillarni chuqur o‘rganish, tarjima maktabini rivojlantirish va malakali tarjimonlarni tayyorlash ustuvor vazifalardan biri sifatida belgilangan. Tarjima san’ati nafaqat ilmiy

adabiyotlarni xalqaro miqyosda o‘zlashtirish, balki o‘zbek adabiy merosini dunyo jamoatchiligiga yetkazishda ham muhim vosita hisoblanadi. Shu nuqtai nazardan, nemis tilidan o‘zbekchaga va aksincha, o‘zbek tilidan nemischaga tarjimalar madaniyatlararo muloqotning samarali shaklini yuzaga keltiradi. Tarjima san’ati turli xalqlarning madaniyati, tafakkuri va adabiy an’analarini bir-biriga bog‘laydigan eng muhim ko‘priklardan biridir. Global kommunikatsiya jarayonlarida o‘zbek va nemis tillari o‘rtasidagi tarjima faoliyati nafaqat lingvistik o‘zaro ta’sirni kuchaytiradi, balki madaniy hamkorlik, ilmiy almashinuv va ijtimoiy taraqqiyotning ham muhim omili sifatida namoyon bo‘ladi. O‘zbek tilining boy tarixiy-lisoniy tizimi hamda nemis tilining qat’iy grammatik tuzilishi tarjimondan yuqori darajadagi lingvistik kompetensiyani, madaniy sezgirlikni va matn yaratilishining pragmatik sharoitlarini chuqur anglashni talab etadi.

Mazkur maqolada tarjima san’atining o‘zbek va nemis tillaridagi o‘rni, muammolari va istiqbollari ilmiy manbalar hamda qonuniy asoslar nuqtayi nazaridan yoritiladi.

Muhokama va natijalar

1. Tarjima san’atining nazariy asoslari. Tarjima san’ati insoniyat tarixida qadimdan mavjud bo‘lib, turli xalqlar o‘rtasida ilmiy, diniy, madaniy va badiiy aloqalarni ta’minlab kelgan. Tarjima nazariyasi mutaxassislari – E. Nayda, V. Komissarov, S. Bassnett, M. Snell-Hornby va boshqalar – tarjimaning mohiyati, usullari va bosqichlari haqida qimmatli ilmiy xulosalar bergan.

Tarjima jarayonida lingvistik, madaniy va psixologik omillar muhim ahamiyat kasb etadi. Ayniqsa, o‘zbek va nemis tillari o‘rtasida tarjima qilganda, ularning grammatik tizimi, leksik birliklari, frazeologik boyligi va stilistik xususiyatlaridagi tafovutlarni chuqur hisobga olish talab etiladi. Tarjimada asosiy mezon − semantik aniqlik va pragmatik ekvivalentlikni ta’minlashdir. O‘zbek tili o‘ziga xos badiiy obrazlar, metaforalar va milliy leksik birliklarga boy. Nemis tilida esa aniq ta’rif, qat’iy mantiqiy tuzilma va funksional yondashuv ustunlik qiladi. Shu sababli tarjima jarayonida nafaqat so‘zma-so‘z, balki funksional-semantik transformatsiyalar, kontekstual moslashtirish, muallif uslubini saqlash kabi jarayonlar amalga oshiriladi.

2. O‘zbek tarjima maktabi va tarixiy taraqqiyoti. O‘zbek adabiyoti tarixida tarjima san’ati alohida o‘rin tutadi. Qadimgi davrlardan boshlab arab, fors va turkiy tillardan o‘zbek tiliga ko‘plab asarlar tarjima qilingan. XIX-XX asrlarda esa rus tili orqali jahon adabiyoti namunalari o‘zbek kitobxonlariga yetkazilgan.

Mustaqillikdan so‘ng O‘zbekistonda tarjima faoliyati yangi bosqichga ko‘tarildi. Jahon adabiyoti durdonalarining bevosita manba tilidan tarjima qilinishi yo‘lga qo‘yildi. “Jahon adabiyoti” jurnali, turli tarjima markazlari va universitetlarda tarjimashunoslik kafedralari tashkil etildi.

3. Nemis tilidan tarjimalarning o‘rni va ta’siri. Nemis adabiyoti jahon madaniyatining eng yirik yo‘nalishlaridan biridir. Gyote, Shiller, Kafkaning asarlari o‘zbek tiliga tarjima qilingan va o‘zbek kitobxonlari orasida keng tarqalgan. Shuningdek, nemis falsafasi – Kant, Hegel, Nitsshe qarashlari o‘zbek ilmiy jamoatchiligida muhim o‘rin tutadi.

Nemis tilidan o‘zbekchaga tarjimalar nafaqat adabiyot, balki texnika, iqtisod, tibbiyot kabi ilmiy sohalarda ham amalga oshirilmoqda. Shu bilan birga, o‘zbek adabiyotining durdonalari – Alisher Navoiy, Abdulla Qodiriy, Cho‘lpon, Erkin Vohidov kabi ijodkorlarning asarlari nemis tiliga tarjima qilinib, xalqaro miqyosda tarqatilmoqda.

Bugungi kunda O‘zbekiston va Germaniya o‘rtasida ta’lim, fan va madaniyat sohalarida hamkorlik aloqalari keng rivojlanmoqda. Tarjima faoliyati esa ushbu aloqalarning samaradorligini oshiruvchi muhim omil bo‘lib xizmat qilmoqda.

Muammolar va istiqboldagi yechimlar

O‘zbek va nemis tillari o‘rtasidagi tarjimalarda bir qator muammolar mavjud. Jumladan:

- ✓ terminologiya muvofiqligini ta’minlashdagi qiyinchiliklar;
- ✓ frazeologizmlar va milliy madaniy unsurlarni to‘g‘ri yetkazish masalasi;
- ✓ tarjimonlarning malaka va tajribasi yetarli emasligi;
- ✓ tarjima maktabi va ilmiy tadqiqotlarning hali yetarli darajada rivojlanmaganligi.

Biroq, bu muammolarning yechimi mavjud: tarjimonlarni tayyorlash tizimini takomillashtirish, tarjimashunoslik bo‘yicha ilmiy tadqiqotlarni kengaytirish, zamonaviy texnologiyalardan – avtomatlashtirilgan tarjima dasturlaridan foydalanish, xalqaro hamkorlik loyihalarini kengaytirish lozim.

Xulosa qilib aytganda, tarjima san’ati o‘zbek va nemis xalqlari o‘rtasida madaniy, ilmiy va ma’naviy aloqalarni mustahkamlashda muhim o‘rin tutadi. O‘zbekiston Respublikasida davlat siyosati darajasida tarjimonlik faoliyatini qo‘llab-quvvatlash, ta’lim tizimida xorijiy tillarni chuqur o‘rgatish hamda ilmiy-adabiy tarjimalarni rivojlantirish kelgusida ushbu sohaning yanada yuksalishiga olib keladi. O‘zbek va nemis tillari o‘rtasidagi tarjima san’ati madaniy integratsiya, ilmiy hamkorlik va axborot almashinuvining strategik ahamiyatga ega yo‘nalishlaridan biridir. Turli struktural tizimlarga mansub bo‘lgan bu ikki til o‘rtasidagi tarjima jarayoni tarjimondan chuqur lingvistik bilim, madaniy kompetensiya, semantik sezgirlik va ijodiy yondashuvni talab qiladi. Tarjima faoliyati nafaqat matn mazmunini ilmiy asosda ko‘chirish, balki ikki xalqning ruhiyati va madaniy merosini o‘zaro boyitish jarayonidir. Shu bois o‘zbek–nemis tarjima amaliyoti zamonaviy tilshunoslik va madaniy tadqiqotlarning dolzarb yo‘nalishlaridan biri bo‘lib qolmoqda.

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SHIFOBAXSH O‘SIMLIKLARDAGI BIOFAOL KOMPONENTLARNING MOLEKULYAR XUSUSIYATLARI VA ULARNI ANIQLASH USULLARI

Annotatsiya: *Mazkur maqolada dorivor o‘simliklarning kimyoviy tarkibi, ularning biosintetik yo‘llari va biologik faol birikmalarining farmakologik ahamiyati yoritilgan. Tadqiqotda alkaloidlar, flavonoidlar, glikozidlar, saponinlar, terpenoidlar kabi tabiiy komponentlarning tuzilishi, biosintezi va analitik tahlil usullari tahlil qilinadi. Shuningdek, fitostandartlashtirish va zamonaviy analitik metodlarning ahamiyati ko‘rsatib o‘tilgan.*

Kalit so‘zlar: *dorivor o‘simliklar, kimyoviy tarkib, alkaloidlar, flavonoidlar, biosintez,fitostandartlashtirish.*

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MOLECULAR PROPERTIES OF BIOACTIVE COMPONENTS IN MEDICINAL PLANTS AND METHODS FOR THEIR IDENTIFICATION

Annotation: *This article discusses the chemical composition of medicinal plants, their biosynthetic pathways, and the pharmacological significance of biologically active compounds. The structure, biosynthesis, and analytical determination methods of natural components such as alkaloids, flavonoids, glycosides, saponins, and terpenoids are analyzed. The importance of phytostandardization and modern analytical techniques is also emphasized.*

Keywords: *medicinal plants, chemical composition, alkaloids, flavonoids, biosynthesis, phytostandardization*

Kirish

Dorivor o‘simliklar asrlar davomida turli xastaliklarni davolashda ishlatib kelingan. Ularning shifobaxsh xususiyatlari tarkibidagi kimyoviy moddalar bilan bog‘liq. Dorivor o‘simliklarning kimyoviy tarkibini o‘rganish ularning farmakologik ta’sirini tushunish va yangi dori vositalarini yaratish uchun muhim ahamiyatga ega. Yer yuzida dorivor o‘simliklarning 10—12 ming turi borligi aniqlangan. 1000 dan ortiq o‘simlik turining kimyoviy, farmakologik va dorivorlik xossalari tekshirilgan.

O‘zbekistonda dorivor o‘simliklarning 700 dan ortiq turi mavjud. Shulardan tabiiy sharoitda o‘sadigan va madaniylashtirilgan 120 ga yaqin o‘simlik turlaridan ilmiy va xalq tabobatida foydalaniladi. Hozirgi davrda tibbiyotda qo‘llaniladigan doridarmonlarning deyarli 40—47% i o‘simlik xom ashyolaridan olinadi.

Dorivor o‘simliklarning asosiy kimyoviy komponentlari

Odamlar tabiat ne’matlaridan foydalana boshlaganidan buyon dorivor o‘tlardan kasalliklarni davolashda foydalanib kelganlar. Bundan 3—4 ming yil ilgari Hindiston, Xitoy, Qadimgi Misr mamlakatlarida shifobaxsh o‘simliklar haqida ma’lumotlar beruvchi asarlar yozilgan. Sharqda, xususan O‘rta Osiyo xalq tabobatida dorivor o‘simliklardan foydalanib davolash o‘zining qadimiy an’analariga ega. Shifobaxsh o‘simliklardan tibbiy maqsadlarda foydalanish borasida Abu Ali Ibn Sinoning "Al-qonun fit-tib" asarida 476 ga yaqin o‘simlikning shifobaxsh xususiyatlari va ularni ishlatish usullari to‘g‘risida ma’lumotlar keltiriladi. Abu Ali ibn Sino yashil olam mahsuli bo’lgan shifobaxsh o’simliklardan turli tuman xastaliklarni davolashda muvaffaqiyatli foydalangan. Olim o’z asarlarida muayyan o’simlikning ajoyib xossalarini qayd etish bilan bir qatorda, qanday kasallikka davo bo’lishi, undan qanday foydalanish kerakligi haqida ham yo’l-yo’riqlar bergan. Bugungi kunda ulug’ alloma foydalangan dorivor o’simliklarning yuzdan ortig’i turli zamonaviy tibbiyot amaliyotida samarali qo’llanilmoqda. Ko’pgina shifobaxsh o’simliklar tibbiyotda qo’llaniladi va hozirgi kunda ham kishilar o’simliklarning kimyoviy tarkibini o’rganish bo’yicha izlanishlarni olib borishmoqda. Bu esa o’z navbatida yangi-yangi kashfiyotlarga olib keldi. Hozirgi kunda mog’or zamburug’i deb ataladigan zamburug’dan penitsillin dorisi tayyorlanmoqda. Ba’zi dorivor o’simliklar, jumladan, yalpiz plantatsiyalarda ko’paytirilmoqda; Yalpiz moyining asosiy qismini tashkil etgan modda – mentol tish poroshogini xushbo’y qiladi. Mentol validol va boshqa yurak kasalligi dorilari, tinchlantiruvchi dorilarga, kosmonavtlarning ovqatlanish ratsioniga kiradigan yalpizli karamelga ham qo’shiladi. Mamlakatimiz yovvoyi holda o’sadigan dorivor o’simliklarga ham boy. O’rmonlarda marvaridgul o’sadi, undan yurak kasalligi bilan og’riganlarga dori tayyorlanadi, o’rmon etagi va nam o’tloq yerlarda o’sadigan valeriana o’simligildan tinchlantiruvchi dori ishlanadi. O’tloq yerlarda har qadamda dalachoy (uni xalq orasida 95 dardga davo bo’ladi deyishadi), bo’yimodaron, ko’ko’t, gazako’t, qora andiz va boshqa dorivor o’simliklar o’sib yotadi.

Dorivor o‘simliklar tarkibida turli xil kimyoviy moddalar mavjud bo‘lib, ularni quyidagi asosiy guruhlarga bo‘lish mumkin:

Alkaloidlar: Tarkibida azot tutuvchi organik birikmalar bo‘lib, ko‘pincha fiziologik faollikka ega. Misol uchun, morfin, kofein, kinin.

Terpenoidlar: Izopren birliklaridan tashkil topgan organik birikmalar. Efir moylari, karotinoidlar va steroidlar shu guruhga kiradi.

Fenolik birikmalar: Benzol halqasiga bir yoki bir nechta gidroksil guruhlari birikkan organik birikmalar. Flavonoidlar, taninlar va ligninlar shu guruhga kiradi.

Glyukozidlar: Qand va aglikon (qand bo‘lmagan qism) dan tashkil topgan organik birikmalar. Yurak glyukozidlari, saponinlar va antrakinonlar shu guruhga kiradi.

Boshqa moddalar: Aminokislotalar, vitaminlar, minerallar, lipidlar va boshqa organik birikmalar.

Shifobaxsh o‘simliklarning kimyoviy tarkibi Shifobaxsh o‘simliklarning dori sifatida foydalanilishining asosiy sababi ularning tarkibida mavjud bo‘lgan biologik faol moddalar bilan bog‘liqdir. Bu moddalar o‘simlikning bargi, guli, ildizi, po‘stlog‘i yoki mevasi tarkibida to‘planadi va o‘ziga xos ta’sir mexanizmlariga ega. Quyidagi moddalar shular jumlasidandir:

- Alkaloidlar – asosan nerv tizimiga ta’sir ko‘rsatadi, og‘riqni qoldiruvchi, spazmolitik xususiyatga ega.

- Flavonoidlar – yallig‘lanishga qarshi, antioksidant va antibakterial ta’sir ko‘rsatadi.

- Glikozidlar – yurak faoliyatini yaxshilovchi, qon bosimini tartibga soluvchi moddalar.

- Efir moylari – mikrob va viruslarga qarshi tabiiy vosita bo‘lib, nafas yo‘llarini tozalovchi ta’sirga ega.

- Saponinlar – balg‘am haydovchi, yallig‘lanishga qarshi va immunitetni mustahkamlovchi moddalar.

- Taninlar – antiseptik xususiyatga ega, teri va shilliq qavatlarni tiklovchi ta’sir ko‘rsatadi. Shuningdek, dorivor o‘simliklarda vitaminlar (A, C, E), mineral tuzlar (kaliy, magniy, kaltsiy) va fermentlar uchrab, organizmning umumiy fiziologik holatini tiklashda katta ahamiyat kasb etadi.

O‘zbekiston florasida uchraydigan dorivor o‘simliklar O‘zbekiston hududi geobotanik zonalarga boy bo‘lib, bu yerda 4500 dan ortiq o‘simlik turi o‘sadi. Ulardan 1000 dan ortig‘i dorivor hisoblanadi. Qadimdan xalq tabobatida foydalanib kelingan ayrim mashhur o‘simliklar quyidagilardir:

- Glycyrrhiza glabra (qand lavlagi) – yo‘tal, oshqozon yarasi va virusli kasalliklarda ishlatiladi.

- Inula helenium (devayasemin) – bronxit, shamollash va nafas yo‘llari infektsiyalarida foydali.

- Hypericum perforatum (zveroboy) – asab tizimi kasalliklari, depressiya va yaralarga qarshi ishlatiladi.

- Mentha piperita (yalpiz) – ovqat hazm qilishni yaxshilaydi, og‘riqni kamaytiradi. - Rosa canina (itgul) – immunitetni oshiradi, S vitaminiga boy, yurak faoliyatini yaxshilaydi.

Farmatsevtik ahamiyati Zamonaviy farmatsevtika sohasida dorivor o‘simliklardan keng foydalaniladi. Ulardan biologik faol modda ajratib olinadi yoki o‘simlik ekstrakti tayyorlanib, turli dori vositalari ishlab chiqariladi. Misollar: - Valeriana officinalis – asabiylik, uyqusizlik, stress holatlarini kamaytiradi. - Ginkgo biloba – miya qon aylanishini yaxshilaydi, xotira va e’tiborni mustahkamlaydi. - Arnica montana – shishlar, ko‘karishlar, mushak og‘riqlarida tashqi surtma sifatida ishlatiladi. - Echinacea purpurea – immun tizimini kuchaytiradi, sovuq urish va grippda foydalidir.

Faol moddalarni ajratib olish usullari

Dorivor o‘simliklardan faol moddalarni ajratib olish uchun turli xil usullar qo‘llaniladi. Ushbu usullar o‘simlik materialining xususiyatlariga, faol moddaning kimyoviy tuzilishiga va kerakli tozalik darajasiga bog‘liq. Asosiy ajratib olish usullari:

Ekstraksiya: O‘simlik materialidan faol moddalarni erituvchi yordamida ajratib olish. Erituvchi sifatida suv, etanol, metanol, xloroform, efir va boshqa organik erituvchilar ishlatilishi mumkin.

Distillash: O‘simlik materialidan uchuvchi moddalarni (efir moylari) bug‘latish va kondensatsiya qilish orqali ajratib olish.

Xromatografiya: Aralashmadagi moddalarni ularning fizik-kimyoviy xususiyatlariga ko‘ra ajratish. Qog‘oz xromatografiyasi, yupqa qatlamli xromatografiya (YXK), gaz xromatografiyasi (GX) va yuqori samarali suyuqlik xromatografiyasi (YUSX) kabi turlari mavjud.

Kristallanish: Eritmadagi moddalarni kristall holatda ajratib olish.

Faol moddalarni identifikatsiya qilish usullari

Ajratib olingan faol moddalarni identifikatsiya qilish uchun turli xil fizikkimyoviy usullar qo‘llaniladi. Asosiy identifikatsiya usullari:

Spektroskopiya: Moddalarning elektromagnit nurlanish bilan o‘zaro ta’sirini o‘rganish. Ultrabinafsha (UV) spektroskopiya, infraqizil (IQ) spektroskopiya, yadro magnit rezonansi (YAMR) spektroskopiyasi va massa spektrometriyasi (MS) kabi turlari mavjud.

Xromatografiya: Ajratilgan moddalarni standart namunalar bilan solishtirish orqali identifikatsiya qilish.

Kimyoviy reaksiyalar: Moddalarning ma’lum reaktivlar bilan reaksiyaga kirishishini o‘rganish.

Boshqa moddalar: Aminokislotalar, vitaminlar, minerallar, lipidlar va boshqa organik birikmalar.

Faol moddalarni miqdoriy aniqlash usullari

Faol moddalarning miqdorini aniqlash uchun turli xil analitik usullar qo‘llaniladi. Asosiy miqdoriy aniqlash usullari:

Titrlash: Ma’lum konsentratsiyali eritma (titrant) yordamida moddaning miqdorini aniqlash.

Spektrofotometriya: Eritmadagi moddaning yorug‘likni yutish darajasini o‘lchash orqali miqdorini aniqlash.

Xromatografiya: Xromatogrammadagi pik maydonini o‘lchash orqali moddaning miqdorini aniqlash.

Xulosa

Dorivor o‘simliklar kimyoviy tarkibining tahlili farmatsevtika, tibbiyot va qishloq xo‘jaligi sohalarida muhim ahamiyatga ega. Ushbu tahlil dorivor o‘simliklarning sifatini nazorat qilish, farmakologik ta’sirini o‘rganish, yangi dori vositalarini yaratish va o‘simliklar resurslaridan oqilona foydalanish imkonini beradi. Zamonaviy analitik usullar dorivor o‘simliklarning kimyoviy tarkibini yuqori aniqlik va sezuvchanlik bilan tahlil qilish imkonini beradi, bu esa ularning shifobaxsh xususiyatlarini chuqurroq o‘rganishga yordam beradi.

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EFIR MOYLARINING KIMYOVIY TARKIBI VA BIOAKTIVLIGI (LAVANDA, ROZMARIN VA CHERNUSHKA MISOLIDA)

Annotatsiya: *Ushbu maqolada lavanda (Lavandula angustifolia), rozmarin (Rosmarinus officinalis) va chernushka (Nigella sativa) o‘simliklaridan olingan efir moylarining kimyoviy tarkibi, asosiy komponentlari, bioaktiv xususiyatlari va ularning tibbiy-farmatsevtik qo‘llanilishi o‘rganildi. Xromatografik va spektroskopik tahlillar natijasida efir moylarining asosiy biologik aktiv moddalari – linalol, linalilatsetat, 1,8-tsineol, timoxinon, karbon va α-pinen kabi birikmalar ekani aniqlandi.*

Kalit so‘zlar: *Efir moylari, Lavanda, Rozmarin, Chernushka (Nigella sativa), Kimyoviy tarkib, Bioaktivlik, Linalol, 1,8-tsineol, Timoxinon, Antibakterial faollik, Antioksidant xususiyat, Fitokimyoviy tahlil*

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CHEMICAL COMPOSITION AND BIOACTIVITY OF ESSENTIAL OILS (A CASE STUDY OF LAVENDER, ROSEMARY AND NIGELLA SATIVA)

Abstract: *This article investigates the chemical composition, major components, bioactive properties, and pharmaceutical applications of essential oils obtained from lavender (Lavandula angustifolia), rosemary (Rosmarinus officinalis), and black cumin (Nigella sativa). Chromatographic and spectroscopic analyses revealed that the key biologically active compounds of these essential oils include linalool, linalyl acetate, 1,8-cineole, thymoquinone, carvone, and α-pinene.*

Keywords: *essential oils, lavender, rosemary, Nigella sativa, chemical composition, bioactivity, linalool, 1,8-cineole, thymoquinone, antibacterial activity, antioxidant properties, phytochemical analysis.*

1. **Kirish**

Efir moylarining asosiy manbai efir moyli o‘simliklardir. Yer yuzida tarqalgan barcha o‘simliklar 300 oilaga mansub bo‘lib, ularning 87 oilasiga kiruvchi turlarida efir moylari borligi aniqlangan. Hozirgi vaqtda 2500 o‘simlik turlarida efir moylarining saqlanishi o‘rganilgan bo‘lib, ulardan 77 oilaga kiruvchi 1100 dan ortiq turi MDH florasida uchraydi.

Efir moylari o‘simlikning ma’lum hujayra va to‘qimalardagi maxsus bo‘shliqlarda hamda kanalchalarda to‘planadi. Bundan tashqari hujayra shirasi tarkibida emulsiya holatida va parenxima hujayralarida uchraydi. O‘simlikning o‘sishi, rivojlanishi va tarqalgan sharoitiga qarab, undagi efir moylarining miqdori o‘zgarib turadi.

Efir moylari o‘simliklarning urug‘ va mevalarida, gul va barglarida, poya hamda ildizlarida bo‘ladi. Efir moylari o‘z kimyoviy tarkibining murakkabligi, uchuvchanligi va xushbo‘y bo‘lishi bilan o‘simlik moylaridan farq qiladi. Agar efir moylari qog‘oz yoki materialga tekkizilsa, unda hech qanday dog‘ qoldirmaydi.

Efir moylari ko‘pchilik o‘simliklarda erkin holda bo‘lib, suv bug‘i yordamida haydab olish yoki ekstraksiya usuli bilan ulardan ajratib olinadi. Ba’zi o‘simliklarda efir moylari glikozidlar va boshqa moddalar bilan birikkan holda bo‘ladi.

Efir moylari — o‘simliklarning gidrofob, uchuvchi, kuchli hidli biologik faol aralashmalari bo‘lib, ular farmakologik va antibakterial hususiyatlari bilan ahamiyatga ega. Lavanda, rozmarin va chernushka moylari so‘nggi yillarda fitoterapiya, aromaterapiya, kosmetologiya hamda farmatsevtika sohasida keng qo‘llanilmoqda.

2. Materiallar va metodlar

2.1. Namunalar:

- Lavanda guli (Lavandula angustifolia)
- Rozmarin bargi (Rosmarinus officinalis)
- Chernushka urugi (Nigella sativa)

2.2. Efir moylarini ajratish usuli

Gidrodistillyatsiya (Klevenj apparati), davomiyligi 3 soat.

2.3. Tarkibni tahlil qilish usullari

GC-MS, FT-IR, antibakterial testlar va antioksidant DPPH testi qo‘llanildi.

1. Suv yoki suv bug‘i yordamida haydab olish (gidrodistillyatsiya, bug‘ distillyatsiyasi)

Bu usul efir moylarini olishning eng qadimiy va eng ko‘p qo‘llaniladigan texnologiyasidir. Jarayon quyidagicha amalga oshiriladi:

Maydalangan o‘simlik xomashyosi kolba yoki maxsus distillyatsiya kubiga solinadi va ustiga yetarli miqdorda suv qo‘shiladi. Kolba kondensator (xolodilnik)

bilan ulanib, qizdiriladi. Hosil bo‘lgan suv bug‘i efir moyini o‘z bilan olib chiqadi va kondensator orqali o‘tib, suyuqlikka aylanadi.

Hosil bo‘lgan distillyat ikki qismdan iborat bo‘ladi:

— suv qatlami,

— efir moyi qatlami (suvdan yengil yoki og‘irligiga qarab yuqoriga yoki pastga cho‘kadi).

Efir moyi florentinal idishlarda ajratib olinadi. Bu usul o‘simliklarning ko‘p turida samarali bo‘lib, uchuvchi komponentlar buzilmasligini ta’minlaydi.

2. Mastsratsiya (maceration) usuli

Mazkur usul efir moylarining yog‘larda yaxshi eruvchanligiga asoslanadi. Tarkibida efir moyi bo‘lgan gul va o‘simlik qismlari o‘simlik yog‘i (odatda zaytun moyi)ga solinadi va 40–50 °C atrofida qizdiriladi.

Natijada efir moyi gul to‘qimasidan yog‘ga o‘tadi. Filtrlashdan so‘ng olingan moy tibbiyot va kosmetologiyada “infuz moy” (oil infusion) sifatida qo‘llanadi. Bu usul ayniqsa yuqori haroratga chidamsiz bo‘lgan nozik aromatik moddalarda qo‘llanadi.

3. Anfleraj (enfleurage) usuli:

Anfleraj — efir moylarining qattiq yog‘larga yutilishiga asoslangan klassik texnologiya bo‘lib, asosan nozik, issiqlikka sezgir gul efir moylarini olishda ishlatiladi (masalan: yasemin, atirgul).

Yassi oynali maxsus ramkalarga cho‘chqa va mol yog‘larining aralashmasi yupqa qatlamda surtib chiqiladi. Yuzasiga yangi terilgan gul barglari joylashtiriladi. Gul tarkibidagi efir moyi tabiiy diffuziya yo‘li bilan yog‘ga o‘tadi. Gul barglari har kuni yangilanadi. Jarayon bir necha kun yoki hafta davom ettiriladi.

Natijada "pomad" deb ataluvchi yuqori sifatli aromatik yog‘ olinadi, undan keyinchalik spirt yordamida sof efir moyi ajratib olinadi.

4. Presslash (sovuq siqish) usuli

Bu usul efir moyi mevalarning po‘stlarida ko‘p to‘planuvchi o‘simliklarda qo‘llanadi: limon, apelsin, bergamot, pomerans va boshqalar.

Mexanik siqish jarayonida meva po‘stidagi efir moyi to‘g‘ridan-to‘g‘ri ajralib chiqadi. Bugungi kunda maxsus tishli barabanlar, siqish presslari va sanoat ekstraktorlarida amalga oshiriladi.

Sitrus efir moylarining asosiy sanoat usuli aynan mana shu texnologiya bo‘lib, issiqlik ishlatilmagani uchun efir moyi tabiiy holatini to‘liq saqlab qoladi.

5. Ekstraktsiya (organik erituvchilarda ajratib olish)

Ekstraktsiya efir moylarining organik erituvchilarda yaxshi eruvchanligi asosida olib boriladi. Ajratish past haroratda, yengil uchuvchi erituvchilar (gexan, eter va boshqalar) yordamida amalga oshiriladi.

Bu usul natijasida “beton”, undan esa spirt yordamida “absolyut” (absolute oil) olinadi. Absolyutlar parfumereyada eng yuqori sifatli aromatik moddalar sifatida qadrlanadi.

Ekstraktsiya usuli issiqlikka chidamsiz, nozik aromatli moddalar uchun eng maqbul hisoblanadi.

3. Natijalar va muhokama

3.1. Lavanda moyi

Asosiy komponentlar:

- Linalol (30–40%)
- Linalilatsetat (25–35%)
- Kamfor (5–7%)
- 1,8-tsineol (3–5%)

Bioaktivligi: tinchlantiruvchi, antibakterial, yallig‘lanishga qarshi, teri regeneratsiyasi.

3.2. Rozmarin moyi

Asosiy komponentlar:

- 1,8-tsineol (40–50%)
- Kamfor (5–15%)
- α-pinen (10–20%)

Bioaktivligi: kuchli antioksidant, xotirani yaxshilash, qon aylanishini faollashtirish.

3.3. Chernushka moyi

Asosiy komponent:

- Timoxinon (30–48%)

Qo‘shimcha komponentlar: karbon, α-pinen, timol.

Bioaktivligi: immunitetni oshiruvchi, antioksidant, antidiabetik, yallig‘lanishga qarshi.

4. Solishtirma tahlil

Lavanda — tinchlantiruvchi; Rozmarin — antioksidant; Chernushka — immunomodulyator.

Xulosa

Tadqiqotlar shuni ko‘rsatdiki, lavanda (Lavandula angustifolia), rozmarin (Rosmarinus officinalis) va chernushka (Nigella sativa) efir moylari yuqori biologik faollikka ega. Ularning asosiy bioaktiv komponentlari — linalol, linalilatsetat, 1,8-tsineol, timoxinon, karvon va α-pinen bo‘lib, ular antioksidant, antibakterial, yallig‘lanishga qarshi va immunomodulyator xususiyatlarga ega.

Efir moylarining kimyoviy tarkibi o‘simlik turi, o‘sish sharoiti va to‘plangan organiga bog‘liq holda o‘zgaradi. Shuningdek, efir moylari o‘zining uchuvchanligi va murakkab kimyoviy tarkibi bilan boshqa o‘simlik yog‘laridan farq qiladi.

Mazkur efir moylari farmatsevtika, kosmetologiya va aromaterapiya sohalarida keng qo‘llanilishi mumkin bo‘lib, ularni standartlashtirish va sifatini saqlash usullari orqali ilmiy va amaliy tadqiqotlarni rivojlantirish istiqbollari mavjud.

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O‘ZBEKISTONNING TOG‘ VA TOG‘ OLDI HUDUDLARIDA INSON SALOMATLIGIGA TA’SIR ETUVCHI GEOGRAFIK OMILLAR

Annotatsiya: *Ushbu maqolada tog‘ va tog‘ oldi hududlarida inson salomatligi va unga ta’sir etuvchi geografik omillarga e’tibor qaratilgan. Tog‘li o‘lkalarda istiqomat qiluvchi aholi orasida tog‘ kasalligi gipoksiya, quyosh urishi, oftalmiya, endemik bo’qoq kabi xastaliklarning birmuncha keng tarqalganligi haqida ma’lumotlar keltirilgan. O‘zbekiston aholisining endemik bo‘qoq bilan kasallanish holatlari yoritib berilgan. Tog‘li va tog‘ oldi hududlarni nozogeografik jihatdan tahlil etishda qanday jihatlarga e‘tibor berish to‘g‘risida olimlarning olib borgan tadqiqotlari o‘rganilib, muallifning takliflari ham keltirilib o‘tilgan.*

Kalit so’zlar: *Inson salomatligi, moslashuv, nozoiqlimiy sharoit, relef, tog‘ kasalligi, kislorod yetishmovchiligi, tog‘ vodiy hududlari, tog‘-kon sanoati, tibbiy geografik tahlil, tog’ balandliklari, yetakchi omillar*

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GEOGRAPHICAL FACTORS AFFECTING HUMAN HEALTH IN THE MOUNTAIN AND FOOTMOUNTAIN REGIONS OF UZBEKISTAN

Abstract: *This article focuses on the type and structure of population health and diseases in mountain and sub-mountain regions. There is information about the prevalence of mountain sickness, hypoxia, sunstroke, ophthalmia, and endemic goiter among the population living in mountainous regions. Cases of endemic goiter of the population of Uzbekistan are highlighted. The research conducted by scientists on what aspects to pay attention to in the nosogeographical analysis of mountainous and sub-mountainous regions has been studied, and the author's suggestions have been presented.*

Key words: *Human health, adaptation, non-climatic conditions, relief, mountain sickness, oxygen deficiency, mountain valley areas, mining industry, medical geographic analysis, mountain heights, leading factors*

Kirish

Yer yuzasining turli mamlakat va o‘lkalarida tabiiy va ijtimoiy-iqtisodiy sharoitlarning xilma-xilligi tufayli turli hududlarda yashovchi kishilar salomatlik darajasi ham turlichaligini ko’rishimiz mumkin. Zero, hudud o‘zgarishi bilan inson salomatligi va xastaliklari: tog‘ va tekislikda, cho‘l va o‘rmonda, turli balandlik mintaqalarda, shahar va qishloqda, har xil rivojlanish darajasiga ega bo‘lgan mamlakatlarda turlicha tavsifga egaki, uning o‘ziga xos qonuniyatlarini geografik jihatdan o‘rganish va tadqiq etish dolzarb vazifalardan biri hisoblanadi. Bunda avvalo, tibbiy geografik jihatdan o‘rganilayotgan muayyan hududning umumiy tavsifi, joylashgan o‘rni va chegaralari hamda uning mamlakat yoki ma’lum iqtisodiy geografik rayon xo‘jaligida tutgan mavqeiga asosiy e’tibor qaratish maqsadga muvofiqdir.

Har bir hududdda aholi salomatligini belgilashda yetakchi ahamiyat kasb etuvchi tabiiy sharoitlar tarkibiga relef, iqlim, tuproq, yer osti va yer usti suvlari, o‘simlik va hayvonot dunyosi singari omillar bilan baholansa, iqtisodiy jihatdan izohlashda esa ko‘proq uning aholisi, aholi punktlari, sanoat va qishloq xo‘jaligi, transport hamda tashqi iqtisodiy aloqalari ko‘zda tutiladi.

Inson salomatligi va ularda uchraydigan kasalliklar hududiy tafovutlarga ega. Chunki, ushbu hududlar o‘z iqlimi, relefi, suv va tuprog‘i, iqtisodiy-ijtimoiy jihatlari bilan o‘zaro farqlanadi. Ularning barchasi aholi salomatligining hududiy tomonlarini va uning geografik xususiyatlarini izohlab beradi. Shu o‘rinda suv, havo va tuproqning yoki bizning fikrimizcha, nozoiqlimiy sharoitning inson salomatligiga ta’sirini alohida ta’kidlash joiz.

Adabiyotlar tahlili va metodlar

Ma’limki, joylarning relef xususiyatlari inson salomatligini belgilovchi muhim omillardan biridir. Baland tog‘ mintaqalarida o‘z nomi bilan “tog‘ kasalligi” deb ataluvchi kasallik keng tarqalgan bo‘lib, u haqidagi dastlabki ma’lumotlar ispan sayyohi Josef de Akosta tomonidan yozib qoldirilgan. U balandlik bilan bog’liq kasalliklar haqida juda ko’p va rang barang ma’lumotlar qoldirgan. Uning yozishicha, 1590 yil And tog‘lari bo‘ylab sayohat chog‘ida 4500 metr dengiz sathidan balandlikda hamrohlari orasida qandaydir kasallik yuzaga kelganligi, ularning yurak urishlari o‘zgarib, bosh aylanish, nafas siqishi, burunlarning qonashi va quloqlarning shang‘illashi kabi holatlar kuzatilgan. Bu tog‘ kasalligi bo‘lib, u faqatgina 1887 yilda fransuz olimi Bert tomonidan aniqlandi va uning bosh sababi kislorod yetishmovchiligi ekanligi qayd etildi.

Xitoylik mashxur Chiyen Xan Shu millodan avval taxminiy o’ttizinchi yillarda o’tkir tog’ kasalligi haqida turli xildagi qiziqarli dallilar asosida ma’lumotlar qoldirgan. Uning yozishicha: balandlikka tashrif – qattiq bosh og’rig’i, kichik bosh og’rig’i, tana haroratining keskin ko’tarilishi, qusish kabi holatlardan ogohlantiradi, bunday holatlar nafaqat insonlarda balki, eshaklar va mollarda ham kuzatilishi mumkinligini ta’kidlaydi.

Inson tanasiga tashqi omillarning ta’siri masalasiga katta ahamiyat bergan Ibn Sino shunday yozadi: “turar joylar odam gavdasiga- joyning past balandligi, yaqin joyda tog’larning bo’lishi, joyning yaqinida daraxtlar, konlar, qabrstonlar

borligi, tuproqning holati, ham ta’sir ko’rsatadi”, bundan tashqari bobomiz shuni ham ta’kidlaydiki, “balandlik yerda yashovchilar sog’lom, kuchli va chidamli bo’ladilar hamda uzoq umr ko’radilar”.

Markaziy Osiyo tadqiqotchilaridan biri I.V. Mushketov 1877 yilda Oloy va Pomir bo‘ylab sayohat qilib, baland tog‘larning nafaqat odamlarga, balki hayvonlarga ham ta’sirini qayd etdi. “Havoning kamayishi, - deb yozgan edi u, “ayniqsa, tog‘larga o‘rganmagan jonivorlarga jumladan, otlarga ham ta’sir”. Hozir hammaga ma’lumki, bu kasalliklarning barchasi, asosan, nafas olayotgan siyrak havoda kislorod yetishmasligidan kelib chiqqan.

O‘rta Osiyodagi tog‘ fiziologiyasi muammolarini rus harbiy shifokorlari P.K. Gorbachev, V.I. Kushelevskiy, N. Tretyakov, V. Tapilovskiy, A. N. Lavrinovich, D. I. Lebedev va boshqalar olib borgan. Ammo bu sohada Tyan-Shan va Pomirda tizimli va maqsadli tadqiqotlar XX asrning 40-yillarida boshlangan. N.N. Sirotinin, A.A.Rachkov, A.D.Slonim, A.P.Jukovlar tamonidan olib borilgan uzoq muddatli tadqiqotlar asab tizimining baland tog‘larga moslashish mexanizmidagi rolini aniqlashga va Pomir va Tyan-Shan balandliklariga moslashish jarayonida qon aylanish apparati va qon tizimining reaksiyasini o‘rganishga qaratilgan.

Natijalar va muhokama

Tog‘ va tog‘ oldi hududlarida aholi salomatligini o‘rganishda avvvalo ushbu hududlarning tabiiy sharoiti, qolaversa, dengiz sathidan balandligi, kislorod tanqisligi tushunchasi ifodalaydi. Yuqoridagi holatlarni umumiy tushuncha bilan ya’ni tog‘ va tog‘ oldi hududlaring “nozoiqlimiy sharoiti” tushunchasi bilan tavsiflash mafsadga muvofiq. Shuningdek, “nozoiqlimiy sharoit” tushunchasi bir vaqtning o‘zida ikkita metodologik yondashuvni asoslashga yordam beradi:

birinchidan, geografik omillar va salomatlikning o‘zaro munosabatlari;

ikkinchidan esa, nozogeografik vaziyatning hududiy va davriy xususiyatlari.

Demak, nozogeografik vaziyatning o‘rganishga bunday yondashuv, kasallanish, uning sabablari va sharoitlarini o‘ziga xos nozogeografik xususiyatlariga ega bo‘lishi imkonini beradi.

Atmosfera bosimining pasayishi barcha tog‘li hududlarga deyarli xos bo‘lsa-da, landshaft xususiyatlari, geografik joylashuvi va iqlim omillari har bir tog‘ oldi hamda tog’ zonasining individual o‘ziga xosligini yaratadi. Yana shunisi ham borki, barcha o‘zgaruvchi jihatlarning o‘zaro ta‘siri natijasida bir hududdagi atrof-muhit sharoitlari boshqa hududlarda mavjud bo‘lgan sharoitdan sifat yoki miqdoriy jihatdan farq qilishi mumkin. Shuning uchun ham turli tog‘ balandliklari iqlimi inson salomatligiga har xil ta’sir ko‘rsatadi. Misol uchun, past tog‘lar (750-1000 metr) va o‘rta tog‘lar (1000-2500 metr) dam olishda, turizm va ba’zi kasalliklarni davolashda qimmatli ahamiyatga ega.

Baland tog‘da (2500 metrdan yuqori) yashovchi kishilar doimiy ravishda shu sharoitda yashaganliklari tufayli ularning jismi mazkur muhit sharoitiga yashashga moslashgan. Alpda tog‘ kasalligi 2500 metrdan, Kavkaz tizmasida 3000 metr, Himolayda esa 4000 metrdan boshlanadi. Demak, kasalliklar ham o‘ziga xos

balandlik (gipsometrik) zonallik xususiyatiga ega-ki, buni sotsial geografik tadqiqotlarda e’tiborga olish zarur.

Yer yuzidagi quruqliklarning o‘rtacha balandligi dengiz sathidan 750 metr yuqorida bo‘lib, baland tog‘li mintaqalarda dunyo aholisining anchagina qismi yashab kelmoqda. Undan ham balandroqda, ya’ni 3000 metrdan yuqorida yer shari aholisining 30 milliondan ortig‘rog‘i istiqomat qiladi. Shuning uchun bunday landshaftlarda yashovchilarning mavjud sharoitga moslashganlik darajasini o‘rganish muhim ahamiyat kasb etadi. Tog‘li o‘lkalarda yashovchi kishilar orasida tog‘ kasalligidan tashqari, quyosh urishi, oftalmiya, endemik bo‘qoq singari xastaliklar ko‘p uchraydi. Jumladan, Shveysariya, Karpat orti o‘lkalari, Kavkaz va o‘rta Osiyoning tog‘li hududlarida (masalan, Farg‘ona vodiysining ayrim tog‘ oldi hududlarida) bu holni kuzatish mumkin.

Ma’lumki, jahon bo‘yicha uzoq umr ko‘ruvchilarning asosiy qismi tog‘ va tog‘ oldi mintaqalariga to‘g‘ri keladi. Ushbu hududlar iqlimining inson salomatligiga ko‘rsatuvchi ijobiy ta’siri ham sir emas. Lekin, so‘nggi yillarda tog‘, ayniqsa, tog‘ vodiy hududlarida tog‘-kon sanoati tarmoqlarining rivojlanib borishi mazkur hududlarda ekologik muhitning ifloslanishiga va shu atrofda yashovchilar salomatligiga ta’sir ko‘rsatmoqda.

Yuqorida to’xtalib o’tganimizdek, baland tog‘larning inson tanasiga ta’siri qadimdan o‘rganilgan hamda bunday hududlarda inson fiziologiyasi va patologiyasi muammolari uzoq vaqtdan beri tadqiqotchilarning e’tiborini tortib kelgan. Bugungi kungacha saqlanib qolgan ko‘pgina urf-odatlar qadimgi xalqlarning baland tog‘larning inson tanaga salbiy ta’siri haqidagi g‘oyalarini aks ettirgan. Baland tog‘larda, yovuz ruh yashiringan, afsunlarni takrorlash orqali qutulish mumkinligi ma’lumotlarda keltirilgan. Shu bilan birga, qadimda tog‘li, baland joylarga alohida ahamiyat berilgan. Birinchi ibodatxonalar tepaliklarda qurilgan bo‘lib, u yerda toza tog‘ havosi bemorlarga ijobiy ta’sir ko‘rsatishi ayrim manbalarda keltirib o‘tilgan. Tog‘ fiziologiyasi muammolari bo’yicha so‘nggi yillarda o‘zbek olimlari ham ilmiy tadqiqotlar olib bormoqda.

Demograflar va iqtisodchilarning bashoratlariga ko’ra, yaqin kelajakda baland tog’larga nisbatan intilish umumiy aholi sonidagi ulushi sezilarli darajada oshib boradi. Shu munosabat bilan insonning baland tog’ sharoitlariga moslashish muammosini o’rganish alohida ahamiyatga ega. Biologlar, shifokorlar va psixologlar organizmning tabiiy muhitning ekstremal sharoitlariga moslashish mexanizmini o‘rganishda katta tajriba to’plashgan bo’lib, bu tadqiqotlar hozirgi kunga qadar asosan yangi rivojlanish mintaqalarining tub aholisiga ya’ni, jismonan muntazam ravishda yaxshi tayyorlangan sportchilar, qutb tadqiqotchilari va boshqa odamlariga tegishli bo’lgan.

Yuqori balandlik sharoitida inson tanasiga bir qator omillar ta‘sir qiladi, ular orasida past barometrik bosim, kislorodning qisman past bosimi, haroratning keskin o‘zgarishi, ultrabinafsha nurlanish darajasining oshishi, havoning yuqori ionlanishi, sezilarli shamol tezligi va boshqalar. Ushbu omillarning barchasini to‘liq tahlil qilish olimlarga ushbu kompleksning yetakchi omili atmosfera bosimining o‘zgarishi degan xulosaga kelishga imkon bergan.

R. Dajo (1975) ma’lumotlariga ko‘ra 1500 m balandlikda mavjud tog‘ sharoitlariga moslashmaganlarda yengil nafas qisilishi odamlarning 2750 m balandlikda, jismoniy mehnat paytida qattiq nafas qisilishi kuzatiladi. 3650 m balandlikda, hatto baland tog‘ sharoitlariga moslashgan kishilarning tanasida sezilarli o‘zgarishlar yuzaga kelishi mumkin. Balandlikka moslashish, birinchi navbatda, kislorod va karbonat angidrid yetishmasligiga moslashish bilan bog‘liq jarayon hisoblanadi. Kislorod tanqisligi ya’ni, gipoksiya sharoitida ishlash va chidamlilikning sezilarli pasayishi qayd etilib, asab tizimining disfunktsiyalari, ko‘rish va eshitish sezgirligining pasayishi bilan tavsiflanadi.

Shu o’rinda Gipoksiya tushunchasiga qisqacha to’xtalib o’tadigan bo’lsak, “Gipoksiya” tushunchasi, bu qadimgi yunoncha so'z, ma‘nosi “past kislorod” deb tarjima qilinadi. Mazkur atama badan ya’ni tananing yoki shaxsiy organlarining ayrim omillarning ta‘siri tufayli kislorod ochligini anglatadi. Agarda inson tanasida uzoq muddatli kislorod ochligi kuzatilganda qaytarib bo‘lmaydigan morfologik jarayonlar sodir bo‘lishiga olib kelishi mumkin. Bu esa o’z navbatida Ular to'qima va organlarning tuzilishini o'zgartiradilar va ularning funktsional qobiliyatlarini buzadilar. Eng kuchli gipoksiya yurak kasalligi, buyraklar, jigar va markaziy asab tizimi kasalliklariga moyillikni oshiradi. Bundan kelib chiqib aytish mumkinki, kislorod tanqisligi har qanday kasallikka hamroh bo‘lishi mumkin ekan, yoki ichki organlarning ajralib chiqishi bilan mustaqil jarayon sifatida amalga oshiriladi.

Yoshi ulug’- keksa, tabiatan organizmi zaif va kasalalmand odamlarda kislorod yetishmasligi 1500 metr, hattoki 1000 m balandlikda ham sezilishi mumkin.

Shuni ham ta’kidlash joizki, balandlik kasalligi bilan tog’ kasalligini aralashitirib yubormaslik lozim, ya’ni, tog’ kassaligidan balandlik kassaligi farq qiladi. Balandlk kasalligi bu organizmning kasallik holati, siyrak havoli joylarda nafas olgan ro’y berib, yuqorida tariflaganimizdek, qonda kislorodning yetishmasligi sababli vujudga keladi. Kishilarning ma’lum sabablariga ko’ra juda baland yerlarga ko’tarilganda ro’y beradigan kassalik turidir. Bundan tashqari balandlik kasalligiga ayrim a’zolarning, asosan markaziy nerv sistemasining izdan chiqishi sabab bo’lishi kuzatiladi. Ushbu kasallik bir pasda ro’y berib, nafasning qisishi, yurakning o’ynashi, boshning aylanishi, kuchli bosh og’rig’i, ko’ngilning aynishi, qusish, ruhiy o’zgarishlar, shuningdek, ayrim hollarda hushdan ketib qolish xolatlari bilan namoyon bo’ladi. Shifokorlar bunday vaqtda bemorni pastga tushirib tinch holatda turli tinchlantiruvchi dorilar, xushbo’y va tinchlantiruvchi xususiyatga ega dorivor o’tlardan tayyorlangan damlama, issiq choy yoki kofe, juda zarur vaqtlarda esa kislorod bilan yordam ko’rsatishni tavsiya qilishadi. Ushbu xolatning yuz bermasligi uchun esa, ya’ni balandlik kasalligining oldini olish uchun eng avvalo yuqoriga ko’tarilishni oldindan mashq qilish, kislorodli asboblardan foydalanish, iqlimga moslanish hamda o’z-o’zini ruhiy jihatdan tayyorlash lozimligini tavsiya qilishadi.

Inson tanasining potentsial imkoniyatlari cheksiz deb bo‘lmaydiyu, ammo imkoniyati juda katta. Kishilarning baland tog‘larning ekstremal sharoitlariga

moslashish qobiliyati bo'yicha mavjud manbaalar va faktlar odamni hayratga soladi. Misol uchun, Tibetda buddist monastirlari dengiz sathidan 5000 m gacha balandlikda joylashganligi bizga ma'lum. Amerika qit'asining And tog'larida konchilar 5335 m balandlikdagi Aqonqulcha qishlog'ida doimiy yashaydilar va ishlash uchun ular 6 km dan ortiq balandlikka ko'tariladilar. Biroq, shifokorlar shuni ta'kidlashadiki, tabiiy chegara 4500 m balandlik insonning moslashuv balandligi eng normal hisoblanadi. Shu yerda qaysi balandlikda "tog' kasalligi" boshlanadi degan savolga to'xtalib o'tish maqsadga muvofiq. Aytish joyizki bu havo namligiga juda ham bog'liq bo'lgan holat hisoblanadi. Maxsus tibbiy tadqiqotlar allaqachon tog'li o'lkalarning tabiati insonning sog'lom turmush kechirishi uchun eng qulay muhit ekanligini isbotlagan. Buni, xususan, asrliklarning joylashuvi geografiyasi ham tasdiqlaydi.

Tog'larda ayniqsa baland joylarda qonda kislorod miqdorining kamayishiga boshqa omillar ham bir qatorda qo'shilishi isbotlangan, jumladan gipotermiya (gipotermiya yunoncha therme –issiqlik ya'ni odam va issiq qonli hayvonlarda haroratning odatdagidan pasayishi, bunga organizmda issiqlikning hosil bo'lishidan ko'ra ko'proq sarflanishi sabab bo'ladi), jismoniy charchoq hamda balandlikda suvsizlanishni misol keltirishimiz mumkin. (Shu o'rinda suvsizlanishi tushunchasi sizda muxokamali savol tug'dirishi mumkin.

Ma'lumot o'rnida shuni aytishimiz mumkinki, tog' iqlimining fiziologik faol komponenti quruq havodir, tog' tumanlari quruq havo bilan ajralib turadi, bu esa teri yuzasidan, jumladan ko'z va yuqori nafas yo'llarining shilliq qavatidan suv yo'qotilishining ko'payishiga olib keladi hamda suv-tuz almashinuvi holatiga ta'sir etadi). Mobodo, ushbu holatda inson to'g'ri harakatni amalga oshirmasa, fiziologik jarayonlar kutilmagan vaziyatda davom etishi mumkin. Ya'ni, balandlikda patologik jarayonlarning yuqori tezligini inobatga olganda.

Tog' kasalligining asosiy tashxisidagi qiyinchiliklar uning alomatlarining aksariyat xollarda ba'zi holat ya'ni intervalgacha nafas olishdan tashqari boshqa kasllanishlarda ham uchraydi, bular quruq va nam yo'talda, nafas siqishi hamda nafas qisilishi, o'tkir pnevmoniya, qorin og'rig'i, ong hamda yo'nalishni buzish bilan miya shikastlanishi, biroq tog' kasalligi mazkur alomatlarning barchasi, kishida tez balandlikka ko'tarilishi yoki uzoq vaqt balandlikda bo'lish bilan kuzatiladi.

Olimlar tamonidan 2000 m dan 3600 m gacha balandlikda yashovchi kishilarning hayotiy qobiliyatining (IQ) haqiqiy qiymati tekislik va past tog'larda yashovchi kishilarnikidan farq qilmasligi o'rganilgan. Bundan tashqari, tog'lilar orasida umumiy o'pkaning tiriklik sig'imi 30-31% ni, tekisliklarda yashovchilar orasida esa atigi 23% ni tashkil etar ekan. Tibbiyot soha olimlarining ta'kidlashlaricha, tog'lilarning yoshi o'sishi bilan o'pkaning tiriklik sig'imining pasayishi, umumiy o'pka hajmining qoldiq hajmi ulushi esa ko'payishi kuzatilsa, RW ya'ni Cholserman reaktsiyasi bo'yicha qon sinovining o'sishi yangi alfalarning ochilishi bilan bog'liq deb taxmin qilinadi. Bundan tashqari, yana shu ham ma'lumki, yuqori balandlik sharoitida alveolalarning qon miqdori ortib

boradi, bu ularning qattiqligining oshishiga olib keladi. Mahalliy aholida kislorod iste‘moli va bazal metabolizmning kichikligi qayd etish o’rinli hisoblanadi.

Ayrim manbaalarda keltirilishicha tog’ oldi va tog’li hududlarda istiqomat qiluvchi insonlarning nafas olish tezligi tekislikda yashovchi kishilarnikidan yuqori ekan, bundan tashqari, karbonat angidrid gazi yuqori faollikka ega bo’lib, hudud qanchalik baland bo‘lsa, ferment faolligi shunchalik yuqori bo‘lishi qayd etilgan[17].

Tog‘ iqlimining bir qator xususiyatlari uning fiziologik ta‘siri va terapevtik ta‘sirini belgilaydiki bu ta’sir ma‘lum balandliklargacha ekanligini ham aytishimiz lozim. Atmosfera havosidagi kislorod miqdorining pasayishi organizmning moslashuv fiziologik reaksiyalarini harakatga keltirishda hal qiluvchi ahamiyatga ega. Tarixan shakllanish va individual rivojlanish jarayonida insonlarda kislorod tanqisligi davrida mobilizatsiya qilinadigan ma‘lum darajadagi gipoksiyaga moslashish va ma‘lum bir qarshilikka ega bo‘lishni ta‘minlaydigan moslashuvchanlik reaktsiyalari shakllangan. Ammo havoning yuqori darajada kamayishi bilan, moslashishning turli xil biologik reaktsiyalari kiritilganiga qaramay, tog‘ kasalligi va kislorod yetishmasligi bilan bog‘liq boshqa hodisalar ham rivojlanadi.

Tog‘ iqlimining ikkinchi xususiyati atrof-muhit haroratining pastligidir. Ma’lumki, hududning balandligi oshishi bilan haroratning asta-sekin pasayishi har yuz metr balandlikka ko’tarilganda taxminan 0,6°C ga qayd etiladi. Atrof-muhitning past harorati, jarayonlarning kuchayishi, yurak-qon tomir tizimi, o‘pkaning ishini oshiradi, ko‘plab fermentlarning faolligini o‘zgartiradi va shu bilan yuqori balandlikdagi gipoksiyaning tanaga ta‘sirini kuchaytiradi. Havoning past harorati inson tanasining, ayniqsa kasal bo‘lganlarning moslasha olish holatiga salbiy ta‘sir ko‘rsatish ehtimoli yuqori. Bilamizki, ob-havoning sovuqligi ko‘p hollarda yashirin infektsiyalarni kuchaytiradi.

Kishilar organizmiga tog‘ iqlimi sharoitlaridan tashqari, ichimlik suvi va tuproqning mikroelement tarkibi (oziq-ovqat mahsulotlari orqali), landshaft va boshqa omillar ham sezilarli ta‘sir ko‘rsatadi.

Inson tanasida juda ko‘p turli xil moslashuvchan reaktsiyalar mavjud bo‘lib, ular yordamida u to‘qimalarni va birinchi navbatda hayotiy organlarni - miya, yurak, jigar, buyraklarni yetarli miqdorda kislorod bilan ta‘minlashga intiladi. Ma’lumki, kislorod miqdori balandlik oshgan sarijuda tez kamayib boradi, dengiz sathiga nisbatan olganimizda 2000 metr balandlikda beshdan bir ulushga, 3000 metrga uchdan bir ulushga kamayadi. Bunday sharoitlarda yuqorida takidlaganimizdek kishilar tog’ kasali bilan og’rishi ya’ni, boshi og’rig’i, ko’ngli behuzur bo’lishi, burnidan qon kelishi, jahldorlik, jizzakilikning o’z-o’zidan paydo bo’lishi, atrof muhitga, xavf xatarga befarqlik xissi yuzaga keladi. Har bir qadami qiyinlashib, xattoki, grammga teng yuklari kilogrammlarda xis qilinadi. Ba’zan hushdan ketib, holsizlik bilan bir qatorda ayrim hollarda o’lim bilan tugashi ham mumkin.

[17] Mirraximov M.M., Агаджанян Н.А. Человек и окружающая среда. — Ф.: Кыргызстан. 1974. - 44 с

Sog‘lom odam 2400 m balandlikda o‘zgarishlarni sezmaydi, boshqalari, ehtimol, boshdagi og’irlikni, uyquchanlikni va jismoniy mehnat paytida tezroq charchoqni sezadilar. Mavjud manbaalar taxlili shuni ko‘rsatadiki, bunday balandliklarda, ko‘rinadigan qulay holatga qaramay, tananing turli fiziologik funktsiyalaridan moslashish reaktsiyalarining butun seriyasi qayd etiladi. Bu birinchi navbatda qon aylanish, nafas olish va qon tizimlariga tegishli bo’ladi.

Yengil tog’ kasalligida – bosh aylanishi, bosh og’rig’i turlari, mushaklar og’rig’i, uqusilik, holsizlik, ko’ngil aynishi, qusish, asabiylashish, ishtahaning bo’g’ilishi, qo’llar va oyoqlar bilan birgalikda yuzning ham shishishi, yurakning tez urishi kuzatilsa, og’ir tog’ kasallida mazkur holatlardan yo’tal, ko’krak qafasi tiqilishi, teri rangining o’zgarishi, muvozanatning yo’qolishi va hattoki yurishning qiyinlashuvi hamda yura olamslik holatlari bilan farqli jihatlarini ko’rish mumkin.

Inson tanasi kislorod yetishmasligi bilan qonning kislorod hajmini oshirish qobiliyatiga ega. Ushbu usullardan biri massani oshirishdir aylanma qon, yuqorida muhokama qilingan. Ammo, boshqa tomondan, eritrotsitlar soni ham, qon birligi uchun qizil qon pigmenti miqdori sezilarli darajada oshadi. Birinchi marta odam baland balandlikda qolganda, eritrotsitlar va gemoglobin soni odatda cho‘ktirilgan holatda saqlanadigan qonning o‘sha qismining mobilizatsiyasi tufayli ortadi, go‘yoki zaxirada mavjud holatday. Bunday to‘plangan qon (juda sekin harakatlanuvchi) taloq, jigar va teri osti to‘qimalarida ham mavjud.

Ma‘lum bo‘lishicha, qonning kislorod bilan to‘yinganligining pasayishi bilan maxsus asab tugunlari qo‘zg‘alib, to‘plangan qon hajmining pasayishiga va uning tomir to‘shagiga harakatlanishiga olib keladi. Mazkur jarayonning yordamida esa organizm kislorodni tashishda faol ishtirok etadigan aylanma qon hajmini oshirishga qodirligini ko’rsatadi. Deyarli birinchi kunlardan boshlab gemoglobinning shakllanishi sezilarli darajada faollashadiki, shuning uchun har bir qizil qon hujayrasi ko‘proq gemoglobinni o‘z ichiga olishi mumkin. Bunday holda, alohida eritrotsitlarning hajmi va diametri o‘zgaradi. Qizil qon hujayralari diametrining o‘zgarishi gemoglobinning kislorodni bog‘lash xususiyatlarida muhim rol o‘ynaydi.

Demak yuqoridagi ma’lumotlarga asoslanib aytishimiz mumkinki, tog‘li hududlarning kishilarga ta’sir qiluvchi asosiy omili bo’lmish iqlim sharoitlarining ta‘sirini baholashda, moslashuvchanlik va ijtimoiy-iqtisodiy omillarning biologik xususiyatlarini hisobga olish kerakligini yuqoridagi dalillardan ham ko’rsak bo’ladi. Gigienik va boshqa himoya choralarini qo‘llash tufayli balandlik omilining salbiy ta‘sirini deyarli butunlay zararsizlantirish ham mumkinligi ma’lum.

Kishilar organizmining tog‘li iqlimga bo‘lgan munosabatlarining biologik xususiyatlarini tahlil qiladigan bo‘sak, ba‘zi insonlar tog‘li iqlim sharoitlariga nisbatan yaxshi moslashar ekanki ulardagi vaqti-vaqti bilan bezovta qiluvchi ayrim xuruj qiluvchi bezovtaliklar butunlay yo’q bo’lib ketish holatlari kuzatilsa, ayrimlarida esa tog‘larga moslashishga to‘sqinlik qiladigan og‘riqli holatlarga duch kelishadi.

Inson organizmining moslashuvchanlik imkoniyatlarini cheklaydigan ko‘plab kasalliklar, uning baland tog‘li omillarga sezgirligini oshiradi.

Kuzatishlarimiz davomida olingan ma’lumotlarimizga kora mamlakatimizning Boysun, Zomin, Baxmal, Bo’stonliq tumanlarida yashovchi aholi orasida uzoq umr ko’ruvchilar salmog’i yuqori ekanligi aniqlandi. Etiborli jihati shundaki, mazkur tumanlar respublikamizning tog’li tumanlari hisoblanadi.

Ammo mamlakatimizning mavjud statistik ma’lumotlaridagi umumiy aholisidagi salmoqqa e’tiborimizni qaratadigan bo’lsak, dengiz sathidan 800 metrdan 1000 metrgacha bo’lgan hududlarda umumiyga nisabatan 37,9 foiz aholi, 1000 metrdan 1500 metrgacha bo’lgan hududlarda 7,3 foiz, 1500 metrdan-2000 metrgacha balandlikda 1,2 foiz va 2000 metrdan balandliklarda esa 0,2 foiz aholi istiqomat qiladi. Boysun (1248 metr) va Yangiobod (1350 metr) tog’ tumanlari o’rta tog’ zonasida joylashgan. Mamlakatimizning eng baland tog’ qishloqlari esa Hisor tog’ining janubiy yonbag’irlarida Surxondaryo viloyatining Sariosiyo tumanida 2500-2600 metr balandlikda joylashgan Hurvatan, Tamshush, Shatrut, Tamarqut va Kshtut qishloqlari hisoblanadi. Balandlik chegarasi 2600 metrni tashkil qiladigan Kshtut qishlog’i o’z navbatida mamlakatimizning tog’larida doimiy aholi yashaydigan aholi punkti hisoblanadi.

Yana shuni eslatish lozimki, mamlakatimizning ayrim tog‘li mintaqalari aholisi orasida ba’zi ichki sekresiya bezlari faoliyatining buzilishi bilan bog‘liq kasalliklar, jumladan, endemik bo‘qoq kasalligi ham keng tarqalgan. Bu hol ayniqsa vodiy hududlarda ko‘proq kuzatilmoqda. Kasallikning asosiy sababi esa aholi ichimlik suvi tarkibida yod moddasining yetarli miqdorda bo‘lmasligidir.

Keying yillarda Farg’ona vodiysi va Samarqand viloyati aholisi orasida endemik bo’qoq kasalligi bilan kasallanishlar sonining oshganini ko’rishimiz mumkin. Ma’lumot o’rnida: bo’qoq ya’ni xalq tilida zob- qalqonsimon bezning kattalashishi hisoblanadi. Bu kasallik ko’pincha yod yetishmasligi kuzatiladigan hududlarda keng tarqalgan qalqonsimon bez inson tanasida modda almashinuvini nazorat qilish markazi hisoblanadi. Shifokorlar uni ko’pincha sog’liq qo’riqchisi deb atashadi, chunki u qanday muammo yuz berishi bilan o’zini ham shunday tutadi: bezovtalanish, kayfiyatning yo’qligi, charchoq va uyquchanlik. Qalqonsimon bez bilan bog’liq muammolar ayollarda ko’proq uchrashi mumkin (ayniqsa yosh o’tishi bilan ayollarda gormonal o’zgarishlarda yuz beradi -klimaks) bo’lsada, erkaklarda ham bunday xastalik tez-tez qayd qilinadi. Bundan tashqari, qalqonsimon bez shuningdek, yurak faoliyatini, miya faoliyatini, yurak mushaklarning tonusini ham boshqaradi. Shuning uchun bunday davrda qalqonsimon bez juda sezuvchan bo’lib, immun tizimining zaiflashuvi, yuqumli kasalliklar, yod yetishmasligi yoki ortiqchaligi, stresslarga tezda javob qaytaradi. Sog’lom hujayralarga qarshi kurashadigan antitanalarning patologik faollashuvi natijasida yosh o’tgani sayin ayollar autoimmun kasalliklarga ko’proq moyil bo’lib qolishadi. Ushbu antitanalar qalqonsimon bez faoliyatini ham sustlashtiradi. Natijada zaiflik, xotiraning pasayishi, shishlar, tana vaznining ortishi, terining quruqlashishi, sochlarning mo’rtligi, mushak og’riqlari va spazmlar, ich qotishlari kuzatiladi.

Empirik kuzatishlar tahlili shuni ko’rsatadiki, balandlikda istiqomat qiluvchi aholi orasida pasttekisliklarda yashovchi insonlarda ko’p kuzatiladigan allergik kasalliklarning eng kam uchrashi kuzatildi.

Tog‘li hududlarda turli xil allergik kasalliklarning kamayishida havoda turli xil aralashmalarning kamligi, balandliklar ko‘tarilishi bilan qishning davomiyligining oshishi muhim ahamiyat kasb etadi. Shu munosabat bilan, pasttekislik sharoitida allergik kasalliklarning ayrim shakllarining paydo bo‘lishida asosiy ro‘l o‘ynaydigan o‘simliklarning kichikroq tarqalishi ham muhim ahamiyatga egaligi bilan ajralib turadi.

Xulosa

Xulosa o’rnida ta’kidlashimiz o’rinliki, tog‘li tumanlarning fiziologik mexanizmlarini baholashda moslashuv, salomatlikka ijobiy yoki salbiy ta‘sir ko‘rsatishda, inson tanasining fiziologik funktsiyalariga sezilarli ta‘sir ko‘rsatadigan tog‘li hududlarning biologik xususiyatlaridan tashqari geokimyoviy xususiyatlari ya’ni tuproqning kimyoviy tarkibi, ichimlik suvi, oziq-ovqatlarni ham o’z o’rnida hisobga olish maqsadga muvofiq. Mazkur shu bilan birga boshqa o‘ziga xos xususiyatlar - landshaft, o‘simliklarning tabiati va boshqalar tog‘li tumanlarning hududiy xususiyatlarini, shu jumladan, terapevtik va fiziologik ta‘sirning qanchalik muhim hamda jiddiy ekanligini belgilaydi. Shu sababli, turli balandlikda joylashgan, ammo turli tog‘li viloyatlarda joylashgan tog‘li hududlarning inson tanasiga ta‘siri sezilarli darajada farq qilishi mumkinligiga guvoh bo‘lishimiz ayni haqiqatdir.

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PATALOGIYALARDA SIYDIK TARKIBINI O'ZGARISHI

Annotatsiya. *Tibbiyot instuti talabalari kasallik belgilariga qarab tashxis qo'yish bilan bir qatorda kasallikka sabab bo'luvchi omillarni aniqlash xam muxim xisoblanadi. Buning uchun seminar mashg'ulot darslari muxim axamiyatga ega, chunki muammolar munozaralarda xal bo'ladi. Xar qanday kasallikka tashxis qo'yish uchun bo'lajak shifokor fikrlay olishi kerak.*

Kalit so'zlar. *Tibbiyot, tashxis, siydik, siydikchil, kreatinin , kreatin, aminokislotalar, giperaminoatsiduriya, miopatiya, komatoz holatlar, gipertireoz, kortizon.*

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CHANGES IN URINE STRUCTURE DURING PATHOLOGIES

Abstract. *It is important for students of the medical institute to make a diagnosis based on the symptoms of the disease, as well as to determine the factors that cause the disease. For this, seminar training classes are of great importance, because problems are solved in discussions. To diagnose any disease, the future doctor must be able to think.*

Key words. *Medicine, diagnosis, urine, diuretic, creatinine, creatine, amino acids, hyperaminoaciduria, myopathy, comatose states, hyperthyroidism, cortisone.*

Siydik hosil bolishi va uning tarkibi buyrak koptokchalari filtratsiyasi (glonierulyar filtratsiya) ga va buyrak to'qimasi kanalchalarida bo'lib turadigan reabsorbsiya hamda sekretsiya jarayonlariga bogliqdir. Siydik tarkibi odam ovqatining tarkibi va organizmning metabologik faolligiga bog'liq.

Normal siydik tarkibi quyidagicha bo'ladi:

Suv - butun hajmining 95 foizi atrofida, elektrolitlar, jumladan, natriy, kaliy, magniy tuzlari, xloridlar va bikarbonatlar, oqsil almashinuvi mahsulotlari - mochevina, urat (siydik) kislotasi kreatinin, kislota-ishqorlar muvozanatini saqlab berishga xizmat qiladigan kislota va ishqorlaming ortiqchasi.

Turli kasalliklarda siydikda quyidagi moddalar topilishi mumkin: oqsil, glyukoza, keton tanalari. bilirubin, urobilinogen, gemoglobin, nitritlar.

Siydik tahlilining hamrna metodlarini to'rt guruhga ajratish mumkin:

— umumiy sifat metodlari;
— siydik cho'kmasi mikroskopiyasi;
— miqdoriy metodlar;
— maxsus metodlar.

Mazkur tezisda sog'liqni saqlashning birlamchi bo'g'inidagi laboratoriyalar uchun tavsiya etiladigan umumiy sifat metodlari va siydik cho'kmasi mikroskopiyasining texnikasi bayon etiladi.

Siydikni sifat jihatidan tekshirishning standart metodlari va mikroskopiya texnikasi quyidagilami o’z ichiga oladi:

— siydikning tashqi ko'rinishi va rangiga mikroskopik baho berish;
— bir martali va bir kecha-kunduzlik siydik hajmini olchash;
— siydikning solishtirma og'irligini o'lchash;
— oqsil, glyukoza, bilirubin, qon, keton tanalari, pH, urobilinogen, nitritlarni aniqlash uchun qo'yiladigan kimyoviy sinamalar;
— sentrifugalangan siydik cho'kmasi mikroskopiyasi.

Siydikning kimyoviy tarkibi. Siydik tarkibidagi quruq moddalar (sutkalik miqdori taxminan 60 g) organik va anorganik moddalardan tarkib topgan. Hozirgi vaqtda siydikda jami 150 dan ortiq kimyoviy moddalar aniqlangan.

Siydikdagi azotli organik moddalar

Siydikchil (mochevina) – siydik tarkibidagi organik moddalarning katta qismini tashkil etadi. Katta odam siydigi bilan o’rtacha bir sutkada 30 g ga yaqin siydikchil chiqariladi. Bir sutkada siydik bilan chiqariladigan azotning umumiy miqdori 10 dan 18 g gacha bo’lishi mumkin, aralash ovqatlanganda siydikchilning azoti 80-90% ni tashkil etadi. Siydikda siydikchilga to’g’ri keladigan azotning miqdori oqsillarga boy bo’lgan ovqat iste’mol qilinganda, to’qima oqsillarini parchalanishi bilan boruvchi kasalliklar (isitmalaganda, saraton, gipertireoz, diabet va boshqalar), shuningdek, ba’zi dorilar iste’mol qilganda (masalan, qator gormonlar) ko’payadi. Siydik bilan ajraladigan siydikchil miqdori jigar og’ir jarohatlanganda, buyrak kasalliklarida (ayniqsa, buyrak filtratsiya qilish qobiliyati buzilganda), shuningdek insulin va boshqalar qabul qilinganda kamayadi.

Kreatinin ham azot almashinuvining oxirgi mahsuloti hisoblanadi. U mushak to’qimasida fosfokreatindan hosil bo’ladi. Har bir odam uchun kreatininnisutkalik miqdori doimiy bo’lib, asosan mushak massasining holatini aks ettiradi.

Erkaklar tanani har bir kg massasiga sutkada siydik bilan 18-32 mg kreatinin ajraladi, ayollarda esa 10 dan 25 mg gacha. Bu sonlar oqsil bilan ovqatlanishga ham bog’liq.

Kreatin – katta odamlar siydigida amaliy jihatdan me’yorda bo’lmaydi. U siydikda kreatinni ko’proq miqdorda iste’mol qilganda yoki patologik holatlarda aniqlanishi mumkin. Qon zardobida kreatin miqdori 0,12 mmol/l ga yetganda u siydik bilan ajraladi.

Ma’lumki, kreatinuriya jigar jarohatlanganida, qandli diabetda, endokrin o’zgarishlarda (gipertireoz, addison kasalligi, akromegaliya va boshqalar), yuqumli kasalliklarda kuzatilishi mumkin.

Aminokislotalar – sutkalik siydikda 1,1 g atrofida bo'ladi. Qon va siydikdagi ayrim aminokislotalar miqdorini nisbati bir xil emas. Siydik bilan ajralayotgan u yoki bu aminokislotalarni miqdori uning qon plazmasidagi miqdori va kanalchalardagi reabsorbtsiya darajasiga bog'liq. Siydikda glitsin va gistidinni kontsentratsiyasi eng yuqori, keyin glutamin, alanin va serinning miqdori turadi.

Giperaminoatsiduriya – jigar parenximasi kasalliklarida uchraydi. Bu jigarda dezaminlanish va transaminlanish jarayonlarini buzilishi bilan tushuntiriladi. Giperaminoatsiduriya, shuningdek, og'ir yuqumli kasalliklar saraton, katta jarohatlar, miopatiya, komatoz holatlar, gipertireoz, kortizon va AKTG bilan davolanganda kuzatiladi.

Ayrim aminokislotalar almashinuvini buzilishlari ham ma'lum. Ko'pchilik bu buzilishlar tug'ma yoki irsiydir. Bularga fenilketonuriya, alkoptonuriya misol bo'lishi mumkin.

Siydik kislota purin almashinuvining oxirgi mahsuloti hisoblanadi. Sutka davomida siydik bilan 0,7 g ga yaqin siydik kislota chiqariladi. Nukleoproteinlar saqlovchi ovqatni ko'p iste'mol qilganda ma'lum vaqtdan keyin siydik kislota chiqarilishi ko'payadi. Aksincha, purinlarni kam saqlovchi ovqat iste'mol qilinganda siydik kislotaning chiqarilishi sutkada 0,2 g gacha pasayadi. Siydik kislotaning ko'p chiqarilishida leykemiya, gepatit va podagrada ham kuzatiladi.

Atsetilsalitsil kislota va ba'zi steroid gormonlar qabul qilinganda ham siydik kislotaning siydikdagi miqdori ortadi.

Siydikni azotsiz organik qismlari – bu shavel, sut va limon, shuningdek, moy, valerian, qahrabo(suktsinat), β-oksimoy, atsetosirka va boshqalar kislotalar. Sutkalik siydikda organik kislotalarni umumiy miqdori odatda 1 g dan ortmaydi.

Siydikning anorganik (mineral) tarkibiy qismlari – qon va organizmni boshqa to'qimalari tarkibiga kiruvchi barcha mineral moddalar siydik tarkibida bo'ladi. Sutkalik siydik quritilganda hosil bo'lgan 50-65 g quruq modda 15-25 g anorganik moddalarga to'g'ri keladi. Bularga natriy, kaliy, xlor, kalsiy va magniy ionlari; bikarbonatlar, fosfatlar va sulfatlar kiradi.

Tadqiqot natijalari. Tahlil uchun barcha qoidalaiga amal qilingan holda yig'ib olingan siydik yig'ilgan paytidan boshlab hisoblaganda bir soat ichida tckshirilishi kerak. Mikroskopiya uchun siydikni sentrifugalash yo'li bilan olingan cho'kmasi kerak bo'ladi. Agar sentrifuga bo'lmasa. cho'kma olish uchun siydik birmuncha vaqt tindirib qo'yiladi. Siydik cho'kmasi eritrositlar, leykositlar, silindrlar, achitqi zamburug'lari, bakteriyalar, sodda jonivorlar, tuz kristallari va epiteliy hujayralarini topish uchun tekshirib ko'riladi.

Xulosa

Tibbiyot instituti talabalari yuqorida keltirilgan ma'lumotlar orqali buyrak tosh kasalliklarini aniqlash, tashxis qo'yish va davolash ishlarini amalga oshirishi, kelejakda ish faoliyatida foydalanishlari mumkin.

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FARG‘ONA VILOYAT KICHIK BIZNES VA XUSUSIY TADBIRKORLIK SUBYEKTLARINI IJTIMOIY IQTISODIY RIVOJLANISH TENDENSIYALARI

Anotatsiya: *Farg‘ona viloyatini kichik biznes va xususiy tadbirkorlik subyektlarini ijtimoiy, iqtisodiy rivojlanishini ilmiy jixatdan o‘rganish, tahlil qilish va isteqbolliy startegiya ishlab chiqish.*

Kalit so’zlar: *hududiy joylashuv,YaIM, YaHM, ekispor, indeks, import, subyekt, aksiyodorlik, tijorat.*

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TRENDS IN SOCIAL ECONOMIC DEVELOPMENT OF SMALL BUSINESS AND PRIVATE BUSINESS ENTITIES OF THE FERGANA REGION

Anotation: *The study, analysis and development of a voluntary start-up of the Fergana region from a scientific nature of social, economic development of small business and private business entities.*

Keywords: *Territorial location, GDP, YaHM, ekispor, index, import, subject, shareholder, commercial.*

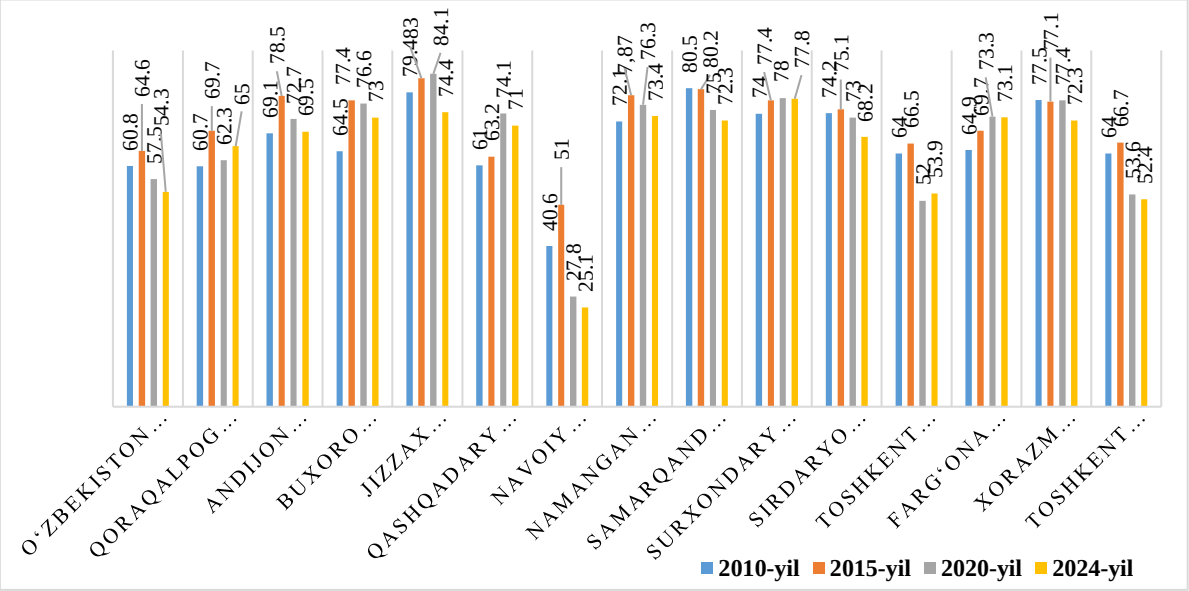
Tadqiqot obyektining dolzarbligi shundaki Farg‘ona viloyati kichik biznes va xususiy tadbirkorlik subyektlarini ijtimoiy-iqtisodiy rivojlanish darajasini monitoring qilishning quydagi jixatlariga etibor berish kerak:

- Respublika, viloyat, tuman va mahalliy miqyosda kichik biznes va xususiy tadbirkorlik subyektlarini barqaror rivojlanish muammolarini tor va keng doirada taxlil qilish murakkab jarayondir;
- Taxlil uchun mavjut axborat bazasini to‘liq shakillanmaganligi sababli turli manbalardan foydalanish, asosiy tarmoq va soxalarga etibor qaratishni dolzarbligi;
- Kichik biznes va xususiy tadbirkorlik subyektlarni boshqa subyektlardan ajratib olgan holda, bir tizimga solgan holda taxlil qilish;
- Subyektlarni ijtimoiy -iqtisodiy va siyosiy rivojlanishini tartibga solish sohalar bo‘yicha hududiy siyosatni amalga oshirishni dolzarbligi;

- Olib borilayotga islohatlarni natijalarini taxlil qilish, bevosita va bilvosita ta’sir qilubchi omillarni tasirini aniqlash;
- Kichik biznes va xususiy tadbirkorlik subyektlarni ijtimoiy-iqtisodiy, siyosiy xolati va ularning isteqbolliy rivojlanishi mintaqa miqyosida amalga oshirrilayotgan strategik ishlar, maqsadli dasturlar, ishbilarmonlik muhiti investitsion loixalar bilan o‘zaro bog‘langanligi.

Farg‘ona viloyati qadimdan shakillanib kelgan silvizatsiya markazlaridan hissoblanadi. Geografik joylashuvi jihatdan mamlakatimizni sharqida, Farg’ona vodiysini janubiy qismida joylashgan. Chegaradosh davlatlari janub va sharqdan Qirg‘iziston respublikasi, g‘arbda Tojikizston respublikasi bilan chegaradosh va shimoldan Namangan va Andijon viloyatlari bilan chegaradosh. Farg‘ona viloyatida 15 ta tuman, 4 ta viloyatga bo‘ysunuvchi shaharlar (Marg‘ilon, Farg‘ona, Quvasoy va Qo‘qon), 5 ta tumanga bo‘ysunuvchi shaharlari (Beshariq, Hamza, Rishton, Quva va Yaypan) mavjud.Bunday infra tuzulma rivojlanish jihatdan qulay bo‘lishiga qaramay birmuncha jixatlari murakkab va muammoli ishlangan. Bunga misol So‘x tumani, Yozovon tumanining ayrim hududlari va Qo’qonga yondosh tumanlarning rivojanishiga Qo‘qon shaharining ta’sirini aytish mumkin.

Bizga ma’lumki hududni iqtisodiyoti qanchalik rivojlanganligini YaIM hajmiga qarab taxlil qilishimiz mumkun so‘ngi yillarda Farg‘ona viloyati kichik biznes va xususiy tadbirkorlik subyektlarining umumiy YaIMdagi ulushi sezilarli darjada o‘zgargan. Bunday holatni quydagi diogrammadan tahlil qilsak bo‘ladi.

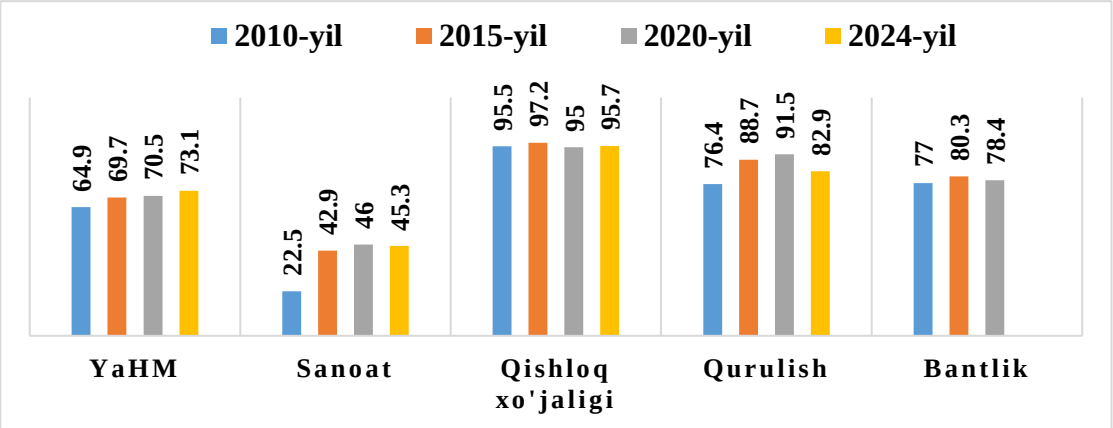


1-rasim. Kichik biznes va xususiy tadbirkorlik subyektlarining jami YaIMdagi ulushi (foizda).[18]

[18] O'zbekiston statistika qo‘mitasi ma’lumotlari muallif tomonidan qayta ishlangan.

Yuqorida keltirilgan malumotlarni tahlil qilsak 2010-yilda Respublikamizda o‘rtacha YaIMdagi ulushi 60,8 foizni tashkil qilgan. Farg‘ona viloyati o‘rtacha ko‘rsatkichdan 4,1 foiz yuqoriligi bilan harakterlangan holda 64,9 foizni tashkil qilgan. 2015-yilga kelib Respublikamizda o‘rtacha ko‘rsatkich 3,8 foizga o‘sgan, ya’ni 64,6 foizni tashkil etgan. Farg‘ona viloyati esa 2010-yilga nisbatan 4,8 foizga o‘sgan holda 69,7 foizga ortgan. 2020-yilga kelib Respublikamizda o‘rtacha ko‘rsatkich 2010-yilga nisbatan 3,3 foizga pasayib, 2015-yilga nisbatan 7,1 foizga kamaygan ya’ni 57,5 foizni tashkil etgan. Farg‘ona viloyati esa 2010-yilga nisbatan 4,8 foizga oshgan, 2015-yilga nisbatan 8,4 foizga ko‘paygan ya’ni 73,3 foizni tashkil etgan. 2024-yilda bu ko‘rstakich Respublikamizda 54,3 foizni tashkil etib 2010-yilga nisbatan 6,5 foizga pasayib, 2015-yilga nisbatan 10,3 foizga pasayib, 2020-yilga nisbat esa 3,2 foizga kamayishi kuzatilgan. Farg‘ona viloyatida esa 2024-yida bu ko‘rsatkich 73,1 foizni tashkil qilib 2010-yilga nisbatan 8,2 foizga o‘sgan, 2015-yilga nisbatan 3,4 foizga oshgan, 2020-yilga nisbat esa 0,2 foizga kamayishi kuzatilgan. Respublikamizda kichik biznes va xususiy tadbirkorlik subyektlarini YaIMda o‘sish ko‘rsatkichi 2010-yildan 2024-yilga nisbatan o‘rtacha 60,3 foizni tashkil etib, foiz hisobida -10,7 ga kamaygan. Farg‘ona viloyatida esa bu ko‘rsatkich 2010-yildan 2024-yilga nisbatan o‘rtacha 9,6 foiz ko‘pligi bilan xarakterlanib 69,9 foizni tashkil etib, foiz hisobida esa 12,5 foizni tashkil etib Respublikani o‘rtacha o‘sish foiziga nisbatan 20,3 foiz ko‘pligi bilan harakterlanmoqda. Bu ko‘rsatkichlar esa Farg‘ona viloyatida kichik biznes va xususiy tadbirkorlik subyektlarini qolgan viloyatlarga nisbatan yaxshi rivojlanganligini bildiradi.

Farg‘ona viloyatida kichik biznes va xususiy tadbirkorlikning iqtisodiy tarmoq tarkibi birmuncha muarkkab rivojlangan bo‘lib to‘liq tahlil qilinmaganligi birmuncha muammolarni yuzga kelishiga sabab bo‘lmoqda. Yuqorida keltirigan manbalarda YaIMda ulushi pasayishi kuztilganligi buning isbotidir.



2-rasm. Farg‘ona viloyati kichik biznes va xususiy tadbirkorlikni iqtisodiy tarmoqlar tarkibi *(umumiy hajmga nisbatan % da)*. [19]

[19] O'zbekiston statistika qo‘mitasi ma’lumotlari muallif tomonidan qayta ishlangan.

Diagrammada Farg‘ona viloyatida kichik biznes va xususiy tadbirkorlik subyektlarining iqtisodiyotning asosiy tarmoqlaridagi ulushi yillar kesimida ko‘rsatilgan. Tahlil natijalariga ko‘ra, ushbu subyektlarning viloyat iqtisodiyotida tutgan o‘rni yil sayin ortib bormoqda. Avvalo, yalpi hududiy mahsulot (YaHM) tarkibida kichik biznesning ulushi 2010-yilda 64,9 foizni tashkil qilgan bo‘lsa, 2024-yilga kelib bu ko‘rsatkich 73,1 foizga yetgan. Bu esa kichik biznesning umumiy iqtisodiy faollikdagi ulushi izchil ortib borayotganini bildiradi.

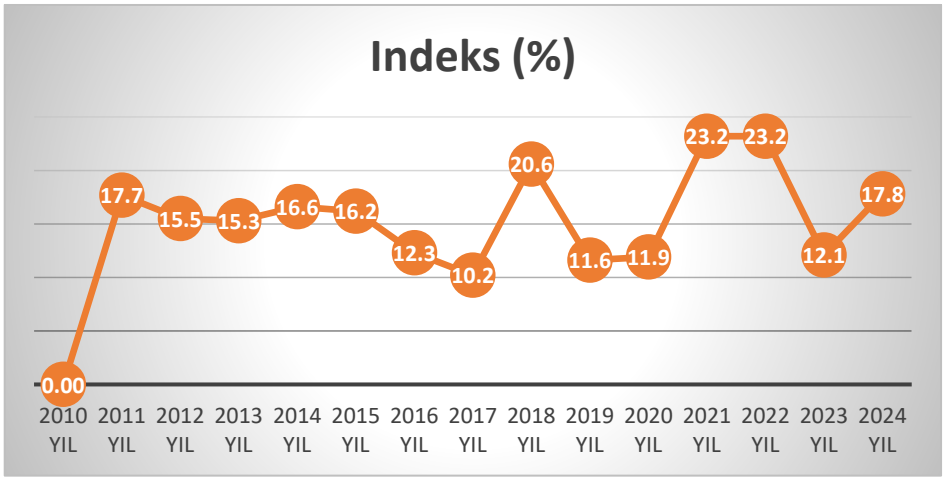
Sanoat tarmog‘ida ham sezilarli o‘sish kuzatilgan. 2010-yilda kichik biznesning sanoatdagi ulushi 22,5 foiz bo‘lgan bo‘lsa, 2015-yilda bu ko‘rsatkich 42,9 foizga, 2020-yilda 46 foizga, 2024-yilda esa 45,3 foizga yetgan. Bu holat kichik sanoat subyektlarining sanoat ishlab chiqarishidagi rolini kuchayganini ko‘rsatadi.

Qishloq xo‘jaligi tarmog‘ida kichik biznesning ulushi doimo yuqori bo‘lib kelgan. 2010-yildagi 95,5 foizlik ko‘rsatkichi 2024-yilda 95 foiz atrofida barqaror saqlanib qolgan. Bu esa ushbu sohada kichik fermer xo‘jaliklari va xususiy ishlab chiqaruvchilarning yetakchi o‘rin egallayotganidan dalolat beradi.

Qurilish sohasida ham xususiy sektor faolligi ortgan. 2010-yilda 76,4 foizni tashkil qilgan ulush 2020-yilda 91,5 foizgacha ko‘tarilib, 2024-yilda esa 89,9 foiz bo‘lib, yuqori darajada saqlanmoqda.

Bandlik sohasida esa kichik biznes va xususiy tadbirkorlikning roli doimiy yuqoriligi bilan ajralib turadi. 2010-yilda 77 foiz bo‘lgan ko‘rsatkich 2024-yilga kelib 78,4 foiz darajasida saqlangan. Bu esa ushbu subyektlarning ish o‘rinlari yaratishdagi asosiy manba ekanligini ko‘rsatadi. Kichik biznes va xususiy tadbirkorlik Farg‘ona viloyati iqtisodiyotining deyarli barcha tarmoqlarida muhim o‘rin tutmoqda. Ayniqsa, qishloq xo‘jaligi, qurilish va bandlik sohalarida ulush juda yuqori. Sanoat va YaHM bo‘yicha o‘sish barqaror davom etmoqda, bu esa diversifikatsiyalashuv jarayonining kuchayganini bildiradi.

Viloyatni yillar davomida iqtisodiy rivojlanib borishi ko‘plab statistik ko‘rsatkichlarda o‘z isbotini topmoqda. Masalan kichik biznes va xususiy tadbirkorlikni YaIM indeksini taxlil qilsak o‘rganilgan davr mobaynida yillar kesimida chuqur taxlil va mulohaza yuritsak bo‘ladi. Quydagi diogrammada 2010-yildan 2024-yillar oralig‘ida aholi jon boshiga to‘g‘ri keladigon YaIM indeksini taxlil qilingan.



3-rasm. Farg‘ona viloyati kichik biznes va xususiy tadbirkorliklarini aholi jon boshiga YaIM indeks[20].

Yuqorida keltirilgan ma’lumotlarga ko‘ra, 2010–2024 yillar davomida Farg‘ona viloyatida kichik biznes va xususiy tadbirkorlikning aholi jon boshiga YaIM indeksi sezilarli tebranishlarga ega bo‘lgan. Bu holat viloyat iqtisodiyotida kichik biznes subyektlarining faolligi, ishlab chiqarish hajmi va aholi sonining o‘zgarishlari bilan chambarchas bog‘liqdir.

2010-yilga nisbatan 2011-yildagi indeks 17,7% gacha oshgan bo‘lib, bu davrda viloyatda kichik biznes subyektlari faoliyatini kengaytirish va soddalashtirilgan soliq tizimining tatbiqi natijasi sifatida izohlanadi. 2012–2014-yillar oralig‘ida indeks nisbatan barqaror bo‘lib, 15,3–16,6% oralig‘ida saqlanib qolgan. Bu davrda kichik tadbirkorlik sektori asosan savdo, xizmat ko‘rsatish va qishloq xo‘jaligi yo‘nalishlarida rivojlanishni davom ettirgan.

2015–2017-yillarda esa indeksda pasayish tendensiyasi kuzatilgan bo‘lib, 2017-yilda eng past daraja — 10,2% qayd etilgan. Ushbu pasayish kichik biznes faoliyatining ayrim tarmoqlarida qisqarishi, shuningdek, iqtisodiyotning umumiy tarkibida yirik ishlab chiqarish korxonalarining ulushi ortganligi bilan izohlanadi.

2018-yilda esa indeksda keskin o‘sish kuzatilib, 20,6% ga yetgan. Bu davrda O‘zbekiston Respublikasi Prezidentining tadbirkorlik faoliyatini qo‘llab-quvvatlashga qaratilgan qarorlari, xususan 2017–2018-yillardagi “Tadbirkorlik subyektlarini rivojlantirishni jadallashtirish dasturi” natijalari o‘z samarasini bergan[21].

2019–2020-yillarda indeksi yana nisbatan pasayib, 11,6–11,9% darajalarida saqlanib qolgan. 2021–2022-yillarda esa Farg‘ona viloyatida kichik biznesning jon boshiga ishlab chiqarish hajmi sezilarli darajada oshib, indeks 23,2% ko‘rsatkich bilan eng yuqori nuqtaga chiqqan. Bu davrda viloyatda sanoat klasterlari, oilaviy tadbirkorlik loyihalari va mikromoliyaviy institutlar faoliyatining kengayishi kuzatilgan.

[20] O'zbekiston statistika qo‘mitasi ma’lumotlari muallif tomonidan qayta ishlangan.
[21] O‘zbekiston Respublikasi Vazirlar Mahkamasining qarori, 20.01.2024 yildagi 37-sonli qarori.

2023-yilda indeksda yana qisqa muddatli pasayish — 12,1% qayd etilgan bo‘lsa, 2024-yilda u 17,8% gacha tiklangan. Bu holat pandemiyadan keyingi iqtisodiy tiklanish, iste’mol bozori kengayishi va yangi kichik ishlab chiqarish subyektlarining paydo bo‘lishi bilan izohlanadi.

Umuman olganda, 2010–2024 yillar mobaynida Farg‘ona viloyatining kichik biznes va xususiy tadbirkorlik sektori dinamik, lekin siklik o‘zgarishlarga ega bo‘lgan. Indeks qiymatlarining tebranishi kichik biznes subyektlarining makroiqtisodiy omillar, davlat siyosati va hududiy investitsion faollikka bog‘liqligini ko‘rsatadi.

Tahlil natijalariga ko‘ra, Farg‘ona viloyatida kichik biznes va xususiy tadbirkorlikning aholi jon boshiga YaIM indeksi o‘rganilgan davrda o‘rtacha 15–17% diapazonida shakllangan. Bu ko‘rsatkich viloyat iqtisodiyotida kichik biznesning barqaror o‘sish omili sifatida muhim ro‘l o‘ynayotganini, ammo ayrim yillarda iqtisodiy tebranishlar va tashqi omillar ta’siri sezilarli bo‘lganini ko‘rsatadi. Shu bois, kelgusida kichik biznesning innovatsion faoliyatini kengaytirish, ishlab chiqarish samaradorligini oshirish va hududiy diversifikatsiyani chuqurlashtirish zarur.

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IMPROVING EFFICIENCY BY MEASURING NOISE LEVELS AND VIBRATIONS OF ELECTRICAL MACHINES AND TRANSFORMERS UNDER TEST

Abstract: *Voice waves pressure vibrations in appearance spreading longitudinal mechanic is a wave Man ear from 16 to 16000 Hz was frequencies feels . High frequency vibration - ultrasound low frequency and is called infrasound . Noise is the sound of pressure disorderly different kind frequencies with to change It is said that electricity machines and transformers by harvest made real noise and vibration degrees safe work requirements and labor productivity factors with Production is limited . release quality improve and noise and vibration the most big level harvest to do electricity machines and transformers separately units improvement because of this requirements certain restrictions within to take possible .*

Key words: *Electricity, Transformers, Control, vibrations, Aerodynamic, mechanisms, Magnet, magnetic field*

Introduction

Electricity of cars noise

Electricity of cars general noise following into parts separation possible . Aerodynamic noise electricity of the car different parts and mechanisms (rotor, fan , collector) (vh .) rotation because of gas cooling of the tool movement as a result appearance The gas whirlwind movement how much strong if there is noise level so much high It will be . Rotating surface on the surface reflection delivered don't be shy gases wide in the circle to the noise reason child his energy whole to hear in the range spectral accordingly distributed . Fan noise mainly his/her speed to the circle related . So so , speed range above 60 m/s electricity cars for general noise level many in cases only fan aerodynamic group with determined . Aerodynamic noise also fan by compressed air or 237 of the gas bearing shields and of the body rib such as etc. to obstacles face arrival with was also the effects inside This obstacles voice of waves distributors become The fan remains . feathers one rhythmic step by step has if yes , siren noise frequency as follows (Hz):

$f = z\,n$

this on the ground z - fan feathers number : n – rotation frequency , rpm . Magnet noise stator and rotor binding vibrations vibrations and periodic to the character has happened electromagnet of forces variable movement impact under appearance Magnet noise , mainly from the machine air of the cavity magnet induction squared proportional to the radial forces that are related . Magnet of the

field air in the void distribution complexity due to arising from was magnet noise wide comprehensive will be . Bearing noise bearing swinger elements working when released road placed error imbalance and uncertainties with is marked . Noise level bearing diameter and shaft rotation speed increase , magnet of strength one one-sided gravity and rotor from reading known one to the corner shift as a result increases .

Transformers noise

Transformer noises mainly magnetostriction (variable) magnet to the square placed ferromagnetic of the body size and appearance change (event) with related . Accelerator cooling systematic large to transformers typical was other noise sources , ventilator and oil pumps own inside takes . From this outside noise in the bushes electrodynamic motion and loading under voltage corrector electromechanical devices by appearance Transformers noise level electromagnetic downloads and size dimensions size with Magnetostriction is defined as as a result appearance to be of noise main reason magnet core vibration , induction , electrical engineering steel parameters structure and to physics related . Vibration oil and magnet conductor columns through directly right to the tank transmitted . Magnet from the heart tank to the wall was distance (frequency 100 Hz in oil for wave complete length about 12 m) wave to the length relatively small that was because of this , each tank part magnet conductor the most close in part vibrations harvest I think it will. let's do possible . Some in cases other noise sources many to be possible . In general when taking , in transformers magnet the noise main to make noise possible .

Methods

Noise level measurement

Acoustic parameters measurement following to the reasons according to one how many to difficulties related : measurement values small absolute value , because acoustic pressure static atmosphere pressure 10-6 ÷ 10-8 organization does ; measure frequencies from 2 to 30,000 Hz was wide range ; sound issuer and acceptance of those who do , as well as measurements done increaseable of the building resonance features ; room acoustic of the fields complexity and their to the frequency connection ; sound , noise and vibration spectrum complicated and stable not , also acoustic acceptance those who do nearby dysfraction events . Therefore for high accurate acoustic measurements for , on demand right coming measurement device and analyzers , the most simple configurations sound fields harvest to be providing special equipped rooms necessary . In decibels expressed gas in the environment acoustic pressure level measurement for voice called a ruler from the apparatus used . Voice ruler (picture 1) measurement microphone amplifier , repair chain , detector and from the indicator consists of is a scale acoustic pressure to the border relatively in decibels graded . Noise on the scale stable , stationary and impulse noises measurement opportunity giving one how many temporary characteristics in sight caught . To GOST 17187-81 according to , noise ruler measurements accuracy four to class divided into : 0, 1, 2, 3. Class 0 devices exemplary measurement tool as applies and work in the standards graded ,

class 1 - clear laboratory and real measurements for , class 2 - normal accuracy measurement for , class 3- approximate ' measurements for . 0 and 1 class noise meters 12.5 Hz ÷ 20 kHz, class 2 -8 Hz÷20 kHz, class 3 -31.5 Hz÷ 8 kHz standard frequency to the range has . Some octave and three one partial octave filters with equipped they are necessary frequency in the range noises in detail analysis to do opportunity gives . Measured noise level dynamic range : minimum – 15÷35, maximum 140÷160 dB[3].

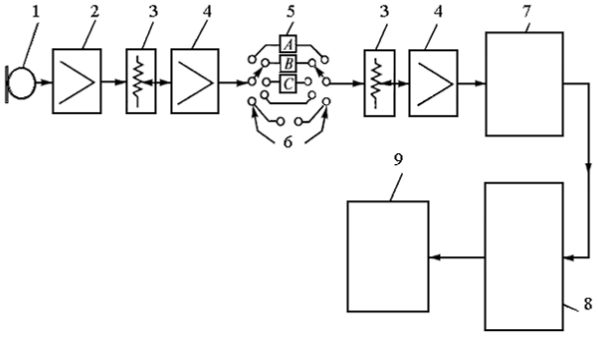


Figure 1. Noise cherry blossom structure circuit : 1-microphone; 2-preamplifier ; 3- limiter transducer ; 4-amplifier; 5- frequency characteristic filters chain ; 6-external filters ; 7-quadratic detector ; 8-average exponential chain ; 9th indicator, in decibels graded

Noise 31.5 to 12,500 Hz on the meter was frequency in the range directionless measurement from the microphone Microphone sensitivity surroundings environment pressure up to ±10% more than ±0.5 dB when changing unchanging Need . Noise level and frequency , as well as measurement to the conditions depending on the following microphone types used : capacitor , piezoelectric and electrodynamics . Electricity cars noises measurement for hypersensitivity and up to 10÷40 Hz good frequency characteristic has condenser microphones the most many is used . From except this kind of microphones external electromagnetic to the fields sensitive not . O' z noise level (35÷50 dB) higher condenser microphones disadvantage However , this is electricity car and transformers most of them for suitable is the value , because 1 m distance between measured electricity of cars bottom permission done noise level 49÷64 dB (according to GOST 16372) according to " Rotary " electricity machines . Permission done noise level "). At a distance of 0.3 m transformers for permission done noise level 47÷66 dB (GOST 12.2.024 76 “ Noise . Oil power Transformers . Control to do norm and methods 1st grade many noise meters condenser microphones with provided[4].

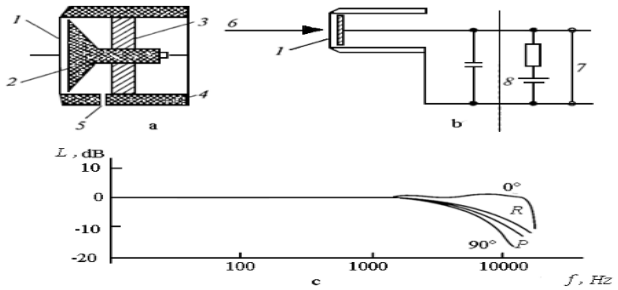


Figure 2, Device a) polarized voltage transmission scheme b) and relative frequency characteristic c) one-inch condenser microphone 0o, 90o drop angle , random (R) fall and (P) pressure for : 1-diaphragm; 2-back plate (immobile electrode); 3- insulator ; 4-body; 5-pressure equalization hole ; 6-sound pressure ; 7-output; 8- polarizer voltage source

Noise ruler letters A, B, C with expressible straightener to the characteristics These characteristics human ear with the noise subjective acceptance to do represents the present . at the time noise level analysis and record to do for used linear characteristic with one in line corrected A - curvature wide spread . A, B, C correction to the curvature suitable incoming amplitude frequency characteristic 4.5 - in the picture from Figure 5. apparently as it stands, A correction curvature measurable If , the low frequency of the noise components sharp decreases, so for Measurement A corrected and uncorrected (linear) two curvature according to to perform This is a curve . lines according to taken measurement the results comparing the spectrum which part advantage is evaluated . A curvature noise level linear scale from measurements if it is much lower , then being measured noise big low frequency organization to the sender If the indicators close if , then noise mainly high frequency organization to the sender has .

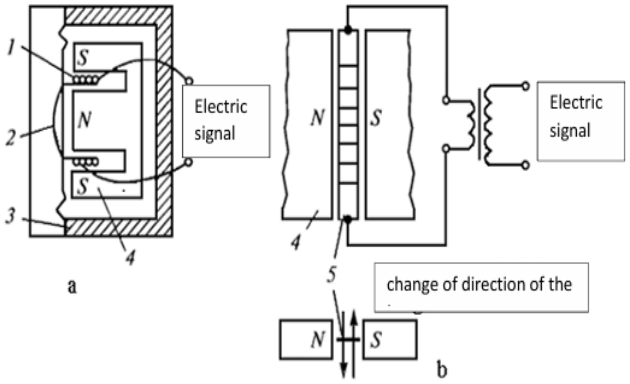


Figure 4. Bobbin (a) and ribbon (b) electrodynamic (dynamic) microphones Device : 1 - reel ; 2 - diaphragm; 3 - body ; 4 - permanent magnet ; 5 - tape Exponential average chain two work to the regime has : F (fast) 125 ms unchanging at the time and S (slow) is immutable time 1 s

Conclusion

Electricity cars and transformers noise Aerodynamic noise electricity of the car different parts and mechanisms in rotor, fan , collectors rotation because of gas cooling of the tool movement as a result appearance to be see We came out . If the vibration The reason is rotor imbalance. missing if there is , many in cases low- frequency noise is considered because 16 Hz hearing ability bottom speed limit 960 rpm to the speed suitable arrival studied . Noise level in measurement Acoustic parameters measurement following to the reasons according to one how many to difficulties dependency : measurement values small absolute value because acoustic pressure static atmosphere pressure 10-6 ÷ 10-8 organization measure frequencies from 2 to 30,000 Hz was wide range; sound issuer and acceptance those who do , as well as measurements done increaseable of the building resonance features ; room acoustic of the fields complexity and their to the frequency connection ; sound , noise and vibration spectrum complicated and stable not, also acoustic acceptance those who do nearby dysfractions and events Therefore for high accurate acoustic measurements for, on demand right coming measurement device and analyzers , the most simple configurations sound fields harvest to be provides .

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O‘ZBEKISTON RESPUBLIKASI MAKROIQTISODIY KO‘RSATKICHLARI VA AHOLI DAROMADLARINING DINAMIKASI

Annotatsiya. *Ushbu maqolada O‘zbekiston Respublikasining asosiy makroiqtisodiy ko‘rsatkichlari respublika Milliy statistika qo‘mitasi ma’lumotlari asosida tahlil qilingan. Shuningdek, aholi daromadlari dinamikasi, ish xaqi va pensiya miqdori hududlar bo‘yicha tahlil qilingan.*

Kalit so‘zlar: *makroiqtisodiy ko‘rsatkichlar, yalpi ichki mahsulot, dinamika, sanoat, qishloq xo‘jaligi, aholi daromadlari, ish haqi, pensiya va ijtimoiy nafaqa.*

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DYNAMICS OF MACROECONOMIC INDICATORS AND POPULATION INCOME OF THE REPUBLIC OF UZBEKISTAN

Abstract. *This article analyzes the main macroeconomic indicators of the Republic of Uzbekistan based on data from the National Statistics Committee of the republic. The dynamics of population incomes, wages and pensions by region are also analyzed.*

Keywords: *macroeconomic indicators, gross domestic product, dynamics, industry, agriculture, population income, wages, pensions and social benefits.*

Mustaqillik yillarida O‘zbekiston Respublikasi ijtimoiy-iqtisodiy rivojlanishida ulkan muvaffaqiyatlarga erishdi. Hattoki 2008-2009 yillarda ro‘y bergan jahon moliyaviy-iqtisodiy inqirozi sharoitida ham O‘zbekiston milliy iqtisodiyotining o‘sish sur’atlari bo‘yicha dunyo mamlakatlari ichida eng yuqorilaridan biri bo‘ldi.

O’zbekiston Respublikasi o’z iqtisodiy rivojlanishida qator omillarga tayanadi. Xususan, O‘zbekiston Markaziy Osiyo doirasida keng tranzit imkoniyatlari xos qulay iqtisodiy-geografik o‘ringa ega bo‘lib, mintaqa davlatlarining o‘zaro integratsiyalashuvida juda muhim rol o‘ynaydi.

Shu bilan birga, respublikamiz ko‘p tarmoqli milliy iqtisodiyotning shakllanishi va rivojlanishi uchun katta imkoniyatlarni yaratadigan tabiiy boyliklariga ega. Eng avvalo, davlatimizning mineral-resurs salohiyati alohida e’tiborga loyiq. O‘zbekiston hududida jami 120 taga yaqin turdagi foydali qazilmalarning 2700 ta konlari topilgan. Jumladan, O‘zbekiston jahon mamlakatlari orasida oltin zaxiralari bo‘yicha 4-, uran bo‘yicha 7-, molibden bo‘yicha 8-, mis bo‘yicha 10-o‘rinda turadi. Yoqilg‘i-energetika resurslari ichida tabiiy gaz eng katta ahamiyatga ega bo‘lib, uning zaxiralari bo‘yicha O‘zbekiston dunyoda 14-o‘rin egallab turmoqda [4]. Noruda qazilma boyliklarda kaliy tuzlari va fosforitlar bo‘yicha dunyoda yetakchi o‘rinlaridan birida turadi. Demak, mineral resurslarning ulkan zahiralari yurtimizda rangli metallurgiya, yoqilg‘i, kimyo va qurilish materiallari sanoatini rivojlantirishga keng imkoniyatlarni beradi.

Mamlakatimiz qishloq xo‘jalikni rivojlantirish uchun qulay sharoit yaratuvchi agroiqlim resurslariga ega. Vegetatsiya davrining davomiyligi, issiq va quyoshli kunlarning ko‘pligi tufayli O‘zbekistonda paxtachilik, bog‘dorchilik, uzumchilik, sabzavotchilik, polizchilik kabi yuqori daromadli dehqonchilik tarmoqlari intensiv ravishda rivojlanmoqda.

Qishloq xo‘jaligi asosan sun’iy sug‘orish yordamida rivojlanayotganligi sababli, respublikamiz qishloq xo‘jaligi suv resurslariga bog‘liq. Suv bilan Toshkent, Andijon, Surxondaryo va Samarqand viloyatlari nisbatan yaxshi darajada ta’minlagan. Shuningdek, davlatimiz g‘arbida joylashgan katta qismini cho‘llar egallagan Navoiy, Buxoro, Qoraqalpog‘iston Respublikasida bu jihatdan ancha murakkab vaziyat shakllangan. Ammo suv resurslarining ayrim hududlarda yetishmovchiligiga qaramay, O‘zbekiston jahon mamlakatlari ichida sug‘oriladigan yerlar maydoni bo‘yicha 13-o‘rinda (FAO tashkiloti ma’lumotlariga ko‘ra) turadi.

O‘zbekiston aholisi va mehnat resurslari ham mamlakatning ijtimoiy-iqtisodiy rivojlanishining poydevori hisoblanadi. Respublikamiz aholisi muntazam ravishda o‘sib bormoqda. 1990 yilda 20,2 mln kishiga teng bo‘lgan respublikamiz aholisi 2024 yilga kelib, 37 mln kishidan oshdi [1].

Qisqa tarixiy davr mobaynida O‘zbekiston xalqaro savdo-iqtisodiy munosabatlarga kirishish, milliy iqtisodiyot tarkibiy tuzilishini takomillashtirish, sanoatni rivojlantirish, mamlakatning oziq-ovqat, energetika va transport

xavfsizligini ta’minlash kabi murakkab vazifalar yechimiga bosqichma-bosqich muvaffaqqiyatli erishdi.

Mustaqillik yillarida respublikamiz yalpi ichki mahsulot (YaIM)ning o‘zgarish dinamikasida *3 ta davr*ni ajratish mumkin. Birinchisi *1991-1996* yillarni o‘z ichiga olib, iqtisodiy pasayish bilan tavsiflangan. Bu holat, asosan, sobiq Ittifoq doirasidagi hududiy mehnat taqsimoti tizimi, O‘zbekiston iqtisodiyoti tarmoqlari va korxonalarining boshqa respublikalarning xo‘jaligi o‘rtasidagi kooperatsiya aloqalarning uzilishi natijasida kelib chiqdi. *1997-2003* yillar oralig‘idagi ikkinchi bosqich milliy iqtisodiyotning barqarorlashuvi va YaIM o‘sishining boshlanishi davri bo‘ldi. O’zbekistonning YaIM ko’rsatkichi 2001-yilda sobiq Ittifoq respublikalari ichida birinchi bo’lib 1990-yildagi darajasidan oshib ketdi. Uchinchi davr *2004* yilda boshlanib, hozirgacha davom etmoqda. Bu yillar uchun O‘zbekiston YaIMning 4,5 foizdan past bo‘lmagan sur’atlar bilan o‘sishi xosdir [3].

O’zbekiston Respublikasining YaIM hajmi 2024-yil yakunlari bo’yicha 1454573,9 mlrd so’mni tashkil qildi (1-jadval). Bu muhim makroiqtisodiy ko’rsatkich, 2010-yil holatiga ko’ra, 74042,0 mlrd so’mga teng bo’lgan. Real hisobda, ya’ni doimiy narxlarda olinganda, 2010-2024-yillar oralig’ida respublikamizning YaIM hajmi 19,6 barobar ko’paydi.

1-jadval

O’zbekiston Respublikasi yalpi ichki mahsuloti (YaIM) 2010-2024-yillardagi dinamikasi

Ko’rsatkichlar	O’lchov birligi	Yillar			
		2010	2015	2020	2024
Joriy narxlarda YAIM	mlrd so’m	74042,0	210183,1	668038,0	1454573,9
YAIM o’sish sur’atlari, o’tgan yilga nisbatan	foiz	107,3	107,4	101,6	106,5
Joriy narxlarda aholi jon boshiga YAIM	ming so’m	2592,3	6715,4	19515,0	39131,4
Aholi jon boshiga YAIM o’sish sur’atlari, o’tgan yilga nisbatan	foiz	104,3	105,6	99,6	104,4

Jadval muallif tomonidan O‘zbekiston Respublikasi Milliy statistika qo‘mitasi ma’lumotlari asosida tuzilgan.

O’zbekistonning aholi jon boshiga hisoblangan YaIM qiymati, 2024-yil yakunlari bo’yicha, 39131,4 ming so’mga teng bo’lgan. 2010-yilda esa bu makroiqtisodiy indikator 2592,3 ming so’mni tashkil qilgan edi. Aholi jon boshiga real YaIM ko’rsatkichi 2010-2024-yillar oralig’ida 15,0 barobar oshdi.

O’zbekiston yalpi ichki mahsuloti tarkibida qishloq, o’rmon va baliq xo’jaligining ulushi 19,2 foiz, sanoat va qurilishning ulushi 33,4 foiz, xizmatlar sohasining ulushi 47,4 foiz, mahsulotlarga sof soliqlarning ulushi 4,7 foizga teng (2024-yil yakunlari bo’yicha). 2010-yilga nisbatan taqqoslaganda, sanoat va qurilishning ulushi ancha o’sgani ko’zga tashlanadi [2].

Kichik biznes va xususiy tadbirkorlikning mamlakat YaIMdagi ulushi 2010-2024-yillar oralig'ida 52,5 foizdan 54,3 foizgacha ko'paydi.

2-jadval

Iqtisodiy faoliyat turlari kesimida O`zbekiston Respublikasi yalpi ichki mahsuloti tarkibi (foizda)

Iqtisodiy faoliyat turlari	YaIM tarkibidagi ulushi	
	2010-yil	2024-yil
Qishloq, o'rmon va baliq xo'jaligi	28,7	19,2
Sanoat va qurilish	22,6	33,4
Xizmatlar	35,9	47,4
Mahsulotlarga sof soliqlar	12,8	4,7

Jadval muallif tomonidan O'zbekiston Respublikasi Milliy statistika qo'mitasi ma'lumotlari asosida tuzilgan.

Asosiy makroiqtisodiy ko'rsatichlardan biri hisoblangan yalpi sanoat mahsuloti, 2023-yil yakuni bo'yicha, 885,8 trln so'mdan ortiq qiymatga ega bo'lgan. Yalpi qishloq xo'jalik mahsuloti esa 467,0 trln so'mni tashkil etdi. Ushbu ko'rsatkichlar, 2010-yil holatiga ko'ra, mos ravishda, 38,1 trln so'm va 30,8 trln so'mga teng bo'lgan. Qurilish ishlari hajmi tegishli davrda 233,8 trln so'm, chakana tovar aylanmasi 403,4 trln so'm, pullik xizmatlar hajmi 818,4 trln so'mni tashkil qilgan.

Investitsiyalar. Hududlar ijtimoiy-iqtisodiy rivojlanishida ularga ko'mak beruvchi, harakatlantiruvchi kuch bo'lgan investitsiyaning ahamiyati katta. Milliy iqtisodiyot rivojlanishining eng muhim omillardan bittasi – investitsiya faoliyati hisoblanadi. Jami asosiy kapitalga kiritilgan investitsiyalar, 2024-yil yakunlari bo'yicha jami 493,7 trln so'mni tashkil etdi.

Asosiy kapitalga kiritilgan investitsiyalarning eng yirik moliyalashtirish manbalari qatoriga kafolatlanmagan xorijiy investitsiya va kreditlar kiradi (jami investitsiyalarning 32,3 %), to'g'ridan-to'g'ri xorijiy investitsiyalar (30,5 %), aholi va korxona mablag'lari (24,1 %) ni kiritish mumkin. Shu bilan birga, respublika byudjetidan asosiy kapitalga jami kiritilgan investitsiyalarning 4,6 % moliyalashtirilgan.

O'zbekiston iqtisodiyotida 2024-yil davomida asosiy kapitalga kiritilgan investitsiyalarning tarkibida mashina, uskuna va inventarlarga 231,4 trln so'm investitsiyalar o'zlashtirilgan bo'lib, jami investitsiyalarning 46,9 % ini tashkil etgan, qurilish-montaj ishlari bo'yicha 212,8 trln so'm (jami investitsiyalardagi ulushi 43,1 %) va boshqa xarajatlarga 49,5 trln so'm (10,0 %) o'zlashtirildi.

Iqtisodiy faoliyat turlari kesimida investitsiyalarning taqsimlanishiga e'tibor qaratilsa, ularning eng katta hajmlari ishlab chiqarish sanoatiga (29,3 %), elektr, gaz bilan ta'minlash (13,9 %), tog'-kon sanoatiga (12,9 %) kiritilgan. Bu borada muhim tendentsiya jami asosiy kapitalga kiritilgan investitsiyalar tarkibida sanoat ulushining keskin o'sishi bilan bog'liq. Ayniqsa, ko'rilayotgan davrda ishlab chiqaradigan sanoat tarmoqlari hamda elektr, gaz, bug' bilan ta'minlash va havoni

konditsiyalash sektoriga kiritilayotgan investitsiyalarning hajmi va ulushi sezilarli darajada o'sdi.

O'zbekiston iqtisodiyotiga 2024-yilda 34,9 mlrd dollar xorijiy investitsiya va kreditlar o'zlashtirilgan. Eng katta miqdordagi investitsiyalar Xitoy Xalq Respublikasi (27,9 %), Rossiya Federatsiyasi (13,2 %) va Turkiya (6,8 %) tomonidan kiritilgan. Jami chet el investitsiyalarining 35,7 foizi ishlab chiqarish sanoatiga, 19,5 % elektr, gaz bilan ta'minlash jalb qilingan.

O'zbekiston Respublikasida 01.01.2024-yil holatiga ko'ra, chet el investitsiyalari ishtirokidagi faoliyat ko'rsatayotgan 14871 ta korxonalardan 3965 tasi qo'shma korxonalar va 10906 tasi xorijiy korxonalar hisobiga to'g'ri keladi.

Ularning asosiy qismida etakchi o'rinni 3357 ta korxonada to'liq yoki qisman ulushi mavjud bo'lgan Xitoy egallagan. Bu respublikada chet el investitsiyalari ishtirokida faoliyat ko'rsatayotgan korxonalar umumiy sonining 22,6 foiz ulushini tashkil etadi. Shuningdek, O'zbekiston iqtisodiyotiga o'z kapitalini kiritayotgan Rossiya Federatsiyasi (ulushi 19,7 foiz), Turkiya (ulushi 12,3 foiz), Qozog'iston (ulushi 7,0 foiz) va Janubiy Koreya (ulushi 4,3 foiz) davlatlari ham yetakchilar hisoblanishadi.

Tashqi savdo. O'zbekiston Respublikasi jahonning 200 yaqin davlatlari bilan tashqi savdo aloqalarin amalga oshiradi. O'zbekistonning tashqi savdo aylanmasi, 2024-yil yakunlari bo'yicha, 65,93 mlrd AQSh dollarini tashkil etgan. Shu jumladan, eksport hajmi 26,9 mlrd AQSh dollari, import hajmi esa 38,9 mlrd AQSh dollariga teng bo'lgan. Tashqi savdo aylanmasi, 2010-yil bilan taqqoslaganda, 3,0 barobar ko'paygan.

O'zbekiston Respublikasi tashqi savdo aylanmasining nisbatan salmoqli hissasi XXRda (18,9 %), Rossiyada (17,6 %), Qozog'istonda (6,5 %), Turkiyada (4,5 %) va Koreya Respublikasida (3,0 %) qayd etilgan.

O'zbekiston Respublikasi eksportining tovar tarkibida, 2024-yil holatiga ko'ra, oltin (27,8 %), xizmatlar (26,7 %), sanoat tovarlari (15,6 %) oziq ovqat mahsulotlari va tirik hayvonlar (8,1 %), mineral yoqilg'i, yog'lash moylari va shunga o'xshash materiallar (4,9 %) yetakchi o'rinlarni egallagan. Xizmatlar eksporti tarkibining asosiy ulushi safarlar (turizm) (48,8 %), transport (35,7 %), telekommunikatsiya, kompyuter va axborot (8,6 %) va boshqa tadbirkorlik bilan bog'liq xizmatlar (3,5 %) hissasiga to'g'ri kelgan. Shu bilan birga, boshqa xizmatlar (3,5 %)ni tashkil etib, tarkibida eng yuqori ulushlar sug'urta va pensiya ta'minoti xizmatlari (0,9 %), moliyaviy xizmatlar (0,9 %) qurilish xizmatlari (0,5 %) hissasiga to'g'ri keldi [5]. Energiya manbalari eksportida tabiiy gaz, to'qimachilik mahsulotlari eksportida paxtadan yigirilgan ip hamda tayyor kiyimlar, qora va rangli metallar eksportida mis, sink hamda po'lat prokati, oziq-ovqat mahsulotlari eksportida esa meva-sabzavotlar ustuvor ahamiyatga ega.

O'zbekiston eksportining tovar tarkibida 2010-2024 yillar oralig'ida ma'lum darajadagi o'zgarishlar ro'y berdi. Ulardan eng muhimlari sifatida paxta tolasi ulushining keskin pasayishi, to'qimachilik mahsulotlari va xizmatlar ulushlarining ko'tarilishini alohida ajratish o'rinlidir. Mamlakatimiz importining tovar tarkibida, 2024-yil holatiga ko'ra, eng katta ulush, mashinalar va transport asbob-uskunalari

(34,6 %), sanoat tovarlari (15,5 %) hamda kimyoviy vositalar va shunga o‘xshash mahsulotlar (12,0 %) hisobiga to‘g‘ri kelgan.

Umuman olganda, 2024- yilda O‘zbekiston Respublikasi 172 ta davlatdan tovar va xizmatlar importini amalga oshirgan. Yetti yirik hamkor davlatlar (XXR, Rossiya, Qozog‘iston, Koreya Respublikasi, Turkiya, Turkmaniston va Germaniya) jami importning 2/3 qismini tashkil etgan.

Aholining daromadlari. So‘nggi yillarda hukumatimiz tomonidan aholi daromadlari va turmush darajasini yanada oshirish, fuqarolarni ijtimoiy qo‘llab-quvvatlash maqsadida amalga oshirilayotgan chora-tadbirlar natijasida aholi jon boshiga to‘g‘ri keladigan daromadlar, ish haqi va pensiyalar doimiy ravishda oshib borgani yaqqol namoyon bo‘lmoqda. Mamlakat aholisining turmush darajasini ifodalovchi muhim ko‘rsatkichlardan biri aholi daromadlari hisoblanadi.

Aholining umumiy daromadlari doimiy yoki takrorlanuvchi xususiyatga ega bo‘lgan, yillik yoki undan kam vaqt oralig‘idagi davrda, uy xo‘jaligi yoki uningalohida a’zolariga tushadigan pul va natura shaklidagi tushumlardan tashkil topadi [5].

2024-yil ma’lumotlariga ko‘ra, respublikamizda aholi umumiy daromadlari 896,3 trln. so‘mni tashkil etgan. Aholi jon boshiga umumiy daromadlari esa 24,1 mln so‘mni, real o‘sish sur’ati 108,1 % tashkil etgan (3-jadval).

3-jadval

O’rtacha aholi daromadlari, ish haqi va pensiyalar miqdori

Ko‘rsatkichlar	2010-y.	2024-y.
Aholi jon boshiga umumiy daromadlar, ming so‘mda	**2192,8**	**24111,9**
O‘tgan yilning mos davriga nisbatan real o‘sish, %	120,1	105,9
Yillik o‘rtacha nominal hisoblangan ish haqi, ming so‘mda	**504,8**	**5357,2**
O‘tgan yilning mos davriga nisbatan real o‘sish, %	129,4	117,4
Belgilangan o‘rtacha pensiya miqdori (yil oxiriga) ming so‘mda	**171,9**	**1234,5**
O‘tgan yilning mos davriga nisbatan real o‘sish, %	125,9	114,2

Jadval muallif tomonidan O‘zbekiston Respublikasi Milliy statistika qo‘mitasi ma’lumotlari asosida tuzilgan.

Aholining umumiy daromadlari tarkibida birlamchi daromadlar (aholi birlamchi daromadlari ishlab chiqarishdan olingan daromadlar va mol-mulkdan olingan daromadlardan tashkil topadi) 74,0 %, transfertlardan olingan daromadlar (transfertlar – uy xo‘jaliklariga boshqa uy xo‘jaliklaridan, davlat tomonidan, yuridik shaxslardan, chet eldan kelib tushadigan hamda kelgusida qaytarilishi shart bo‘lmagan tovarlar, xizmatlar va aktivlardir.) 26 % tashkil qilgan.

O‘z navbatida, birlamchi daromadlarning 35,0 % mustaqil ravishda band bo‘lishdan olingan daromadlar (mustaqil ravishda tashkillashtirilgan va uy xo‘jaligi a’zolari jalb qilingan mehnat jarayoninatijasida olingan daromadlar), 27,9 % yollanma ishchilar daromadlari, 7,8 % shaxsiy iste’mol uchun o‘zida ishlab chiqarilgan xizmatlardan (bozor uchun mo‘ljallanmagan va uy-joy egalari

tomonidan foydalanilayotgan turar-joy xizmatlarining shartli ravishda hisoblangan qiymati kiradi) va 3,3 % qismi mol-mulkdan olingan daromadlardan (mulkiy egalik qilish huquqi bo‘lgan moliyaviy va nomoliyaviy aktivlarni boshqa shaxslarga foydalanish uchun berishdan uy xo‘jaliklariga tushgan tushumlar tushuniladi) iborat.

Ish haqi. Respublikamizda 2024 – yilda o‘rtacha oylik ish haqi 5357,2 ming so‘mni tashkil qilgan. Ush bu ko‘rsatkich 2020 yilda 2673,3 ming so‘mga teng bo‘lgan yoki o‘tgan 5 yil maboynida 2683,9 ming so‘mga ortgan.

2024 – yilda mamlakatimizda iqtisodiy faoliyat turlari bo‘yicha o‘rtacha oylikish haqining eng baland ko‘rsatkichi – bank, sug‘urta, lizing, kredit va vositachilik faoliyati sohasiga to‘g‘ri kelib, 15 263,7 ming so‘mni tashkil etgan. Keyingi o‘rinlarda esa, axborot va aloqa sohasi 13157,4 ming so‘mni, tashish va saqlash sohasi 8 113,3 ming so‘mni va sanoat sohasi 6 439,9 ming so‘mni tashkil etib, o‘rtacha oylik ish haqiga nisbatan yuqori ko‘rsatkichni tashkil qilgan. Shuningdek, ta’lim (3 637,0 ming so‘m) hamda sog‘liqni saqlash va ijtimoiy xizmatlar ko‘rsatish (3411,0 ming so‘m) sohalari esa boshqa sohalarga nisbatan eng quyi pog‘onalarda ekanligini ko‘rishimiz mumkin [5].

Aksariyat hollarda sanoat ishlab chiqarishida ham o‘rtacha oylik ish haqi nisbatan yuqori ko‘rsatkichga ega bo‘ladi. Sanoatning asosiy tarmoqlari bo‘yicha o‘rtacha oylik ish haqining eng yuqori ko‘rsatkichini tog‘-kon sanoati va ochiq konlarni ishlash tarmog‘i (9132,8 ming so‘m), elektr, gaz, bug‘ bilan ta’minlash va havoni konditsiyalash (7471,4 ming so‘m) hamda ishlab chiqarish sanoatida (6181,0 ming so‘m) ko‘rish mumkin.

O‘rganilayotgan yilda savdo sohasining asosiy tarmoqlari bo‘yicha o‘rtacha oylik ish haqining eng yuqori ko‘rsatkichi avtomobil va mototsikllarning ulgurji va chakana savdosi va ularni ta’mirlash sohasida (7769,9 ming so‘m), eng past ko‘rsatkich esa avtomobil va mototsikllarning savdosidan tashqari chakana savdoda (5 676,4 ming so‘m) kuzatilgan.

2024 yilda tashish va saqlash iqtisodiy faoliyat turining asosiy tarmoqlari bo‘yicha o‘rtacha oylik ish haqining eng yuqori ko‘rsatkichi ombor xo‘jaligi va yordamchi transport faoliyatiga (9 599,9 ming so‘m), eng past ko‘rsatkich esa pochta va kuryerlik faoliyatiga (3 875,0 ming so‘m) to‘g‘ri kelgan. Shuningdek, axborot va aloqa sohasining asosiy tarmoqlari bo‘yicha o‘rtacha oylik ish haqining eng yuqori ko‘rsatkichi kompyuter dasturlashtirish, maslahat berish va boshqa yordamchi xizmatlarda (18 288,6 ming so‘m), eng past ko‘rsatkich esa aloqa sohasida (10917,1 ming so‘m) kuzatilgan. Ta’lim sohasida oliy ta’limda 8562,1 ming so‘m, maktabgacha ta’limda esa 1963,3 ming so‘m bo‘lgan.

Pensiya va ijtimoiy nafaqa. Statistik ma’lumotlarga ko‘ra, respublikada jami pensiya va ijtimoiy nafaqa oluvchi shaxslar soni 4827,3 ming kishini tashkil qilgan yoki har 10000 ta aholiga 1311,8 tadan mos kelgan. Pensiya va ijtimoiy nafaqa oluvchi shaxslar soni 2019-yil bilan taqqoslanganda 948,9 kishiga yoki 24,5 % ko‘pagan. Pensiya va ijtimoiy nafaqa oluvchi aholi soni 2010-yilda oldingi yilga nisbatan 98,8 %, 2015-yilda 102,7 %, 2020-yilda 103,9 % va 2023-yilda 105,4 foizga ortgan.

Pensionerlarga tayinlangan o‘rtacha oylik pensiya miqdori 2023-yil oxiriga 1234,5 ming so‘mni tashkil qilgan, mazkur ko‘rsatkich 2015-yilda 438,2 ming so‘mni, 2019-yilda esa 733,2 ming so‘mni tashkil qilgan. Tayinlangan o‘rtacha oylik pensiya miqdorining o‘tgan yilning mos davriga nisbatan foizdagi o‘zgarishi quyidagicha bo‘lgan: 2010-yilda 130,3 %, 2015-yilda 110,0 %, 2020-yilda 117,7 % va 2023-yilda 102,7 foizga o‘zgargan.

Umuman olganda, O‘zbekiston milliy iqtisodiyotini rivojlantirishning pirovard maqsadi aholi turmush sharoiti va darajasini yaxshilash, ijtimoiy muammolarni izchil hal qilib borishdan iboratdir.

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INVESTIGATION OF ABRASIVE WEAR AND EROSION PROCESSES AND ENHANCEMENT OF OPERATIONAL PERFORMANCE IN PUMPS USED FOR THE TRANSFER OF HEAVY HYDROCARBONS (WAX WITH SOLIDS)

Abstract: *The transportation of heavy hydrocarbons, particularly wax-containing crude oil with suspended solid particles (Wax with solids), presents significant operational challenges in industrial pumping systems. High viscosity flow, abrasive contaminants, crystallized wax deposits, and multiphase regimes intensify mechanical degradation within pump components. This study investigates the mechanisms and influencing factors of abrasive wear and erosion in centrifugal and screw pumps used for heavy hydrocarbon transfer, and proposes engineering strategies to improve operational efficiency and service life. Experimental and analytical findings indicate that optimization of material selection, hydraulic design, flow temperature control, and anti-wear coatings significantly reduce wear intensity and energy losses.*

Keywords: *Wax with solids; heavy hydrocarbons; centrifugal pump; screw pump; abrasive wear; erosion; tribology; anti-wear coating; wax deposition; rheology.*

1. Introduction

Oil fields producing high-wax crude typically experience wax precipitation and deposition during transportation due to temperature drop and pressure variations. In addition, heavy hydrocarbons often contain sand, shale fragments, scale particles, and corrosion products, which contribute to internal abrasion of pumps. The combination of solid contamination, high fluid viscosity, and unstable rheological behavior causes rapid deterioration of pump rotors, impellers, bearings, and sealing elements. Consequently, the reduction of abrasive wear and erosion has become a crucial research area for maintaining system reliability and reducing maintenance costs.

2. Materials and methods

The study analyzes abrasive and erosive processes in industrial pump systems transporting heavy hydrocarbons with solid inclusions. The methodology includes:

- Laboratory simulation of slurry-viscous flow containing wax crystals and solid particles (50–500 μm).
- Surface wear rate measurements using scanning electron microscopy (SEM) and profilometry.
- Computational Fluid Dynamics (CFD) to evaluate particle trajectories and high-velocity impact zones.
- Tribological analysis of coating and substrate material hardness, microstructure, and adhesion.
- Field data from offshore and onshore oil pipelines experiencing wax-solid transport conditions.

3. Results and discussion

3.1 Wear and erosion mechanisms

Results show that pump degradation is primarily driven by:

- **Three-body abrasive wear** due to solid particles trapped between rotating and stationary surfaces.
- **Hydro-erosion** at high-velocity flow zones such as impeller leading edges, volute tongue, and diffuser inlet.
- **Synergistic effects of viscosity and particle impact**, where increased viscosity amplifies drag forces and maintains particle–surface contact.

3.2 Critical influencing factors

Factor	Effect on wear
Solid particle size	Larger particles (≥300 μm) cause higher cutting and ploughing
Velocity	High rotational speed increases impact erosion
Wax crystallization	Intensifies blockage and turbulence, increasing abrasion
Temperature	Low temperature increases viscosity → higher shear stress
Material hardness	Higher hardness significantly reduces wear depth

3.3 Performance enhancement strategies

The following engineering improvements proved effective:

1. **Use of wear-resistant materials** – Tungsten carbide, Ni-Cr-B-Si alloys, duplex stainless steel, and ceramic-filled composites show superior durability.
2. **Anti-erosion surface coatings** – HVOF-sprayed WC-Co coatings reduce wear up to 52% in wax-solid service. – Diamond-like carbon (DLC) coatings decrease friction by 30–40%.
3. **Hydraulic redesign** – Optimizing impeller blade angle and increasing inlet radius reduces particle impact frequency.
4. **Thermal control of transported fluid** – Maintaining temperature above the wax appearance temperature (WAT) lowers viscosity and solids deposition.
5. **Magnetic and hydrodynamic particle separation** – Effective for reducing hard particle entrainment into the pump chamber.

4. Conclusion

The transfer of heavy hydrocarbons containing wax and solid contaminants accelerates abrasive wear and erosion in industrial pump systems, leading to reduced operational efficiency and increased maintenance costs. The results of this research demonstrate that a combination of material optimization, advanced

surface coatings, refined hydraulic design, and temperature-controlled transportation significantly extends pump lifespan and maintains stable operating performance. These findings offer practical guidance for designing high-reliability pumping solutions in wax-rich crude oil production and processing environments.

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RESEARCH ON THE APPROPRIATE DESIGN OF A FILTER DEVICE USED IN LIQUID-SOLID PHASE SEPARATION

Abstract: *This article considers the issue of selecting the optimal design of a filter device used in the process of liquid-solid phase separation. The study analyzes the relationship between the filter material, surface area, and flow rate. According to the results, metal mesh, ceramic, and polymer-based membranes have high efficiency and have advantages in terms of energy efficiency and stability.*

Keywords: *filtration, liquid-solid phase, filter material, design, efficiency, energy efficiency.*

Separation of liquid-solid phases is an integral part of industrial processes. The efficiency of this process directly depends on the design, material and operating conditions of the filter device. Creating an optimal filter system in modern technologies ensures product quality and production stability. The purpose of the study is to determine the optimal design of the filter device, that is, to find a solution that meets technical requirements such as high filtration speed, low pressure loss and long service life.

Oil is currently the main and most popular source of energy. However, its reserves are catastrophically decreasing, and the end of the oil era is already clearly visible. In a number of countries with large reserves, there is a decrease in the rate of oil production, as well as a decrease in the profitability of its production. In addition, the requirements for the quality of petroleum products, including the reduction of sulfur and other harmful impurities, are becoming increasingly stringent. This requires the introduction of additional purification methods into the overall oil refining process. All this leads to an increase in the cost of petroleum products and, as a result, imposes certain restrictions on the economic development of individual countries and the world economy as a whole. This forces us to seriously consider alternative energy sources other than oil.

As an achievement of modern technologies, we can cite GTL technology. The gas-to-liquid technology process is carried out in a Fischer-Tropsch reactor with the participation of catalysts. The product, which passes from the gas phase to the liquid phase, carries with it dispersed catalyst particles, which is harmful to the subsequent process.

The filter can separate the liquid from the fine catalyst particles by using a porous medium to retain the catalyst and allow the liquid product to pass through.

Methods such as cross-flow filtration, which flows parallel to the filter surface, are used to prevent micron particles from clogging the filter and achieve efficient separation.

Filtration Methods

The most common filtration method is surface filtration, a traditional method in which the liquid flows perpendicular to the filter surface. However, it can be difficult to maintain and repair because small particles can become stuck to the filter, making it ineffective at removing very small particles.

Other separation methods

Dynamic sedimentation: In this method, a liquid is poured into a settling vessel, where the heavier catalyst particles sink to the bottom, while the lighter catalyst particles rise to the top and are collected.

Gravity or centrifugal sedimentation: These methods use gravity or centrifugal force to separate the catalyst particles from the liquid, which often requires a long settling time.

Magnetic filtration: This method uses a magnet to separate iron-based catalyst particles from the reaction mixture. The use of a magnet can be used to remove the catalyst particles.

Disadvantages

Fine particles: The presence of very fine catalyst particles can hinder efficient separation. Clogging: Filters can become clogged with catalyst particles, leading to reduced efficiency and the need for frequent regeneration.

High viscosity: The viscosity of the liquid-solid phase mixture can affect separation efficiency, and high viscosity makes it difficult to separate particles.

The conducted analyses show that increasing the filter surface increases the filtration rate, but excessively dense material leads to pressure loss. Metal meshes are mechanically strong, ceramics are resistant to high temperatures and chemical influences, and are economical. According to the results of mathematical modeling, combined filter systems provide the most optimal effect.

Choosing the optimal design of the filter device is important for increasing production efficiency, reducing waste and ensuring environmental safety. In the future, it is recommended to further improve filter systems based on numerical modeling and experimental tests.

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THE IMPORTANCE OF PUBLIC CONTROL IN THE FIGHT AGAINST CORRUPTION

Annotation: *The article presents opinions on the role and importance of public control in the fight against corruption in modern developed societies.*

Keywords: *Corruption, public, control, law, Aristotle, democracy, human rights, trust in authority, public administration, equality, social justice, etc.*

Corruption poses a serious threat to ensuring the rule of law, the principles of democracy, human rights, trust in authority, public administration, equality and social justice, healthy competition in the economy and hinders economic growth, trying to stop the formation and development of democratic and civil society institutions. History of corruption crimes Corruption is certainly not a new phenomenon, it has existed since ancient times. The ancient Greek philosopher Aristotle said that “In any state system, work should be organized in such a way - through laws and other decrees - that officials should not be allowed to enrich themselves illegally.” The French thinker Charles Montesquieu expressed the following thoughts in this regard: “It is known from the experience of centuries that a person who has any authority is inclined to abuse it and will continue in this direction until he achieves a certain goal.” In the subsequent history of Western European states, various forms of corruption and the rise of corrupt relations were reflected not only in historical sources, but also in the works of leading philosophers of that time. In particular, it is also covered in Shakespeare's "Merchant of Venice", "Blood for Blood, Soul for Soul", Dante's "Inferno", "The Purifier". Dante expressed the opinion that corrupt people should be thrown into the darkest and deepest part of hell. Niccolo Machiavelli, studying the history of the origin and development of corruption, compared it to a cough and said, "Corruption, like a cough, is difficult to detect in advance, but easy to cure; but if you miss this disease, it is easy to detect, but difficult to cure." The truth in these words can also be applied to the forms of corruption that are widespread throughout the world today.

In any society, the state and governance, as stipulated in the Constitution of that state, must correspond to its fundamental goals. Article 2 of the Constitution of the Republic of Uzbekistan states that “The state expresses the will of the people and serves their interests. State bodies and officials are responsible to society and citizens.” Such requirements of the Basic Law increase the

responsibility of officials in the mechanisms of activity of state power, state service and local self-government bodies or in their spheres, and determine the obligations of the state apparatus to citizens. The fact that 2017 was declared the “Year of Dialogue with the People and Human Interests” is also evidence of our opinion. The people's trust in state authorities, of course, serves the development of this state. At a time when democratic values are being established in our country and globalization processes are gaining momentum, it is alarming that a terrible evil called corruption threatens the development of not one state, but an entire region or the world. It should be emphasized that corruption undermines the foundations of democracy and the rule of law, leads to gross violations of human rights, derails the economy, and creates conditions for the widespread spread of organized crime and terrorism, which are extremely dangerous for society and the state. There are different opinions on the etymological concept and definition of the term corruption. In particular, according to supporters of the first widely popular opinion, etymologically the term corruption comes from the Latin word "corruptio", which means "to deceive in exchange for a bribe"[22].

According to recent studies, the term corruption comes from the Latin word "corrumpere", which means "to corrupt, to degenerate, to degrade". [23]. Corruption, which poses a great threat to the individual, society and the state and at the same time negatively affects all spheres of social life, today not only affects the socio-economic development and security of the country, but also violates the constitutional rights and freedoms of citizens and hinders the development of entrepreneurship. “It is more difficult to predict in advance what trick a cunning official will devise than to predict which direction a bird in the sky will turn; just as it is impossible to determine whether a fish in the sea drinks water or not, so it is impossible to determine whether an official is misusing the property entrusted to him or not.”[24].

The fight against corruption, its elimination in most cases consists of identifying and eliminating the factors, circumstances and conditions that cause it, as well as a comprehensive fight against it. Factors that lead to corruption include the complexity of the system of government bodies, the abundance of authoritarian practices, the lack of external and internal control over the activities of state authorities. It is sometimes very difficult to distinguish organizational misunderstandings from encouraging corrupt behavior of citizens. The excessive number of prohibitions, permission procedures, the absence of a mechanism for protecting the interests of citizens involved in the activities of state authorities also lead to corruption. Since the first days of gaining state independence, the Republic of Uzbekistan has been sharply and uncompromisingly fighting corruption - a vice inherited from the former totalitarian regime. A solid legal basis has been created in our country in the field of combating corruption. In particular, the National

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Security Concept of the Republic of Uzbekistan, adopted in 1997, recognized corruption as one of the threats to the country's national security. The "National Program for Improving Legal Culture in Society" also identifies issues of combating corruption.

On July 7, 2008, our country acceded to the UN Convention against Corruption (New York, October 31, 2003). In March 2010, our state acceded to the Istanbul Plan for Combating Corruption (September 10, 2003), adopted within the framework of the Organization for Economic Cooperation and Development. Also, the Oliy Majlis ratified the Agreement on the Eurasian Group on Combating the Legalization of Proceeds of Crime and the Financing of Terrorism (Moscow, June 16, 2011) on December 13, 2011. Uzbekistan was one of the first in our region to adopt the Law "On Combating the Legalization of Proceeds of Crime and the Financing of Terrorism". As a logical continuation of these measures, the Law “On Combating Corruption”, signed by the President of the Republic of Uzbekistan Shavkat Mirziyoyev on January 3, 2017, is of great importance. The document identifies the following as the main principles of combating corruption: legality; the primacy of the rights, freedoms and legitimate interests of citizens; openness, transparency and systematicity; cooperation between the state and civil society; the priority of measures to prevent corruption and ensure accountability. At the same time, state bodies directly implementing anti-corruption activities are identified, which include the Prosecutor General's Office of the Republic of Uzbekistan; the National Security Service of the Republic of Uzbekistan; the Ministry of Internal Affairs of the Republic of Uzbekistan; the Ministry of Justice of the Republic of Uzbekistan; and the Department for Combating Tax, Currency Crimes and Money Laundering under the Prosecutor General's Office of the Republic of Uzbekistan. The analysis shows that the measures of state bodies alone are not enough to fight against corruption and prevent it, but strong cooperation of civil institutions is required and effective in this direction. Civic institutions, non-governmental non-commercial organizations are now becoming an important factor in the protection of democratic values, human rights and freedoms, as well as legal interests, they create conditions for citizens to realize their potential, increase their social, socio-economic activity and legal culture, they help ensure the balance of interests in society. Various difficulties encountered in the initial stages of reforms, weak public control over the activities of officials and civil servants made the form of social life and corrupt activities in many areas of state activity a potential threat. Corruption-related crimes committed by officials and other civil servants create a sense of distrust, fear, and unwillingness to cooperate with the authorities and law enforcement agencies in society and among citizens. In this regard, the First President of the Republic of Uzbekistan, I. Karimov, expressed the following opinion: “I would like to repeat here an idea that I have already expressed before. Let us not forget that the more we strengthen the control functions of the state, the more we increase the number of state structures and bodies engaged in control, the more violence and corruption by officials will increase. Therefore, we must pay special attention to

comprehensively strengthening public control, public control over state activities, including the activities of its law enforcement agencies."[25].

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INTEGRATION OF RECREATION AREAS AND HOUSING IN MOUNTAINOUS AREAS WITH THE LANDSCAPE AND ECOLOGICAL ENVIRONMENT

Annotation: *This article discusses the issues of integrating rural houses located in the mountainous regions of Uzbekistan with the natural landscape and achieving ecological harmony. It analyzes the specific features of mountainous terrain, climatic conditions, and the use of local building materials. The paper identifies key principles for designing energy-efficient, environmentally sustainable, and culturally appropriate rural architecture. Recommendations are also provided for developing housing projects that are well adapted to the natural environment and harmoniously integrated into the landscape.*

Key words: *Mountain regions, rural housing architecture, landscape design, ecological integration, natural environment, sustainable development, topography, local materials, energy efficiency.*

Introduction

The natural, socio-demographic, and economic conditions in the Republic of Uzbekistan create a solid foundation for shaping the modern appearance of rural areas. At the same time, ecological sustainability has become an integral part of rural infrastructure. In mountainous regions, this process is closely related to terrain, climate, water resources, and landscape conditions. Therefore, ensuring ecological integration and harmony with the natural environment has become an urgent issue in rural housing design.

In recent years, under the initiative of the country's leadership, a series of measures aimed at improving the living standards of the population have been implemented. The development and consistent implementation of state programs have opened a new era in this field.

As can be seen from the maps, settlements located in regions bordering the Republic of Tajikistan are situated at altitudes of 2000 meters and above. From an architectural perspective, large-scale works are being carried out to improve planning systems and develop housing and social infrastructure projects.

Methodology

Analytical–methodological approach:

Architectural objects, rural housing systems, landscape characteristics, and ecological conditions in Uzbekistan's mountainous areas were analyzed. Comparative studies were also conducted with foreign examples (Turkey, Georgia, Nepal, Italy, Japan).

Cartographic and topographic analysis:

Relief, wind direction, solar radiation, water sources, and land structure were studied based on maps.

Survey and observation method:

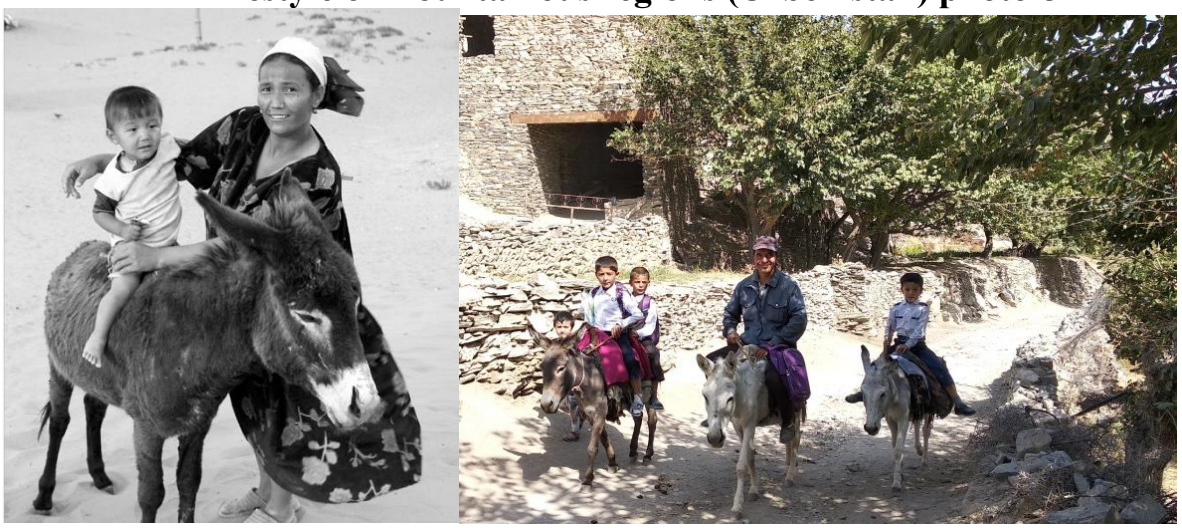
The lifestyle, construction traditions, and ecological attitudes of residents in mountain villages (for example, in Kashkadarya, Samarkand, Surkhandarya, and the foothill areas of the Fergana Valley) were studied.

Architectural modeling:

To test the integration of architectural forms with the landscape, computer modeling was carried out using AutoCAD, Revit, 3ds Max, SketchUp, and Lumion.

Environmental impact, waste management, and water and energy consumption levels of housing projects were measured. The ecological awareness, local values, and attitudes toward sustainability among residents were also studied.

Lifestyle of mountainous regions (Uzbekistan) photo-3



Rural Life in Mountainous Areas

The main economic activities of people living in Uzbekistan's mountainous and foothill regions are agriculture, livestock farming, horticulture, and beekeeping — all directly dependent on natural resources. Their lifestyle is shaped by the availability of water, climate, and relief conditions.

Mountain villages are typically located in river valleys, along streams, or at the foothills, where the landscape is scenic but construction space is limited. Hence, houses are built in harmony with the terrain, considering slopes and wind direction.

A survey was conducted to analyze the living conditions and housing features in mountainous and foothill areas

2-table.

Which category does your area belong to?	How do you assess living conditions in your area?	What material is your house built from?	What do you consider the biggest problem?	What are the living conditions in winter?	What improvements are needed to make your home more comfortable?	If possible, would you like to move to another area?	Do natural disasters (landslides, avalanches, etc.) occur frequently in your village?
Foothill	Very comfortable	Wood	Road and transport issues	Slightly inconvenient	Comfortable	No	Yes
Foothill	Average	Clay	Road and transport issues	Slightly inconvenient	Needs water and roads	No	Yes
Mountainous	Uncomfortable	Clay	Heating system absence	Very difficult	Need heating improvement	Undecided	Sometimes
Mountainous	Very comfortable	Brick	Power outage	Comfortable	Everything is fine	No	Sometimes
Mountainous	Average	Clay	Distance to healthcare	Slightly inconvenient	Restore power lines and schools	Undecided	No

Key aspects of rural life include:

Use of local materials (brick, stone, wood, clay) — cost-effective and environmentally safe.

Traditional housing structure — courtyard-type houses with verandas, flat roofs, and good natural ventilation adapted to the local climate.

Community-oriented lifestyle — strong neighborly relations, mutual help, and adherence to traditional values.

Harmony with nature — sustainable use of natural resources such as water and soil, and balanced coexistence with the environment.

However, in recent years, socio-economic changes, migration, and uneven infrastructure development have significantly affected rural life, leading to growing ecological issues.

Ecological Problems in Mountainous Villages

Environmental problems in mountainous settlements arise mainly from the fragility of the natural environment and human activities. The most common issues include:

Decline and pollution of water resources:

Melting glaciers caused by global warming reduce freshwater availability. The absence of sewage systems also lowers drinking water quality.

Soil erosion and reduced fertility:

Unsuitable farming on steep slopes causes soil degradation and productivity loss.

Deforestation and habitat destruction:

Cutting down trees for fuel and construction decreases green cover, increasing risks of landslides and floods.

Waste management problems:

Lack of waste processing systems leads to pollution of soil and water sources.

Climate change effects:

Temperature fluctuations, uneven rainfall, and droughts make living conditions harder and accelerate rural depopulation.

Need for Ecological Sustainability

Today, improving the quality of rural life while ensuring ecological safety is crucial. This requires:

Housing Features in Mountainous Regions

In Uzbekistan's mountainous zones, local residents traditionally built houses based on terrain conditions. These buildings often have basements (cellars), small courtyards, and use locally available materials such as stone and adobe.

For example, in the Fergana Valley mountain areas, folk architecture is characterized by the use of natural materials, craftsmanship, and earthquake-resistant designs. Due to limited flat land, houses are built in terraced formations — the lower level is used for livestock, and the upper level serves as a living area and courtyard.

Mountain settlements can be categorized into four main types based on topography and socio-economic conditions:

Low-altitude areas — located near farmlands and gardens, with large plots and flexible design.

Small rural clusters — with limited land and compact settlements.

High-altitude villages — with minimal agricultural land and compact housing.

Terraced settlements — small courtyard houses interconnected with neighboring ones.

In Kashkadarya, two-family houses are common, with two or three rooms and corner verandas. The houses are arranged around a central courtyard. Similar designs are found in Nurota as well.

In Samarkand's Urgut district, winters are cold (around –40°C) and summers are mild. Southern houses are built from clay due to limited sunlight, while northern houses are made of stone, abundant in mountain areas. House orientation and room layout reflect centuries of adaptation to the climate, forming what is now known as the "traditional national house."

Mountain housing designs also naturally ensure ventilation and thermal balance due to the cooler mountain air compared to plains.

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MUSHAK TO‘QIMALARI: SILLIQ, SKELET VA YURAK MUSHAKLARINING MIKROSKOPIK SOLISHTIRUV TAHLILI

Annotatsiya: *Ushbu maqolada mushak to‘qimalarining uch asosiy turi — silliq, skelet va yurak mushaklari —ning mikroskopik tuzilishi, funksional xususiyatlari va klinik ahamiyati solishtirilib tahlil qilinadi. Histologik tuzilishdagi farqlar, ularning organizmdagi roli, evolyutsion jihatlari, rivojlanishi hamda fiziologik jarayonlarga ta’siri yoritiladi. Maqola tibbiyot va biologiya yo‘nalishidagi talabalarga mushak tizimini chuqur tushunishda yordam beradi.*

Kalit so’zlar: *Mushak to‘qimalari; skelet mushaklari; silliq mushaklar; yurak mushaklari; mikroskopik tuzilish; histologiya; sarkomer; aktin; miozin; interkalatsion disklar.*

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MUSCLE TISSUES: MICROSCOPIC COMPARATIVE ANALYSIS OF SMOOTH, SKELETAL AND CARDIAC MUSCLES

Annotation: *This article presents a comparative analysis of the three main types of muscle tissues — smooth, skeletal and cardiac muscles — focusing on their microscopic structure, functional characteristics and clinical significance. Differences in histological architecture, roles in the body, evolutionary aspects, development and effects on physiological processes are discussed. The article helps students of medicine and biology to gain a deeper understanding of the muscular system.*

Keywords: *Muscle tissues; skeletal muscles; smooth muscles; cardiac muscles; microscopic structure; histology; actin; myosin; intercalated discs.*

Kirish

Inson organizmi hayotiy faoliyatining katta qismi mushak to‘qimalariga bog‘liq. Harakatlanish, qon aylanish, ichki organlar peristaltikasi, tana holatini ushlab turish — bularning barchasi mushak tizimi orqali amalga oshiriladi. Mushak to‘qimalari uch asosiy turga bo‘linadi: skelet (ixtiyoriy), silliq (ixtiyorsiz) va yurak mushaklari. Ularning mikroskopik tuzilishini solishtirish orqali funksional farqlarni ham tushunish mumkin.

Skelet mushaklari

Skelet mushaklari ko‘ndalang-targ‘il tuzilishga ega bo‘lib, ixtiyoriy boshqaruv ostida qisqaradi. Histologik jihatdan ular uzun, ko‘p yadroli tolalardan tashkil topgan. Yadrolar periferiyada joylashadi. Mikroskop ostida aniq A va I disklar, sarkomerlar ko‘rinadi. Skelet mushak tolalari aktin va miozin filamentlariga boy bo‘lib, bu tuzilma ularning tez va kuchli qisqarishini ta’minlaydi. Diametri 10–100 mkm, uzunligi bir necha santimetrga yetadi.

Funksiyasi — tana harakati, holatini ushlab turish, issiqlik hosil qilish. Skelet mushaklari somatik nerv tizimi tomonidan boshqariladi.

Silliq mushaklar

Silliq mushaklar ichki organlar devorida joylashgan bo‘lib, ularning qisqarishlari vegetativ nerv tizimi tomonidan avtomatik tarzda boshqariladi. Histologik jihatdan ular ingichka, cho‘zilgan, bir yadroli. Yadrolar markazda joylashadi. Mikroskop ostida ko‘ndalang-targ‘il chiziqlar ko‘rinmaydi. Silliq mushaklar ichki organlar peristaltikasi, qon tomirlari diametrini nazorat qilish, ichki muhit barqarorligini saqlashda muhim.

Yurak mushaklari

Yurak mushaklari faqat yurakda uchraydi va o‘ziga xos morfologik xususiyatlarga ega. Histologik jihatdan tolalari qisqa, tarmoqlangan, bitta yoki ikkita yadroli. Yadrolar markazda. Eng muhim belgisi — interkalatsion disklar: ular yurak tolalarini mexanik va elektr jihatdan bog‘laydi. Bu disklar yurak mushaklarining sinxron qisqarishini ta’minlaydi. Yurak mushaklari vegetativ nerv tizimi va yurakning o‘z pacemaker markazlari tomonidan boshqariladi.

Mikroskopik solishtiruv tahlili

Skelet mushaklari tolalari eng yirik, ko‘p yadroli va ko‘ndalang-targ‘il.

Silliq mushak tolalari eng ingichka, bir yadroli, chiziqsiz.

Yurak mushak tolalari o‘rta o‘lchamda, tarmoqlangan, interkalatsion disklar bilan bog‘langan.

Uchala turda ham aktin va miozin mavjud, ammo joylashuvi va boshqarilishi farq qiladi.

Fiziologik farqlar

* Skelet mushaklari tez qisqaradi, lekin charchaydi.
* Silliq mushaklar sekin qisqaradi, lekin charchoqqa chidamli.
* Yurak mushaklari ritmik va doimiy qisqaradi, charchamaydi.

Skelet mushaklari ixtiyoriy, silliq va yurak mushaklari ixtiyorsiz boshqariladi.

Embrional kelib chiqish va rivojlanish

Uchala mushak turi mezodermadan rivojlanadi: skelet mushaklari somatik mezodermadan, silliq mushaklar visseral mezodermadan, yurak mushaklari yurak naychasining mezodermasidan. Bu kelib chiqish ularning morfologik va funksional xususiyatlarini belgilaydi.

Energetik xususiyatlar

Skelet mushaklarida mitoxondriya ko‘p, lekin anaerob glikoliz ham muhim. Silliq mushaklar sekin qisqaradi, energiya sarfi kam. Yurak mushaklari doimiy faolligi sababli juda ko‘p mitoxondriyaga ega.

Evolyutsion jihatlar

Hayvonot olamida mushak tizimining rivojlanishi turlicha. Umurtqasizlarda asosan silliq mushaklar bo‘ladi. Umurtqalilarda skelet mushaklari rivojlangan, yurak mushaklari faqat qon aylanish tizimi murakkablashgan guruhlarda paydo bo‘ladi. Bu evolyutsion yo‘l mushaklarning funksional ixtisoslashuvini ko‘rsatadi.

Histologik tajribalar va bo‘yoqlar

Mushak to‘qimalarini mikroskop ostida ko‘rish uchun turli bo‘yoqlar ishlatiladi: gematoksilin-eozin (H&E), Masson trixrom bo‘yoqlari, immunogistokimyoviy markerlar (desmin, troponin). Elektron mikroskopiya orqali sarkomerlarning ichki tuzilishi ham aniqlanadi.

Fiziologik tajribalar va klinik qo‘llanish

Mushak kasalliklarini tashxislashda mushak biopsiyasi, elektromiografiya (EMG), yurak uchun elektrokardiografiya (EKG) va exokardiyografiya ishlatiladi. Bu metodlar mushak faoliyatining patologik o‘zgarishlarini erta aniqlashga yordam beradi.

Yosh davrlarida mushak to‘qimalari

Bolalarda mushak tolalari yupqaroq, mitoxondriyalar kamroq. Qariyalarda esa mushak massasi kamayadi (sarkopeniya). Bu o‘zgarishlar mushak tizimi funksiyasini tushunishda muhim.

Regeneratsiya

Skelet mushaklarida sputnik hujayralar (satellite cells) regeneratsiyada muhim. Silliq mushaklar ham qisman regeneratsiya qila oladi. Yurak mushaklarida regeneratsiya juda cheklangan, shuning uchun infarktdan keyin chandiq hosil bo‘ladi.

Klinik ahamiyati

Mushak to‘qimalarining mikroskopik xususiyatlarini bilish kasalliklarni tushunish va davolashda muhim. Masalan, yurak mushaklarining interkalatsion disklariga zarar — aritmiyalar. Silliq mushak spazmlari — ichki organ kasalliklari. Skelet mushaklaridagi degenerativ jarayonlar — miopatiyalar, distrofiyalar.

Xulosa

Mushak to‘qimalari organizm hayotiy faoliyati uchun zarur asosiy funksiyalarni bajaradi. Ularning mikroskopik tuzilishi va fiziologik xususiyatlari o‘zaro bog‘liq bo‘lib, tibbiyot hamda biologiyada muhim ahamiyatga ega.

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QASHQADARYO VILOYATI SANOATINI INNOVATSION RIVOJLANTIRISH STRATEGIYASINING ASOSIY YO‘NALISHLARI VA ULARNI EKONOMETRIK MODELLAR YORDAMIDA BAHOLASH

Annotatsiya: *Ushbu maqolada Qashqadaryo viloyati sanoat tarmog‘ini innovatsion rivojlantirish strategiyasining asosiy yo‘nalishlari tahlil qilingan bo‘lib, hududiy iqtisodiyotning barqaror o‘sishini ta’minlashda ilm-fan va texnologiyalarning o‘rni ko‘rsatib berilgan. Sanoat ko‘rsatkichlari asosida econometrik (ko‘p omilli regressiya) model qurildi va innovatsion omillarning yalpi hududiy mahsulot (YHM) o‘sishiga ta’siri baholandi. Natijalar hududda innovatsion infratuzilma, raqamli texnologiyalar, yuqori qo‘shimcha qiymatga ega ishlab chiqarishlar ahamiyatini tasdiqlaydi.*

Kalit so‘zlar: *innovatsiya, sanoat, Qashqadaryo, strategiya, iqtisodiy o‘sish, ekonometrik model, investitsiya, raqamli iqtisodiyot.*

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KEY DIRECTIONS OF THE INNOVATIVE DEVELOPMENT STRATEGY FOR THE INDUSTRY OF KASHKADARYA REGION AND THEIR ASSESSMENT USING ECONOMETRIC MODELS

Abstract: *This article analyzes the main directions of the strategy for innovative development of the industrial sector of the Kashkadarya region, showing the role of science and technology in ensuring sustainable growth of the regional economy. An econometric (multivariate regression) model was built based on industrial indicators and the impact of innovative factors on the growth of gross regional product (GRP) was assessed. The results confirm the importance of innovative infrastructure, digital technologies, and high-value-added production in the region.*

Keywords: *innovation, industry, Kashkadarya, strategy, economic growth, econometric model, investment, digital economy.*

Kirish

So‘nggi yillarda O‘zbekistonda sanoat tarmoqlarini modernizatsiya qilish, innovatsion faoliyatni kengaytirish va raqamli iqtisodiyotni rivojlantirish bo‘yicha chuqur islohotlar amalga oshirilmoqda. Qashqadaryo viloyati respublikaning yirik sanoat hududlaridan biri bo‘lib, uglevodorod zaxiralari, kimyo, qurilish materiallari, energetika va oziq-ovqat sanoati bilan ajralib turadi.

Mazkur tadqiqotning maqsadi — Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning ustuvor yo‘nalishlarini aniqlash va iqtisodiy ko‘rsatkichlar asosida econometrik baholash orqali strategik tavsiyalar ishlab chiqishdan iborat.

Adabiyotlar sharhi

Innovatsion rivojlanish bo‘yicha olimlar (J.Shumpeter, P.Druker, R.Solou) iqtisodiy o‘sishning bosh omili sifatida texnologik yangiliklarni qayd etgan. O‘zbekistonda innovatsion iqtisodiyotga o‘tish, hududlarda texnologik infratuzilma yaratish va sanoatni modernizatsiya qilish bo‘yicha ko‘plab normativ hujjatlar qabul qilingan.

Mahalliy tadqiqotlarda (X.Abduraxmonov, B.Samatov, M.Olimov) sanoatni hududiy rivojlantirishda innovatsion omillarning ta’siri tahlil qilingan, ammo Qashqadaryo viloyati kesimida ekonometrik baholash yetarli darajada yoritilmagan.

Qashqadaryo viloyati sanoatini innovatsion rivojlantirishning asosiy yo‘nalishlari:

1. Raqamli texnologiyalarni joriy etish

- sanoat korxonalarida ERP, SCADA, IoT tizimlari;
- raqamli monitoring va sifat nazorati;
- ishlab chiqarish avtomatlashtirish darajasini oshirish.

2. Innovatsion infratuzilmani kengaytirish

- texnoparklar, innovatsion markazlar, startap-ekotizim;
- ilmiy-tadqiqot faoliyatini korxonalar bilan integratsiyalash;
- universitet–sanoat hamkorligini kuchaytirish.

3. Yuqori qo‘shimcha qiymatli sanoat tarmoqlarini rivojlantirish

- gaz-kimyo klasteri;
- polimerlar, ECM (energiya tejovchi materiallar);
- agrosanoat chuvalchang zanjirlarini chuqurlashtirish.

4. Yashil texnologiyalar va energiya samaradorligi

- qayta tiklanuvchi energiya manbalaridan foydalanish;
- sanoat chiqindilarini qayta ishlash;
- energiya tejamkor uskunalar joriy etish.

5. Innovatsion investitsiyalarni jalb qilish

- xususiy sektorni rag‘batlantirish;
- xorijiy investitsiyalar uchun soliq-imtiyozlar;
- davlat–xususiy sheriklik loyihalari.

Metodologiya.

Tadqiqotda 2010–2024 yillar uchun Qashqadaryo viloyati sanoat koʻrsatkichlari asosida koʻp omilli ekonometrik regressiya modeli qurildi.

Modelning maqsadi — innovatsion omillarning YHM (Yalpi hududiy mahsulot) oʻsishiga ta’sirini aniqlash.

Model shakli: $YHMt = \beta0+\beta1INVt+\beta2INNOVt +\beta3DIGt +\beta4EMPt+\epsilon t$

bu yerda:

INV — sanoatga yoʻnaltirilgan investitsiyalar (mlrd soʻm);

INNOV — innovatsion faol korxonalar ulushi (%);

DIG — sanoatning raqamlashtirish darajasi (indeks);

EMP — sanoatdagi bandlik (ming kishi).

Natijalar: Ekonometrik tahlil shuni koʻrsatdiki:

INV — investitsiyalarning 1% oʻsishi YHMni oʻrtacha **0,47% ga oshiradi**.

INNOV — innovatsion korxonalar ulushining 1% ortishi YHMga **0,62% ijobiy ta’sir** koʻrsatadi.

DIG — raqamlashtirish indeksining oshishi YHMga **0,55% ijobiy ta’sir** beradi.

EMP — sanoat bandligining oʻsishi iqtisodiy faollikni kuchaytiradi, ammo ta’siri investitsiya va innovatsiyaga qaraganda pastroq (**0,21%**).

Modelda $\mathbf{R^2 = 0.87}$, bu modelning izohlash darajasi yuqoriligini bildiradi.

Xulosa

Tadqiqotdan kelib chiqqan holda quyidagi xulosalar berildi. Qashqadaryo viloyati sanoatini innovatsion rivojlantirish strategiyasi raqamli iqtisodiyot, yashil texnologiyalar, yuqori qoʻshimcha qiymatli tarmoqlar va innovatsion infratuzilmaga tayanishi zarur. Ekonometrik natijalar innovatsiyalar, investitsiyalar va raqamlashtirishning YHMga sezilarli ijobiy ta’sirini tasdiqladi. Innovatsion klasterlar, texnoparklar va ilmiy-sanoat integratsiyasini kuchaytirish viloyatning raqobatbardoshligini oshiradi. Sanoat korxonalarining energiya samaradorligini oshirish va ekologik texnologiyalarni joriy etish uzoq muddatli barqarorlikni ta’minlaydi. Raqamli transformatsiya jarayonini tezlashtirish ishlab chiqarish samaradorligini 15–25% ga oshirish salohiyatiga ega.

Foydalanilgan adabiyotlar:

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BO‘LAJAK SHIFOKORLARDA KASBIY FAOLIYATGA QIZIQISH MOTIVASIYANING PSIXOLOGIK XUSUSIYATLARI

Annotatsiya: *Ushbu maqola bo‘lajak shifokorlarda kasbiy faoliyatga qiziqish motivatsiyasining psixologik xususiyatlarini o‘rganishga bag‘ishlangan. Zamonaviy tibbiy ta’lim sharoitida professional motivatsiyani tushunish va uni shakllantirish juda muhim ahamiyat kasb etadi, chunki motivatsiya talabaning bilim olishga bo‘lgan qiziqishi, amaliy ko‘nikmalarni rivojlantirish va kelajakda sifatli professional faoliyat yuritishiga bevosita ta’sir qiladi.*

Maqolada kasbiy faoliyatga qiziqish motivatsiyasining asosiy turlari tahlil qilinadi: ichki motivatsiya, ya’ni shaxsiy qoniqish, o‘zini rivojlantirish va kasbiy maqsadlarga erishish istagi; tashqi motivatsiya esa ijtimoiy kutishlar, kasbning obro‘si, moddiy va ma’naviy rag‘batlar orqali namoyon bo‘ladi. Shuningdek, shaxsning psixologik xususiyatlari — mas’uliyatlilik, emotsional barqarorlik, empatiya qobiliyati, kognitiv va kommunikativ ko‘nikmalar — professional motivatsiya va kasbiy faoliyatga qiziqishning shakllanishiga katta ta’sir ko‘rsatadi.

Kalit so‘zlar: *Bo‘lajak shifokorlar, kasbiy motivatsiya, faoliyatga qiziqish, ichki va tashqi motivatsiya, psixologik xususiyatlar, emotsional barqarorlik, o‘zini boshqarish, kasbiy orientatsiya, kognitiv va kommunikativ ko‘nikmalar, kompetensiya rivoji, ta’lim jarayoni.*

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PSYCHOLOGICAL CHARACTERISTICS OF MOTIVATION FOR INTEREST IN PROFESSIONAL ACTIVITY AMONG FUTURE DOCTORS

Annotation: *This article is devoted to the study of the psychological characteristics of motivation for interest in professional activity among future doctors. In the context of modern medical education, understanding and developing professional motivation is of great importance, as it directly affects students' interest in acquiring knowledge, the development of practical skills, and the performance of high-quality professional activity in the future.*

The article analyzes the main types of motivation for interest in professional activity: intrinsic motivation, which includes personal satisfaction, self-development, and the desire to achieve professional goals; and extrinsic motivation, which is manifested through social expectations, the prestige of the profession, and material and moral incentives. In addition, the psychological characteristics of the individual — responsibility, emotional stability, empathy ability, cognitive and communicative skills — have a significant impact on the formation of professional motivation and interest in professional activity.

Keywords: *Future doctors, professional motivation, interest in activity, intrinsic and extrinsic motivation, psychological characteristics, emotional stability, self-regulation, professional orientation, cognitive and communicative skills, competence development, educational process.*

Bo‘lajak shifokorlarning kasbiy faoliyatga qiziqishi ularning kelajakdagi ishiga tayyorgarligi va muvaffaqiyati uchun juda muhimdir. Bu qiziqish asosan motivatsiya orqali namoyon bo‘ladi, ya’ni talabaning nima uchun shifokor bo‘lishni xohlashi va kasbiga qanday e’tibor berishi bilan bog‘liq.

Psixologik xususiyatlar bu jarayonda muhim rol o‘ynaydi. Masalan:

• **Ichki motivatsiya** – talabaning shaxsiy qiziqishi va o‘zini rivojlantirish istagi; u o‘z kasbini foydali va qiziqarli deb biladi.

• **Tashqi motivatsiya** – jamiyat, oila, ustozlar yoki moddiy rag‘batlar orqali keladigan qiziqish.

• **Emotsional barqarorlik** – stressli vaziyatlarda ham ishlay olish qobiliyati.

• **Empatiya** – bemorlarga nisbatan hamdardlik va g‘amxo‘rlik his qilish.

• **Mas’uliyatlilik va o‘zini boshqarish** – ish vazifalarini to‘g‘ri bajarish va muhim qarorlar qabul qilish qobiliyati.

Talabalar o‘z ichki motivatsiyasini rivojlantirib, tashqi rag‘batlar bilan uyg‘unlashtirsa, ular yanada faol, mas’uliyatli va malakali shifokor bo‘lishga tayyor bo‘ladilar. Shu bilan birga, motivatsiya yuqori bo‘lgan talaba o‘quv jarayonida bilim olishga ko‘proq intiladi, amaliy mashg‘ulotlarda faol ishtirok etadi va bemorlar bilan ishlashda muvaffaqiyatli bo‘ladi.

Oddiy qilib aytganda, bo‘lajak shifokorlarda kasbiy qiziqish va motivatsiya — bu ularning kasbga bo‘lgan ishtiyoqi va shaxsiy psixologik xususiyatlarining uyg‘unligi bo‘lib, ular kelajakdagi ish faoliyatining sifatini belgilaydi.

Kasbiy faoliyatga qiziqish va motivatsiya har bir bo‘lajak shifokor uchun professional tayyorgarlikning asosiy omillaridan biridir. Tibbiyot sohasida muvaffaqiyatli faoliyat yuritish nafaqat bilim va amaliy ko‘nikmalarga, balki shaxsning ichki intilishlari va motivatsiyasiga ham bog‘liq. Kasbiy motivatsiya talabaning o‘quv jarayonida faol ishtirok etishi, amaliy ko‘nikmalarni chuqur o‘zlashtirishi va kelajakda bemorlarga samarali yordam ko‘rsatishi uchun zarur psixologik poydevor hisoblanadi.

Bo‘lajak shifokorlarning kasbiy qiziqishini shakllantirishda ichki va tashqi motivatsiya, shaxsiy psixologik xususiyatlar va ijtimoiy muhitning o‘zaro ta’siri muhim ahamiyat kasb etadi. Ichki motivatsiya shaxsning o‘zini rivojlantirish, bilim olish va kasbiy maqsadlarga erishish istagi bilan bog‘liq bo‘lsa, tashqi motivatsiya jamiyatning kutishlari, kasbning obro‘si, ustoz va mentorlarning rag‘bati hamda moddiy va ma’naviy rag‘batlar orqali shakllanadi. Shu bilan birga, emotsional barqarorlik, mas’uliyatlilik, empatiya va o‘zini boshqarish kabi psixologik xususiyatlar talabaning kasbiy qiziqishi va professional intilishlarini mustahkamlaydi.

Shaxsiy tajriba va hayotiy omillarning shifokorlar yetishishiga ta’siri

Bo‘lajak shifokorlarning kasbiy faoliyatga qiziqish motivatsiyasi ko‘plab shaxsiy va tashqi omillarga bog‘liq bo‘lib, ularning shaxsiy tajribasi, psixologik xususiyatlari va hayotiy tajribalari bilan chambarchas bog‘liqdir. Talabaning kasbga bo‘lgan qiziqishi ko‘pincha bolalik davrida shakllangan qadriyatlar, oila muhitidagi tarbiya, o‘rganilgan kasbiy qiyofalar va shaxsiy kuzatuvlar bilan bog‘liq bo‘ladi. Masalan, oilada shifokor yoki tibbiyot xodimlari mavjud bo‘lsa, bolalikdagi kuzatuvlar va hayotiy tajribalar orqali talabaning kelajakdagi kasbiy qiziqishi shakllanishi mumkin. Shu bilan birga, talabaning o‘zini o‘zi rivojlantirish istagi, shaxsiy muvaffaqiyatga intilishi va boshqalarga yordam berish istagi ham ichki motivatsiyaning kuchayishiga hissa qo‘shadi.

Psixologik yondashuvga ko‘ra, motivatsiya — bu insonning faoliyatga yo‘naltirilgan ichki qiziqishi va intilishlar majmuasidir. Kasbiy motivatsiya nafaqat bilim va ko‘nikmalarni o‘rganishga bo‘lgan intilish bilan bog‘liq, balki shaxsning emotsional barqarorligi, mas’uliyatlilik darajasi, empatiya qobiliyati va o‘zini boshqarish ko‘nikmalariga ham bevosita ta’sir qiladi. Shu sababli, talabaning shaxsiy xususiyatlari va psixologik holati uning kasbiy faoliyatga qiziqishini shakllantirishda muhim rol o‘ynaydi.

Shuningdek, hayotiy tajribalar motivatsiyaning dinamikasini belgilaydi. Talaba o‘zining hayotiy maqsadlari, ijtimoiy kutishlar va shaxsiy qadriyatlar bilan bog‘liq tajribalar orqali kelajakdagi kasbiy yo‘nalishni tanlaydi. Bu jarayon, o‘z navbatida, ichki motivatsiya va tashqi rag‘batning uyg‘unlashuviga olib keladi. Ichki motivatsiya — shaxsiy qoniqish, kasbga bo‘lgan qiziqish va o‘zini rivojlantirish istagi bilan bog‘liq bo‘lsa, tashqi motivatsiya — ijtimoiy obro‘, prestij va tashqi rag‘batlar orqali namoyon bo‘ladi. Ularning o‘zaro uyg‘unligi

bo‘lajak shifokorlarning professional faoliyatga tayyorgarligini yanada mustahkamlaydi.

Shunday qilib, bo‘lajak shifokorlarda kasbiy qiziqish motivatsiyasi ularning shaxsiy tajribasi, psixologik xususiyatlari va tashqi omillarning o‘zaro ta’siri orqali shakllanadi. Psixologik yondashuv ushbu jarayonni tushunish va talabalarda kasbiy motivatsiyani rivojlantirish uchun samarali strategiyalar ishlab chiqish imkonini beradi.

Talabaning ichki motivatsiyasi va shaxsiy qoniqish darajasi

Ichki motivatsiya bo‘lajak shifokorlarning kasbiy faoliyatga qiziqishida eng muhim psixologik omil hisoblanadi. U talabaning shaxsiy qoniqish hissi, kasbiy o‘sishga intilishi, o‘zini rivojlantirish va kasbiy maqsadlarga erishish istagi bilan bevosita bog‘liqdir. Ichki motivatsiya mavjud bo‘lsa, talaba nafaqat bilim olish jarayonida faol ishtirok etadi, balki amaliy ko‘nikmalarni puxta o‘zlashtirishga va kasbiy vazifalarni samarali bajarishga intiladi. Masalan, klinik fanlarda o‘zini sinovdan o‘tkazish, murakkab kasbiy vaziyatlarni hal qilish yoki bemorlarga yordam berish orqali talaba o‘z qobiliyatini rivojlantirishga imkon yaratadi. Ichki motivatsiya yuqori bo‘lgan shifokor talaba o‘quv jarayonidagi qiyinchiliklarni yengib, mustaqil va faol o‘rganishga intiladi, bu esa uning kelajakdagi professional kompetensiyasini oshiradi.

Psixologik jihatdan ichki motivatsiya talabaning shaxsiy qoniqish darajasi bilan chambarchas bog‘liqdir. Shaxsiy qoniqish — bu o‘zining kasbiy faoliyati va tanlagan yo‘nalishidan ruhiy mamnuniyat his qilishi. Bo‘lajak shifokor uchun bu qoniqish odatda o‘zini foydali, muhim va jamiyat uchun zarur bir shaxs sifatida his qilish bilan bog‘liq bo‘ladi. Shu nuqtai nazardan, ichki motivatsiya va shaxsiy qoniqish o‘rtasidagi o‘zaro bog‘liqlik talabaning kasbiy faoliyatga bo‘lgan qiziqishini mustahkamlaydi, uni har tomonlama rivojlanishga undaydi.

Ichki motivatsiya shakllanishida shaxsning emotsional barqarorligi ham katta rol o‘ynaydi. Emotsional barqaror talaba stressli vaziyatlarda ham o‘z qiziqishini yo‘qotmaydi, muvaffaqiyatsizliklardan keyin ruhiy tiklanadi va kasbiy vazifalarni bajarishda qat’iyatli bo‘ladi. Shu bilan birga, empatiya qobiliyati ichki motivatsiyani kuchaytiradi, chunki talaba bemorlarning holatiga qayg‘urib, ularga yordam berish orqali shaxsiy qoniqish va kasbiy mahoratni oshiradi.

Ichki motivatsiyaning shakllanishida shaxsiy qadriyatlar va hayotiy maqsadlarning o‘rni ham katta. Talaba o‘z kasbini insonlarga xizmat qilish, sog‘liqni saqlash tizimida samarali faoliyat ko‘rsatish yoki jamiyat foydasiga hissa qo‘shish vositasi sifatida ko‘rsa, uning ichki motivatsiyasi yanada kuchayadi. Shu sababli, pedagogik va psixologik yondashuvlarda talabaning shaxsiy qadriyatlarini aniqlash, ularni kasbiy qiziqishga yo‘naltirish va rag‘batlantirish muhim ahamiyat kasb etadi.

Ichki motivatsiyaning yuqori darajasi bo‘lajak shifokorlarning mustaqil o‘rganish, ijodiy fikrlash va professional vazifalarni bajarish qobiliyatini rivojlantiradi. Shuningdek, ichki motivatsiya talabaning psixologik barqarorligini oshiradi, ijtimoiy muhitdagi bosim va stresslarni yengib o‘tishga yordam beradi. Talaba o‘z kasbini qadrlasa va unga qiziqsa, uning kelajakdagi professional

faoliyati samarali va sifatli bo‘ladi, bu esa nafaqat shaxsiy rivojlanish, balki jamiyat salomatligiga ham bevosita ta’sir qiladi.

Shu nuqtai nazardan, ichki motivatsiya va shaxsiy qoniqish darajasi bo‘lajak shifokorlarning kasbiy tayyorgarligida markaziy ahamiyatga ega bo‘lib, psixologik yondashuv orqali ularni rivojlantirish, mustahkamlash va qo‘llab-quvvatlash samarali natijalarni beradi. Bu esa o‘z navbatida, tibbiy ta’lim jarayonining sifatini oshirish va professional kompetensiyani yanada rivojlantirish imkonini yaratadi.

Tashqi motivatsiya va ijtimoiy omillar

Tashqi motivatsiya bo‘lajak shifokorlarning kasbiy qiziqishini shakllantirishda ichki motivatsiya bilan bir qatorda muhim ahamiyatga ega. U talabaning kasbga bo‘lgan qiziqishini tashqi rag‘batlar, ijtimoiy kutishlar, kasbning obro‘si, moddiy va ma’naviy rag‘batlar orqali mustahkamlaydi. Masalan, tibbiyot sohasining jamiyatdagi nufuzi, kasbning hurmatga sazovorligi va talabaning kelajakdagi ijtimoiy mavqei uni kasbiy faoliyatga qiziqtiradi va kuchli rag‘batlantiradi. Shu bilan birga, o‘qituvchilar, ustozlar va hamkasblar tomonidan berilgan ijobiy baholar ham tashqi motivatsiya manbai sifatida faol ishlaydi.

Tashqi motivatsiyaning boshqa jihati — bu professional faoliyat natijasida olinadigan moddiy va ma’naviy rag‘batlar. Talaba o‘zining kelajakdagi kasbiy faoliyatidan daromad olish, jamiyatda obro‘ga ega bo‘lish, shuningdek, oila va yaqinlar tomonidan qadrlanishni kutadi. Ushbu tashqi rag‘batlar, ayniqsa ichki motivatsiya bilan uyg‘unlashganda, talabaning kasbiy qiziqishini mustahkamlaydi va ularni faoliyatga yanada sodiq qiladi.

Shuningdek, ijtimoiy muhitning ta’siri katta ahamiyatga ega. Talabaning do‘stlari, sinfdoshlari, oilasi va jamiyatdagi qadriyatlar unga kasbga bo‘lgan qiziqishni rivojlantirishda yordam beradi. Ijtimoiy qo‘llab-quvvatlash, professional tajriba almashish va mentorlardan o‘rganish orqali talaba o‘zining kasbiy intilishlarini aniqlaydi va mustahkamlaydi. Shu sababli, tashqi motivatsiya nafaqat rag‘batlantiruvchi omil, balki shaxsiy qiziqish va professional rivojlanishning kuchayishiga xizmat qiladi.

Psixologik jihatdan tashqi motivatsiya talabaning kasbiy yo‘nalishga moslashish va faoliyatga tayyor bo‘lish qobiliyatini oshiradi. U talabaning ijtimoiy mas’uliyatini rivojlantiradi, kasbga sodiqlik hissini shakllantiradi va o‘quv jarayonida faoliyatni barqaror qiladi. Shu bilan birga, tashqi motivatsiya ichki motivatsiya bilan uyg‘unlashganida, talabaning kasbiy intilishi mustahkamlanadi, emotsional barqarorligi oshadi va kasbiy muvaffaqiyatga erishish ehtimoli kuchayadi.

Shu nuqtai nazardan, tashqi motivatsiya va ijtimoiy omillar bo‘lajak shifokorlarning kasbiy qiziqishini shakllantirish va mustahkamlashda markaziy ahamiyatga ega bo‘lib, ularning professional tayyorgarligi va kelajakdagi muvaffaqiyatli faoliyati uchun zarur psixologik poydevor yaratadi. Pedagogik va psixologik yondashuvlar orqali tashqi rag‘batlarni to‘g‘ri yo‘naltirish va ichki motivatsiya bilan uyg‘unlashtirish samarali natijalarga olib keladi.

Psixologik xususiyatlarning o‘zaro ta’siri va umumiy xulosalar

Bo‘lajak shifokorlarning kasbiy faoliyatga qiziqish motivatsiyasi bir nechta psixologik xususiyatlarning o‘zaro ta’siri orqali shakllanadi. Ichki motivatsiya, shaxsiy qoniqish, tashqi rag‘batlar va ijtimoiy omillar bir-birini to‘ldirib, talabaning kasbiy qiziqishi va professional intilishlarini mustahkamlaydi. Masalan, kuchli ichki motivatsiya va yuqori shaxsiy qoniqish tashqi rag‘batlar bilan uyg‘unlashganda, talabaning kasbiy faoliyatga bo‘lgan qiziqishi maksimal darajada oshadi. Shu bilan birga, emotsional barqarorlik va empatiya kabi shaxsiy xususiyatlar motivatsiyaning mustahkamligida hal qiluvchi rol o‘ynaydi.

Psixologik tahlil shuni ko‘rsatadiki, talabaning o‘zini boshqarish qobiliyati va mas’uliyatlilik darajasi, uning ichki va tashqi motivatsiyasini samarali uyg‘unlashtirishga yordam beradi. Mas’uliyatli va o‘zini boshqaradigan talaba kasbiy faoliyatga bo‘lgan qiziqishini davom ettiradi, murakkab vaziyatlarda ham qat’iyatli bo‘ladi va kasbiy maqsadlariga erishishga intiladi. Shu nuqtai nazardan, shaxsiy psixologik xususiyatlar motivatsiya jarayonining samaradorligini belgilovchi muhim omil hisoblanadi.

Ijtimoiy muhit va pedagogik yondashuvlar ham bu jarayonda katta ahamiyatga ega. Talabaning do‘stlari, ustozlari va jamiyat qadriyatlari orqali olinadigan qo‘llab-quvvatlash uning kasbiy qiziqishini mustahkamlaydi va motivatsiyani barqaror qiladi. Shuningdek, o‘quv jarayonidagi amaliy mashg‘ulotlar, klinik tajriba va mentorlik tizimi talabaning motivatsiyasini yanada rivojlantirishda samarali vosita sifatida xizmat qiladi

Umuman olganda, bo‘lajak shifokorlarning kasbiy faoliyatga qiziqish motivatsiyasi ichki va tashqi omillar, shaxsiy psixologik xususiyatlar va ijtimoiy muhitning o‘zaro ta’siri natijasida shakllanadi. Ushbu psixologik mexanizmlarni chuqur tushunish ta’lim jarayonida samarali pedagogik strategiyalar ishlab chiqishga imkon beradi.

Xulosa:

Bo‘lajak shifokorlarning kasbiy faoliyatga qiziqish motivatsiyasi — bu murakkab va ko‘p qirrali psixologik jarayon bo‘lib, u shaxsning ichki va tashqi motivatsiya, psixologik xususiyatlar va ijtimoiy muhitning o‘zaro ta’siri orqali shakllanadi. Ichki motivatsiya talabaning shaxsiy qoniqish hissi, kasbiy maqsadlarni amalga oshirishga bo‘lgan intilishi va o‘zini rivojlantirish istagi bilan bevosita bog‘liq. Bu esa talabaning o‘quv jarayonida faol ishtirok etishini, amaliy ko‘nikmalarni chuqur o‘zlashtirishini va kelajakda professional mas’uliyatni yuqori darajada bajarishini ta’minlaydi. Ichki motivatsiya yuqori bo‘lgan talaba murakkab vaziyatlarda ham qat’iyatli bo‘lib, o‘z kasbiy intilishlarini davom ettiradi, bu esa uning kelajakdagi professional muvaffaqiyati uchun poydevor vazifasini bajaradi.

Tashqi motivatsiya va ijtimoiy omillar ham bo‘lajak shifokorlarning kasbiy qiziqishini rivojlantirishda katta rol o‘ynaydi. Jamiyatdagi kasbning obro‘si, ijtimoiy kutishlar, oila va do‘stlarning qo‘llab-quvvatlashi, shuningdek, ustoz va mentorlarning rag‘bati talabaning kasbga bo‘lgan qiziqishini mustahkamlaydi. Moddiy va ma’naviy rag‘batlar esa tashqi motivatsiyaning muhim omili bo‘lib, talabaning faoliyatga sodiqligini oshiradi va kasbiy intilishga turtki beradi. Ichki

va tashqi motivatsiya uyg‘unlashganda, talabaning kasbiy qiziqishi yanada mustahkamlanadi, bu esa professional kompetensiyani rivojlantirishga xizmat qiladi.

Shaxsiy psixologik xususiyatlar — emotsional barqarorlik, empatiya qobiliyati, mas’uliyatlilik va o‘zini boshqarish — motivatsiyaning samaradorligini oshiradi va talabaning kasbiy faoliyatga tayyorligini mustahkamlaydi. Shu bilan birga, pedagogik va psixologik strategiyalarni qo‘llash orqali ichki va tashqi motivatsiya uyg‘unligi ta’minlanadi, talabaning kasbiy qiziqishi rivojlantiriladi va u kelajakda malakali, samarali va mas’uliyatli shifokor sifatida faoliyat yuritadi.

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AHOLI KASALLANISHIGA TA'SIR ETUVCHI GEOGRAFIK OMILLAR

Annotatsiya: *Ushbu maqolada aholining kasallanishiga ta'sir etuvchi geografik omillar tizimli ravishda ilmiy tahlil qilinadi. Tadqiqotda iqlim sharoitlari, relyef, ekologik holat, tabiiy resurslar sifati, urbanizatsiya jarayoni, aholi zichligi, iqtisodiy omillar va hududiy infratuzilmaning sog'liq holatiga ta'siri ko'rib chiqiladi. Shuningdek, geografik omillar va epidemiologik jarayonlar o'rtasidagi o'zaro bog'liqlik ilmiy manbalar asosida yoritilgan.*

Kalit so'zlar: *geografik omillar, sog'liq geogrfiyasi, iqlim, relyef, ekologik muhit, urbanizatsiya, epidemiologiya, aholi zichligi, kasallanish darajasi*.

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GEOGRAPHICAL FACTORS AFFECTING POPULATION DISEASE

Abstract: *This article presents a systematic scientific analysis of geographical factors affecting the incidence of diseases in the population. The study examines the impact of climatic conditions, relief, ecological status, quality of natural resources, urbanization, population density, economic factors and regional infrastructure on health. The relationship between geographical factors and epidemiological processes is also highlighted based on scientific sources.*

Keywords: *geographical factors, health geography, climate, relief, ecological environment, urbanization, epidemiology, population density, incidence rate.*

Aholi kasallanishining hududiy farqlanishi geografiya fanining muhim tadqiqot yo'nalishlaridan biridir. Inson salomatligi faqat tashqi biologik omillargagina emas, balki geografik muhit bilan bog'liq bo'lgan iqlim, relyef, tabiiy resurslar, havo va suv sifati, landshaft tuzilishi hamda ijtimoiy-iqtisodiy sharoitga ham bevosita bog'liqdir. Jahon sog'liqni saqlash tashkiloti (JSST)

ma’lumotlariga ko‘ra, inson salomatligiga ta’sir etuvchi omillarning 25–30 foizi tabiiy-geografik sharoitlarga to‘g‘ri keladi. Shu sababli tibbiy geografiya va sog‘liq geogrfiyasi hududlar bo‘yicha kasallanishni o‘rganishda ilmiy asos bo‘lib xizmat qiladi. Mazkur maqolada aholining kasallanishiga ta’sir etuvchi geografik omillar kompleks tarzda tahlil qilinadi.

GEOGRAFIK OMILLAR — BU HUDUDNING TABIIY, EKOLOGIK VA IJTIMOIY-GEOGRAFIK SHAROITLARI BO‘LIB, ULAR AHOLINING SOG‘LIG‘IGA BEVOSITA YOKI BILVOSITA TA’SIR QILADI. TIBBIY GEOGRAFIYA AYNAN SHU OMILLARNI ILMIY O‘RGANADI. IQLIM AHOLI SOG‘LIGINING ENG MUHIM GEOGRAFIK BELGILOVCHISI HISOBLANADI.

- Harorat: issiq iqlimda issiq urishi, suvsizlanish, ichak infeksiyalari; sovuq iqlimda esa o‘pka kasalliklari, gipertoniya ko‘payadi.
- Namlik: yuqori namlik zamburug‘li va respirator kasalliklarni kuchaytiradi.
- Shamol va chang: nafas yo‘llarini qo‘zg‘atadi (astma, bronxit).
- Quyosh radiatsiyasi: ortiqcha UV nurlanishi teri kasalliklarini, kamligi esa D vitamini yetishmovchiligini yuzaga keltiradi.

Hududning baland-pastligi, tog‘, dasht yoki vodiyda joylashuvi kasallanish darajasiga ta’sir qiladi.

- ✓ Tog‘li hududlar: kislorod kamligi yurak-qon tomir kasalliklarini kuchaytiradi.
- ✓ Cho‘l va dasht: chang ko‘pligi sababli allergiya, astma, teri kasalliklari ko‘p uchraydi.
- ✓ Vodiy va botqoqlar: namlik yuqori bo‘ladi, bezgak va suv orqali yuqadigan kasalliklar keng tarqaladi.

Inson faoliyati tufayli yuzaga kelgan geografik-ekologik sharoit salomatlikka katta ta’sir ko‘rsatadi. Havo ifloslanishi: sanoat gazlari va avtomobil chiqindilari nafas yo‘llari, allergik va yurak-qon tomir kasalliklarini oshiradi. Suv ifloslanishi: ichak infeksiyalari, jigar va buyrak kasalliklarini ko‘paytiradi. Tuproqdagi og‘ir metallar: oziq-ovqat orqali zaharlanish va endokrin tizim muammolariga sabab bo‘ladi. Radiatsiya: saraton va genetik kasalliklar xavfini oshiradi.

Aholining hududiy joylashuvi va demografik omillar; Aholi zichligi: zich hududlarda infeksion kasalliklar tez tarqaladi. Urbanizatsiya: yirik shaharlarda shovqin, stress, ekologik ifloslanish, surunkali kasalliklarni ko‘paytiradi. Migratsiya: virus va infeksiyalarning bir hududdan boshqasiga o‘tishiga sabab bo‘ladi.

Ijtimoiy-iqtisodiy geografik omillar. Daromad darajasi: kambag‘al hududlarda ovqatlanish sifati past bo‘lib, kasallanish darajasi yuqori bo‘ladi. Tibbiy infratuzilma: uzoq qishloqlarda shifokorlar yetishmasligi, kech tashxis qo‘yilishi kasallanish ko‘rsatkichlarini oshiradi. Sanitariya sharoitlari: ichimlik suvi tizimi, kanalizatsiya va chiqindilar boshqaruvi sog‘liqka bevosita ta’sir qiladi.

Keskin kontinentallik yoki yuqori harorat inson organizmida issiqlik stressini yuzaga keltiradi, natijada yurak-qon tomir kasalliklari, issiq urishi va suvsizlanish hollari ko‘payadi. Sovuq iqlimda esa sovqotish, o‘pka va yuqori nafas yo‘llari kasalliklari, gipertoniya ko‘p uchraydi. Yuqori namlik qo‘ziqorin kasalliklari va respirator infeksiyalar tarqalishiga zamin yaratadi. Atmosfera bosimining keskin o‘zgarishi esa gipertoniya va yurak ishemik kasalliklari bo‘lgan bemorlarga salbiy ta’sir ko‘rsatadi. Ultrabinafsha nurlanishning me’yoridan yuqori bo‘lishi teri saratonlari xavfini oshiradi; yetishmovchiligi esa D vitamini defitsitiga sabab bo‘ladi.

Xulosa

Aholi kasallanishiga ta’sir etuvchi geografik omillar o‘z tabiatiga ko‘ra murakkab va ko‘p qirrali bo‘lib, ular tabiiy-geografik, ekologik va ijtimoiy-iqtisodiy sharoitlarning o‘zaro ta’siri natijasida shakllanadi. Tibbiy geografiya fanining tadqiqotlari shuni ko‘rsatadiki, geografik omillar aholining sog‘liq darajasi, kasallanish ko‘rsatkichlari va kasalliklarning hududiy tarqalishiga bevosita ta’sir ko‘rsatadi.

Birinchidan, iqlim omillari — harorat, namlik, atmosfera bosimi, shamol tezligi va quyosh radiatsiyasi inson organizmining fiziologik holatini belgilovchi asosiy omillardir. Issiq va quruq iqlim sharoitida suvsizlanish, oshqozon-ichak infeksiyalari, yurak-qon tomir tizimi kasalliklari kuchayadi, sovuq hududlarda esa o‘pka va yuqori nafas yo‘llari kasalliklari ko‘proq uchraydi. Iqlim sharoitining keskin o‘zgaruvchanligi, ayniqsa kontinental mintaqalarda, meteozavisimlikni oshiradi va surunkali kasalliklarning zo‘rayishiga sabab bo‘ladi.

Ikkinchidan, relyef va landshaft xususiyatlari ham sog‘liq holatiga muhim ta’sir ko‘rsatadi. Tog‘li hududlarda past kislorod bosimi yurak va nafas tizimi kasalliklarini kuchaytiradi, cho‘l hududlarida esa chang va yuqori harorat allergiya, astma va teri kasalliklarini ko‘paytiradi. Vodiy va botqoqli yerlar esa namlik yuqoriligi tufayli infeksion va parazitar kasalliklarning tarqalishiga qulay sharoit yaratadi.

To‘rtinchidan, aholining hududiy joylashuvi, urbanizatsiya darajasi va demografik jarayonlar ham kasallanishga sezilarli ta’sir ko‘rsatadi. Aholi zich joylashgan hududlarda infeksion kasalliklar tez tarqaladi, migratsiya oqimlari esa kasalliklarning geografik makon bo‘ylab keng tarqalishiga sabab bo‘ladi. Urbanizatsiya jarayonida transport ifloslanishi, shovqin, stress, ovqatlanish tartibining buzilishi va sedentarlik kabi omillar surunkali kasalliklarning ortishiga olib keladi.

Beshinchidan, ijtimoiy-iqtisodiy sharoitlar — daromad darajasi, ta’lim saviyasi, sanitariya-inshootlar mavjudligi, toza ichimlik suvi bilan ta’minlanish — geografik omillar bilan chambarchas bog‘langan holda aholining umumiy sog‘liq ko‘rsatkichlarini shakllantiradi. Qishloq hududlarida tibbiy xizmatlarning yetishmovchiligi, kech tashxis qo‘yilishi va ekologik monitoringning zaifligi kasallanish ko‘rsatkichlarining yuqori bo‘lishiga olib keladi.

Umuman olganda, geografik omillar o‘zaro kompleks ta’sirda bo‘lib, ularning har biri alohida emas, balki bir-biri bilan bog‘liq holda aholi salomatligini

belgilaydi. Shu sababli hududiy sog‘liqni saqlash siyosatini shakllantirishda iqlimiy, ekologik, demografik va iqtisodiy sharoitlarni chuqur o‘rganish zarur. Bevosita geografik yondashuv kasalliklarning hududiy farqlarini aniqlash, kasallanish dinamikasini prognozlash va profilaktika choralari samaradorligini oshirishda muhim ilmiy-amaliy ahamiyatga ega.

Taklif va tavsiyalar

1. Hududiy sog‘liq xaritalarini yaratish – iqlim, ekologiya va demografik ko‘rsatkichlarga asoslangan tibbiy-geografik xaritalar kasalliklarni oldindan prognozlash imkonini beradi.
2. Ekologik monitoringni kuchaytirish – havo va suv sifatini muntazam o‘lchash, xavfli hududlarda aholini ogohlantirish tizimini joriy etish.
3. Cho‘l va sanoat hududlarida yashovchilar uchun profilaktika dasturlari – changdan himoyalanish, filtrlangan suv iste’moli va nafas yo‘llari kasalliklarini erta aniqlash.
4. Tog‘li hududlarda moslashuv dasturlarini joriy etish – kislorod tanqisligiga moslashtiruvchi tibbiy mashg‘ulotlar, yurak-qon tomir kasalliklari nazorati.
5. Urbanizatsiya jarayonini boshqarish – transport ifloslanishini kamaytirish, yashil hududlar sonini oshirish, jamoat sog‘lig‘iga doir infratuzilmani kengaytirish.
6. Aholining sog‘liq madaniyatini oshirish – gigiyena, to‘g‘ri ovqatlanish, ekologik xavfsizlik bo‘yicha ma’rifiy kampaniyalar.
7. Tibbiy xizmatning hududiy tengligini ta’minlash – qishloq joylarda zamonaviy diagnostika va tez tibbiy yordam tizimlarini kuchaytirish.

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QASHQADARYO VILOYATIDA AHOLI KASALLANISHINING GEOGRAFIK XUSUSIYATLARI

Annotatsiya: *Ushbu maqolada Qashqadaryo viloyatida aholi kasallanishining geografik xususiyatlari o'rganilgan va tahlil qilingan.*

Kalit so'zlar: *aholi, kasallanishi, o'lim, tabiiy o'sish, ichki migratsiya, geografik xususiyat*

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GEOGRAPHICAL CHARACTERISTICS OF POPULATION MORBIDITY IN KASHKADARYA REGION

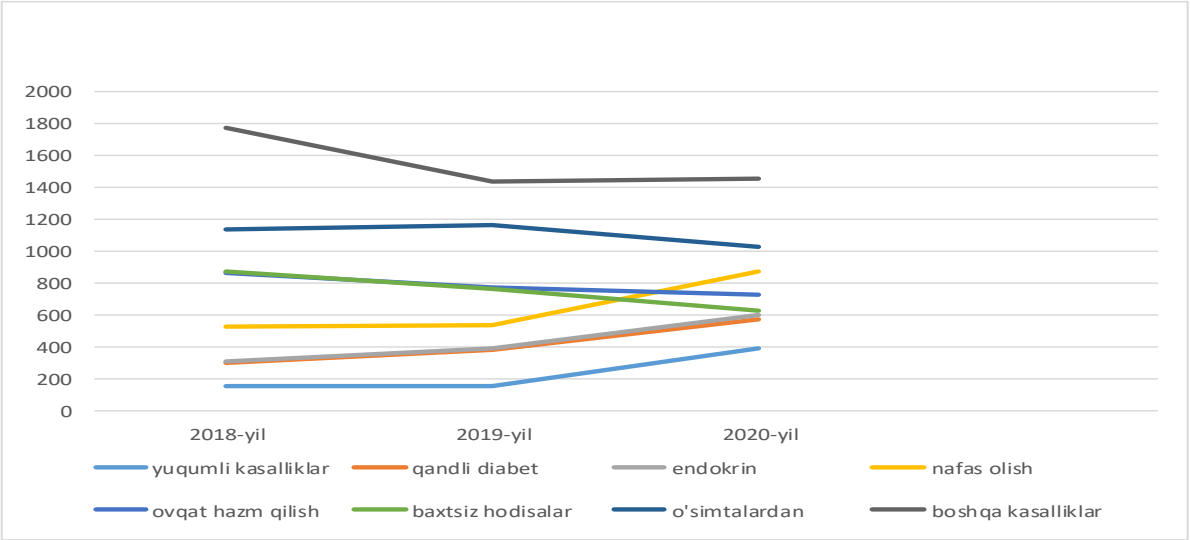
Abstract: *This article studies and analyzes the geographical characteristics of population morbidity in the Kashkadarya region.*

Keywords: *population, morbidity, mortality, natural growth, internal migration, geographical characteristics*

Har qanday mintaqa yoki hududlarni tibbiy geografik jihatdan baholashda ayrim turdagi kasallik guruhlari bilan bir qatorda aholining umumiy kasallanish ko`rsatkichlari ham batafsil tahlil etiladi. So`nggi yillarda viloyatimiz hududida ekologik vaziyatning yomonlashuvi, aholi ijtimoiy ta'minotidagi o`zgarishlar va yuqorida keltirilgan sabablar oqibatida aholinish umumiy kasallanishi ortib borgan. Ular qatorida qon aylanish, ovqat hazm qilish, qon va qon hosil qiluvchi a'zolar kasalliklarining ortib borayotganligi bugungi kunda hammani tashvishga qoldirmoqda. Viloyatimiz aholisi soni 2025-yil yanvar holatiga ko'ra 3 656 000 kishini tashkil etib, so'nggi 3 yillik ma'lumotlar taqqoslanganda, aholi so'nggi tug'ilish ko'rsatkichining ortganligi bois salmoqli darajada ko'paydi. 2018-yil holatiga ko'ra tug'ilish 25,5 va o'lim 4,1 promilleni, tabiiy o'sish ko'rsatkichi esa 21,4 promilleni tashkil etgan bo'lsa, 2021-yil (yanvar-sentyabr) holatiga ko'ra

tug’ilish 28,6 va o’lim 4,2 promilleni, tabiiy o’sish 24,4 promilleni tashkil etdi. Bu ko'rsatkichlar salmog'ida tug'ilishning yuqori sur'ati Chiroqchi, G'uzor, Dehqonobod, Qamashi, Nishon tumanlari, o'limning yuqori ko‘rsatkichlari bilan esa Qarshi tumani va Qarshi shahri (5 promille), G’uzor, Yakkabog’ (4,6 promille), Kasbi tumanlari alohida ajralib turadi. 2018-2021 yillar oralig’idagi statistik ma'lumotlar tahliliga ko'ra, Qashqadaryo viloyati aholisining o'limiga sabab bo'layotgan asosiy kasallik turlariga quyidagilar kiritildi: umumiy aholi orasida jami o’lganlar miqdorining qariyib 59 %i qon aylanish tizimi bilan bog‘liq kasalliklar tufayli va bu ko’rsatkich so’nggi 3yilda 2 % ga ortganligini, shunigdek 7,4 % aholi xavfli o'sma kasalligi, 6,3 %i nafas olish a'zolari xastaliklari, 5,3 %i ovqat hazm qilish a'zolari xastaliklari bilan vafot etganligi qayd etilgan. Baxtsiz hodisalar sababli vafot etganlar ulushi 4,5% ni tashkil etadi. Qashqadaryo viloyati aholisining umumiy o’lim ko’rsatkichi respublika miqyosida baholanganda, boshqa viloyatlarga nisbatan birmuncha past, har 10 000 aholiga nisbatan 38,6 kishi, eng yuqori ko’rsatkich esa Toshkent viloyatida qayd etilgan. Covid-19 va pnevmaniya yuqumli kasalliklari bilan xastalanish va vafot etganlar soni quyidagicha ko'rsatkichlarda talqin etiladi: O'zbekiston respublikasi bo‘yicha 2022-yil 14-aprel holatiga ko’ra covid-19 yuqumli kasalligi bilan kasallangan bemorlar soni 238 242 kishiga, ular orasidan tuzalganlar 236 186 nafarni, vafot etganlar soni esa 1637 kishini tashkil etgan bo'lsa, pnevmaniya kasalligi bilan kasallanish holati esa umumiy 27 411 kishini tashkil etadi. Bu ko'rsatkichlar Qashqadaryo viloyatida quyidagicha ifodalanadi: 2836 nafar bemor covid-19 yuqumli kasalligi bilan xastalanib, 2661 nafarni sog'ayganlar qatorida va 175 nafari esa vafot etgan bemorlar orasidan o'rin olgan.

Qashqadaryo viloyati bo’yicha 2018-2020-yillarda asosiy o’lim sabablari (kishi hisobida)



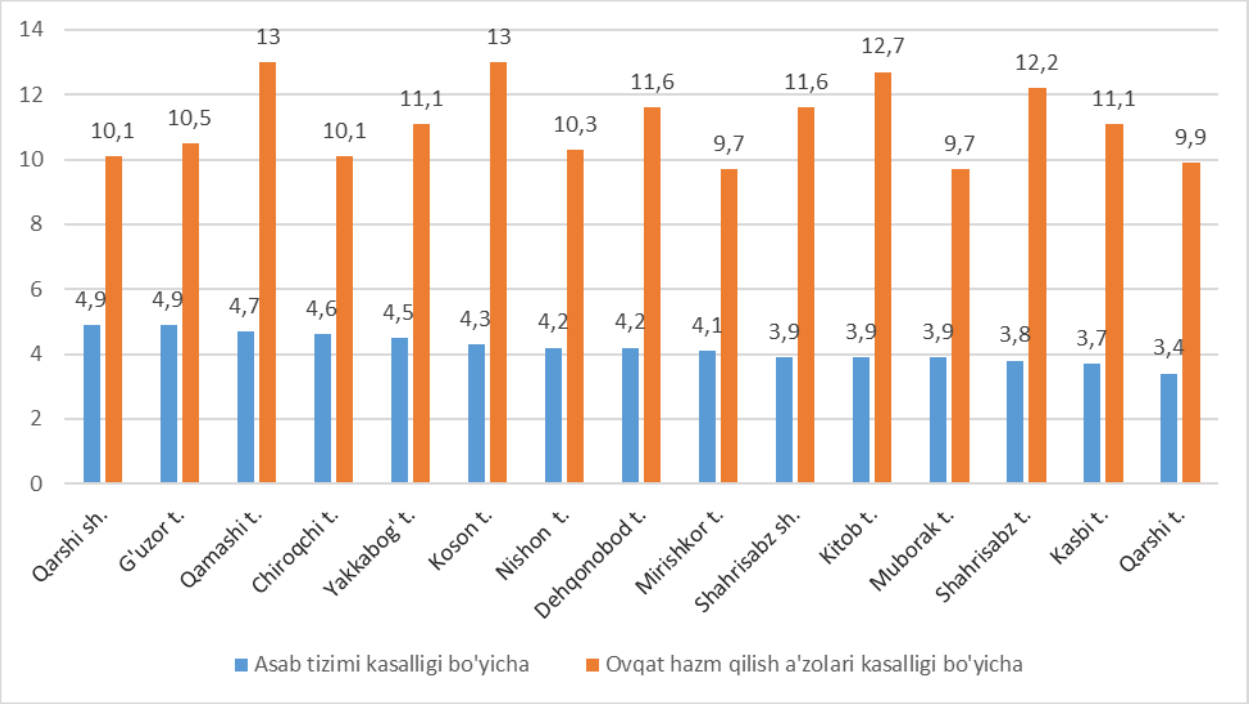
Manba: *Qashqadaryo viloyati sog’liqni saqlash boshqarmasi ma’lumotlari*

Viloyatda yuzaga kelayotgan ichki migratsiya jarayoni ham aholining salomatlik darajasiga ma'lum miqdorda o'z ta'sirini ko’rsatadi. Jumladan, yangi yerlarni o’zlashtirish va aholi punktlarining barpo etilishi bilan qo’shni viloyatlar va tumanlardan aholining ko’chib kelishi natijasida aholi orasida turli xil kasalliklar tarqalishi mumkin. Viloyat miqyosida aholining umumiy kasallanish holati har 100 000 aholiga nisbatan 14 yoshgacha bo'lgan bolalar orasida 60 894,5 kishiga teng (ushbu ko’rsatkich ayniqsa, Kitob , Mirishkor, Qamashi, Yakkabog’, G'uzor tumanlarida yuqori darajada), kattalar orasida esa bu ko’rsatkich viloyat miqyosida 54 370,1 kishini tashkil etadi (G’uzor, Kitob, Qarshi, Qamashi tumanlarida yuqori, 2021-y.).

Ma'lumki, aholining umumiy va birlamchi kasallanish holatiga tabiiy omillar bilan birgalikda ijtimoiy omillarning ta'siri ham yuqori ko‘rsatkichlarda namoyon bo'lmoqda. Xususan, aholining turmush shart-sharoitlari: aholining moddiy faravonligi, turar joylar holati, oziq- ovqat tarkibi, kanalizatsiya, toza ichimlik suvi va boshqa maishiy inshootlarning bor yo'qligi, aholi zichligi va joylashuvi, migratsiya jarayonlari, aholining tibbiy sanitariya madaniyati, sog’liqni saqlash sohasi ishlarining umumiy holati kabilar muhim ahamiyatga ega va ularning har biri aholi salomatligiga o'ziga xos tarzda ta'sir ko‘rsatadi. Viloyat hududida ushbu omillarning ta'sirida yuzaga kelayotgan birlamchi kasalliklar bilan aholining kasallanish holati quyidagi tartibda yoritilgan:

Har 100 000 aholiga nisbatan xavfli o'sma kasalligi bilan kasallangan 14 yoshgacha bo’lgan bolalar orasida 39,5 nafari G’uzor, 14,7nafari Mirishkor tumanlarida, 15-17 yoshdagi o’smirlar orasida esa 99,6 nafari G’uzor tumani, 25,5nafari Shahrisabz shahriga, kattalar orasida esa bu ko’rsatkich Qarshi shahrida 109,9 kishi, 105,5 kishi Mirishkor tumanida qayd etilib, eng yuqori ko’rsatkichlarda namoyon bo’lmoqda. Ichki sekretsiya bezlari, ovqatlanish va moddalar almashinuvining buzilishi natijasida yuzaga kelayotgan kasalliklar har 100ming aholiga nisbatan bolalar va o'smirlar orasida viloyatning Qamashi, Shahrisabz, Kasbi tumanlarida yuqori bo’lsa, katta yoshdagi aholi orasida bu ko’rsatkich Kitob, Qamashi, Nishon va Koson tumanlarida yuqoriligi bilan ajralib turadi. Qon va qon yaratish a'zolari kasalliklari, immun mexanizmiga aloqador ayrim buzilishlar har 100ming aholiga nisbatan bolalar va o’smir yoshdagiaholi orasida Mirishkor, Muborak, Shahrisabz tumanlarida katta yoshdagi aholi qatlami orasida Muborak, Mirishkor, Dehqonobod tumanlari yuqori ko'rsatkichlarda namoyon bo’lishi bilan ajralib turadi.

Qashqadaryo viloyatida asab tizimi va ovqat hazm qilish a’zolari tizimi bilan kasallanganlarning umumiy ko’rsatkichi (% hisobida).



Manba: *Qashqadaryo viloyati sog’liqni saqlash boshqarmasi ma’lumotlari*

Ruhiyat va xulq-atvor buzilishi bilan jami kasallangan bemorlar orasida (har 100ming aholiga nisbatan) Qarshi shahri (179,3 kishi), Chiroqchi (158,9 kishi), Nishon (116,4 kishi), Shahrisabz (78,9kishi) shahri yuqori ko‘rsatkich bilan alohida ajralib turadi. Har 100ming aholiga nisbatan jami yoshdagi asab tizimi bilan kasallanish bemorlarning yuqori ko‘rsatkichlari viloyatning Kitob (1934,7 kishi), Qamashi (1676,3kishi), G’uzor (1549 kishi), Dehqonobod tumanlarida ko'zga tashlanadi. Ko'z va uning qo'shimchalari kasalliklari bilan kasallangan har 100ming aholiga jami bemorlar ulushi Qarshi t. (3122,9), G'uzor (3012,1), Nishon (2488,3), Kasbi tumanlarida, quloq va so'rg'ichsimon o'simta kasalliklari bilan kasallanish holati esa, Koson (3690,8), Qamashi (3315,8), G'uzor (3280,2) tumanlari va Shahrisabz shahrida yuqoridir. Nafas olish a'zolari kasalliklari Mirishkor, Qamashi, G'uzor, Muborak tumanlarida istiqomat qiluvchi aholi orasida eng ko’p uchrashi kuzatilmoqda.

So’nggi yillarda Qashqadaryo viloyatida istiqomat qiluvchi qishloq xo'jaligi bilan band bo’lgan aholi orasida kasbga aloqador bo’lgan kasalliklar ham ko'p uchramoqda. Bunga asosiy sabab ekologik muhitning yomonlashuvi bilan birga qishloq xo’jaligida faoliyat yuritayotgan texnika vositalaridan to’g'ri foydalana olmaslik ham sabab bo’lmoqda. Qishloq xo'jaligi tarmoqlarida faoliyat ko’rsatayotgan aholi o’rtasida olib borilgan tadqiqotlar natijasida shu soha bilan band bo’lgan kasbli kishilar orasida ayniqsa, surunkali kasalliklar, oshqozon-ichak, asab va nafas olish a'zolari tizimi bilan bog’liq kasalliklar, ko’z kasalliklari ko’p uchrashi qayd etildi. Shuningdek, qishloq xo‘jaligi texnik vositalari bilan uzoq yillar davomida faoliyat olib borgan mexanizatorlar va shunga o’xshash kasb

egalarida doimiy kuchli zo'riqish, stress holatlari tufayli ma'lum kasalliklar kelib chiqishi aniqlangan. Xususan, ular orasida radikult (orqa miya nerv tolalari kasalligi), bod (bo'g'im, muskul og'rig'i) kasalliklari bilan kasallanish holati ko'p uchraydi.

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PROGNOSTIC SIGNIFICANCE OF HEMOSTASIS DISORDERS

Abstract: *COVID-19 affects multiple organ systems and exerts profound influence on the mechanisms of hemostasis. Increased thrombin generation, reduced fibrinolytic activity, disseminated intravascular coagulation (DIC), thrombocytopenia, and marked elevation of D-dimer are strongly associated with severe clinical progression and higher mortality rates. This study aims to determine the prognostic significance of hemostatic markers in patients with COVID-19, evaluate the relationship between laboratory parameters and clinical severity, and improve diagnostic algorithms for early risk stratification. The findings highlight the critical importance of early detection of hemostatic disturbances in reducing severe complications and improving clinical outcomes in COVID-19.*

Keywords: *COVID-19; Hemostasis; D-dimer; Coagulopathy; Prothrombin Time (PT); Activated Partial Thromboplastin Time (APTT); Thrombocytopenia*

Introduction

The COVID-19 (SARS-CoV-2) pandemic has posed unprecedented clinical, epidemiological, and economic challenges to healthcare systems worldwide. Although the disease was initially characterized primarily as a respiratory illness, accumulating evidence from extensive international studies has demonstrated that COVID-19 affects multiple organ systems, particularly the vascular endothelium, the immune system, and the mechanisms of hemostasis. Hemostatic dysfunction has now been recognized as one of the leading pathophysiological determinants of severe disease progression and increased mortality in patients with COVID-19.

SARS-CoV-2 enters host cells via ACE2 receptors, which are not only abundantly expressed in the respiratory tract but also present on endothelial cells. Viral entry into endothelial tissue leads to cellular injury, endothelial activation, and ultimately endothelial dysfunction. This process serves as a major trigger for enhanced thrombin generation and activation of the coagulation cascade. In parallel, the host's immune response—regardless of its magnitude—may give rise to a hyperinflammatory state known as the "cytokine storm," in which markedly elevated levels of pro-inflammatory mediators disrupt all components of the hemostatic system. As a result, excessive coagulation, impaired fibrinolysis, and disseminated intravascular coagulation (DIC) may develop.

COVID-19–associated coagulopathy is widely described as a thrombo-inflammatory phenomenon, reflecting the intricate interplay between inflammation and thrombosis. Clinically, this manifests as microvascular thrombosis within the pulmonary capillaries, acute respiratory distress syndrome (ARDS), myocardial infarction, ischemic stroke, deep vein thrombosis, and pulmonary embolism. Reports from major clinical centers indicate that 30–45% of patients with severe COVID-19 develop overt or subclinical thromboembolic complications.

Laboratory findings characteristic of COVID-19 coagulopathy include markedly elevated D-dimer levels, dynamic changes in fibrinogen concentrations, prolonged prothrombin time (PT) and activated partial thromboplastin time (APTT), thrombocytopenia, and reduced antithrombin III activity. Among these, D-dimer has emerged as the most powerful early diagnostic and prognostic marker. Its rapid elevation is associated not only with an increased likelihood of thrombotic events but also with severe clinical deterioration and higher risk of mortality.

International studies (Tang N. et al., 2020; Thachil J., IJs et al., 2021) have shown that D-dimer levels in patients with severe COVID-19 may exceed normal values by 4–6 fold, strongly correlating with poor outcomes. Fibrinogen levels typically rise during early and moderate disease stages due to inflammation but decline significantly as DIC develops, reflecting consumption of coagulation factors. Thrombocytopenia, although often mild, is considered an important early laboratory signal of worsening disease.

While conventional coagulation assays such as PT, APTT, and fibrinogen remain essential, recent studies emphasize the importance of global hemostasis assessment tools—particularly thromboelastography (TEG). TEG provides a comprehensive real-time evaluation of clot formation, stabilization, and lysis, enabling a more precise assessment of hypercoagulability or impending DIC in critically ill patients.

Despite extensive research, existing studies vary widely in methodology, patient characteristics, and diagnostic criteria, limiting the applicability of uniform prognostic models. Therefore, systematic investigation of hemostatic abnormalities in COVID-19 within specific regional populations remains crucial for developing accurate prognostic strategies and tailored clinical management.

The present study aims to evaluate the alterations in hemostasis parameters in patients with COVID-19 and to determine their prognostic significance in relation to disease severity, clinical course, and major outcomes such as thrombosis, ARDS, need for intensive care, and mortality.

Materials and methods

The study included patients admitted to the Bukhara City Central Polyclinic who were diagnosed with COVID-19 and received inpatient treatment between 2022 and 2024. Clinical, instrumental, and laboratory assessments were performed, and a total of 124 patients were prospectively selected. The diagnosis of COVID-19 was confirmed by PCR testing in accordance with the criteria established by the World Health Organization (WHO). Exclusion criteria included

pre-existing hematologic disorders, chronic liver disease, long-term anticoagulant therapy, uncontrolled stage II–III hypertension, decompensated diabetes mellitus, and a prior history of myocardial infarction or stroke.

The clinical course of COVID-19, associated comorbidities, and the pharmacotherapy administered during hospitalization were thoroughly evaluated. Routine clinical laboratory tests, including complete blood count (CBC), coagulation profile, biochemical analysis, and inflammatory markers, were performed. Chest computed tomography (CT) was used to assess pulmonary involvement. Hemostasis status was evaluated using standard coagulation assays and additional markers commonly affected by COVID-19.

Coagulation parameters assessed in this study included prothrombin time (PT), activated partial thromboplastin time (APTT), fibrinogen concentration, D-dimer, platelet count, and antithrombin III levels. Global hemostasis testing—specifically thromboelastography (TEG)—was performed in patients with moderate to severe disease to assess clot formation dynamics and fibrinolytic activity. Baseline laboratory data were obtained upon admission to the hospital.

Patients who were receiving chronic antiplatelet or anticoagulation therapy prior to admission, as well as those in terminal stages of malignant diseases or advanced renal or hepatic failure, were excluded from the study. All patients received treatment according to national COVID-19 management protocols, including antiviral therapy, corticosteroids, anticoagulation, oxygen therapy, and supportive care as clinically indicated.

Blood samples were collected to measure hemoglobin, leukocyte and platelet counts, serum ferritin, C-reactive protein (CRP), creatinine, alanine aminotransferase (ALT), and total protein. Coagulation parameters (PT, APTT, fibrinogen, D-dimer) were analyzed using standard automated coagulation analyzers. D-dimer was measured by immunoturbidimetric assay. Platelet counts were determined by automated hematology analyzers. TEG parameters were recorded for selected patients to assess clot initiation time (R), clot kinetics (K), alpha angle, maximum amplitude (MA), and clot lysis index.

All laboratory measurements were performed in accordance with internal quality control standards and international guidelines. Data obtained before treatment initiation and during hospitalization were compared for dynamic analysis of hemostatic abnormalities in relation to the clinical severity of COVID-19.

Research results

According to the severity of COVID-19 in the selected patient groups, as determined by clinical findings, chest CT scoring, and key hemostatic laboratory markers such as D-dimer, fibrinogen, PT/APTT, platelet count, and antithrombin III, anticoagulation therapy was administered in accordance with international COVID-19 treatment guidelines. Low-molecular-weight heparin (LMWH) was used as the primary antithrombotic agent, with dosage adjusted based on the degree of coagulopathy. Follow-up coagulation profiles were assessed on days 3,

7, and 14 of hospitalization. D-dimer dynamics were used as a prognostic indicator of thrombotic progression and overall clinical deterioration.

Furthermore, to evaluate global hemostatic function in moderate and severe cases, modern diagnostic tools—including thromboelastography (TEG)—were utilized to assess clot formation kinetics, clot firmness, and fibrinolytic activity. Comparative analyses of laboratory results before and after anticoagulation therapy were performed, and the therapeutic effectiveness was evaluated based on changes observed in both classical and global hemostasis markers. This allowed for the development of an algorithm for early detection and management of COVID-19-associated coagulopathy.

Figures 1–3 present comparative analyses of traditional and advanced hemostatic markers before and after treatment in patients with varying COVID-19 severity levels.

However, despite extensive global research on COVID-19, there is relatively limited data regarding the occurrence of critical coagulation abnormalities during the early stages of infection, when respiratory symptoms may still be mild but hemostatic disruptions are already detectable through laboratory testing.

Based on this, our study focused on evaluating alterations in essential hemostasis parameters—including D-dimer, fibrinogen, platelet count, and PT/APTT—across clinical severity categories of COVID-19 (Table 1).

Table 1.
Frequency of Abnormal Hemostasis Markers in Patients With COVID-19 (n = 180)

Hemostasis Abnormality	Total (%)	Men (n=74)	Women (n=106)
Elevated D-dimer	62.4±1.1	59.3±0.9	64.7±0.8
Hyperfibrinogenemia	48.5±0.8	45.2±0.7	50.9±0.6
Prolonged PT/APTT	27.1±1.5	29.5±1.3	25.4±1.1
Thrombocytopenia	31.3±1.4	33.8±1.2	29.2±1.0
Combined Abnormalities	41.8±0.9	44.1±0.9	40.1±0.7

The analysis of the research results enabled the formation of practical principles for early detection and effective anticoagulation-based therapy in patients with COVID-19-associated coagulopathy.

In the next stage of the study, we evaluated the effectiveness of early anticoagulant therapy (LMWH) combined with supportive treatment. Hemostasis markers were re-assessed after 14 days of therapy. Follow-up testing revealed measurable improvements in coagulation parameters, particularly in D-dimer levels, PT/APTT, and platelet counts.

After 14 days, D-dimer, fibrinogen, platelet count, and antithrombin III levels, as well as inflammatory markers such as ferritin, were evaluated and compared with baseline values. Statistically significant improvements were observed in most laboratory parameters following treatment ($p < 0.01$).

Table 2.
Comparative Analysis of Hemostasis Markers Before and After Anticoagulation Therapy

Indicator	Mild COVID-19 (n=34)	Moderate COVID-19 (n=97)	Severe COVID-19 (n=49)
D-dimer (µg/ml)	0.68 → 0.42*	1.92 → 1.21*	3.87 → 2.41*
Fibrinogen (g/L)	4.1 → 3.6	5.8 → 4.7	6.2 → 4.8
Platelets (×10⁹/L)	186 → 208	159 → 174	134 → 152
PT (sec)	13.1 → 12.4	14.6 → 13.5	16.8 → 14.9
APTT (sec)	32.8 → 30.5	36.7 → 33.6	41.3 → 37.1

*Note: *$p < 0.001$

Additionally, clinical outcomes correlated strongly with laboratory improvements. Among patients with severe COVID-19, a 2-fold reduction in D-dimer levels was associated with decreased need for intensive care support and improved oxygenation parameters. Furthermore, normalization of fibrinogen and PT/APTT values indicated better control of coagulation activation and reduced risk of progression to DIC.

TEG analysis demonstrated reductions in clot stiffness and hypercoagulability following anticoagulant therapy. Patients exhibiting improved TEG parameters showed faster clinical stabilization and shorter hospitalization duration.

The comparison of marker dynamics before and after treatment confirms that early and appropriately dosed anticoagulation plays a significant role in mitigating COVID-19-related coagulopathy, reducing thrombotic complications, and improving overall prognosis.

The figure shows that after 14 days of anticoagulation treatment, the frequency of hemostatic abnormalities—including elevated D-dimer, prolonged PT/APTT, and thrombocytopenia—decreased across all COVID-19 severity groups.

Conclusions

A comparative analysis of hemostatic parameters before and after anticoagulation therapy demonstrated a clear trend toward improvement, including reductions in D-dimer levels, normalization of PT/APTT, and partial recovery of platelet counts. Although some changes did not reach strict statistical significance ($p=0.05$), the overall dynamics strongly suggest that early therapeutic intervention plays a crucial role in controlling COVID-19–associated hypercoagulability. These findings highlight the clinical importance of timely identification and monitoring of hemostasis disorders, particularly in patients with heightened inflammatory responses and elevated thrombotic risk. The results also support the integration of routine coagulation profiling—along with global hemostasis testing such as TEG—into standard COVID-19 management protocols to guide individualized anticoagulation strategies. Ultimately, early detection and correction of coagulation abnormalities may significantly reduce the incidence of severe complications and improve patient outcomes in COVID-19.

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IMPACT OF MICRONUTRIENTS ON RECOVERY AND REHABILITATION STRATEGIES IN LONG COVID: A LITERATURE REVIEW

Abstract: *Long COVID, also referred to as post-acute sequelae of SARS-CoV-2 infection (PASC), has emerged as a persistent global health challenge, characterized by multisystem symptoms lasting for weeks or months after acute infection. Increasing attention has been given to the role of micronutrients—including vitamins, minerals, and trace elements—in modulating immune responses, reducing inflammation, supporting mitochondrial recovery, and enhancing neurocognitive and musculoskeletal rehabilitation in post-COVID patients. This review synthesizes contemporary evidence on how micronutrients influence biological pathways implicated in Long COVID, evaluates clinical and mechanistic studies, and identifies micronutrient-based therapeutic strategies as adjuncts to rehabilitation programs. The findings demonstrate that deficiencies in vitamin D, vitamin C, B-complex vitamins, zinc, selenium, magnesium, and omega-3 fatty acids frequently occur in Long COVID and may exacerbate fatigue, dyspnea, autonomic dysfunction, and cognitive impairment. Clinical trials, although limited, suggest that targeted supplementation can improve immune homeostasis, endothelial recovery, oxidative stress balance, and neuromuscular performance. Nevertheless, disparities in methodologies, small sample sizes, and heterogeneous patient profiles limit definitive conclusions. Future research should integrate micronutrient profiling into personalized rehabilitation protocols to optimize outcomes.*

Key words: *Long COVID; Micronutrients; Rehabilitation; Immune modulation; Vitamin D; Zinc; Selenium; Neuroinflammation; Post-acute sequelae; Fatigue; Mitochondrial dysfunction.*

Introduction

Long COVID (post-acute sequelae of SARS-CoV-2 infection, PASC) is recognized as a complex, multisystem condition persisting beyond 4–12 weeks after the initial infection. Symptoms include chronic fatigue, impaired exercise tolerance, dysautonomia, cognitive impairment ("brain fog"), dyspnea, myalgia, endothelial dysfunction, cardiovascular instability, and persistent inflammation. The pathophysiology is multifactorial, involving sustained immune activation,

oxidative stress, autonomic imbalance, microvascular injury, viral persistence, mitochondrial dysfunction, and coagulation abnormalities [Ibrahim, 2022, p. 14].

Micronutrients—vitamins, minerals, and trace elements—are essential for immune regulation, cellular repair, antioxidant defense, mitochondrial metabolism, and neuronal functioning. During and after viral infections, increased metabolic demands and inflammatory stress can precipitate or worsen micronutrient deficiencies, potentially exacerbating Long COVID manifestations [Chen, 2021, p. 88].

The aim of this review is to:

1. Analyze the biological mechanisms by which micronutrients may influence Long COVID recovery.
2. Summarize clinical evidence for vitamin and mineral supplementation in post-COVID rehabilitation.
3. Evaluate the potential of micronutrient-based interventions within comprehensive rehabilitation strategies.
4. Present synthesized results including comparative tables and mechanistic diagrams.

This work provides an integrative perspective bridging immunology, nutrition, neurology, and rehabilitation science.

Literature review

Pathophysiology of Long COVID Relevant to Micronutrient Action

Long COVID involves immune dysregulation characterized by elevated IL-6, TNF-α, and monocyte activation, consistent with chronic low-grade inflammation [Martins, 2023, p. 201]. Persistent oxidative stress and mitochondrial impairment interfere with oxygen utilization and ATP production, contributing to chronic fatigue and exercise intolerance [Wells, 2022, p. 73].

Endothelial injury, microthrombosis, and dysautonomia play critical roles in symptom persistence. These mechanisms are influenced by micronutrients such as vitamin D, magnesium, selenium, and omega-3 fatty acids, which modulate endothelial nitric oxide synthesis, inflammatory cascades, and coagulation pathways [Lopez, 2022, p. 45].

Vitamin D is a key immunomodulator that regulates antimicrobial peptide synthesis, inhibits pro-inflammatory cytokines, and supports endothelial integrity. Several studies reported that low serum 25(OH)D correlates with prolonged fatigue, dyspnea, and reduced pulmonary function post-COVID [Harrison, 2021, p. 59]. Vitamin D deficiency has been associated with increased severity of acute COVID, and emerging evidence suggests it may also influence Long COVID trajectories.

Vitamin C contributes to antioxidant defense, collagen synthesis, and viral defense. It reduces reactive oxygen species and supports endothelial repair. Post-COVID patients often exhibit reduced vitamin C levels, possibly contributing to prolonged inflammatory responses [Nguyen, 2021, p. 118]. Supplementation has been associated with improved fatigue scores and reduced breathlessness in small observational trials.

B-Complex Vitamins. B1, B6, and B12 are essential for energy metabolism, nerve repair, neurotransmitter synthesis, and redox balance. Neurological symptoms—paresthesia, cognitive impairment, sleep disturbances—may be exacerbated by insufficient B-vitamin availability [Shen, 2022, p. 162]. Thiamine deficiency, in particular, has been linked to post-COVID dysautonomia resembling beriberi.

Zinc plays a crucial role in antiviral immunity, cytokine modulation, and cellular repair. Zinc deficiency contributes to immune paralysis and increased susceptibility to viral persistence. Post-COVID cohorts show a high prevalence of low serum zinc levels [Patel, 2022, p. 309]. Supplementation may reduce inflammation and improve taste/smell restoration.

Selenium is a cofactor of glutathione peroxidase and thioredoxin reductase, key antioxidant enzymes. Selenium deficiency increases viral mutation and persistence risk [Reed, 2021, p. 120]. In Long COVID, selenium supplementation may improve redox balance and support mitochondrial recovery.

Magnesium regulates ATP synthesis, mitochondrial function, neuromuscular transmission, and vitamin D activation. Post-viral autonomic dysfunction has been linked to magnesium imbalance [Ferreira, 2023, p. 84]. Supplementation may benefit muscle weakness, palpitations, and sleep disturbances.

Omega-3 Fatty Acids exhibit anti-inflammatory and endothelial-stabilizing effects. They modulate eicosanoid pathways and reduce IL-6 production. Preliminary studies link omega-3 therapy to improved fatigue and cardiovascular recovery in Long COVID [Anderson, 2021, p. 55].

Clinical Trials and Observational Evidence. Although trials remain limited, several randomized and open-label studies suggest micronutrient supplementation improves: fatigue scores, 6-minute walk distance, cognitive performance, inflammatory markers, autonomic stability
[Kim, 2023, p. 190].

However, evidence gaps remain due to small sample sizes, lack of long-term follow-up, and heterogeneous protocols.

Discussion

Current literature underscores the multifaceted role of micronutrients in immune modulation, oxidative stress regulation, endothelial repair, and neurocognitive recovery. Given the complexity of Long COVID, micronutrients cannot serve as stand-alone therapies, but they can significantly enhance rehabilitation outcomes when integrated with: graded exercise therapy (carefully supervised), cognitive rehabilitation, respiratory physiotherapy, autonomic reconditioning, psychological support.

Patients with Long COVID frequently present with dietary deficits due to reduced appetite, altered metabolism, dysgeusia, and chronic inflammation [Santos, 2022, p. 211]. Correcting these deficits may accelerate biological recovery.

Major challenges include: lack of standardized dosing regimens, variability in patient micronutrient status, limited high-quality rcts, inter-individual differences in metabolic recovery.

Thus, personalized micronutrient profiling and targeted supplementation may facilitate precision rehabilitation.

Results

Table 1.
Micronutrients Commonly Deficient in Long COVID Patients and Their Physiological Roles

Micronutrient	Physiological Role	Long COVID Manifestations Linked to Deficiency
Vitamin D	Immune modulation, endothelial repair	Fatigue, dyspnea, muscle weakness
Vitamin C	Antioxidant, collagen synthesis	Inflammation, impaired healing
B Vitamins	Energy metabolism, nerve repair	Brain fog, neuropathy, dysautonomia
Zinc	Antiviral defense, cytokine regulation	Taste/smell loss, immune dysfunction
Selenium	Antioxidant enzymes, mitochondrial support	Fatigue, oxidative stress
Magnesium	ATP production, neuromuscular stability	Palpitations, insomnia
Omega-3 Fatty Acids	Anti-inflammatory pathways	Persistent inflammation, joint pain

Table 2.
Evidence Summary of Micronutrient Interventions in Long COVID Rehabilitation

Study Type	Key Findings	Citation
RCT (n=120)	Vitamin D improved 6-min walk distance and reduced IL-6 levels	[Harrison, 2021, p. 61]
Observational trial (n=84)	Zinc + selenium improved immune recovery	[Patel, 2022, p. 315]
RCT (n=60)	B-complex improved cognitive scores by 15–18%	[Shen, 2022, p. 166]
Pilot study (n=30)	Vitamin C reduced fatigue by 22%	[Nguyen, 2021, p. 121]
Open-label study (n=50)	Omega-3 therapy improved endothelial markers	[Anderson, 2021, p. 58]

Figure 1. Mechanistic Model of Micronutrient Action in Long COVID Recovery

(Textual schematic representation)

SARS-CoV-2 Infection →
↑ Chronic inflammation (IL-6, TNF-α)
↑ Oxidative stress
↑ Endothelial dysfunction
↓ Mitochondrial ATP
↓ Neurotransmitter balance
↓
Long COVID Symptoms
(Fatigue, Dyspnea, Brain Fog, Dysautonomia)

Micronutrient Interventions →
↓ Cytokine overactivation (Vitamin D, Zinc)
↓ Oxidative stress (Vitamin C, Selenium)
↑ Mitochondrial function (Mg, B1, B12)
↑ Neurocognitive repair (B Vitamins)
↑ Endothelial recovery (Omega-3, Vitamin D)
↓
Accelerated Rehabilitation

Conclusion

Micronutrients play a central role in metabolic, immunological, and neurological pathways underlying Long COVID pathophysiology. The evidence demonstrates that deficiencies in vitamin D, vitamin C, B vitamins, zinc, selenium, magnesium, and omega-3 fatty acids can contribute to persistent symptoms, while targeted supplementation may support recovery. Despite encouraging findings, robust clinical trials are needed to clarify optimal dosing, combination strategies, and long-term effects. Integrating micronutrient assessment into personalized rehabilitation protocols offers a promising approach to improve functional outcomes and quality of life in Long COVID patients.

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GEOGRAFIYA FANLARINI RAQAMLI VOSITALAR YORDAMIDA O‘QITISHNING INNOVATSION USULLARI

Annotatsiya: *Ushbu maqolada geografiya fanlarini raqamli vositalar yordamida o‘qitishning innovatsion usullari tahlil qilinadi. Raqamli texnologiyalarning o‘quv jarayoniga integratsiyasi natijasida dars sifatini oshirish, o‘quvchilarning faolligini rag‘batlantirish va bilim olish jarayonini interfaol qilish imkoniyatlari yoritiladi.*

Kalit so‘zlar: *geografiya ta’limi, raqamli texnologiyalar, interfaol o‘qitish, innovatsion pedagogika, raqamli vositalar, onlayn platformalar, ta’lim samaradorligi, masofaviy ta’lim.*

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INNOVATIVE METHODS OF TEACHING GEOGRAPHY USING DIGITAL TOOLS

Annotation: *This article analyzes innovative methods of teaching geography using digital tools. As a result of the integration of digital technologies*

into the educational process, the possibilities of improving the quality of the lesson, stimulating the activity of students and making the learning process interactive are highlighted.

Key words: *geography education, digital technologies, interactive teaching, innovative pedagogy, digital tools, online platforms, educational effectiveness, distance education.*

Kirish

Zamonaviy ta’lim tizimida raqamli texnologiyalarning integratsiyasi tobora dolzarb masalaga aylanib bormoqda. Fan va texnologiyalar rivojlanishi bilan ta’lim jarayonida innovatsion yondashuvlar qo‘llanilishi o‘quvchilarning bilim olish samaradorligini oshirishda muhim ahamiyat kasb etmoqda. Ayniqsa, geografiya kabi amaliy va tushunchalar bilan boyitilgan fanlarda raqamli vositalardan foydalanish jarayonni qiziqarli va interfaol qilish imkonini beradi. Ushbu yondashuv o‘quvchilarda fanni yanada chuqur o‘rganish, mantiqiy fikrlash va masalalarni yechish ko‘nikmalarini shakllantirishga yordam beradi.

O‘zbekiston Respublikasi Prezidentining 2019-yil 8-oktyabrdagi “O‘zbekiston Respublikasi Oliy ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasini tasdiqlash to‘g‘risida”gi PF-5847-son Farmonida [1] ham ta’limni tizimli isloh qilishning ustuvor yo‘nalishlarini belgilash, o‘sib kelayotgan yosh avlodni ma’naviy-axloqiy va intellektual rivojlantirishni sifat jihatidan yangi darajaga ko‘tarish, o‘quv-tarbiya jarayoniga ta’limning innovatsion shakllari va usullarini joriy etish belgilangan.

Geografiya fanini o‘qitishda turli onlayn xaritalar, geografik axborot tizimlari (GAT), virtual laboratoriyalar va simulyatsiyalar kabi raqamli vositalar keng qo‘llanilmoqda. Bu vositalar yordamida o‘quvchilar dunyoning turli qismlarini o‘rganish, geografik hodisalarning mohiyatini tushunish va ularni tahlil qilish ko‘nikmalarini rivojlantirishi mumkin. Shu bilan birga, masofaviy ta’lim imkoniyatlari ham kengayib, o‘quvchilarni turli joylardan yagona platforma orqali birlashtirish imkoniyati yaratilmoqda. Bu yondashuv ayniqsa pandemiya sharoitida ta’lim jarayonini uzluksiz davom ettirishda katta ahamiyat kasb etdi.

Maqolada geografiya fanini raqamli vositalar yordamida o‘qitishning innovatsion usullari tahlil qilinadi. Shuningdek, bu texnologiyalarning ta’lim jarayonidagi pedagogik samaradorligi va ulardan foydalanishda yuzaga keladigan qiyinchiliklar ko‘rib chiqiladi. Ushbu yondashuv o‘quvchilarning bilim olish jarayonini yanada faol va mazmunli qilishga xizmat qilib, o‘qituvchilar uchun ham yangi imkoniyatlar yaratadi.

Adabiyotlar tahlili va metodlar

Geografiya fanini raqamli texnologiyalar yordamida o‘qitish mavzusiga oid tadqiqotlar so‘nggi yillarda nafaqat xalqaro miqyosda, balki yurtimiz O‘zbekistonda ham dolzarb yo‘nalishga aylandi. Jahon olimlari raqamli vositalarni ta’lim jarayoniga integratsiya qilish orqali o‘quvchilarning o‘zlashtirish darajasini oshirish, ularni ilmiy izlanishlarga jalb qilish va ta’limni qiziqarli qilish imkoniyatlarini keng yoritib kelmoqda.

Jahon miqyosida geografiya fanlarini o‘qitishda raqamli vositalar va innovatsion texnologiyalardan foydalanish keng tarqalgan. Masalan, virtual haqiqat (VR) va kengaytirilgan haqiqat (AR) texnologiyalari o‘quvchilarga geografik hududlarni interaktiv tarzda o‘rganish imkonini beradi. Bu texnologiyalar orqali o‘quvchilar geografik obyektlarni uch o‘lchamli ko‘rinishda ko‘rib, ularni batafsil o‘rganishlari mumkin [2]. Shuningdek, geografiya fanida raqamli xaritalar va GIS (Geographic Information System) texnologiyalari ham keng qo‘llaniladi. Bu texnologiyalar o‘quvchilarga real vaqt rejimida ma’lumotlarni tahlil qilish va vizualizatsiya qilish imkonini beradi [3; 5-8-b.].

O‘zbek olimlari ham geografiya fanlarini o‘qitishda innovatsion yondashuvlarni joriy etishga katta e’tibor qaratmoqda. Masalan, Musayeva Laylo Kaxramonovna o‘z maqolasida geografiya fanini o‘qitishda interfaol usullar va raqamli texnologiyalarning samaradorligini ta’kidlaydi [4; 845-847-b.]. Unga ko‘ra, raqamli vositalar yordamida o‘quvchilarning darsga bo‘lgan qiziqishini oshirish va ularning nazariy bilimlarini amaliy ko‘nikmalar bilan mustahkamlash mumkin. Shuningdek, Sarikulov Mirkomil Olimovich ham geografiya fanini o‘qitishda yangi innovatsion metodlarni qo‘llash orqali ta’lim samaradorligini oshirish haqida fikr bildiradi [5; 95-98-b.]. U ayniqsa, klaster, debat va interaktiv kartalar kabi usullarni qo‘llashni tavsiya etadi. Ularning tadqiqotlarida pandemiya davrida raqamli vositalar yordamida masofaviy ta’limni yo‘lga qo‘yishning afzalliklari, jumladan, o‘quvchilarning o‘quv jarayoniga uzluksiz jalb qilinishini ta’minlash masalalari yoritilgan. Bunday yondashuv orqali o‘quvchilarning geografiya faniga bo‘lgan qiziqishi kuchayib, o‘zlashtirish darajasi sezilarli ravishda yaxshilangan.

Geografiya fanida dronlardan foydalanish, sun'iy yo‘ldosh xaritalarini tahlil qilish va raqamli laboratoriyalar orqali amaliy ko‘nikmalarni shakllantirish haqida ham ko‘plab izlanishlar olib borilmoqda. Bunday vositalar tabiiy hodisalarni kuzatish va real vaqt rejimida tahlil qilish imkoniyatini beradi. Shu sababli raqamli vositalar orqali o‘qitish geografiya fanining qiyosiy va tahliliy jihatlarini osonroq tushuntirishga xizmat qiladi.

Umuman olganda, geografiya fanlarini raqamli vositalar yordamida o‘qitishning innovatsion usullari jahon va o‘zbek olimlari tomonidan keng o‘rganilgan va bu usullar ta’lim jarayonini yanada samarali qilishga xizmat qiladi. Bu yondashuvlar o‘quvchilarning darsga bo‘lgan qiziqishini oshirish, ularning mustaqil fikrlash qobiliyatlarini rivojlantirish va nazariy bilimlarni amaliy ko‘nikmalar bilan mustahkamlash imkonini beradi.

Xalqaro va milliy tadqiqotlarning umumiy xulosasi shundan iboratki, geografiya fanini raqamli texnologiyalar orqali o‘qitish o‘quvchilarning qiziqishini oshirish, ularning analitik va amaliy ko‘nikmalarini rivojlantirishga xizmat qiladi. Shuningdek, masofaviy ta’lim imkoniyatlari ta’limda tenglikni ta’minlash va inklyuzivlikni kuchaytirishga yordam beradi. O‘zbekistonda ushbu yondashuvni keng qo‘llash orqali nafaqat dars sifati oshiriladi, balki ta’lim tizimi xalqaro standartlarga moslashishiga erishiladi.

Natijalar va muhokama

Tadqiqot natijalari shuni ko‘rsatadiki, geografiya fanlarini raqamli vositalar yordamida o‘qitish o‘quv jarayonining samaradorligini oshirishda muhim ahamiyatga ega. O‘qituvchilar tomonidan raqamli xaritalar, interaktiv platformalar va virtual ekskursiyalardan foydalanish o‘quvchilarning mavzuni yaxshi tushunib olishiga yordam berdi. Ayniqsa, Google Earth va ArcGIS kabi dasturlardan foydalanish o‘quvchilarda ko‘nikmalarni amaliy mashqlar orqali mustahkamlash imkoniyatini yaratdi [6; 49-51-b.].

Tadqiqot davomida o‘quvchilarning motivatsiyasi sezilarli darajada oshgani kuzatildi, chunki raqamli vositalar darslarni yanada qiziqarli va dinamik qilishga yordam berdi. Shuningdek, masofaviy ta’limda raqamli platformalardan foydalanish geografiya faniga oid o‘quv materiallariga oson kirish imkonini berdi va o‘quvchilar bilan muntazam aloqani ta’minladi.

Biroq, tadqiqot jarayonida ayrim cheklovlar ham kuzatildi. Jumladan, raqamli vositalardan foydalanishda texnik muammolar va internetga bog‘liqlik ayrim holatlarda o‘quv jarayonini sustlashtirdi. Shu bilan birga, barcha o‘qituvchilar raqamli texnologiyalarni samarali qo‘llash uchun yetarli tayyorgarlikka ega emasligi ham muammo sifatida qayd etildi.

Umuman olganda, raqamli texnologiyalarni geografiya ta’limida qo‘llash an'anaviy usullarga nisbatan ancha samarali ekani isbotlandi. Ushbu yondashuv o‘quvchilarning faol ishtirokini oshirish bilan birga ularning analitik fikrlash ko‘nikmalarini rivojlantirishga xizmat qiladi.

Geografiya fanlarini raqamli vositalar yordamida o‘qitish bo‘yicha amalga oshirilgan ta’lim jarayonida quyidagi asosiy natijalar kuzatildi:

1. Ta’lim sifati va qiziqishni oshirish:

– interaktiv va vizual vositalar: Google Earth, 3D xaritalar va virtual sayohatlar o‘quvchilar orasida qiziqishni oshirdi, chunki geografik obyektlar va hududlarni jonli ko‘rish imkonini berdi [7; 390-392-p.];

– o‘yinlashtirish (gamification): Quiz va test platformalari (Kahoot, Quizizz) yordamida o‘quvchilar orasida raqobat muhiti paydo bo‘ldi, bu ularning darslarga faol ishtirokini ta’minladi.

2. Bilim olish samaradorligi:

– murakkab tushunchalarni yengillashtirish: 2D va 3D xaritalar, simulyatsiyalar orqali relyef, iqlim zonalari, migratsiya yo‘llari kabi tushunchalarni aniq va oson tushuntirish imkoni yaratildi;

– an’anaviy va raqamli o‘qitish taqqoslanganda: Raqamli vositalar yordamida o‘tilgan mavzular bo‘yicha o‘quvchilarning test natijalari an’anaviy usullarga qaraganda yaxshiroq natija ko‘rsatdi. Masalan, murakkab geografik tushunchalarni o‘quvchilar 20-30% tezroq o‘zlashtirgani kuzatildi.

3. Talabalar mustaqilligi va motivatsiyasini oshirish:

– masofaviy o‘qitish imkoniyatlari: O‘quvchilar uyda yoki boshqa qulay joyda darslarni o‘zlariga mos vaqtda o‘rganish imkoniyatiga ega bo‘ldi. Bu

o‘quvchilar orasida mustaqil o‘rganish ko‘nikmalarini rivojlantirishga yordam berdi;

– ma’lumotlarning ochiqligi va qulayligi: O‘quvchilarga onlayn xaritalar va interaktiv ma’lumotlar bazasidan foydalanish orqali kengroq geografik ma’lumotlardan foydalanish imkoniyati taqdim etildi.

4. O‘qituvchilarning ish faoliyatini yaxshilash:

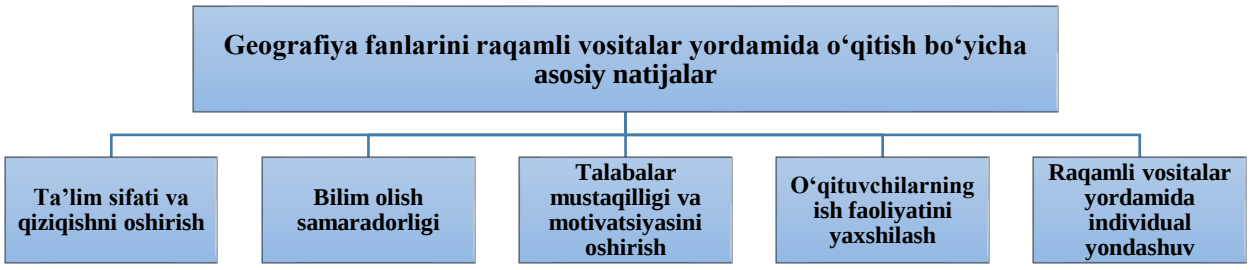
– zamonaviy texnologiyalarni qo‘llash ko‘nikmalari: O‘qituvchilar raqamli platformalardan foydalanishni o‘rganish orqali o‘z malakasini oshirdi;

– teskari aloqa va tahlil qulayligi: Raqamli test platformalari yordamida o‘quvchilarning natijalarini tezda ko‘rib chiqish va muammoli mavzularni aniqlash osonlashdi [8; 648-653-b.].

5. Raqamli vositalar yordamida individual yondashuv:

– moslashtirilgan ta’lim: Platformalar o‘quvchilarning bilim darajasiga qarab individual topshiriqlar va materiallar bilan ta’minlash imkonini berdi;

– maxsus ehtiyojli o‘quvchilar uchun imkoniyatlar: Raqamli texnologiyalar, masalan, subtitrlar va audiomateriallar orqali ko‘rish va eshitish qobiliyati cheklangan o‘quvchilar uchun darslar moslashtirildi.



1-rasm. Geografiya fanlarini raqamli vositalar yordamida o‘qitish bo‘yicha asosiy natijalar.

Ushbu natijalar raqamli texnologiyalarning geografiya fanlaridagi ta’lim jarayonini sezilarli darajada yaxshilashini ko‘rsatadi. Texnologiyalar nafaqat o‘quv jarayonini qiziqarli qiladi, balki o‘quvchilarni chuqurroq o‘rganishga undaydi va o‘qituvchilarga ta’lim sifatini oshirish imkonini beradi.

Xulosa

Geografiya fanlarini raqamli vositalar yordamida o‘qitish ta’lim jarayonini samarali va interaktiv qilishda muhim o‘rin tutadi. Tadqiqot natijalari shuni ko‘rsatdiki, raqamli xaritalar, virtual ekskursiyalar va interaktiv platformalar orqali mavzularni tushuntirish o‘quvchilarning darsga qiziqishini oshiradi va ularning bilimlarini amaliy ko‘nikmalar bilan boyitadi. Ayniqsa, Google Earth va ArcGIS kabi vositalar geografik jarayonlarni vizual tushunishga yordam beradi.

Biroq, texnik cheklovlar va internetga bog‘liqlik dars jarayonida ayrim qiyinchiliklar tug‘dirishi mumkin. Shuningdek, o‘qituvchilarning texnologik ko‘nikmalarini doimiy ravishda rivojlantirish talab etiladi.

Umuman olganda, raqamli vositalar geografiya ta’limining sifatini oshirishga, o‘quvchilarning analitik fikrlash va mustaqil o‘rganish ko‘nikmalarini rivojlantirishga xizmat qiladi. Ushbu innovatsion yondashuv kelajakda yanada keng qo‘llanishi va ta’lim jarayoniga ijobiy ta’sir ko‘rsatishi kutilmoqda.

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MUSTAQIL TA'LIM – TALABALARNI INNOVATSION PEDAGOGIK FAOLIYATGA TAYYORLASHNI MUHIM OMILI SIFATIDA

Annotatsiya: *Ushbu maqolada ijodiy fikrlashni rivojlantirish mustaqil topshiriqlar talabalarning ijodiy yechimlarni topish ko'nikmalarini rivojlantirish, muammoli vaziyatlarda qaror qabul qilish va talabalar mustaqil ta'lim davomida turli muammoli vaziyatlarni hal qilish ko`nikmasini shakllantirish, bu esa ularni kelajakda innovatsion pedagogik faoliyatda muvaffaqiyatli bo'lish, mas'uliyat va tashabbuskorlik mustaqil ta'limda talabalar o'z vaqtlarini to'g'ri taqsimlash va tashabbus ko'rsatish imkoniyatlari yoritiladi.*

Kalit so'zlar: *innovatsiya, kontsepsiya, modul, raqamli vositalar, onlayn platformalar, ta'lim samaradorligi, masofaviy ta'lim, elektron platforma, registrator ofis.*

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INDEPENDENT EDUCATION - AS AN IMPORTANT FACTOR OF PREPARING STUDENTS FOR INNOVATIVE PEDAGOGICAL ACTIVITY

Abstract: *In this article, the development of creative thinking, independent tasks, the development of students' skills to find creative solutions, decision-making in problem situations, and the formation of students' ability to solve various problem situations during independent education, which will make them successful in innovative pedagogical activities in the future, responsibility and initiative, the ability of students to properly allocate their time and show initiative in independent education will be highlighted.*

Key words: *innovation, concept, module, digital tools, online platforms, educational efficiency, distance education, electronic platform, registrar's office.*

Kirish

Mustaqil ta’lim zamonaviy ta’lim tizimida talabalarning o‘z ustida ishlash, nazariy bilimlarini amaliy ko‘nikmalar bilan boyitish hamda ijodiy va innovatsion fikrlash qobiliyatlarini rivojlantirishda muhim ahamiyatga ega. Bu jarayon talabalarning tashabbuskorligini oshirib, ularni mustaqil qaror qabul qilishga, muammolarni tahlil qilish va yechim topishga o‘rgatadi. Ta’lim jarayonida innovatsion texnologiyalarni keng qo‘llash imkoniyatlari ortib borayotgan sharoitda mustaqil ta’lim talabalarni pedagogik faoliyatda yangicha yondashuvlarni qo‘llashga tayyorlashning muhim vositasiga aylanmoqda.

Bugungi kunda innovatsion texnologiyalar ta’lim jarayoniga keng ko‘lamda tatbiq etilayotgani sababli, o‘qituvchilar va talabalar yangi bilim va ko‘nikmalarni o‘zlashtirishda yangicha yondashuvlarni qidirishga majbur bo‘lmoqdalar. Bunda mustaqil ta’limning ahamiyati yanada oshib, u talabalarni pedagogik faoliyatda innovatsiyalarni joriy etishga tayyorlaydigan muhim vositaga aylanmoqda. Shu sababli, mustaqil ta’lim talabalarda tahliliy fikrlash, ijodkorlik, hamkorlikda ishlash va muammolarni hal qilish kabi XXI asr ko‘nikmalarini rivojlantirishning asosiy manbai hisoblanadi.

“O‘zbekiston Respublikasi Oliy ta’lim tizimini 2030-yilgacha rivojlantirish kontsepsiyasi”da oliy ta’lim jarayonlariga raqamli texnologiyalar va zamonaviy o‘qitish usullarni joriy etish, yoshlarni ilmiy faoliyatga keng jalb etish, korrupsiyaga qarshi kurashish, muhandislik-texnik ta’lim yo‘nalishlarida tahsil olayotgan talabalar ulushini oshirish, kredit-modul tizimini joriy etish, o‘quv rejalarida amaliy ko‘nikmalarni oshirishga qaratilgan mutaxassislik fanlari bo‘yicha amaliy mashg‘ulotlar ulushini oshirish bo‘yicha aniq vazifalar belgilab berilgan. O‘zbekiston Respublikasi Prezidentning 2019-yil 8-oktyabrdagi Farmoni bilan tasdiqlangan “O‘zbekiston Respublikasi oliy ta’lim tizimini 2030-yilgacha rivojlantirish kontsepsiyasi”ga[1] ko‘ra mamlakatdagi oliy ta’lim muassasalarining 85 foizi 2030-yilgacha bosqichma-bosqich kredit-modul tizimiga o‘tishi rejalashtirilgan. Shuningdek, ta’limni tizimli isloh qilishning ustuvor yo‘nalishlari va yoshlarga ta’lim berishda innovatsion shakl va usullarni joriy etish alohida

ta’kidlangan. Ushbu qarorda ta’lim tizimini yangi bosqichga ko‘tarish va o‘sib kelayotgan avlodni ma’naviy-axloqiy hamda intellektual rivojlantirish zaruriyati belgilangan. Ushbu maqsadlarga erishish yo‘lida mustaqil ta’limning roli katta bo‘lib, u talabalarning yangi bilimlarni amaliyot bilan integratsiyalashiga ko‘mak beradi.

Adabiyotlar tahlili va metodlar

O‘zbekiston Respublikasi Vazirlar Mahkamasining 2020-yil 31-dekabrdagi “Oliy ta’lim muassasalarida ta’lim jarayonini tashkil etish bilan bog‘liq tizimni takomillashtirish chora-tadbirlari to‘g‘risida”gi 824-son qarori [2] hamda Oliy va o‘rta maxsus ta’lim vazirining 2020-yil 16-iyuldagi “Oliy ta’limning davlat ta’lim standartlarini tasdiqlash to‘g‘risida”gi 311-son buyrug‘i hamda O‘zbekiston Respublikasi Oliy va o‘rta maxsus ta’lim vazirligining 2022-yil 30-maydagi 02/3530/05-49-sonli xatidagi “Oliy ta’lim muassasalarida kredit-modul tizimida talabalarning mustaqil ta’limini tashkil etish va nazorat qilish bo‘yicha namunaviy yo‘riqnoma” ishlab chiqilgan bo‘lib bu talabalarni mustaqil ta’limni tashkil etishda amaliy ahamiyat kasb etadi.

Talabaning mustaqil ta’lim yuklamasi o‘quv rejasida muayyan fanni o‘zlashtirish uchun belgilangan o‘quv ishlarining ajralmas qismi hisoblanadi. Talabaning mustaqil ta’limi auditoriya va auditoriyadan tashqarida (o‘quv yuklamasida ajratilgan auditoriya soatini inobatga olmagan holda) bevosita o‘qituvchi rahbarligida mustaqil ish yoki talabaning fan (modul) bo‘yicha mavzulami mustaqil o‘qib-o‘rganishi tarzida amalga oshiradigan o‘quv ishlari majmuini anglatadi.

Mustaqil ta’lim-bu talabaning o‘z bilimlarini kengaytirish va chuqurlashtirish uchun o‘quv topshiriqlarini o‘z kuchi bilan bajarishi hamda yangi bilimlarni mustaqil ravishda o‘zlashtirishini nazarda tutadi. Ushbu jarayon talabaning mustaqil fikrlashini, mas’uliyatlilik va o‘z-o‘zini boshqarish ko‘nikmalarini rivojlantirishga qaratilgan. Mustaqil ta’limning asosiy maqsadi talabalarga o‘z ta’lim jarayonini rejalashtirish, boshqarish va ijodiy faoliyatni amalga oshirish uchun zarur bo‘lgan bilim va ko‘nikmalarni shakllantirishdan iborat [3; 24-28-b.].

Innovatsion ta’lim jarayonlari talabaning faqatgina tayyor bilimlarni o‘zlashtirishini emas, balki yangi bilimlarni izlab topish va ishlab chiqishni ham talab qiladi. Shu nuqtayi nazardan, mustaqil ta’lim talabalarni innovatsion faoliyatga tayyorlashda quyidagi jihatlarda muhim rol o‘ynaydi:

– **ijodiy fikrlashni rivojlantirish:** mustaqil topshiriqlar talabalarning ijodiy yechimlarni topish ko‘nikmalarini rivojlantiradi;

– **muammoli vaziyatlarda qaror qabul qilish:** talabalar mustaqil ta’lim davomida turli muammoli vaziyatlarni hal qilishni o‘rganadilar, bu esa ularni kelajakda innovatsion pedagogik faoliyatda muvaffaqiyatli bo‘lishiga yordam beradi;

– **mas’uliyat va tashabbuskorlik:** mustaqil ta’limda talabalar o‘z vaqtlarini to‘g‘ri taqsimlash va tashabbus ko‘rsatishni o‘rganadilar, bu esa innovatsion faoliyatda kerak bo‘ladigan muhim jihatlardir [4; 213-216-b.].

Bugungi kunda rivojlangan mamlakatlarda talabalarning o‘quv va ijodiy faolliklarini oshiruvchi, ta’lim-tarbiya jarayonining samaradorligini kafolatlovchi pedagogik texnologiyalarni qo‘llashga doir katta tajriba to‘plangan bo‘lib, bu tajriba asosini interfaol metodlar tashkil etmoqda. Talaba asosan, o‘zi o‘zlashtirgan bilimlarni namoyish etadi, o‘qituvchi esa uning fikrlarini tinglaydi, zarur o‘rinlarda o‘qituvchi – talaba an’anaviy ta’limdagi suhbat ishtirokchilari savollar bilan murojaat qiladi. Talabalar guruhi (jamoasi) bu vaziyatda butunlay sust ishtirokchi, tinglovchi bo‘lib qoladi. Bir qarashda talaba yoki o‘qituvchi tomonidan uzatilayotgan axborotlarning qabul qilinishi talabalar guruhi (jamoasi) uchun bilimlarni o‘zlashtirish imkoniyatini yaratayotgandek taassurot uyg‘otadi. Biroq, psixologik tadqiqot natijalarining ko‘rsatishicha, shu tarzda qabul qilingan bilim (ma’lumot)lar juda tez unutiladi. Hususan, amerikalik psixolog olimlar R.Karnikau va F.Makelrouning o‘rganishlariga ko‘ra shaxsning tabiiy fiziologik-psixologik imkoniyatlari muayyan shakllarda o‘zlashtirilgan bilimlarni turli darajada saqlab qolish imkonini beradi. Zamonaviy ta’limni tashkil etishga qo‘yiladigan muhim talablardan biri ortiqcha ruhiy va jismoniy kuch sarf etmay, qisqa vaqt ichida yuksak natijalarga erishishdir [5; 308-317-b.].

Natijalar va muhokama

Mustaqil ta’lim – o‘quv materialini mustaqil o‘zlashtirish, murakkablik darajasi turlicha bo‘lgan topshiriqlar, amaliy vazifalami auditoriya hamda auditoriyadan tashqarida ijodiy va mustaqil bajarish asosida nazariy bilim, amaliy ko‘nikma va malakalari shakllantirishga qaratilgan tizimli faoliyatdir. Mustaqil ish – o‘qituvchining topshirig‘i va rahbarligida o‘quv vazifasini hal etadigan ta’limning faol metodi. Mustaqil ish qo‘yilgan maqsad bilan bog‘liqlikda talabalarning aniq faoliyatini tashkil etish va amalga oshirishdir. Talabaning mustaqil ishlari uning yuqori darajadagi faollik, ijodiylik, mustaqil tahlil, tashabbuskorlikka ham da barcha vazifalamio‘z vaqtida va mukam mal tarzda bajarishga asoslangan faoliyatidir.

Mustaqil ish turi va shakli muayyan ta’lim yo‘nalishi (mutaxassislik) hamda fan (modul) laring xususiyatidan kelib chiqqan holda belgilanadi. Mustaqil o‘qib-o‘rganishuchun taklif etilgan mavzular ham da mustaqil ish topshiriqlari va ularni bajarish bo‘yicha ko‘rsatmalar talaba uchunishlab chiqilgan fan dastur (Sillabus)da o‘z aksini topishi lozim. Mustaqil ish uchun taqdim etilgano‘quv topshiriqlari variativ tavsifga ega bo‘lishi tavsiya etiladi.

Didaktik jarayonlarni jadallashtirish, talabalaming mustaqil ta’lim olish samaradorligini oshirish maqsadida o‘quv davriningi-sem estrida tyutorlar, ARM xodimlari va fan mas’ullari tomonidan mazkur jarayonni amalga oshirish tartibi bo‘yicha davriy ravishda (shu jum ladan, kredit haftaligi doirasida) o‘quv seminarian tashkil etilishi maqsadga muvofiq [6; 172-174-b.].

Mustaqil ish topshiriqlari vauni bajarish muddatlari elektron platformada qat’iy belgilanadi. Elektron platformada qabul qilingan va baholangan mustaqil ishlar qog‘oz varianti talab qilinmaydi. Fan (modul) xususiyati va topshiriq shakli mazkur elektron vatiantni inkor qilsa, qog‘oz variant shaklida olinadi. Uzrli sabablarsiz mustaqil ishni bajarish muddatini o‘tkazib yuborgan talabaning o‘quv

faoliyati natijalari tekshirilmaydi va baholanmaydi uzrli sabablar esa, dekanat (registrator ofis) tomonidan o‘rganib chiqilishi, dekan ruxsati bilan inobatga olinishi hamda topshiriq bajarilishi uchun yakuniy nazorat o‘tkazilishiga qadar qayta topshirish muddati belgilanishi mumkin.

Mustaqil o‘qib-o‘rganish uchun taklif etiladigan mavzular va mustaqil ish topshiriqlari fan (modul)ga ajratilgan kreditlar soni hamda talabaning vaqt budjetini inobatga olgan holda belgilanishi lozim.

Talaba tomonidan elektron tizim (platforma)ga yuklangan mustaqil ish topshiriqlari aniq belgilangan muddatda professor-o‘qituvchi tomonidan tekshirilishi va natijasi talabaga ma’lum qilinishi shart.

Talabalar mustaqil ta’limini tashkil etishning maqsad va vazifalari:

1. Talabalarning mustaqil ta’limni tashkil etishdan asosiy maqsad fan (modul) bo‘yicha o‘zlashtirilgan bilimlari mustahkamlash, boyitish, amaliy ko‘nikma va malakalarni takomillashtirish, axborot bilanishlash, o‘z-o‘zini rivojlantirish, kognitiv, kreativ, ham korlikdaishlash kom petensiyalarini shakllantirishdan iboratdir.

2. Talabalarning mustaqil ta’limini tashkil etish quyidagi vazifalarni muvaffaqiyatli hal etishga xizmat qilishi lozim:

– talabalarda o‘z-o‘zini rivojlantirish, mustaqil bilim olish va innovatsion faoliyatni shakllantirishga imkon beruvchi kompetensiyalarni egallash maqsadi bilan bog‘liqlikda mustaqil o‘quv faoliyatini amalga oshirish;

– bilim, ko‘nikma va malakalarni mustaqil egallash, muammoni shakllantira olish va uni hal etishning maqbul yo‘larini izlab topishga qobiliyatli kreativ shaxsni tarbiyalash;

– talabalarda o‘quv dasturini o‘zlashtirishga doir motivatsiyani hosil qilish;

– ta’lim oluvchilarda bilim olishga doir mas’uliyatni oshirish;

– talabalarda umummadaniy va kasbiy kompetensiyalari rivojlantirishga imkon berish;

– ta’lim oluvchilarda mustaqil bilim olish, o‘z-o‘zini boshqarish va o‘z-o‘zini rivojlantirishga qobiliyatlilikni shakllantirish uchun sharoit yaratish [7; 174-178-b.].

Mustaqil o‘qib-o‘rganish va mustaqil ish topshiriqlarini bajarishda talabalar quyidagi vazifa va majburiyatlarni amalga oshirishi lozim:

– fan (modul)lar bo‘yicha mustaqil o‘qib-o‘rganish uchun tavsiya etilgan mavzularni to‘liq o‘zlashtirishi va mustaqil ish topshiriqlarini belgilangan muddatlarda sifatli tarzda taqdim etishi;

– mustaqil ish topshiriqlarini bajarishda plagiat (ko‘chirmakashlik)ga yo‘l qo‘ymasligi;

– mustaqil ish topshiriqlarini bajarishga kreativ yondashishi, mustaqil, tanqidiy va innovatsion fikrlash, axborotlar bilan ishlash kompetentligiga ega bo‘lishi, o‘z-o‘zini rivojlantirishga intilishi;

– kichik guruhlarda hamkorlikdagi mustaqil ish topshiriqlarini bajarishda jamoaning umumiy maqsadiga mos harakat qilishi, o‘ziga yuklatilgan vazifalarni o‘z vaqtida bajarishi, jamoada ishlay olish kompetensiyasini o‘zlashtirishi.

Mustaqil ishga qo‘yilgan baho (ballar) bo‘yicha e’tirozlar bo‘lgan taqdirda, talaba belgilangan muddat tugaganidan keyin 24 (yigirma to‘rt) soat (1 sutka) davomida dekanat (registrator ofis)ga elektron platforma orqali ariza bilan murojaat qilishi mumkin. Talabalar mustaqil ta’limini baholash mezonlari tegishli kafedralar tomonidan fan (modul)lar xususiyatini inobatga olgan holda ishlab chiqiladi va fakultet ilmiy kengashida tasdiqlanadi [8; 2-9-b.].

Mustaqil ta’lim talabalarni innovatsion pedagogik faoliyatga tayyorlashning muhim omili hisoblanadi. Talabalar mustaqil ravishda bilim olish va amaliyotda qo‘llashni o‘rganar ekan, ularning ijodiy va innovatsion faoliyati rivojlanadi. Shu bois, ta’lim muassasalari mustaqil ta’limni rag‘batlantirish va qo‘llab-quvvatlashga alohida e’tibor qaratishi lozim. Talabaning mustaqil ta’limi o‘quv rejasining ajralmas qismi bo‘lib, nazariy bilimlarni mustahkamlash va amaliy ko‘nikmalarni rivojlantirishga qaratilgan. Bu jarayon auditoriya va auditoriyadan tashqarida amalga oshirilib, talabaning ijodiy va tanqidiy fikrlashini rivojlantirishga xizmat qiladi. Mazkur ta’lim shakli talabaning o‘z-o‘zini boshqarish, axborot bilan ishlash, hamkorlikda faoliyat yuritish va o‘z-o‘zini rivojlantirish ko‘nikmalarini shakllantirishga yordam beradi. Mustaqil ta’limni samarali tashkil qilish orqali talabalarning nazariy va amaliy bilimlarini integratsiyalash, ularni pedagogik faoliyatga tayyorlashda sezilarli natijalarga erishish mumkin. Natijada, kelajak avlodning kasbiy tayyorgarligi va ijodiy salohiyati ortadi. Mustaqil ta’limni samarali tashkil qilish nafaqat talabalarning bilimini chuqurlashtiradi, balki ularni innovatsion pedagogik faoliyatga tayyorlashda ham muhim ahamiyat kasb etadi.

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AMIR TEMURNING HARBIY ISLOHOTLARI

Annotatsiya: *Ushbu maqola Amir Temuning davlat boshqaruvi va siyosiy iqtisodiy islohotlari jarayonlarini keng yoritadi. Davlat boshqaruvida amal qilingan qonunlar va tizimlar o`rganilib ilmiy tahlil qilingan. Maqola mustaqil O`zbekiston halqiga buyuk sarkarda jahongir avlodimiz Sohibqiron Amir Temurning davlati haqida keng malumot berib halqimizni vatanparvarlik ruhini o`yg`otishda muhim ahamiyat kasb etadi.*

Kalit so’zlar: *Temur tuzuklari, lashhkarboshi , G’azalxonlar , munajjimlar, saltanat , boquvvat ,mingboshi , yuzboshi sardor, Amir, Amir Ul-Umaro, otliq qo’shin, mashvaratu-maslahat, sohibqiron*

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MILITARY REFORMS OF AMIR TEMUR

Abstract: *This article extensively covers the processes of state governance and political and economic reforms of Amir Temur. The laws and systems used in state governance have been studied and scientifically analyzed. The article provides the people of independent Uzbekistan with extensive information about the state of our great commander and conqueror, Sahibkiran Amir Temur, and plays an important role in awakening the spirit of patriotism in our people.*

Keywords: *Timur's regulations, lashkhkarboshi, Ghazalkhans, astrologers, empire, strong, thousand-headed, hundred-headed commander, Amir, Amir Ul-Umar, cavalry, consultation, sahibkiran*

Amir Temur davlat boshqaruvi, harbiy yurishlar va harbiy islohotlar o` tkazishda ustozlarining ko`rsatmalariga qattiq amal qilgan.Jumladan kengash, mashvaratu-maslahat, qat`iy qaror,tadbirkorlik va hushyorlik, ehtiyotkorlik tamoyillariga qattiq amal qilganini kurish mumkin. Ushbu tamoyillarga amal qilishi Amir Temurni buyuk va qudratli davlat barpo qilishida asis bulib xizmat qildi. Temur Tuzuklarida yozishicha sohibqiron davlat ishlarining 9 ulishini kengash, tadbir va mashvarat, qolgan 1 ulishi esa qilich bilan bajo qilganini takidlab utgan. . Amir Temur 143 kishi bilan kengashgan va tadbir yuritgan holda Qarshi qal`asi ustiga yurish qilib, Amir Muso va Malik bahodirning 12 ming otliq askarini mag`lube tib qal`ani egallaydi. Oz sonli lashkar bilan katta qushinni mag`lubiyatga uchratishi ham Temurning mohir lashkarboshiligini ko`rsatadi.Kengashlarda Amir Temurga aytilgan maslahatlarni til uchida

aytilganini emas, balki chin dildan aytilganini qabul qilgan, ushbu holat ham Qmir Temurni zzukko boshqaruvchilik qobiliyatiga ega ekanligini ko` rsatadi. Amir Temur uz qo`shini ichida birlik va jipslikni taminlash maqsadida lashkarboshilar bilan suhbat o`tkazib, ularni sodiq xizmati uchun mol-mulk va turli mansablar bilan taminlab har biriga bittadan kutvol yaniqala kamendantini tayinlagan.Qo`shindagi qolgan askarlarga ham oziq-ovqat, kiyim-kechak bilan taminlashini aytib sulh tuzadi. Qo`l ostidagi har bir askarini qilgan xizmati uchun rag`batlantirgan. Natijada Amir Temurni qullovchi va unga qarshi bulgan barcha lashkarboshilar, amaldorlar, askarlar uning atrofida birlashdilar.Harbiy yurish vaqtlarida Amir Temur uz qo`shinini yeti qismga bo`lib harakatlangan. Jumladan Tug`luq Temur bilan jangda ham shunday taktikadan foydalangan. Davlat va saltanatt boshqaruvida Amir Temur 12 ta tamoyilga qattiq amal qilgan. Bu tamoyilning birinchisi uz suziga ega bulsin ishini o`zi bilib qilsin deb takidlagan. Ikkinchisi sulton har bir ishida adolatli bo`lsin atrofida adolatli insofli vazirlarni jamlasin. Uchinchidan butun mamlakatda buyruq-farmon berishi podishohning ixtiyorida bulishi lozim. Podishoh har ishda o`zi hukm chiqarsin , hech kim hukimdorning qaroriga qarshi bormasin. To`rtinchidan podishoh qabul qilgan qarorida qattiq tursin va uni tuliq bajarilishini talab qilsin. Veshinchidan pidishih qaroriga hech kim monilik qilmasin. Oltinchidan podishohlik lavozimini tamomila boshqa shaxsga ishonib topshirmasin. Yettinchidan saltanat ishlarida har kimning suzini eshitsin, harkimdan fikr olsin va maqul topgan fikrni zarur vaqtda ishlatsin. Sakkizinchidan saltanat ishlarida sipohu raiyatga bog`liq masalalarda boshqalarning fikriga kura ish kurmasin. Tuqqizinchidan ppodishohning salobati butun mamlakatda o`z mavqeyiga ega bulsin. Uninchidan podishoh barrcha ishlarni mustaqil qaroriga asosan bajarsin. Unbirinchidan podishoh butun mamlakatda yakka podishohlikka amal qilsin, saltanat boshqaruvida hech kim bilan sheriklik qilmasin. Unikkinchidan mashvarat va majlislardan har doim habardor bulsin. Ushbu tamoyillarga amal qilishi Amir Temur saltanatining mustahkamligini taminlagan.Sohibqiron askarlarining o`n nafari ichidan janglarda toblanga boquvvat bir kishini qolgan to`qqiz kishining roziligi bilan o`zlariga sardor etib tayinlab, sardornint lavozimi nomini o`nboshi etib tayinlagan. O`nboshi o`n kishilik lashkarga boshchilik qilgan. O`n nafar o`nboshi ichidan birini yuzboshi etib tayinlagan. Yuzboshi o`n nafar o`nboshiga sardor hisoblangan. O`n nafar yuzboshidan eng aqlli janglarda toblangan mohir sarkarda dep topilganini mingboshi etib tayinlagan. Mingboshilar o`n nafar yuzboshiga sardor hisoblanib bazan ular amiri hazora deb ham atalgan. Agar o`nboshilar, yuzboshilar, mingboshilar qo`lidagi biron askar vafott etsa yoki izsiz yuqolsa, ularning urnini to`ldirish maqsadida boshqa shaxsni tayinlash onboshi bulimida sodir bulsa o`nboshi, yuzboshi bo`limida sodir bo`lsa yuzboshi mingboshi bo`limida sodir bo`lsa mingboshi masul hisoblangan. Jang vaqtida o`nboshi yuzboshiga,yuzboshi esa mingboshining buyrug`iga so`zsiz itoat qilgan. Ushbu tamoyildan bosh tortgan va masuliyatsizlik qilgan har bir shaxs jazoga tortilgan.Sohibqiron o`z qo`shiniga oylik maosh tayinlagan. Oylik maosh quyidagicha belgilangan. Oddiy askarga bir ot bahosi, bahodirlarga ikki ot bahosi,

o`nboshilarga o`n ot bahosi, yuzboshilarga yigirma ot bahosi, mingboshilarga esa oltmish ot bahosi miqdorida maosh tayinlangan. Sohibqiron qo`shinida xizmat qiluvchilar xatoga yul qo`ysa oylik maoshining o`ndan biri berilmagan.Sohibqiron qo`shinida amir ul-umaroning buyrug`I bilan qo`shin oziq-ovqat va oylik maosh bilan taminlangan.Devonbegi, vazir va amir ul-umarolarning maoshlari mingboshilar maoshidan o`n barobar ko`p bo`lgan. Yasovullar (quriqchilar), chopovullar (tungi bosqinchilar), qalaqchilar (xiroj miqdorini belgilovchi mansabdorlar) maoshlari qilgan xizmatlariga qarab ming tangadan o`n ming tangagacha belgilangan. Yig`ilishlarda qatnashuvchi sayyidlar, olimlar, tabiblar, munajjimlar, g`azalxonlar, xabarchilar, tarixchilarga yerlarni suyurg`or etib tayinlagan. Oddiy askarlar, xizmatchilar, farroshlarga yuz tangadan ming tangagacha maosh berilgan. Maoshlarni devonbegi va vazirlar avval sohibqironga tasdiqlatib sung davlat xazinasidan xizmatchilarga taqsimlab bergan. O`nboshi va yuzboshilarga oylik maosh shahar xazinasidan va podishohlik Mulki daromadidan naqd pul hisobida yozilsin. Mingboshilarga viloyat ichidagi yerlardan tushgan soliqlardan berilsin. Amirlar va amir ul-umarolarga chegara viloyatlaridan biri yerdan olinadigan soliqlari bilan topshirilgan. CHegara viloyati yerlari amir ul-umarolarga uch yil muddatga berilib, bunday viloyatlarga ikki nafar vazir tayinlangan. Vazirlarning biri xazinaga tushgan daromadni hisoblagan. Ikkinchisi sarf xarajadlar oylik maoshlarni hisob qilib nazorat qilgan. UC yil o`tgach ushbu viloyat tekshirilgan. Viloyatda aholi norozichiligi bulmasa, shahar avvalgidanda obod qilingan bulsa inom etilgan yer amir ul-umaroda qoldirilgan. Aksincha bulib chiqsa bu yerlar boshqa amir ul-umaaroga olib berilgan. USbu jarayonlarga etibor qaratsak Amir Temur iqtisodiy islohotlarni ham puxtalik bilan amalga oshirganini kuramiz.

Amir Temur o`z o`g`illari va nabiralariga ham oylik maosh va viloyatlarni taqdim etgan. Jumladan birinchi o`g`li Muhammad Jahongir Mirzo qo`l ostida 12 ming otliq qo`shinni boshqargani uchun maosh berilgan. Ikkinchi o`g`li Umarshayx qo`l ostida 10 ming qo`shinni boshqargani uchun maosh olgan. Uchchinchi o`li Mironshoh 9 ming otliq qo`shinni boshqargani uchun maosh olgan. To`rtinchi o`g`li Shoxrux Mirzo 7 ming askkarni boshqargani uchun maosh olgan. Sohibqironning nabiralari esa o`z istedodlariga qarab 3 mingdan 7 minggacha qo`shinni boshqargani uchun oylik maosh olgan. Vu jarayon Temur qo`shinida qattiq tartib va intizomni taminlagan. Sohibqiron davlat amaldorlari va o`z qarindoshlariga ham istedodlariga qarab turli lavozim majburiyatlarini tayinlagan va ularga ham oylik maosh bergan. Nizommi buzgan har bir shax qattiq jazolanga jumladan o`z o`g`illari va nabiralari ham bu tartibga qattiq amal qilgan. Ushbu tamoyillar Amir Temurning qudratini yanada oshirgan. Sohibqiron saltanatida o`z o`g`illari taxt uchun davo qilib isyon ko`tarsalar ularni qatl qilishga yoki tana azolaridan biridan judo qilishga buyurmagan, lekin ular qattiq nazoratta saqlanishi tayinlangan. Temurning nabiralari yoki qarindoshlari xatoga yo`l qo`ysa ularni oylik maoshlaridan mahrum qilib darvesh holatiga solingan. Saroy amaldorlari o`zaro nizoga borsalar ulardan egallab tuurgan amali va qo`l ostidagi yer mulki tortib olingan. Saltanatga zarar yetkazgan amaldorlar boshqa

amaldorlarga tobe etib qo`yilgan. Oddiy askar o`z vazifasini bajarishda masuliyatsizlik qilsa o`z vazifasidan ozod qilinib yozuvchilar bo`limidan ish berilgan. Shunda ham masuliyatsizlik qilgudek bulsa saroy ishlaridan chetlatilgan. Sohibqiron davlat vazirlaridan kimda-kim xiyonat qilganini eshitsa, ularni jazolashga shoshilmagan,chunki amaldorlarga nisbatan turli buhronlar ko`p uyushtirilar edi. UUlar qattiq tergov qilingan. Ayblari isbot qilingach jazo tayinlangan.Qishloq oqsoqollari va hokimlaridan biri o`z martabalaridan past tabaqadagi shaxslarga nisbatan zulm o`tkazsalar ular turli miqdorda jarimaga tortilgan. Jumladan dorug`alar ham mansablarini suistemol qilsalar ularga nisbatan ham jazo tayinlangan. Sohibqiron saltanatida aybi iisbotlangan shaxlarga nisbatan jarima yoki darra bilan urish jazosi tayinlangan. Jarima tayinlangan aybdorga darra bilan urish jazosi tayinlanmagan. Darra bilan urish jazosi berilgan aybdorlarga esa jarima to`lash jazosi tayiinlanmagan. Amir Temur davlatida o`g`rilar, talonchilar, zoravonlarga nisbatan ham jazo tayinlanibb ularga jazoni qozilar berganlar. Shariyat va din ishlarini islom qozilari hal qilganlar. Sohibqiron o`z vazirlarini to`rt xislatiga qarab tayinlagan. Birinchisi nasl nasabbi, ikkinchisi donishmandlik, uchchinchisi davlat ishlaridan yaxshi xabardoor ,to`rtinchisi kuchli sabrga ega shaxslar ichidan saralab tayinlagan.natijada saltanatning vazirlar devoni kuchli bilim va irodali shaxslar vilan to`ldirilgan. Amir Temur saltanatida har bir davlat amaldorining o`rinbosarlari bo`lib, davlat amaldorlari vafot etgudek bo`lsa uning o`rnini o`rinbosarlari egallagan. Temur Tuzuklarida yozilishicha Temuriylar saroyida 313 nafar amaldor davlat ishlarida xizmat qilgan. Sohibqironning noibi Amir ul-umaro deb nomlangan. Temur qo`shinida oddiy askarlikdan sarkarda darajasigacha yetidhish mumkin. Janglarda mardlik qilib jasorat ko`rsadkan askarlarning lavozimi oshirilgan.Dushman qo`shinidan asirga tushgan askarlar o``ldirilmagan balki ularga Temur qo`shinida xizmat qilish taklifi berilgan. Agar asr tushgan shaxs rozi bo`lmasa u ozod qilingan. Ushbu jarayonlarga etibor qaratsak Sohibqiron nafaqat buyuk davlat arbobi , balki kuchli insonparvar ekanligini koo`ramiz. Sohibqiron saroyiga aval dushman bulib, keyinchalik vaqt o`tgach najot so`rab kelgan har bir shaxsga nisbatan ehtirom ko`rsatilgan. Amirlar ichida janglarda jonbozlik ko`rsatib do`shman qo`shinini yengganlarga saroy tomonidan sovg`alar taqdim etilgan. Ular quyidagilardan iborat 1 sarkarda bahodir deb elon qilinga. 2 tug` va nog`ora taqdim etilgan. 3 maqtov yorlig`I berilgan. Amirlar ichida xon o`g`illarini yenggan yoki shikast yetkazgan, xonni yenggan va shikast yetkazganlarga ham mukofotlar taqdim etilgan. Jumladan ular bazi hollarda Sohibqironga maslahatchi etib tayinlangan.

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YAQIN QARINDOSHLAR O'RTASIDAGI NIKOHNING GENETIK OQIBATLARI VA IRSIY KASALLIKLARNING RIVOJLANISHI

Anatatsiya:*Mazkur maqolada yaqin qarindoshlar o'rtasidagi nikohlarning genetik xavflari, autosomal-retsessiv kasalliklarning avlodlarda ko'payishiga sabab bo'ladigan omillar hamda bunday nikohlar oqibatida yuzaga keladigan irsiy nuqsonlar tahlil qilinadi. Shuningdek, ilmiy adabiyotlar asosida qarindoshlar nikohining populyatsion genetika nuqtayi nazaridan oqibatlari, mutatsiyalar to'planishi, genetik yuk ortishi va genetik kasalliklarning paydo bo'lish mexanizmlari bayon qilinadi. Maqolada zamonaviy genetik tekshiruv usullaridan foydalanish metodologiyasi, klinik–genetik maslahatlarning ahamiyati va kasalliklarning oldini olish strategiyalari ham yoritilgan. Tadqiqot natijalari yaqin qarindosh nikohlari jamiyat salomatligiga sezilarli xavf tug'dirishini ko'rsatadi.*

Kalit so'zlar: *yaqin qarindoshlar nikohi, genetic xavf, irsiy kasalliklar, retsessiv allellar, tug'ma nuksonlar, autosomal retsessiv kasalliklar, genetic maslahat, karyotiplash, DNK mutatsiyasi.*

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GENETIC CONSEQUENCES OF CONSANGUINEOUS MARRIAGES AND THE DEVELOPMENT OF HEREDITARY DISEASES

Abstract:*This article analyzes the genetic risks of consanguineous marriages, the factors contributing to the increased prevalence of autosomal*

recessive diseases in subsequent generations, and the hereditary defects arising as a result of such unions. In addition, the population-genetic consequences of consanguineous marriages, mutation accumulation, increased genetic load, and the mechanisms of genetic disease development are described based on scientific literature. The article also highlights the methodology of applying modern genetic testing techniques, the importance of clinical-genetic counseling, and strategies for disease prevention. The research results demonstrate that consanguineous marriages pose a significant risk to public health.

Keywords: *consanguineous marriage, genetic risk, hereditary diseases, recessive alleles, congenital defects, autosomal recessive disorders, genetic counseling, karyotyping, DNA mutation.*

Kirish

Yaqin qarindoshlar o‘rtasidagi nikoh (konsangvinitet) ko‘plab xalqlarda tarixan an’anaviy shakllangan bo‘lsa-da, zamonaviy genetika ushbu amaliyotning sog‘liq uchun jiddiy oqibatlari borligini tasdiqlaydi. Inson genomida ko‘plab retsessiv, yashirin mutatsiyalar mavjud bo‘lib, ular odatda fenotipda namoyon bo‘lmaydi. Ammo ota-onaning genetik jihatdan yaqin bo‘lishi bir xil mutatsiyaga ega bo‘lish ehtimolini keskin oshiradi. Natijada farzandlarda tug‘ma nuqsonlar, rivojlanishdan orqada qolish, metabolik sindromlar, irsiy kasalliklar va immun tizimi yetishmovchiligi kuzatilish xavfi ortadi.

Dunyo sog‘liqni saqlash tashkiloti (DSST) ma’lumotlariga ko‘ra, qarindosh nikohlarda tug‘ilgan bolalarda irsiy kasalliklar xavfi 2–3 barobar yuqori. Bu holat nafaqat alohida oilaga, balki butun populyatsiya genofondiga ta’sir ko‘rsatadi. Shuning uchun mazkur mavzuni ilmiy yondashuv asosida o‘rganish va genetik xavflarni izohlash juda muhimdir.

Adabiyotlar tahlili va metodologiyasi

Quyidagi metodlardan foydalanildi1. 1.Klinik-genetik metod Bunda bemorlarning fenotipik belgilari, genealogik daraxti o‘rganiladi. Pedigri (nasl-nasab) tahlili orqali kasallikning irsiylanish turi aniqlanadi.

2. Sitogenetik metod-Karyotiplash yordamida xromosomal anomaliyalar, translokatsiyalar, delesiyalar va duplikatsiyalar aniqlanadi.

3. Molekulyar genetik metod-DNK sekvenslash, PCR, gen panellar orqali yashirin retsessiv mutatsiyalar aniqlanadi. Ayniqsa:WES (Whole Exome Sequencing),

- WGS (Whole Genome Sequencing) kabi usullar yuqori aniqlik beradi.

4. Biokimyoviy skrining-Metabolik kasalliklarning erta bosqichlari:

- fenilalanin darajasi,
- galaktoza almashinuvi buzilishlari,
- aminokislotalar spektri orqali aniqlanadi.

5. Populyatsion-genetik tahlil-Hardy–Weinberg tenglamasi asosida:

- allel chastotalari,
- genetik yuk (genetic load),

- inbriding koeffitsienti (F) hisoblanadi.

6. Statistik metodlar-Genetik kasalliklarning chastotasi, xavf darajasi, korrelyatsiya va regressiya tahlili yordamida ilmiy xulosalar chiqariladi.

Yaqin qarindoshlar nikohlarida ko'p uchtaydigan irsiy kasalliklar

1. Autosomal–retsessiv kasalliklar

Konsangvin nikohda eng ko‘p uchraydigan kasalliklar retsessiv irsiylanadigan kasalliklardir. Chunki ota-onada bir xil “yashirin” mutant gen bo‘lish ehtimoli ortadi.

Misollar:

- Fenilketonuriya — fenilalanin almashinuvi buziladi, aqliy rivojlanishdan orqada qolish kuzatiladi.
- Galaktozemiya — galaktoza parchalanishidagi yetishmovchilik, jigar yetishmovchiligi, katarakta.
- Kistik fibroz — o‘pka va oshqozon osti bezida quyuq shilliq yig‘iladi; nafas yetishmovchiligi.
- Taloassemiya (β-taloassemiya) — gemoglobin sintezi buzilishi, og‘ir anemiya.
- Glikogenozlar — glikogen almashinuvi buzilishi, jigar kattalashishi, mushak zaifligi.
- Spinal mushak atrofiyasi (SMA) — mushaklarning progressiv zaiflashuvi.
- Neyrodegenerativ kasalliklar — Tay-Saks kasalligi, Nyman–Pik.
- Adrenogenital sindrom — buyrak usti bezlari ferment yetishmovchiligi, gormonal buzilishlar.

2. Tug‘ma nuqsonlar va rivojlanish kamchiliklari

Inbriding tufayli embrion rivojlanishi buziladi, natijada tug‘ma anomaliyalar ko‘proq kuzatiladi.

- Tug‘ma yurak nuqsonlari (Fallot tetradasi, klapan stenozlari).
- Eshitish nuqsonlari (tug‘ma kar-soqovlik) — ko‘pincha retsessiv irsiylanadi.
- Ko‘rish nuqsonlari — tug‘ma katarakta, retinal distrofiyalar.
- Skelet tizimi deformatsiyalari — qo‘l-oyoqlarning rivojlanishdan qolishi, polidaktiliya.
- Markaziy asab tizimi nuqsonlari — mikrotsafaliya, gidrotsefaliya, neyron migratsiyasi buzilishlari.

3. Metabolik kasalliklar:Yaqin qarindosh nikohlarida ferment yetishmovchiligi bilan kechadigan kasalliklar chastotasi sezilarli oshadi.

- Maple Syrup Urine Disease (MSUD) — aminokislotalar parchalanmasligi.
- Homotsistinuriya — homotsistein to‘planadi, tromboz xavfi ortadi.
- Mukopolisaxaridozlar (MPS I–VII) — suyaklar deformatsiyasi, aqliy rivojlanish sustligi.

4. Immonologik kasalliklar:Genetik o‘xshashlik immun tizimining zaiflashishiga sabab bo‘ladi.

- Birlamchi immun yetishmovchiliklar

5.og‘ir reproduktiv tizim kasalliklari

Qarindoshlar nikohi infertilitet va reproduktiv muammolarni kuchaytirishi mumkin.

Kromosomal muvozanatsiz translokatsiyalar tufayli:

- bepushtlik,
- takroriy tushishlar,
- erta homila o‘limi.

kombinatsiyalangan immun yetishmovchilik (SCID)

Muhokama

Yaqin qarindoshlar o‘rtasidagi nikohlarning genetik oqibatlari ko‘plab ilmiy tadqiqotlar, epidemiologik kuzatuvlar va klinik amaliyot natijalari bilan tasdiqlangan. Ushbu tadqiqotlar shuni ko‘rsatadiki, konsangvin nikohlar avlodlarda retsessiv genetik kasalliklar, tug‘ma nuqsonlar va rivojlanish kamchiliklarining sezilarli darajada ko‘payishiga olib keladi. Ushbu bo‘limda mavzu bo‘yicha mavjud adabiyotlar, ilmiy natijalar va populyatsion-genetik tahlillar asosida muhim ilmiy fikrlar muhokama qilinadi.

Xulosa

Yaqin qarindoshlar o‘rtasidagi nikohlar genetik nuqtai nazardan yuqori xavfga ega bo‘lib, irsiy kasalliklarning avlodlarda uchrash ehtimolini sezilarli oshiradi. Bunga sabab populyatsiyada kam uchraydigan retsessiv zararli allellarning ikki tomonlama birikishidir. Natijada tug‘ma nuqsonlar, aqliy rivojlanish sustligi, immun tizimi zaifligi va bir qator metabolik sindromlar ko‘proq uchraydi. Ilmiy tadqiqotlar bunday nikohlarning salbiy oqibatlari isbotlanganini ko‘rsatadi. Shu bois konsangvin nikohlarning oldini olish, aholiga genetik savodxonlikni oshirish, nikohdan oldi tibbiy-genetik maslahatlarni takomillashtirish va xavf guruhidagi oilalarda prenatal diagnostika o‘tkazish muhim ahamiyatga ega. Bunday yondashuv irsiy kasalliklar tarqalishini kamaytirish va sog‘lom avlodni ta’minlashda asosiy omil bo‘lib xizmat qiladi.

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MAKTABGACHA KATTA YOSHDAGI BOLALAR SHAXSINI BILISH JARAYONLARINI SHAKLLANTIRISHDA O'YINNING AHAMIYATI

Annotatsiya: *Ushbu maqolada maktabgacha katta yoshdagi bolalar bilish jarayonlarini o‘yin faoliyat turlari orqali rivojlantirish yo‘llari va ularning xususiyatlari haqida fikr bildirilgan.*

Kalit so‘zlar*: o‘yin, faoliyat, bilish jarayonlari, katta yoshdagi bolalar, o‘yin xususiyatlari.*

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THE IMPORTANCE OF PLAY IN THE FORMATION OF PERSONALITY PROCESSES OF PRESCHOOL OLDER CHILDREN

Abstract: *This article presents ideas about ways to develop cognitive processes in older preschool children through play activities and their characteristics.*

Keywords: *play, activity, cognitive processes, older children, game characteristics.*

Ma‘lumki, maktabgacha ta‘lim davrida tarbiyalanuvchilarning asosiy faoliyat turi o’yin hisoblanadi. O‘yin jarayonida bola shakllana boshlaydi. Pedagogik nuqtai nazardan to’g’ri tashkil etilgan o’yin axloqiy, irodaviy xususiyatlarni shakllantirish bilan birga, unda bilim olishga, tevarak-atrofni bilishga qiziqish uyg’otadi. Maktabgacha ta’lim tizimida o‘yinlarni uchta asosiy guruhga ajratish mumkin.

1. Didaktik –bolalar dunyoqarashini kengaytirish, bilish faoliyatini tashkil etish, bilimlarini amaliyotda qo’llashga o’rgatish, ko’nikma va malakalarini rivojlantirish.

2. Tarbiyaviy –mustaqillik va irodani tarbiyalash, axloqiy-estetik sifatlarni shakllantirish hamkorlikda ishlashga o’rgatish.

3. Rivojlantiruvchi-diqqat, xotira, nutq, tafakkurni rivojlantirish, taqqoslashga, tahlil qilishga o'rgatish. O'quv faoliyatiga bo'lgan qiziqishni rivojlantirish.

O'yinlarni o'tkazishga qo'yiladigan talablar:

- o'yinlarni tanlashda bolaning yosh xususiyatlarini inobatga olish;
- maqsadni aniq belgilash;

o'yinlarni bosqichma-bosqich amalga oshirish yo'llarini ishlab chiqish;

- o'yin jarayoniga barcha bolalarni jalb etish;
- o'yindagi individuallashtirish va guruhlash tamoyillarini hisobga olish;

(didaktik o'yinlar, so'z o'yinlari, qoidalari-harakatli, ijodiy-ixtiyoriy, mazmunli-rangli o'yinlarda)

- bolalar fikrlashi uchun sharoitlar yaratish;
- bola erishgan yutuqlarni e'tiborga olish, ularni rag'batlantirish;

Bolalarni rivojlantirishda ijodiy va rolli o'yinlar alohida ahamiyatga ega. Bu turdagi o'yinlarning quyidagi xususiyatlari mavjud. O'yin jarayonida bola atrofdagi insonlar hayotini, hamda aks ettirishi mumkin. Bu uning ijtimoiylashuvi jarayoniga samarali ta'sir ko'rsatadi. Olgan bilimlarini, o'rgangan narsalarini amalda qo'llash, mashq qilish imkoniga ega bo'ladi. Buning natijasida bolaning ongi, bilish qobilyati, tafakkuri rivojlanadi. Jamoa bo'lib tashkil etilgan o'yinda uning barcha a'zolari o'rtasida o'zaro munosabatlar o'rnatiladi. Bu hurmat qilishga hamda o'zining mustaqil fikriga ega bo'lishga o'rgatadi. Bolalarni har tomonlama rivojlantirish bilan birga, o'yin qoidalari ham takomillashib boradi. Tarbiyachi bolalarning qiziqishlari, intilishlariga qarab, o'yinga ma'lum bir o'zgartirishlar kiritishi maqsadga muvofiqdir. Tarbiyachi bolalar faoliyatini boshqaradi, ya'ni ularni o'yin mazmuni bilan tanishtirib, faol va mustaqil harakatlar bajarishga undaydi, qoidalarining to'g'ri bajarilishini nazorat qiladi.

Agar bola o'yinni yoqtirib qolgan bo'lsa, uni takrorlashni xohlaydi, harakatlarni mustaqil bajaradi. O'yinning asosiy maqsadi ham shunda. Shu jarayon davomida rivojlantiruvchi omillar ham ro'yobga chiqadi. Bolalar faoliyatini kuzatar ekanmiz, uning bilish jarayonini ikkita bir-biri bilan bog'liq bo'lgan komponentga ajratish mumkin.

Birinchi komponent –atrof muhit haqidagi ma'lumotlar va ularni qabul qilish hamda qayta ishlash uchun zarur bo'lgan tafakkur jarayonlari, ya'ni:

- bolani tevarak-atrofdagi muhitda qiziqtiradigan narsalar va jarayonlar;
- ma'lumot olish vositasi
- ma'lumotni qayta ishlash

O'yin, mashg'ulot,sayr, kechki soat kabi pedagogik jarayonlarda tarbiyachi bolaning vositasi sifatida muayyan funksiyalarni bajaradi. Bunda tarbiyachining asosiy maqsadi bolaga bilim (ma'lumot) berish emas, balki shu ma'lumot orqali uning bilish jarayonlarini rivojlantirishdan iboratdir. Tarbiyalanuvchilarning idrok, diqqat, xotira, tafakkur, ijodiy qobilyatlarini rivojlantirishda matematik o'yinlardan foydalanish yaxshi samara beradi.

Matematik o'yinlarning maqsadlari asosan quyidagilarga qaratilgan bo'ladi.:

1. Son va sanoq bilan tanishtirish.

2. Vaqt haqidagi va fazoviy tasavvurlarni rivojlantirish

3. Geometrik shakllar bilan tanishtirish

4. Mantiqiy tafakkurni rivojlantirish Son va sanoq bilan tanishtirishda “Qanday raqam yo’qolib qoldi?”, “Xatoni top”, “Raqamning qo‟shnilarni toping”, “Sanaganda adashma” va hokazo.

Bunday o’yinlar yordamida bola birdan o’ngacha va o’ndan birgacha bo’lgan raqamlar ketma-ketligini esda saqlab qoladi. Elementar hisoblarni bajarishga o’rganadi, tafakkuri rivojlanadi. Hafta kunlarini yaxshi eslab qolishlari uchun har bir kun ma’lum bir rangdagi doiracha bilan belgilanadi. Masalan, dushanba-sariq, seshanba-oq va hakazo.Buning uchun har kuni doskaga ma’lum bir rangdagi doiracha yopishtirib boriladi. Maktabgacha ta’lim muassasalarida o’yin texnologiyalaridan keng foydalanish kichkintoylarni har tomonlama rivojlanishlarida katta ahamiyatga ega. O’yinlar texnologiyasi tushunchasi pedagogik texnologiyaning tarkibiy qismidir. O’yin texnologiyasi ta’limdagi an’anaviy o’yin metodidan o’zining aniq maqsadi, amalga oshirish kerak bo’lgan jarayonlarning mantiqiy ketma-ketligi va o’zaro bog’liqligi, oldindan belgilangan natijalarga erishish kafoloti bilan farq qiladi.

Maktabgacha yoshdagi bolalarni o’yini xilma-xildir. Ularni o’yin turlarini asosan quyidagi klassifikatsiya qilish mumkin.

1) syujetli va rollarga bo’lib o’ynaladigan o’yinlar;

2) Didaktik o’yinlar;

3) Harakatli yoki qoidali o’yinlar;

4) Aralashtirilgan o’yinlar;

5) Qurish va yasash o’yinlari.

Syujetli va rollarga bo’lib o’ynaladigan bog’cha yoshi bolalarni eng asosiy o’yin formasidir. O’yinlarning syujeti xilma-xilligiga qaramay, ularni maxsus guruhlarga biriktirish imkoniyati mavjuddir.

Masalan, yirik psixolog E.A.Arkin o’yinlarning quyidagi tasnifini tavsiya qiladi:

1) ishlab chiqarishga (texnikaga); sanoat, qishloq xo’jaligi, qurilish, kasb-hunarga oid o’yinlar;

2) maishiy va ijtimoiy siyosatga ro’zg’or: bog’chaga, maktabga, kundalik turmushga oid o’yinlar;

3) harbiy urush-urush o’yinlari;

4) drammalashtirilgan: kino, spektakl va boshqalarga oid o’yinlar.

Biz shu tasnif haqida L.S.Vigotskiy, A.N.Leontev, D.B.Elkonin singari psixologlarning tanqidiy mulohazalariga to’la qo’shilamiz, chunki harbiy va drammalashtirilagn o’yinlarni ham ijtimoiy-siyosiy guruhga kiritish mumkin. Bizningcha, D.B.Elkoninning tasnifi ma’quldir.

U maktabgacha yoshdagi bolalarga xos rolli o’yinlarning syujetiga ko’ra uchta guruhga ajratishni tavsiya qiladi:

1) maishiy mavzu syujetiga oid o’yinlar;

2) ishlab chiqarish syujetiga taalluqli o’yinlar;

3) ijtimoiy-siyosiy syujetli o’yinlar.

Muallif ayrim o’yin turlari maktabgacha yoshdagi bolalarning barcha bog’inlariga mosligini, syujetlar maishiydan ishlab chiqarishga qarab va undan ijtimoiy-siyosiy voqealarni aks ettirishga qarab rivojlanishini alohida uqtiradi. Uning fikricha, o’yin syujetidagi bunday izchillik bolaning bilim saviyasi, turmush tajribasi kengayishi, uning katta yoshdagi odamlar turmushiga chuqurroq kirib borishi bilan bog’liqdir. Darxaqiqat, o’yin syujetining o’sishi turmushning tobora yangi qirralarini aks ettirish bilan cheklanib qolmay, muayyan syujetning o’ziga xos boshqa ko’rinishlari bilan boyishi sababli ham amalga oshadi. Bolalarga tashabbuskorlik, jamoaviylik, burch xislarini o’stiradi. Bunga «Kim birinchi», «koptok», «oq quyoncha o’tiribdi», «yetib ol» o’yinlari kiradi.

Harakatli o’yinlar asosan sayr va jismoniy tarbiya mashg’ulotlarida o’tkaziladi. Drammalashtirilgan o’yinlarni ham bolalar sevib o’ynaydilar. Bu o’yinlar turli xil ertak va xikoyalar sahnaga qo’yiladi, rollarni esa bevosita bolalarni o’zlari ijro etadilar. Masalan: «Qizil shapkacha», «Tortmoq», «Sholg’om» drammali o’yinlar bolalarni nutqi xayol va qobiliyatlarini tarkib toptiradi.

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VARIABLE ELECTRICITY WITH BASE-LOAD REACTOR OPERATION

Abstract: *Another way of storing energy to meet a variable electricity with base-load reactor operation is suggested by Charles Forsberg of MIT based on recent technology and research suggested by Forsberg et al. On Nuclear Air-Brayton Combined Cycle which is a continuous collaboration [1].*

The goal of their collaboration is not only to deal with a low-carbon world and use the energy sources such as nuclear but also to look at other means of renewable energy source such as wind, solar, and hydrogen produced by means of very-hightemperature reactor (VHTR) of next-generation nuclear plant coupled with hydrogen production plant (HPP) in a coexisting circumstance.

Key words: *Power plant, airflow, turbine system, steam, natural gas, reactor, prototype, gas turbine system.*

Introduction

The defining characteristics of these technologies are:

1. High capital and low operating costs requiring full capacity operation for economic energy production.

2. Output does not match the variable energy needs by men.

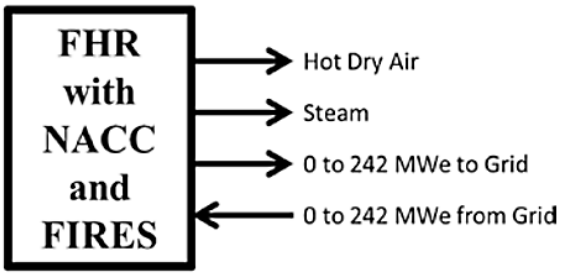


Figure 1. Hybrid Renewable Energy Systems. Capability of modular FHR with NACC and FIRES with base-load FHR operation (See references by Forsberg et al).

This challenge suggests a need to develop new nuclear technologies to meet the variable energy needs for low-carbon world while improving economics. Hence, to the above challenge, we have been developing a fluoride-salt-cooled high-temperature reactor (FHR) with a Nuclear Air-Brayton Combined Cycle (NACC) and Firebrick Resistance-Heated Energy Storage (FIRES) [2]. The goals are to:

1. Improve nuclear power plant economics by 50–100% relative to a base-load nuclear power plant.

2. Develop the enabling technology for a zero-carbon nuclear renewables electricity grid by providing dispatchable power.

3. Eliminate major fuel failures and hence eliminate the potential for major offsite radionuclide releases in a beyond design basis accident.

Figure 1 shows the capabilities of a modular FHR when coupled to the electricity grid. FHR produces base-load electricity with peak electricity produced by a topping cycle using auxiliary natural gas or stored heat or further into the future using hydrogen. The FIRES heat storage capability enables the FHR to replace energy storage technologies such as batteries and pumped storage—a storage requirement for a grid with significant non-dispatchable solar or wind generating systems.

The FHR is a new class of reactors (Figure 2) with characteristics different from light-water reactor (LWR). The fuel is the graphite-matrix coated-particle fuel used by high-temperature gas-cooled reactor (HTGR) resulting in similar reactor core and fuel cycle designs—except the power density is greater because liquids are better coolants than gases. The coolant is a clean fluoride-salt mixture. The coolant salts were originally developed for the molten salt reactor (MSR) where the fuel is dissolved in the coolant. Current coolant-boundary material limitations imply maximum coolant temperatures of about 700 °C. New materials are being developed that may allow exit coolant temperatures of 800 °C or more. The power cycle is like that used in natural gas-fired plants.

Methods

The fluoride-salt coolants were originally developed for the US Aircraft Nuclear Propulsion in the late 1950s. The goal was to develop a nuclear-powered jet bomber. These fluoride salts have low nuclear cross sections with melting points of 350– 500 °C and boiling points more than 1200 °C—properties for efficient transfer of heat from a reactor to a jet engine. Since then there have been two developments. The first development was high-temperature graphite-matrix coated-particle fuels

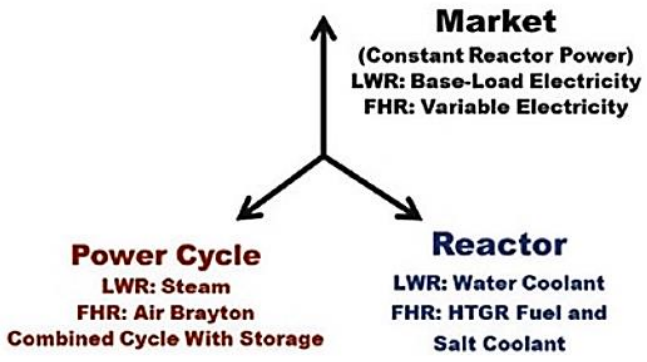


Figure 2. Comparison of the LWR and FHR

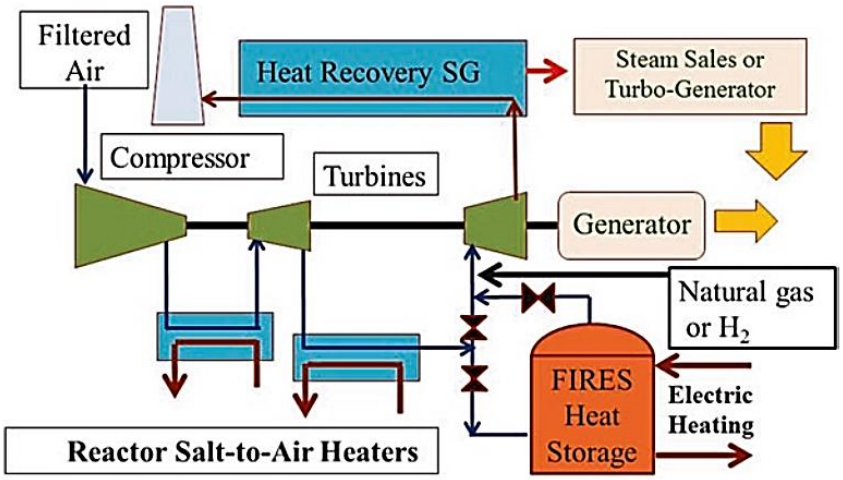


Figure 2. Nuclear air-Brayton combined cycle (NACC) with firebrick resistance-heated energy storage (FIRES)

for HTGRs that are compatible with liquid salt coolants. The second has been a half-century of improvements in utility gas turbines that now make it feasible to couple a nuclear reactor (the FHR) to NACC.

The FHR is coupled to a NACC with FIRES (Figure 3). In the power cycle, external air is filtered, compressed, heated by hot salt from the FHR while going through a coiled tube air heat exchanger (CTAH), sent through a turbine producing electricity, reheated in a second CTAH to the same gas temperature, and sent through a second turbine producing added electricity. Warm low-pressure airflow from the gas turbine system exhaust drives a heat recovery steam generator (HRSG), which provides steam to either an industrial steam distribution system for process heat sales or a Rankine cycle for additional electricity production. The air from the HRSG is exhausted up the stack to the atmosphere. Added electricity can be produced by injecting fuel (natural gas, hydrogen, etc.) or adding stored heat after nuclear heating by the second CTAH. These boost temperatures in the compressed gas stream going to the second turbine and to the HRSG [3].

Since a NACC system looks quite good for a salt cooled reactor, it is worth considering what it might do for a sodium-cooled reactor. With some modifications, it appears that it could be competitive with systems that have been built. A computer model was built based on standard techniques for analyzing Brayton and Rankine systems. System performance was optimized by varying the turbine outlet temperatures for a fixed turbine inlet temperature. A second parameter that can usually be varied to obtain optimum performance is the peak pressure in the steam cycle. For most of the cases considered here, this was held constant at 12.4 MPa (1800 psi) [4].

The stored heat option involves heating firebrick inside a press-tress concrete pressure vessel with electricity to high temperatures at times of low electricity prices; that is, below the price of natural gas. When peak power is needed, compressed air after nuclear heating and before entering the second

turbine would be routed through the firebrick, heated to higher temperatures, and sent to the second turbine. The efficiency of converting electricity to heat is 100%. The efficiency of converting auxiliary heat (natural gas or stored heat) to electricity in our current design is 66%. This implies a round-trip efficiency of electricity to heat to electricity of ~66%. Improvements in gas turbines in the next decade are expected to raise that efficiency to 70%. FIRES would only be added to NACC in electricity grids where there are significant quantities of electricity at prices less than the price of natural gas. As discussed later, these conditions are expected in any power grid with significant installed wind or solar capacity.

As we said, much of the FIRES heat storage technology is being developed by General Electric® and its partners for adiabatic compressed air energy storage (CAES) system called ADELE (German abbreviation). The first prototype storage system is expected to be operational by 2018 with 90 MWe peak power and storing 360 MWh. When the price of electricity is low, the air is (1) adiabatically compressed to 70 bars with an exit temperature of 600 °C, (2) cooled to 40 °C by flowing the hot compressed air through firebrick in a prestress concrete pressure vessel, and (3) stored as cool compressed air in underground salt caverns. At times of high electricity prices, the compressed air from the underground cavern goes through the firebrick, is reheated, and sent through a turbine to produce electricity with the air exhausted to the atmosphere. The expected round-trip storage efficiency is 70%. The ADELE project is integrating firebrick heat storage into a gas turbine system. For NACC using FIRES, the differences are (1) the peak pressure would be about a third of the ADELE project, (2) the firebrick is heated to higher temperatures, and (3) electricity is used to heat the firebrick at times of low electricity prices to higher temperatures. The technology for heat storage integration into NACC is partly under development.

NACC systems can be applied to most of the proposed next-generation systems. Their strongest competitor in terms of cycle efficiency is the supercritical CO2 system. NACC systems will match or better the efficiency of these systems at or above 700 °C. But NACC systems have the competitive advantage of a large customer base for system hardware, significantly reduced circulating water requirement for rejecting waste heat, and much greater efforts to improve the technology relative to other power cycles [5].

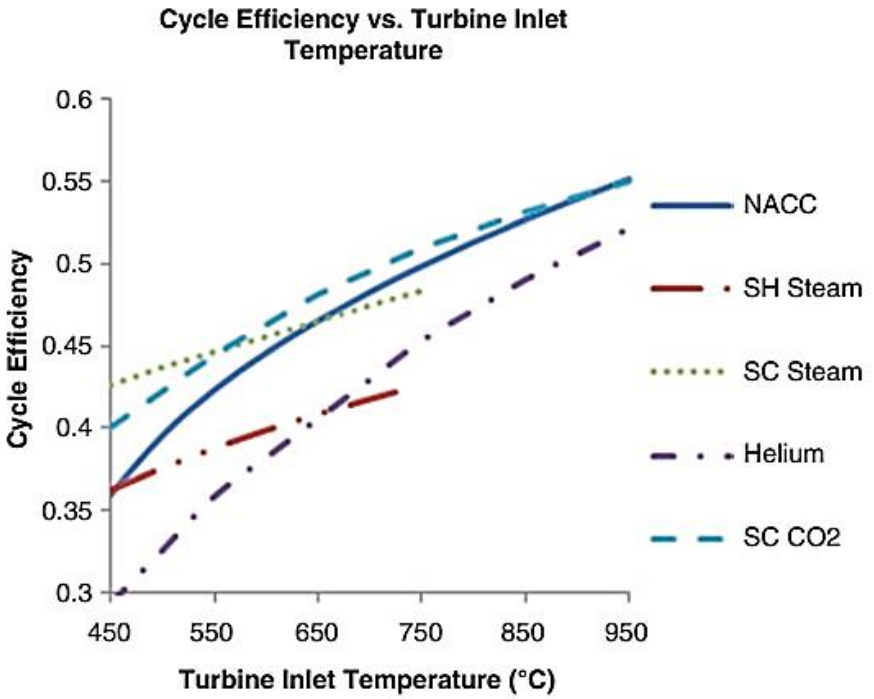


Figure 3. Cycle efficiencies for various advanced cycles.

However, construction of a prototype brings new obstacles and other challenges. The engineering of heat storage sites capable of holding the energy over longer periods without significant losses, compressors that can handle both high pressures and high temperatures, and turbines with the ability to maintain on a constant output under changing conditions (changing temperatures, decreasing air pressure) are some of the challenges. However, with the current state of the art, it is very doable.

Conclusion

The article highlights the development of advanced nuclear technologies aimed at supporting a flexible, low-carbon energy system. The combination of the Fluoride-Salt-Cooled High-Temperature Reactor (FHR), the Nuclear Air-Brayton Combined Cycle (NACC), and Firebrick Resistance-Heated Energy Storage (FIRES) is presented as an integrated solution capable of meeting variable electricity demand while maintaining base-load reactor efficiency.

FHR technology offers significant advantages over conventional light-water reactors due to its high-temperature capability, improved passive safety, and higher power density. When coupled with NACC, the system can efficiently utilize modern gas-turbine technology. The addition of FIRES provides low-cost, high-temperature thermal storage, enabling the plant to store cheap off-peak electricity and generate additional power during peak demand. This makes the system competitive with, and in some cases superior to, existing energy storage technologies such as batteries or pumped hydro.

The integrated FHR–NACC–FIRES configuration supports grid stability in systems with high penetration of intermittent renewable sources such as wind and solar. It enables dispatchable, zero-carbon electricity while enhancing nuclear

plant economics by 50–100%. Furthermore, the design reduces the risk of major fuel failures, improving overall safety.

Although several engineering challenges remain—such as high-temperature materials, long-duration thermal storage integrity, and turbine operation under variable conditions—the article concludes that these obstacles are solvable with current and near-term technology.

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ALOE EXTRACT, FACTORS OF THE RAPID ONSET OF THE STAGE OF SCARING IN ZOOONOUS LEISHMANIASIS

Abstract: *The study examined the efficacy of aloe extract in the topical application of zoonotic leishmaniasis. To date, specific drug prevention of leishmaniasis has not been developed. One of the important problems in dermatology is the search for effective, low-toxic agents and methods of therapy for cutaneous leishmaniasis, since the drugs used have cardio-, hepato-, and nephrotoxicity. Aloe is known as a medicinal plant. The enhanced antimicrobial properties of aloe vera are attributed to aloe-emodin, present in aloe latex, in the exudate of the aloe plant, which has antibacterial, antifungal and antitumor effects. Aloe vera is well known for its antioxidant, anti-inflammatory, anti-diabetic, pain relieving, immune, anti-aging, and anti-cancer properties.*

Keywords: *aloe extract, apoptosis, promastigotes, in vitro, in vivo, Leishmania major.*

Introduction

The prevalence of leishmaniasis is one of the highest among diseases of parasitic etiology. Annually, up to 1 million people worldwide are affected (1).

The causative agent of cutaneous leishmaniasis was first identified in 1898 in Tashkent by P.F. Barovsky (2). In 1898, P. F. Borovsky precisely determined the systematic position of Leishmania, assigning it to the simplest. Many articles describe the causative agent, which the authors classify as protozoa, close to trypanosomes (3).

By the beginning of the 20th century, various burning and binding agents had become widespread: calcined iron and caustic potassium (Heidenreich), chromium (Cherepnin), lapis (Rapchevsky), lactic acid (Manotskov, Shulgin), zinc chloride (Myshkin, Satinsky) (Dobrotvorskaya N.V. 1940). E. I. Marcinovsky also used a surgical treatment method, removing "under cocaine" the ulcers and scabies in four patients, and after a few days, complete healing occurred. There were no relapses." (4). Professor V. L. Yakimov wrote in 1913 that there is no specific treatment for cutaneous leishmaniasis (5). In world health practice, according to WHO recommendations from 2010, for specific treatment of cutaneous leishmaniasis, five-valent antimony preparations (6), anti-tumor agent for local

use: Miltefozin (Impavido, Paladin - Canada), antibacterial drugs: Amphotericin B, Ambisom are used; Paromomycin (India), Monomycin (Uzbekistan), preparations of non-specific, auxiliary action: antiseptics, the action of which is aimed at combating a secondary infection that has joined (7)

In this regard, the publications of authors who empirically treated patients with antibiotics of various pharmacological groups are valuable. These are doxycycline (8) and cefotoxime (Claphoran - 3rd generation cephalosporin) (9). At the same time, data on preclinical studies of these drugs are absent in the literature. Considering that cefotoxime (Claphoran) is an imported drug (France), studying the domestic antibiotic of the same group - ceftriaxone in vitro and in vivo is relevant for research aimed at import substitution. The universal drug for treating leishmaniasis is 5-valent antimony. Therefore, meglumine antimonate (glucanthym) can be used as a control when evaluating the effectiveness of other drugs.

Studies by foreign specialists indicate that the etiological factor of the disease may not be the leishmania itself, but the virus present in them (LRV - leishmanial RNA virus) discovered in 1988 in a patient infected with L. Guyanensis (10). Later, it was found in L. braziliensis and indicated a connection with the more severe course of CL, up to the development of cutaneous-mucosal leishmaniasis (11). When hamsters were infected with LRV-containing leishmania, a strong inflammatory response was noted due to an increase in the level of IFN-β, as well as an increase in the survival of parasites with the virus (12).

In 1928, it was reported that patients with cutaneous leishmaniasis were treated with autohemotherapy without effect (2).

Aloe is known as a medicinal plant. The enhanced antimicrobial properties of aloe vera are attributed to aloe-emodin, present in aloe latex, in aloe plant exudate, which has antibacterial, antifungal, and antitumor effects (13).

Aloe has been used for traditional medical purposes in several cultures. In vitro A. vera extracts stimulate the proliferation of several cell types. Many studies have shown that treatment with A.vera gel extracts leads to faster wound healing, can have a direct effect on the wound healing process as a whole, which is manifested in an increase in the rate of wound healing and an increase in collagen synthesis. (14).

Aloe vera is well-known for its antioxidant, anti-inflammatory, antidiabetic, analgesic, immune, anti-aging, and anti-cancer properties (15).

The plant's various parts contain about 75 nutrients, as well as 200 active compounds, including amino acids, sugars, enzymes, vitamins, minerals, saponins, anthraquinones, lignin, and salicylic acid (16). Volatile components and ascorbic acid are present in the flowers, while polysaccharides, lignin, pectin, hemicellulose, and cellulose are present in the bark. Similarly, leaves are a source of various organic acids, enzymes, phenolic compounds, minerals, and vitamins (17).

Aloe vera as an ingredient is defined as a preparation that maximizes desired components while maintaining them in active and unchanged form,

minimizes the number of ingredients that have negative effects, retains benefits, and is present in the final product in quantities sufficient to achieve desired results. (18.21)

A number of antioxidants, such as alpha-tocopherol, carotenoids, ascorbic acid, flavonoids, tannins, vitamins C and E, are present in aloe vera (19,20). Many authors report the antioxidant potential of aloe vera extracts (leaves and flowers). (21, 22, 23).

Due to its unique composition, various industrial applications of aloe vera began to be used. This article briefly describes the therapeutic use of aloe vera, as well as its application in the local treatment of skin leishmaniasis.

Purpose of the research

The purpose of this study was to assess the effect of aloe vera leaf exudate on Leishmania major in the affected areas.

Evaluate the clinical and laboratory changes in local treatment of zoonotic leishmaniasis with aloe extract.

Research materials and methods: 50 inpatient records of sick children, men, and women with zoonotic leishmaniasis were studied for 2 months, with an average age ranging from 3 to 56 years. Patients complained of necrotic foci, leishmaniomas accompanied by an increase in regional lymph nodes and lymphangitis (usually painless), and wounds complicated by purulent infection with the development of phlegmon and sarcoma. Microscopic examination of wound material was carried out to diagnose Borovsky's carcass. Positive parasitological indicators were identified in all patients.

To assess the geometric model, patients with zoonotic leishmaniasis (Karakul district) were divided into 2 groups based on the course of the disease and the method of using aloe extract. Patients of the 1st group (main group) Study the effect of aloe extract when applied 4 times locally for 20 days in patients with wound size from 0.5 to 2 cm and more and with complications in regional lymph nodes.

Results and discussions

In the 1st group (32 individuals), wound size ranged from 0.5 to 2 cm and larger, with regional lymph node complications.

The remaining patients of the 2nd group, regardless of the size of the wound, received traditional therapy. Normal epithelialization of wounds with almost perfect smooth scars occurred in 2 people in the 1st group and in 1 person in the 2nd group.

The following results were obtained after 20 days of application of aloe extract. Changes in wound geometry among patients with leishmaniasis (patients of the 1st group) were detected in the largest number of patients with a weakly expressed atrophic scar formation in 21.9% of cases (7 people). A scar with keloid-like growths was identified in an equal number of patients - 31.3% (10 people). In 47% (10 people) of patients, scars with abscesses: in the center, a scarring of irregular shape is located, surrounded on the periphery by small scars caused by seed bumps, and scars with keloid-like growths were identified in 28%

(3 people). Patients of the 2nd group (control group) received traditional therapy in 22.22% (4 people) with mildly expressed atrophic scars, with keloid-like growths in 26.66% (3 people), the remaining patients who had not yet begun epithelialization during the study were 55.5% (10 people).

The following results were obtained that the timing of cleansing and healing of leishmaniasis wounds depends on the clinical form of the disease.

Comparative results of local application of aloe extract in patients with CL. In patients of the 1st group who used the aloe extract, the scarring process began on the 16th-20th day, in patients of the 2nd group, the scarring process began after 2 months of traditional treatment.

Conclusion

Cutaneous leishmaniasis is a significant, potentially modifiable risk factor for enlargement of the geometric boundaries of wounds, which in turn increases the area of the scar. Thus, the increase in scar size is a more significant factor in the formation of the social complex. Local application of aloe extract showed that the use of this compound in the initial stages of CL wound formation reduces the size of the lesion.

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ARTEMIYA SALINA NI LABORATORIYA SHAROITIDA DENGIZKO‘L SUVLARIDA KO’PAYTIRISH

Annotatsiya: *Dengizko’l suv havzasi turli qismdagi suv havzalari uchun Artemiya mayda qisqichbaqasimonni morfologik xususiyatlari,sistematik tahlili ularning o‘rganilganlik darajasi ,uning suv havzasida uchrovchi boshqa zooplanktonlaridan nisbatan farqlar borligi aniqlanish uchun namunalar yig‘ilib labaratoriya sharoitida ko’paytirib ularning xususiyatlari haqida ma’lumotlar keltirilgan.*

Kalit so‘zlar*. Buxoro viloyati , Dengizko’l suv havzasi, mayda qisqichbaqasimonlar, namunalar ,konturlar, A. salina, turlari, sistalar,*

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PRODUCING ARTEMIA SALINA IN LAKE WATERS UNDER LABORATORY CONDITIONS

Abstract*: The morphological characteristics of the small crustacean Artemia for different parts of the Dengizkul water basin, their systematic analysis, the level of their study and contours, and their differences from other zooplankton found in the water basin were determined by collecting samples and multiplying them in laboratory conditions. Data on their properties are presented*

Keywords*: Bukhara region, Dengizkul water basin, small crustaceans, specimens, contours, A. salina, species, cysts,*

Kirish

Hozirgi kunda tabiiy oziq-ovqat mahsulotlariga bo‘lgan talab va ehtiyojlarining ortishi, sun'iy mahsulotlardan ahamiyati va qiymati yuqoriligi bilan ajralib turadi.Tabiiy va hovuz xo‘jaliklarida ayniqsa baliqlar uchun ozuqa bazasining ozligi o’z navbatida ularning taqchilligi olib kelishi barchamizga ma'lum. Dunyo akvakulturasida birgina 2020 - yilda 75-80 million tonnadan ortiq yetishtirilgan baliqlarni ozuqa bilan ta’minlashmasalalari bo‘yicha bir qator tadqiqot ishlari olib borilmoqda, (FAO, 2020)[1]. Respublikamizda daryolar oqimining to‘liq boshqarilishi va suv quyilishining kamayishi natijasida Dengizko‘l suv havzasining maydoni keskin qisqarib, suvining sho‘rligi oshib ketdi. Natijada, zooplankton va ayrim qisqichbaqasimonlar son jihatdan kamaygan bo’lsa, ba’zi qisqichbaqasimonlar vakillarining rivojlanishi uchun (Artemiya salina) sharoit paydo bo‘ldi. Shu nuqtai nazardan, mazkur istiqbolli bioresurslarning shakllanishi, uni laboratoriya va sanoat usulida tayyorlash, baliqchilikda foydalanish bo‘yicha muayyan darajada ilmiy tadqiqot ishlari amalga oshirildi. 2022-2026 yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasida “suv zahiralarini boshqarish tizimini tubdan isloh qilish” “chorvachilik mahsulotlari ishlab chiqarish hajmini 1,5-2 hissa oshirish” shuningdek, eksportga mo‘ljallangan mahsulotlarni yetishtirish va eksport salohiyatini oshirish”[1]bo‘yicha vazifalar belgilab berilgan. Ushbu vazifalarni amalga oshirishda mazkurb kol suvlarida yasdhashga moslashgan zooplanktonlarni va qo’shimcha obyekt sifatida Artemiyasalina qisqichbaqasimonlarini labaratoriya sharoitida ko’paytirib , baliq chavoqlarini yetishtirishda qo‘llash va tabiiy bioresurslaridan foydalanish hisobiga baliqlar samaradorligini oshirishda muhim ilmiy- amaliy ahamiyat kasb etadi. 2017 yil 7 fevraldagi O‘zbekiston Respublikasi Prezidentining PF- 4947-son «O‘zbekiston respublikasini yanada rivojlantirish bo‘yicha Harakatlar strategiyasi to‘g‘risida» gi Farmoni va 2017-yil 21-apreldagi O‘zbekiston Respublikasi Prezidentining “O‘zbekiston Respublikasi Ekologiya va atrof muhitni muhofaza qilish davlat qo‘mitasi faoliyatini ta’minlash chora-tadbirlari to‘g‘risida” PQ–2915-son qarori va «Suv resurslaridan foydalanish samaradorligini oshirish chora-tadbirlari to‘g‘risida»gi 2018 yil 2 iyuldagi PQ-3823-son qarorlari, 2017 yil 13 sentabrdagi 719-son O‘zbekiston Respublikasi Vazirlar Mahkamasining «Baliqchilik tarmog‘ini kompleks rivojlantirish chora-tadbirlari to‘g‘risida»gi qonunda ham bir qancha ilmiy ishlar yoritilgan [2]

Morfologiyasi va biologik xususiyatlari Tasnifi

-Bo‘lim: Crustacea (qisqichbaqasimonlar)

- Sinfi: Branchiopoda
- Oilasi: Artemiidae
- Jinsi: Artemia
- Eng ko‘p uchraydigan turi: Artemia salina

Artemiya (lot. Artemia salina) — asosan sho‘r va o‘ta sho‘rlangan suv havzalarida tarqalgan mayda qisqichbaqa turidir. Artemiya qadimdan biologiya, ekologiya va baliqchilik sohalarida muhim obyekt sifatida o‘rganib kelinmoqda.

Ular o‘zining yuqori moslashuvchanligi, tez ko‘payishi va oziqaviy ahamiyati bilan ajralib turadi.Artemiya tanasi uzunchoq, shaffof va 8–12 mm atrofida bo‘ladi. Ular: 11 juft oyoqchalarga ega, bu oyoqchalari yordamida nafas oladi va suvda harakatlanadi. Erkak va urg‘ochilari bir- biridan aniq farqlanadi. Erkaklarining oldingi oyoqlari juft qisqichlarga aylangan bo‘ladi.Artemiyalar tuxum (sista) holida uzoq vaqt, hatto yillar davomida noqulay sharoitga chidab yashay oladi.[3]

Tarqalishi

Artemiya asosan: O‘zbekiston, Qozog‘iston, Xitoy, Rossiya, AQSh, Peru Eron kabi mamlakatlarning sho‘r ko‘l va suv havzalarida uchraydi. O‘zbekistonda Artemiya ko‘proq Dengizko‘l, Sho‘rko‘l, Aydarko‘l kabi suv havzalarida kuzatiladi.

Muammoning o‘rganilganlik darajasi

Artemiyani o‘rganishda dunyoning turli hududlarida chet el olimlaridan. Patrick Sorgeloos (Ghent University, Belgia) — Artemia akvakultura va biologiyasini,T. J. Abatzopoulos (Gretsiya) — Artemia taksonomiyasi va genetikasi bo‘yicha , Robert A. Browne (AQSh) — Artemia biologiyasini mukammal o‘rgangan, Gilbert Van Stappen (Belgiya) — Artemia inkubatsiyasi va sifat nazorati bo‘yicha bir qator tadqiqot ishlarini amalga oshirgan. Balushkina E.V., Golubkov S.M., Golubkov M.S., Litvinchuk L.F., Shadrin N.V. (2009) Qrimning sho'rlangan ko'l ekotizimlarining tarkibiy va funktsional tashkil etilishiga abiotik va biotik omillarning ta'siri. General jurnali Biologiya [Jurnal obshchei biologii], 70(6): 504-514 (rus tilida)][4] Kovacheva N.P., Litvinenko L.I., Saenko E.M., Jigin A.V., Kryaxova N.V., Semik A.M. (2019) Rossiyada akvakultura artemiyasining hozirgi holati va istiqbollari. Trudy VNIRO, B-150-171[5].Bundan tashqari Eronda (Urmia University, Razi University), Ocean University of China), Hindistonda (Unit of Aquaculture & Cryobiology, Department of Zoology, University of Madras) AQSHda (Iowa State University), Xitoyda (Institute of Evolution and Marine Biodiversity, Ocean University of China), Eronda (Urmia University, Razi University), Hindistonda (Unit of Aquaculture & Cryobiology, Department of Zoology, University of Madras) kabi universitetlarning olimlari tomonidan o‘rganilgan.

MDH mamlakatlarida ham artemiya populyatsiyalarini o‘rganish bo‘yicha ham bir qator tadqiqotlar olib borilgan. Ushbu ishda Yevroosiyoning shimoliy qismidagi suv havzalarida (G‘arbiy Sibir, Qrim, Orol) yashovchi Artemia populyatsiyalarining xilma- xilligi o‘rganilgan. Rossiya hududidagi Janubiy Sibir, Jumladan, L.I.Litvinenko, A.I.Litvinenko, Ye.G.Boyko (2009), , D.A.Starovoytova, O.S.Burmistrova (2017) kabi olimlar tadqiqotlar olib borishgan.O‘zbekistonda A.K.Musayev 2020 I.M.Mirabdullaev 2021, Artemiya zooplanktonining tavsifi miqdorining ortishi bilan ularni labaratoriya sharoitida ko’paytirish, sanoat miqyosida tayyorlash bo‘yicha bir qator ishlar aytib o‘tilgan. Utemuratova Feruza Jumamuratovna Orol Dengizi Artemiya Populyatsiyalaridan Baliqchilikda Foydalanishning Biologik Asoslari dissertatsiyasida aytib o‘tilgan.

Bizning tadqiqotning maqsadimiz Dengizko‘l suv havzasidagi suvlarda

artemiya qisqichbaqasimonini ko‘paytirish va baliq chavoqlarini yetishtirishda foydalanishning biologik asoslarini aniqlashdan Artemiya salinani labaratoriya sharoitida ko‘paytirishdan ibarat.

Tadqiqot materiallari va uslublari

Tadqiqot obyekti Dengizko‘l suv havzasi bo‘lib**,** Dengizko‘l O‘zbekiston Respublikasining janubi-g‘arbida, Buxoro viloyatining Olot tumanida, Buxoro shahridan 75 km uzoqlikda, Turkmaniston bilan chegaradosh , Olot tumani markazidan 40 km shimoli-g‘arbda joylashgan Dengizko’l Buxoro viloyati tekisliklarining chuqur qismini egallaydi. Olimlarning ma’lumotlariga ko’ra Dengizko’l suv havzasining umumiy maydoni 35500 gektarni tashkil qilishi qayd etilgan bo’sa Mitropolskiyning 2020-yildagi ma’lumotiga ko’ra ,ko’lning maydoni 26000 gektardan iboratligi keltirilgan. SHodmonov F,Q o’rganishi bo’yicha ko’lning 2021-yil iyun oyidagi suv bilan qoplangan maydoni 25600 gektarni tashkil etilishi hozirgi kunga kelib 2025 yil aprel oyida olib borilgan tadqiqot ishlarida o’rganilganda 22300 gektarni tashkil etganligi ko’rildi. Dengizko‘l suv havzasining shakllanishida Zarafshon daryosi muhim rol o‘ynagan. Ko‘lga Zarafshon daryosining quyi irmog‘i Tayqir kelib quyilishi hozirgi kunda ko'lning asosiy suv manbai janubiy Olot kollektori hisoblanishi taqqiqot ishlari orqali o’rganilgan.

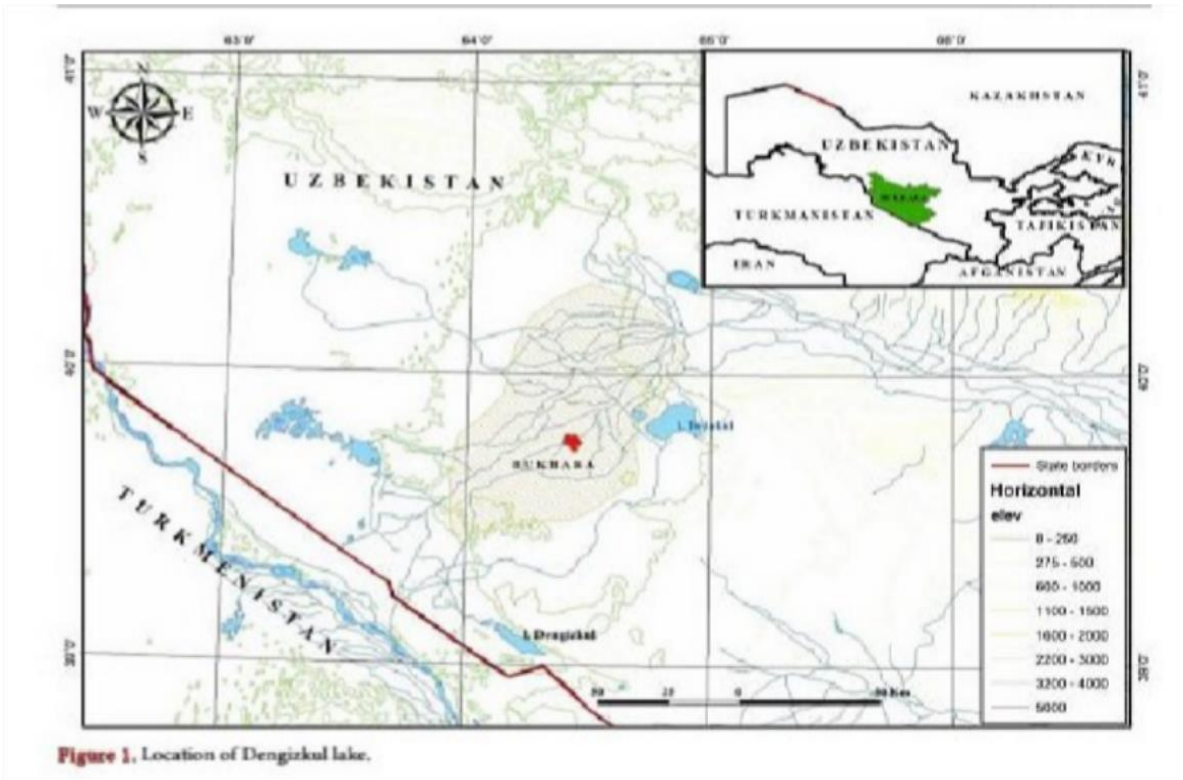
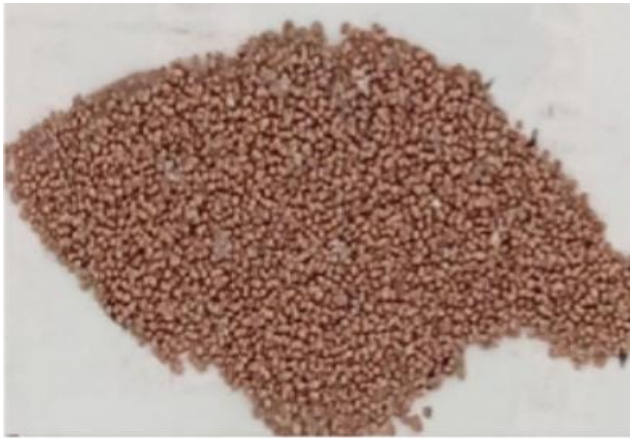
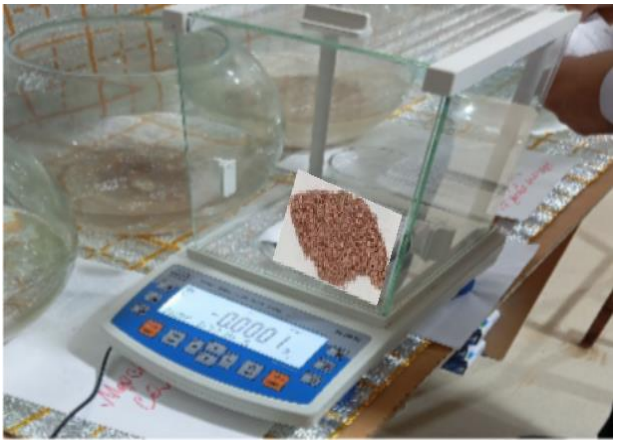


Figure 1. Location of Dengizkul lake.

1-rasm.Buxoro viloyati Dengizko’l suv havzasining xaritasi.

Tadqiqotning amaliy natijalari quyidagilardan iborat:

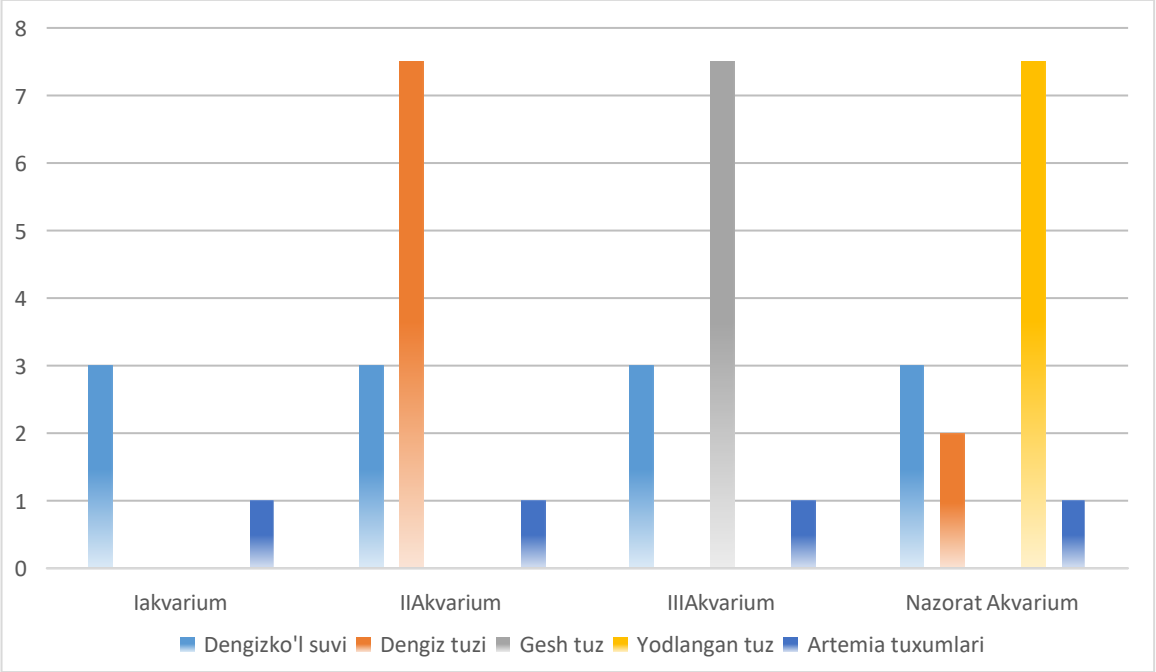




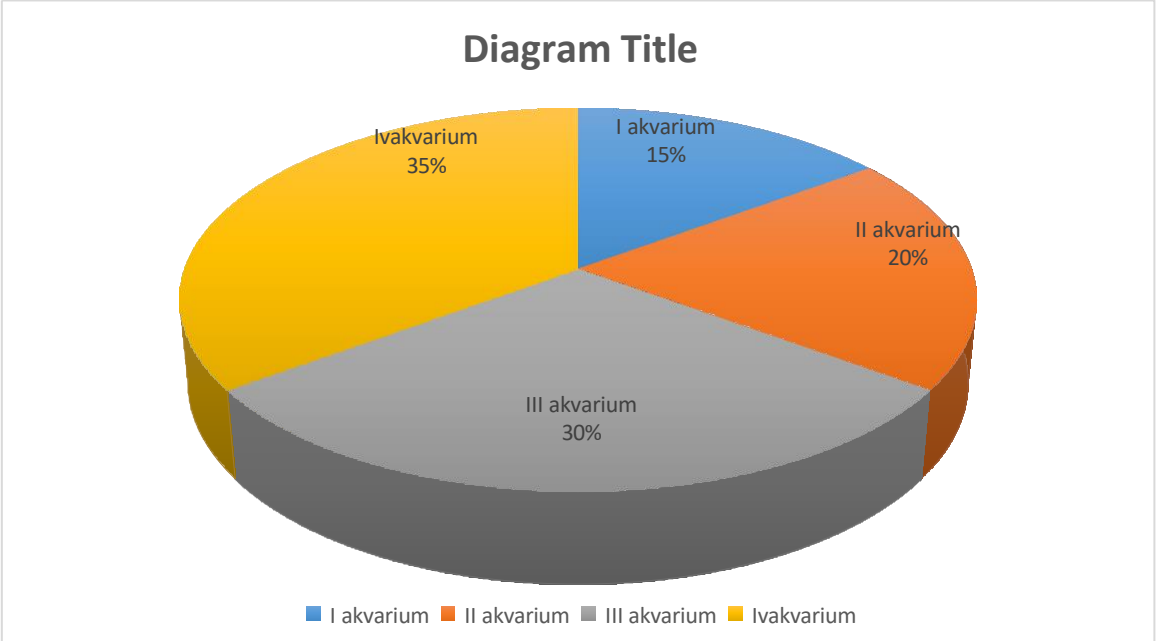
a **b**

2-rasm. Labaratoriyada sharoitida Artemiya tuxumlari va o‘lchash tajriba uchun olingan akvariumlarda ekish

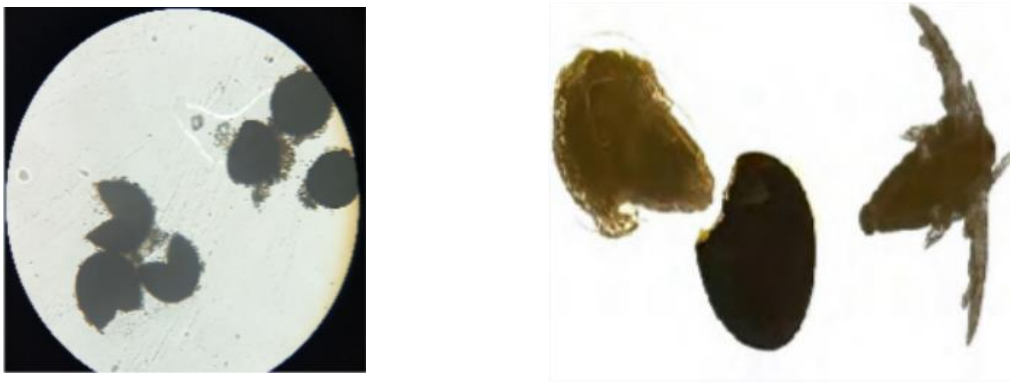
Artemia Salina tuxumlarini o‘lchab olganimizdan so‘ng ma‘lumotlarga asoslanib Artemiya Salina tuxumlari Dengizko‘l II kontur suvlariga ekildi. Bunda 1 litr ko‘l suviga 75 grdan uch xil tuz alohida –alohida yumaloq 5litr hajmli akvairumlarga (Har bir akvariumga uch litr suv 75 gr tuz) solindi.Akvariumlar raqamlanib nomlandi.1- 1Akvariumga faqat uch litr Dengizko‘l suvi va 1,0 gr Artemiya tuxumlari solindi.2- Akvariumga uch litr ko‘l suvi va 75 gr dengiz tuzi 3-Akvariumga uch litr ko‘l suvi va 75 gr Gesh tuzi 4-Akvariumga uch litr ko‘l suvi va 75 gr yodlangan osh tuzi solinib ularning har biriga 1,0 gr Artemiya tuxumlari solindi



Labaratoriya xonasining harorati 24-25C, suv harorati 18-22C holatda bo‘lib turishi ta‘minlab turildi. Yorug‘likning 150 lokusdan bo‘lishi 24 soat davomida ta‘minlandi. 1- Tajriba Dengiz tuzi solingan variantdagi tuxumlar 1,5 sutkada 2-Tajriba Gesh tuzi solingan variantdagi tuxumlar 2-kundan keyin 3-Tajribada Osh tuzi solingan variantdagi tuxumlar 2,5 sutkadan so‘ng lichinkalar yorib chiqqanligi ko‘rildi.Nazorat variantlaridagi esa 3,5-4 kundan keyin qisqichbaqa lichinkalari chiqa boshladi



31.05.2025yilda nazorat variantdagi suvga Artemiya tuxumlari solindi va uning yorib chiqish muddati 5-sutka davom etishi nazorat ostida tekshirib borildi. Buning uchun artemiya tuxumlari analitik taroziga 1gr o‘lchab olindi va 1grda tuxumlar sanaldi 0,05 grda 3600ta 1gr da 7200ta tuxumlar borligi ko‘rildi.Nazorat va tajriba variantdagi artemiyalar har kuni 10 mldan Xlorella vulgaris bilan oziqlantirib borildi va natijalar yozib olindi.

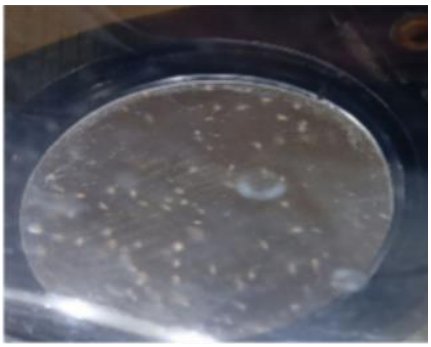


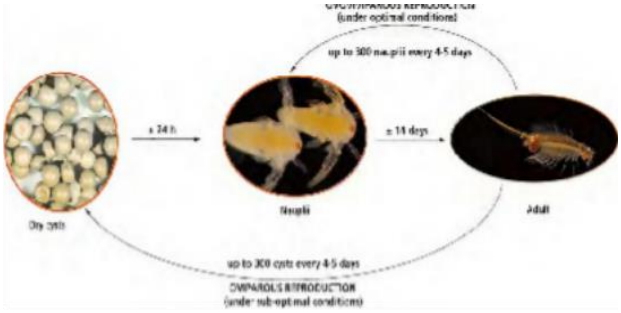
A **B**

2- **rasm Artemiya Salinani sistalarida Dengizko‘l suv havzasi suvlarida 3,5-4 sutkada yorib chiqishi**

Tadqiqot natijalarining amaliy ahamiyati.

Dengizko‘l artemiya populyatsiyalarining baliqlar uchun qimmatbaho ozuqa ekanligining artemiya nauplilari o‘zining baliqchilik sifatlari bo‘yicha karp balig‘i chavoqlarini intensiv yetishtirishda foydalaniladigan mahalliy firmalar tomonidan ishlab chiqariladigan sanoat yemlaridan ustun ekanligi isbotlanganligi bilan izohlanadi. Artemiya lichinkalari baliq, qisqichbaqa va boshqa suv hayvonlari bolalari uchun eng samarali tirik ozuqa hisoblanadi.. Sanoat miqyosida: Artemiya tsistalari (quritilgan tuxumlari) xalqaro bozorda yuqori qiymatga ega bo‘lib, baliqchilik xo‘jaliklari uchun eksport qilinadi.





A **B**

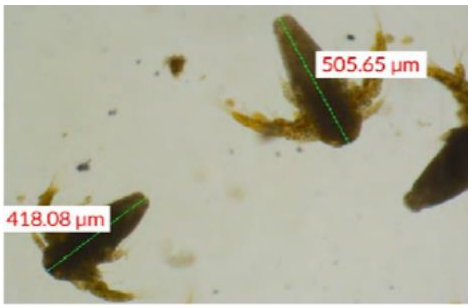
3- rasm

A-Nazorat variantidagi 96 soatda sistasi yorib chiqqan Artemiya Salinaning 14 kun holadidagi labaratoriya tahlili.

Bunga ko‘ra uning o‘lchami 403,57 mmni tashkil etdi.B

3- rasm.



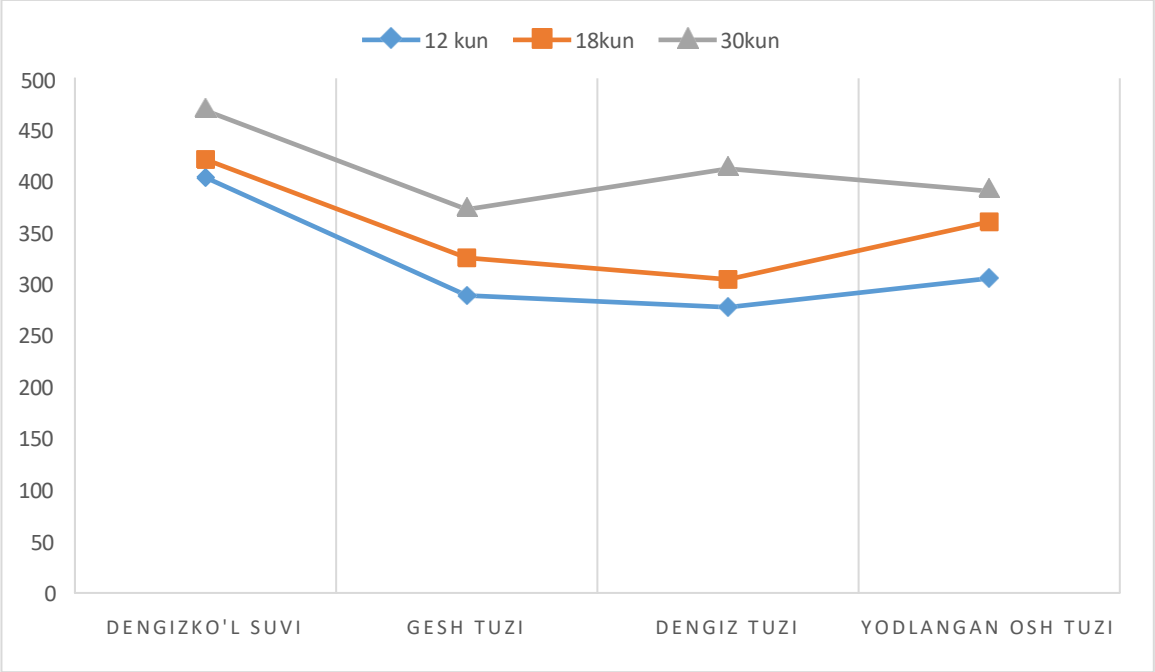


A **B**

4- rasm

A-Nazorat variantidagi Artemiya Salina 30kunlik o’lchami 468,66mm ga yetdi.labaratoriyada tekshirilganda dastlab o’sih jadalligi yuqori kun oshgan sari o’sish miqdori ham kamayib bordi.

B- Litvinenko L.I., Litvinenko A.I., Sorgeloos P., Marden B., VdovchenkoM.A.maqolalarida keltirilgan



Tahlil natijalariga ko‘ra Dengizko‘l suvida uning 12 kunlik,18 kunlik va 30 kunlik o‘sishi tekshirilgan vaqtda Dengizko'l suvi 12kunda 403,57mm 18 kunda 421,1mm ,30 kunda 468,66mmga tengligi Gesh tuzida 289mm, 325,55 mm va 372,60 mm,ekanligi Yodlangan osh tuzida 305,59 mm, 360,51 mm, hamda 390,33mm kattalikda bo‘lishi tekshirildi va nazorat variantdagi tahlil 4-rasmda ifodalandi

Xulosalar

Artemiya sho‘r suv havzalarida yashovchi noyob organizm bo‘lib, nafaqat tabiiy biogeotsenozda , balki iqtisodiy va ilmiy sohalarda ham katta ahamiyatga ega.

O‘zbekiston hududidagi Artemiyani o‘rganish va samarali foydalanish baliqchilikni rivojlantirishda muhim omillardan biri sanaladi. Artemia salina — o‘zining biologik xususiyatlari, yuqori moslashuvchanligi va iqtisodiy ahamiyati bilan alohida ahamiyat kasb etuvchi mayda qisqichbasimon hisoblanadi. O‘zbekiston suv havzalarida ushbu turni o‘rganish, ularni ko‘paytirish va samarali foydalanish baliqchilik xo‘jaliklari uchun istiqbolli yo‘nalishlardandir.Tadqiqot natijalari so‘ngida artemiya sistalari sharsimon shaklda bo‘lishi ularning tinim davridagi holati tuxumdan yorib chiqish muddati va o’sish jadalligi o‘rganildi.SHuni ayta olamanki Dengizko‘l suv havzasi suvlarida ushbu turni ko‘paytirish mumkin.

Foydalanilgan adabiyotlar

1. 2022-2026 yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasida “suv zahiralarini boshqarish tizimini tubdan isloh qilish” “chorvachilik mahsulotlari ishlab chiqarish hajmini 1,5-2 hissa oshirish” shuningdek, eksportga mo‘ljallangan mahsulotlarni yetishtirish va eksport salohiyatini oshirish”

2- O‘zbekiston Respublikasi Prezidentining 2017 - yil 1 - maydagi PQ-2939- son

“Baliqchilik tarmog‘ini boshqarish tizimini takomillashtirish chora-tadbirlari to‘g‘risida”[2]gi qarori, shuningdek, O‘zbekiston Respublikasi Prezidentining 2018 - yil 6 - apreldagi “Baliqchilik sohasini jadal rivojlantirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”gi №3657-son qarori
3- Van Stappen, G., Sorgeloos, P. & Rombaut, G., eds. 2024. Manual on Artemia production and use. FAO Fisheries and Aquaculture Technical Papers, No. 702. Rome, FAO. https://doi.org/10.4060/cd0313en
4- Balushkina E.V., Golubkov S.M., Golubkov M.S., Litvinchuk L.F., Shadrin N.V. (2009)Qrimning sho'rlangan ko'l ekotizimlarining tarkibiy va funktsional tashkil etilishiga abiotik va biotik omillarning ta'siri. General jurnali Biologiya [Jurnal obshchei biologii], 70(6): 504-514 (rus tilida)]
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6- Litvinenko L.I., Litvinenko A.I., Boyko E.G. (2009) G'arbiy Sibir ko'llarida artemiya. Novosibirsk, Nauka, B-304-308.
7- A.K.Musayev I.M.Mirabdullaev artemiya populyatsiyalar holatiga baho berish artemiya sistalari

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SIRKULYAR IQTISODIYOTNING ZARURIYATI VA AHAMIYATI

Annotatsiya*: Sirkulyar iqtisodiyot zamonaviy iqtisodiy taraqqiyotning barqaror yo‘nalishlaridan biri bo‘lib, u ishlab chiqarish va iste’mol jarayonlarida resurslardan oqilona foydalanish, chiqindilarni minimallashtirish hamda materiallar aylanishini ta’minlashni nazarda tutadi. Ushbu konsepsiya an’anaviy “chiziqli iqtisodiyot” modelidan tubdan farq qiladi. Chunki chiziqli tizimda resurslar “olish–ishlatish–tashlash” asosida sarflansa, sirkulyar iqtisodiyotda “qayta ishlash–qayta foydalanish–qayta tiklash” tamoyillari ustuvor ahamiyat kasb etadi. Shuningdek, ushbu model ekologik barqarorlikni mustahkamlash, resurs taqchilligi xavfini kamaytirish, yashil iqtisodiyotni rivojlantirish va yangi biznes imkoniyatlarini yaratishda muhim o‘rin tutadi. Demak, sirkulyar iqtisodiyot nafaqat ekologik xavfsizlikni, balki iqtisodiy samaradorlik va ijtimoiy farovonlikni ham ta’minlovchi zamonaviy mexanizm sifatida dolzarb ilmiy-amaliy ahamiyatga ega.*

Kalit so'z: *Sirkulyar iqtisodiyot, Chiziqli iqtisodiyot, Barqaror rivojlanish, Resurslardan samarali foydalanish, Chiqindilarni kamaytirish, Qayta ishlash, Qayta foydalanish, Qayta tiklash (regeneratsiya), Ekologik xavfsizlik, Yashil iqtisodiyot, Innovatsion texnologiyalar, Ijtimoiy farovonlik.*

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THE NECESSITY AND IMPORTANCE OF THE CIRCULAR ECONOMY

Abstract: *The circular economy is one of the most significant directions of modern sustainable economic development. It aims at the rational use of resources, minimization of waste, and ensuring the closed-loop circulation of materials within production and consumption systems. Unlike the traditional linear economy model, which follows the “take–make–dispose” pattern, the circular economy emphasizes the principles of “reuse–recycle–regenerate.” This paradigm shift plays a crucial role in strengthening ecological sustainability,*

reducing the risks of resource scarcity, promoting the transition towards a green economy, and fostering new business opportunities. Therefore, the circular economy should be considered not only as an ecological necessity but also as a key mechanism for enhancing economic efficiency and ensuring long-term social well-being, which underlines its strong scientific and practical relevance.

Keyword: *Circular economy, Linear economy, Sustainable development, Efficient use of resources, Waste reduction, Recycling, Reuse, Regeneration, Environmental safety, Green economy, Innovative technologies, Social well-being.*

Kirish

Sirkulyar iqtisodiyot bugungi kunda global iqtisodiy taraqqiyotning muhim yo‘nalishlaridan biri sifatida dolzarblik kasb etmoqda. An’anaviy chiziqli iqtisodiyot modeli – “olish–ishlatish–tashlash” tamoyiliga asoslangan bo‘lib, u tabiiy resurslarning tezkor tugab borishi, chiqindilar hajmining ortishi va ekologik muammolarning chuqurlashuviga olib kelmoqda. Aksincha, sirkulyar iqtisodiyot konsepsiyasi resurslardan oqilona foydalanish, chiqindilarni minimallashtirish, qayta ishlash va materiallar aylanishini ta’minlash orqali barqaror rivojlanishni qo‘llab-quvvatlaydi.

Sirkulyar iqtisodiyotning zaruriyati nafaqat ekologik barqarorlikni ta’minlash, balki iqtisodiy samaradorlik, yangi innovatsion yechimlar va ijtimoiy farovonlikni mustahkamlash bilan ham izohlanadi. Shu bois mazkur mavzuning ilmiy jihatdan o‘rganilishi O‘zbekiston iqtisodiyotining yashil transformatsiyasi, resurslardan samarali foydalanish siyosati hamda xalqaro tajriba asosida yangi iqtisodiy mexanizmlarni ishlab chiqishda muhim ahamiyatga ega.

Metodlar

Mavzuni o‘rganish jarayonida ilmiy abstraksiya, qiyosiy tahlil, induktiv va deduktiv yondashuv, sistemali yondashuv kabi tadqiqot metodlaridan foydalanildi:

Tadqiqot davomida sirkulyar iqtisodiyotning dolzarbligi va uning iqtisodiy-ijtimoiy ahamiyati chuqur tahlil qilinib, quyidagi natijalar aniqlandi:

Resurslardan samarali foydalanish bu sirkulyar iqtisodiyot an’anaviy chiziqli modelga nisbatan resurslarni 30–40% tejamkor ishlatish imkonini beradi. Bu, ayniqsa, tabiiy boyliklari cheklangan davlatlar uchun strategik ahamiyat kasb etadi.

Qayta ishlash, qayta foydalanish va regeneratsiya mexanizmlari chiqindilar hajmini keskin kamaytiradi va bu esa ekologik barqarorlikni mustahkamlashga xizmat qiladi.

Iqtisodiy samaradorlik bu sirkulyar iqtisodiyot innovatsion texnologiyalar va yashil investitsiyalarni rag‘batlantirishi orqali yangi biznes modellarini yuzaga keltirish bilan yalpi ichki mahsulotning o‘sish sur’atlari barqaror bo’ladi.

Ijtimoiy ta’siri bu yangi ish o‘rinlari yaratilishi, aholining ekologik madaniyatini oshirish va yashash sifati yaxshilanishida yuzaga chiqadi.

Xalqaro tajriba bo’yicha rivojlangan mamlakatlarda sirkulyar iqtisodiyot siyosati barqaror rivojlanish strategiyasining asosiy tarkibiy qismiga aylangan

bo‘lib, O‘zbekistonda ham bu tajribani bosqichma-bosqich joriy etish maqsadga muvofiq bo’ladi.

Munozaralar

Zamonaviy global iqtisodiy taraqqiyot jarayonlari insoniyat oldiga tubdan yangi talablarni qo‘ymoqda. XXI asr sharoitida iqtisodiy faoliyatni amalga oshirishda an’anaviy chiziqli model tobora ko‘proq tanqidlarga uchramoqda va cheklovlarga duch kelmoqda. Buning sababi – tabiiy resurslarning taqchilligi, ekotizimlarning degradatsiyasi bo’lishi, iqlim o‘zgarishi va aholi sonining yuqori sur’atlar bilan o’sib borishi natijasida xomashyolarga va tabiiy resurslarga bo‘lgan ehtiyojning keskin ko‘payishi hisoblanadi.

Shu bois barqaror rivojlanishni ta’minlovchi yangi paradigma – sirkulyar (aylanma) iqtisodiyot konsepsiyasi – global jamiyat kun tartibining markaziy nuqtasidan joy olmoqda. Barqaror rivojlanish tushunchasi o‘z mazmunida iqtisodiy o‘sish va farovonlik bilan bir qatorda ekologik xavfsizlikni ta’minlashni, jamiyatning ijtimoiy farovonligini oshirishni va tabiiy resurslardan oqilona foydalanishni ham mujassam qiladi. Aynan shu jihatdan, iqtisodiy taraqqiyotning yangi yo‘nalishlari sifatida yashil iqtisodiyot va sirkulyar iqtisodiyot modellari bugungi kunda dolzarb ahamiyat kasb etmoqda.

Barqaror rivojlanishni ta’minlash uchun, ya’ni iqtisodiy taraqqiyot, ekologik xavfsizlik va aholi turmush darajasini yaxshilashni ko‘zda tutuvchi taraqqiyot borasida globallashuv muntazam avj olib borayotgan davrda o’zgacha rivojlanish paradigmasi zarur bo’lmoqda. Shu bois bugungi kunda dunyoda an’anaviy iqtisodiy model qayta ko‘rib chiqilmoqda va tobora kengroq rezonans qozonayotgan yangi paradigmaga – sirkulyar iqtisodiyot konsepsiyasiga asoslangan rivojlanishga e’tibor muntazam ortib bormoqda. Chunki bu iqtisodiyotning bosh vazifasi – mahsulot yoki xizmatning hayotiy siklidagi har bir bosqich va jarayon samaradorligini maksimal darajaga yetkazish qaratilgan. Shu bois uning ustuvor yo‘nalishlaridan biri – chiqindilarni qayta ishlatishga qaratilgan faoliyat hisoblanadi. Ko‘plab mamlakatlarda hozirgi iqtisodiy model “ol – ishlab chiqar – tashlab yubor” tamoyiliga asoslangan chiziqli iqtisodiyot shaklida faoliyat olib boradi. Shu sababli an’anaviy model qayta talqin qilinmoqda va ko‘proq e’tibor “ol – ishlab chiqar – qayta foydalan” tamoyiliga asoslangan sirkulyar iqtisodiyot konsepsiyasiga qaratilmoqda.

Zero, sirkulyar iqtisodiyotning asosiy jihatlaridan biri bo’lgan yashil iqtisodiyot konsepsiyasi Iqtisodiy hamkorlik va taraqqiyot tashkiloti (OECD) tomonidan 2009-yilda “green growth” siyosati sifatida qabul qilingan bo‘lib, uning asosiy maqsadi 2030 va 2050-yilgacha bo‘lgan davrda iqtisodiy o‘sishni jarayonini ekologik cheklovlar bilan uyg‘unlashtirishdan iborat hisoblanadi.

Sirkulyar iqtisodiyotning asosiy afzalligi shundaki, u nafaqat tabiiy muhitni asrab qolishga, balki xomashyo va tabiiy resurslar iste’mol hajmini oshirmasdan iqtisodiy o‘sishga erishish uchun imkoniyat yaratib beradi. Chunki, bugungi kunda jahon miqyosida amaliy xarakterga ega bo’lgan “Chiziqli iqtisodiyot modeli (Linear economic model)” bu “ol – ishlab chiqar – tashlab yubor” tamoyiliga asoslangan bo‘lsa, “Sirkulyar iqtisodiyot modeli (circular economy model)da “ol –

ishlab chiqar – qayta foydalan” tamoyilini o’rtaga tashlaydi. Buning natijasi o’laroq ishlab chiqarish va iste’mol zanjirida chiqindilarni minimal darajaga tushirish va ularni imkon qadar to’liq qayta ishlash hamda mavjud salohiyatdan samarali foydalanishga sharoit yaratiladi.

Aksariyat tadqiqotchilar va mutaxassislarning fikr-mulohazalariga ko’ra, yopiq siklli iqtisodiyot modeli iqtisodiyot va tabiat o‘rtasidagi integratsiyani ta’minlovchi eng maqbul yondashuv tarzi yoki uyg‘unlikni topish yo’li hisoblanadi. Chunki ko’p asrlar davomida iqtisodiy faoliyati ko‘pincha tabiat bilan ziddiyatli va qarama-qarshi bo’lib kelganligi kuzatiladi. Qolaversa, bu ziddiyatda tomonlardan birini ustun qo‘yish ikkinchisining manfaatlariga zarar yetkazmasdan iloji yo‘q. Shu bois, tomonlar o’rtasida maqbul munosabatni va muvozanatni ta’minlash, qaysidir tomonning qo’pol ravishda mutlaq hukmronligiga yo’l qo’ymaslik eng ustuvor vazifa sifatida o’rtaga chiqmoqda. Aynan bunday yondashuv va harakatlar barcha tomonning manfaatiga xizmat qilishi hamda ratsional faoliyat bo’lishi amalda tasdiqlanmoqda. Shuning uchun bugungi kunda global miqyosda mavjud muammolarni hal qilish uchun iqtisodiy faoliyatning yangi yo‘nalishlariga o’tish dolzarb va zaruriyatga aylangan.

Zero, sirkulyar iqtisodiyotning amalda joriy etilishi mamlakatlarda ekologik muvozanatni tiklashga, resurslardan samarali foydalanishga, yangi ish o‘rinlarini va ishlab chiqarish tizimlarini yaratishga, ijtimoiy tabaqalashuvni kamaytirishga va turmush farovonligini oshirishga xizmat qiladi. Bugungi kunda Yevropa Ittifoqiga a’zo mamlakatlar, AQSh, Yaponiya, Janubiy Koreya va boshqa ko’plab rivojlangan mamlakatlar sirkulyar iqtisodiyot konsepsiyasini faol ravishda tatbiq etmoqda va tashviqot qilmoqda. Xususan, Yevropa Komissiyasi 2015-yilda “Circular Economy Action Plan” (Sirkulyar iqtisodiyot harakatlar rejasi) ni qabul qildi va uni 2020-yilda yangiladi. Mazkur hujjatga ko‘ra, Yevropa Ittifoqi 2050-yilgacha iqlim neytralligiga erishishni va resurslardan foydalanishda yopiq sikl modeliga o‘tishni ustuvor maqsad sifatida belgilagan. Ayni paytda, BMT, Jahon banki, Xalqaro valyuta jamg‘armasi kabi yirik xalqaro muassasalar ham sirkulyar iqtisodiyotning afzalliklariga va yutuqlariga urg’u berib kelmoqda.

Global jamiyatda sirkulyar iqtisodiyot nafaqat Yevropa yoki umuman taraqqiy etgan mamlakatlarda, balki butun dunyo bo‘ylab keng ko‘lamli tadqiqot qilinadigan va o’rganiladigan masalaga aylangan. Chunki, tadqiqotchi mutaxassislar va amaliyotchilar uni jamiyat rivojlanishi uchun potentsial strategiya sifatida ko’rmoqda. Chunki, mamlakatda aholi farovonligini oshirishi bilan bir qatorda mustaqil davlatlarning xomashyo va energiyaga resurslariga tobeligini umuman bartaraf qilishi yoki hech bo’lmaganda kamaytirishi mumkin. Ko‘plab biznesmenlar va tadbirkorlar sirkulyar iqtisodiyotni iqtisodiy o‘sishni rag‘batlantirish va foydani ko‘paytirish omili sifatida ko‘radilar.

Bundan tashqari, ko’plab milliy hukumatlar sirkulyar iqtisodiyot modeliga o‘tishning jozibadorligini, uning yangi ish o‘rinlari yaratishga va resurs sarfini qisqartirishga ta’sirini, iqtisodiy o‘sishdagi va atrof-muhitni muhofaza qilishdagi ijobiy rolini, ishlab chiqarish xarajatlarini kamaytirishdagi va raqobatbardoshlikni mustahkamlashdagi ahamiyatini inobatga olmoqda. Chunki, jahon jamoatchiligi

uuchun sirkulyar iqtisodiyot tabiatning ifloslanishini oldini olishga, biologik xilma-xillikning kamayishiga yo'l qo'ymaslikka, iqlim o'zgarishi muammosini bartaraf qilishga va o'sib borayotgan tengsizliklarga qarshi kurashda asosiy vosita bo'lishi mumkin. Biroq bunday muvaffaqiyatga erishish uchun bugungi kunda tabiat bilan iqtisodiyot o'rtasidagi barcha mavjud muammolarning ildiz sabablarini ko'rib chiqish zarur hisoblanadi. Chunki, har qanday mahalliy miqyosdagi faoliyat ham global o'zgarishlarga ta'sir ko'rsatishi mumkin. Shu sababli hukumatlarning, jamiyatlar, kompaniyalar va shaxslar darajasidagi hamkorlikka ehtiyoj mavjud bo'lib, bu sirkulyar iqtisodiyotni joriy etish hamda rivojlantirish uchun umumiy asos bo'lib xizmat qiladi va mutlaq ustuvor vazifa hisoblanadi.

O'zbekiston Respublikasida ham so'nggi yillarda yashil iqtisodiyot va sirkulyar iqtisodiyot tamoyillarini amaliyotga joriy etish bo'yicha muhim qadamlar tashlanmoqda. Xususan, 2019-yilda "Yashil iqtisodiyotga o'tish strategiyasi" qabul qilindi, unda 2030-yilgacha bo'lgan asosiy yo'nalishlar belgilab berildi. "Yashil iqtisodiyotga o'tish strategiyasi"ning 2-bobi birinchi bandida **"**Strategiyaning asosiy maqsadi mamlakatda amalga oshirilayotgan tuzilmaviy islohotlarga "yashil" iqtisodiyot tamoyillarini integratsiya qilish orqali ijtimoiy rivojlanishga, issiqxona gazlarining ajratmalari darajasini pasaytirishga, iqlim va ekologiya barqarorligiga imkon beruvchi mustahkam iqtisodiy taraqqiyotga erishishdan iborat" deb [26] belgilangan. Shuningdek, O'zbekiston Respublikasi Prezidentining "2030-yilgacha O'zbekiston Respublikasining "yashil" iqtisodiyotga o'tishiga qaratilgan islohotlar samaradorligini oshirish bo'yicha chora-tadbirlar to'g'risida"gi **(**2022-yil 2-dekabrdagi PQ-436-son) qaroriga 1-ilovasining 2-bob. "Yashil" o'sishning ustuvor yo'nalishlarining 2.4. Innovatsiyalarni joriy etish va samarali "yashil" investitsiyalarni jalb qilish bandida ustuvor vazifalar sifatida **"**butunjahon qiymat zanjirlarida ishtirok etish imkoniyatlarini kengaytirish va rag'batlantirish uchun siyosiy hamda institutsional islohotlarni amalga oshirish orqali davlat va xususiy investitsiyalarni jalb qilish" hamda ""yashil" iqtisodiyotga o'tish uchun innovatsion siyosat va milliy innovatsion tizimlarni takomillashtirish" ko'zda [27] tutilgan. Mazkur hujjatlar asosida mamlakatimizda sirkulyar iqtisodiyot tizimini rivojlantirish va "yashil" iqtisodiyotga o'tish, xususan, chiqindilarni qayta ishlash, qayta tiklanuvchi energiya manbalaridan samarali foydalanish, ekologik toza transport vositalarini joriy qilish kabi yo'nalishlarda sezilarli o'zgarishlar amalga oshirilmoqda.

Sirkulyar iqtisodiyotning zaruriyati global ekologik muammolarni hal qilish va resurslarni tejashda yotadi. U chiziqli iqtisodiyotdan farqli o'laroq, chiqindilarni resursga aylantirib, atrof-muhitni muhofaza qiladi va iqtisodiy o'sishni ta'minlaydi. Zero, sirkulyar iqtisodiyot biznes, jamiyat va atrof-muhit uchun manfaatli bo'lib, u

[26] O'zbekiston Respublikasi Prezidentining "2019 — 2030-yillar davrida O'zbekiston Respublikasining "Yashil" iqtisodiyotga o'tish strategiyasini tasdiqlash to'g'risida"gi (2019-yil 4-oktabrdagi PQ-4477-son) qaroriga 1-ILOVA

[27] O'zbekiston Respublikasi Prezidentining "2030-yilgacha O'zbekiston Respublikasining "yashil" iqtisodiyotga o'tishiga qaratilgan islohotlar samaradorligini oshirish bo'yicha chora-tadbirlar to'g'risida"gi **(**2022-yil 2-dekabrdagi PQ-436-son) qaroriga 1-ILOVA

yangi bozorlar ochilishiga, chiqindilar emissiyasi kamayishiga va barqarorlikni rag'batlanishiga xizmat qiladi. Faqat sirkulyar iqtisodiyotni samarali amalga oshirish uchun innovatsiyalar, yashil moliya va siyosiy qo'llab-quvvatlov talab etiladi. Chunki, barqaror jamiyatga o'tish uchun qo'shimcha harakatlar zaruriy hisoblanadi. Shuning uchun sirkulyar iqtisodiyot kelajakdagi iqtisodiy model sifatida muhim ahamiyatga ega va uni joriy etish bu boradagi global muammolarni hal qilishda ustuvor yo'nalish hisoblanadi.

Zamonaviy iqtisodiyotning barqaror rivojlanishi uchun sirkulyar iqtisodiyot modeli nafaqat dolzarb, balki muqarrar bo'lgan ustuvor yo'nalish hisoblanadi. U iqtisodiy o'sish va tabiat o'rtasidagi muvozanatni ta'minlashga qaratilgan bo'lib, davlatlar, biznes sektori, jamiyat va har bir shaxsning hamkorligini talab etadi. Shu jihatdan, ushbu sirkulyar iqtisodiyotning nazariy asoslarini, xalqaro tajribani va milliy iqtisodiyotdagi amaliy jihatlarni chuqur tahlil qilish hamda ilmiy to'xtamlarga kelish maqsadga muvofiq hisoblanadi.

Xulosalar

Olib borilgan tadqiqot shuni ko'rsatadiki, sirkulyar iqtisodiyot nafaqat ekologik muammolarni hal etishda, balki iqtisodiy samaradorlikni oshirish, resurs sarfini kamaytirish va ijtimoiy barqarorlikni ta'minlashda ham muhim ahamiyat kasb etadi. Shu bois, ular quyidagi ilmiy-amaliy xulosalarga olib keladi:

Milliy xo'jalikda sirkulyar iqtisodiyot konsepsiyasini joriy etish tabiiy resurslardan oqilona foydalanish va chiqindilarni minimallashtirishning eng samarali mexanizmlaridan biri hisoblanadi.

- Bu model iqtisodiyotning yashil transformatsiyasini tezlashtiradi, innovatsion biznes imkoniyatlarini kengaytiradi va yangi ish o'rinlarini yaratishga xizmat qiladi.
- O'zbekiston sharoitida sirkulyar iqtisodiyot tamoyillarini joriy etish va amalga oshirish ekologik xavfsizlikni, iqtisodiy raqobatbardoshlikni va aholining farovonligini oshirishda strategik ahamiyat kasb etadi.
- Ayni paytda, tadqiqot natijalari sirkulyar iqtisodiyotni milliy rivojlanish strategiyalariga chuqur integratsiya qilish va uyg'unlashtirish zarurligini ko'rsatmoqda.

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REPRODUCING THE TRAFFIC SCHEDULE ON ROUTE EIGHTEENTH IN NAMANGAN CITY

Anatation. *This article presents the work on the redevelopment of the timetable for route eighteenth in Namangan, cardinal improvement of the passenger transportation system in urban conditions, raising it to the level of modern requirements, improving transportation conditions, determining the direct and return bus routes in the volume of transportation by the hour, ensuring timely passage of buses, complete organization of work.*

Keywords: *Route, classification table, city bus, passenger traffic, traffic flow, bus capacity.*

Due to the economic reforms carried out in the country, the industry is characterized by a resumption of growth, a significant increase in the types and volume of services, further strengthening of the production and technical base, further expansion and growth of the network and structure of car service enterprises, a sharp increase in the number of private car companies operating in the form of small and medium-sized businesses, the launch of passenger transportation in our country, the emergence of competition in the industry.

So, the organization of passenger transportation in our region, which was mentioned above, was the same period. There are 6.3 thousand km of highways in the region, and the traffic flow on them is increasing day by day [1].

For example, the length of the highway “Irvadon - Chorsu” (eighteenth bus route) in Namangan city is 13.2 km, and it is considered a road of state importance. Its average traffic flow is 5000-8000 vehicles/day. This is one of the busiest highways in the city. For this purpose, it is necessary and the right decision to redevelop the traffic schedule of the Namangan city Irvadon - Chorsu route. This will create a number of conveniences for drivers of vehicles traveling on this road. This highway also crosses densely populated areas, which will create the opportunity to create additional jobs. [2].

Based on the above, we will consider the following in order to redevelop the traffic schedule on the eighteenth route in Namangan city.

Kunlik yo‘lovchi tashish hajmi:

Q_{AB} = 2,89 thousand passengers;
Q_{BA} = 2,059 thousand passengers;
Route length 1m= 13.2 km;
Number of intermediate stops pop= 11;
Technical speed of the bus Vt= 17.6 km/h;
Average free time at intermediate stops top = 1 min;
Average free time at the initial and final stops tok = 10 min.

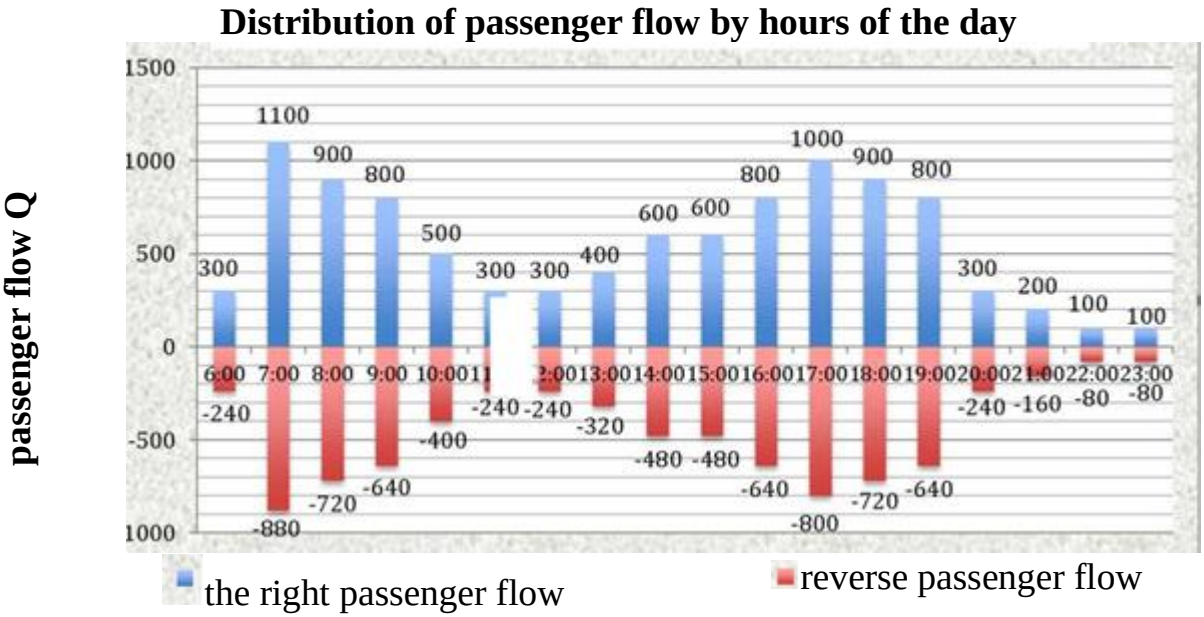


Figure 1. Diagram of the distribution of passenger traffic by hours of the day

The number of buses and the interval between them are determined by the traffic volume during a certain part of the day.

Table 1

Hours of the day	X,% distribution	Passenger		Calculation results			
		Q_{AB}	Q_{BA}	Q_{AB}		Q_{BA}	
				A_m	I_p, min	A_m	I_p, min
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
6-7	3	77	62	5	31,17	4	38,71
7-8	11	281	228	17	8,54	14	10,53
8-9	9	230	186	14	10,43	12	12,90
9-10	8	204	166	13	11,76	10	14,46
10-11	5	128	104	8	18,75	6	23,08
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
11-12	3	77	62	5	31,17	4	38,71
12-13	3	77	62	5	31,17	4	38,71
13-14	4	102	83	6	23,53	5	28,92
14-15	6	153	124	10	15,69	8	19,35
15-16	6	153	124	10	15,69	8	19,35
16-17	8	204	166	13	11,76	10	14,46
17-18	10	255	207	16	9,41	13	11,59
18-19	9	230	186	14	10,43	12	12,90
19-20	8	204	166	13	11,76	10	14,46
20-21	3	77	62	5	31,17	4	38,71
21-22	2	51	41	3	47,06	3	58,54
22-23	1	26	21	2	92,31	1	114,29
23-24	1	26	21	2	92,31	1	114,29
06-24	100	**2553**	**2070**				

Determining the volume of passenger transportation across the city by the hours of the day on the forward and reverse bus route; the volume of passenger transportation along the city bus route by the hours of the day is determined by the formula as follows[3]:

- for forward direction

$AB,\ Q_{AB},\ 6\text{-}7 = X\%\cdot Q_{AB}/100$, passenger; (1)

- for reverse direction

$BA,\ Q6\text{-}7 = X\%\cdot Q_{BA}/100$, passenger; (2)

Calculation and construction of demand diagrams by hours of the day

Return time for travel is determined by $_{to}$

$$to = t_{dv}+(t_{op}+t_{ok}) = (2\cdot l_m/V_t)+2(t_{op}\cdot n_{op}+t_{ok})/60 =$$

$$= (2\cdot 14)/20+2\cdot(0{,}5\cdot 28+5)/60 = 2{,}03 \quad (3)$$

The required number of buses per hour per day is determined by the following formula:

$A_m = Q_{max}\ to/q_n = (600 \text{ x } 2{,}03)/170 = 12$ bus; (4)

Q_{max} – maximum traffic volume per hour of the day;

q_n – nominal capacity of the bus;

Choosing a bus for a route

Buses of various models and capacities can be used to transport passengers. However, if the nominal capacity does not correspond to the actual passenger

density on the route, their use is not the same. The use of small-capacity buses with a large passenger capacity increases the number of vehicles required, increases the load on the streets and the need for drivers. The use of large-capacity buses on routes with low passenger flow leads to significant gaps in bus traffic and excessive waiting time for passengers [4].

The graphical-analytical method consists of the following: Depending on the volume of passenger traffic during the noise period, the estimated value of the bus capacity is selected according to Table 2.

Then, based on Table 3, two types of buses are selected, for which buses with conditional names of larger (q_n) and smaller (q_{cpas}) capacities are compared..

Table 2

Ratio of passenger transport and bus capacity

Passenger transportation, hours	Bus capacity
200-1000	40
1000-1800	65
1800-2600	80
2600-3800	100
3800 i vnshe	160

Table 3

Bus capacity characteristics

Brand and model of the bus	Number of seats, q_{pas}	Total capacity bus q_n, for γ=1
Isuzu NP-37	14	37
Isuzu NC-38	16	40
Isuzu NC-45	20	45
Isuzu SAZ-NP-26	26	26
Isuzu LE-60	32	60
Isuzu SAZ-ND-50	50	50

The bridge is selected with a nominal capacity of the Isuzu NC-40 city bus q_{pas} = 17 people, and q_n = 40 people during peak hours.

The lowest hours are assumed to be when more than 200 people move during peak hours of the day.



Figure 2 . Bus «Isuzu NC-40»

A_m values are included in Table 2.

Based on the A_m values, a diagram of bus needs by hour of the day (Figure 4) was constructed.

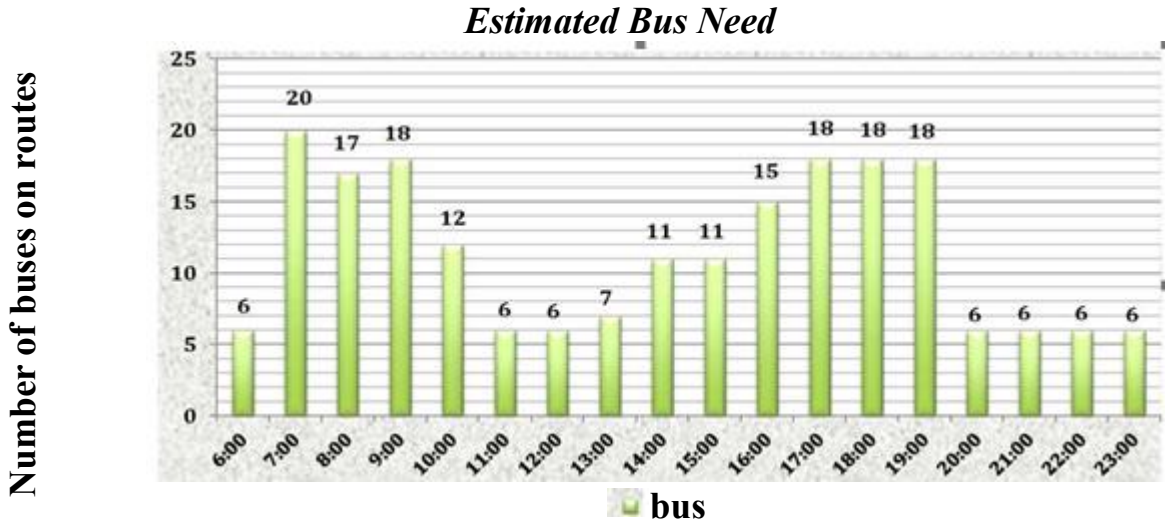


Figure 3. Bus demand diagram by hour of the day

The minimum number of buses on the route is determined [4, 5].

$$A_{m\,min} = t_{ob} \cdot 60 / J_{dop}, \quad (5)$$

J_{dop} – maximum interval between buses due to citizen waiting time at the bus stop, J_{dop} =0,20 soat (15min);

$$A_{m\,min} = 2{,}03 \cdot 60/12 = 10{,}09; \quad (6)$$

$A_{m\,min}$ = 6 buses received.

The maximum utilization coefficient of buses on the route is determined by α: equal to 0.9 for all options.

A_{rtax} - *Number of buses on the route:*

$$A_{mtax} = A_{rtax} * \alpha = 14*0{,}9 = 12 \text{ buses}; \quad (7)$$

α - Bus fleet utilization coefficient, *(KIP);*

The area of the diagram determines the volume of transport work ΣT_m in bus hours:

$\Sigma Tm = T^1+T^2+\ldots T^n$ soat; (8)

T^1,T^2- Hours of operation of buses in graph 1-2

General bus shifts along the route are determined:

$d = (t_{ob} \cdot A_{m\ max}+\Sigma T_m)/D_t$ bus.; (9)

Dt - Average bus shift duration, $D_t = 8$ hours;

$d = (2{,}03 \cdot 18+180)/8 = 27{,}06$

Approximately $d = 27$ people.

Determining the shift pattern of bus operations on a route

$DA_m = (2 \cdot A_{m\ max})/\ d = 2 \cdot 20\backslash 27 = 1{,}48 \approx$ 2-x shift; (10)

It follows from the calculations that

$2 \cdot A_{m\ max}\ d = 40 - 27 = 13$ smen.~ 12 shift.; (11)

We assume: 6 buses are single-shift and 12 buses are double-shift.

The correction value for the number of buses per hour of the day is included in Table 4.

Table 4

Number of buses, interval between them by traffic volume during a part of the day

Hours of the day	Passenger		Calculation results			
	QAB	*QBA*	*QAB*		*QBA*	
			A_m	I_p, min	A_m	I_p, min
1	*3*	*4*	*5*	*6*	*7*	*8*
6-7	28	54	1	86	2	44
7-8	351	230	16	7	11	10
8-9	231	210	11	10	10	11
9-10	209	181	10	11	8	13
10-11	170	123	8	14	6	20
11-12	126	117	6	19	5	21
12-13	150	94	7	16	4	26
13-14	126	86	6	19	4	28
14-15	131	101	6	18	5	24
15-16	220	119	10	11	5	20
16-17	431	186	20	6	9	13
17-18	410	270	19	6	13	9
18-19	191	175	9	13	8	14
19-20	77	72	4	31	3	33
20-21	29	34	1	83	2	71
Total	**2880**	**2052**				

The travel distance between L_P buses is determined by the following formula::

$l_p = (t_o/Am) \cdot 60$, min. (12)

Determining the main performance indicators of buses on the route:

The non-uniform coefficient Kt of passenger transportation is determined by the hours of the day

$K_t = Q_{max}/\ Q_{o'rt.max}$; (13)

Q_{max} – maximum number of passengers transported per hour during peak hours, people; $Q_{ort.max}$ – average number of passengers transported per hour; days, people;

$Q_{ort} = Q_c / T_r$, kishi; (14)

Q_c – maximum traffic volume during bus traffic on routes; T_r – avtobus soatlari, T_r=17hours;

$Q_{ort}AB$ =10000/17=588 pas;

$Q_{ort}BA$ =8000/17=471 pas;

K_tAB = 1100/588=1,87;

K_tBA = 880/471=1,87.

The coefficient K_n is determined by the unevenness of passenger traffic along the route directions.:

$K_n = Q_{ortmax}/Q_{ortmin} = (Q_{max}/T_r)/(Q_{min}/T_r) =$ (15)

(10000/17)/(8000/17) = 1,25;

The operating speed V., the bus is determined

$V_e = 2 \cdot l_m/t_{ob} = 2 \cdot 14/2{,}03 = 13{,}79$ km/h; (16)

In conclusion, it can be said that the optimal distance between stops on city bus routes is recommended to be 300–700 meters, depending on the length of the passenger journey. In suburban passenger transport, the distance between stops is 700–1000 meters, and on bus routes to long-distance destinations, taking into account the population centers along the route. The number of stops on the routes depends on the distances between them and the location of residential areas or the busiest passenger nodes (industrial enterprises, offices, large retail outlets, etc.).

Taking into account traffic safety and in order to increase the throughput characteristics of intersections, stops near intersections should be located at a distance of at least 25–30 meters from them. The location of stops required by bus routes reduces the throughput characteristics of streets and the speed of communication. In order to eliminate this, they should be placed inward, that is, "road pockets".

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BRIEF DESCRIPTION OF PASSENGER TRANSPORTATION TECHNOLOGIES IN AUTOMOBILES

Anatatsia. *The bus is equipped with information on the main qualitative characteristics that determine the degree of service (passenger traffic) and the efficiency of vehicle use.*

Keywords: *Route, classification table, city bus, passenger traffic, traffic flow, bus capacity.*

Passenger transportation by automobiles constitutes an integral part of the overall transport system of our country and, alongside other modes of passenger transport, performs the essential function of carrying passengers. Regardless of the mode of transport, certain general requirements are imposed on the organization of passenger transportation. These include delivering passengers to their destinations within the shortest possible time, ensuring precise and regular operation of vehicles along the entire route, efficient utilization of transport means, guaranteeing complete safety during transportation, providing passengers with high-quality and culturally appropriate services, and minimizing operational costs whenever possible.

Compared to other modes of passenger transport capable of carrying large passenger flows, automobile-based passenger transportation has several advantages. Chief among them is the high maneuverability of buses, which allows passengers to be transported closer to their workplaces and residences. Furthermore, on well-developed and paved road networks, buses achieve higher operational speeds than other ground-based passenger transport modes. Another advantage of bus transport lies in its flexibility — new routes can be introduced quickly whenever needed.

However, bus transport also has certain drawbacks. Compared to suburban railways, trams, and trolleybuses, bus productivity is relatively low. In addition, the higher cost of fuel and the resulting operational expenses, as well as the significant environmental pollution caused by harmful emissions, are major disadvantages.

The organization of bus transport is based on specific routes. Passenger

transport routes within cities, districts, or regions are referred to as the transport route network. A network consisting exclusively of bus routes is termed the bus route network. Urban passenger transport routes are classified according to transport mode (bus, tram, trolleybus, metro, etc.), route configuration, operational speed, and service regime.

A bus route is defined as a designated path connecting the initial and terminal stops of buses and route taxis. Depending on operational characteristics, urban bus routes may be divided into regular, semi-express, or express services. On regular routes, buses stop at every designated stop. Semi-express routes only stop at major transfer points with significant passenger exchange. Express routes, by contrast, typically stop only at terminal stations or, in some cases, at a few selected intermediate stops, thus ensuring higher average speeds.

Semi-express and express services may be organized within existing regular routes, whereas such systems are not feasible for trams or trolleybuses. Routes are also categorized as permanent or temporary depending on service duration. Permanent routes operate consistently throughout the week with fixed vehicle frequencies, while temporary routes are introduced seasonally or in response to demand fluctuations.

Each bus route is assigned a numerical code, beginning with “1.” In large cities, urban routes are numbered from 1 to 99 (sometimes up to 199), suburban routes from 101 to 199 (or 201–299), while intercity routes receive subsequent numbering. Express routes are often marked with the letter “E,” semi-express routes with “T,” and shortened routes with the letter “Q.”

The primary qualitative indicators that determine the level of passenger service and the efficiency of vehicle utilization on bus routes include:

- Travel speed;
- Headway (interval between buses);
- Load factor of vehicle capacity;
- Passenger turnover coefficient;
- Average trip length.

The headway is the time interval between successive buses passing a given stop. Routes with high service frequency generally have headways not exceeding 10–15 minutes, whereas routes with lower frequency require strict timetables to ensure passengers can plan their trips reliably. The distance covered by a bus from the initial stop to the terminal stop is defined as a trip, while a round trip denotes a complete cycle of travel from the initial terminal to the final terminal and back again.

In major cities, buses remain the most widespread form of urban passenger transport. In small and medium-sized towns, they are often the only available means of public passenger transportation. The choice of a specific mode of transport depends primarily on its operational characteristics, initial capital investment requirements, and unit transportation cost. In large cities, however, the combined use of all available passenger transport modes is considered most

effective.

Bus routes are organized to serve specific passenger flows depending on the spatial distribution of demand. The average travel distance between stops directly influences overall trip length. Extending average trip distances enhances connectivity and improves passenger travel speed between stops.

- ✓ The main requirements for suburban transport networks include:
- ✓ Direct accessibility to destinations with minimal transfers;
- ✓ Reduction of travel time;
- ✓ Passenger loads not exceeding the normative vehicle capacity;
- ✓ Assurance of passenger safety.

The design and justification of bus routes depend on the distribution of passenger flows. Properly selected routes reduce passenger travel times and improve transport efficiency. All route-planning decisions must therefore be based on accurate data regarding passenger flow characteristics.

In some cases, multiple bus routes may overlap within sections of the transport network. To assess the degree of coverage of urban streets by bus services, the route coefficient is applied. This coefficient is calculated as the ratio of the total length of all bus routes to the length of the street network traversed by these routes.

$$K_y = \sum Lu / \sum Lk ;$$

L_u – the total length of routes,

L_k – the total length of streets traversed by the routes.

The route coefficient indicates the average number of routes passing through each segment of the bus transport network. The greater the route coefficient, the better the streets are covered by bus services, which in turn provides greater convenience for passengers. As a result, the walking time to reach bus stops decreases. In cities with a highly developed bus transportation system, the value of the route coefficient generally ranges between 1.2 and 3.5 [7–8].

Another indicator used to evaluate the level of service provided to suburban populations is the network density. Network density reflects the extent to which suburban areas are covered by bus routes. This measure also determines the amount of time passengers spend walking to reach bus stops. Network density is calculated as the ratio of the total length of bus routes to the surface area of the suburban territory:

$$\sigma = \frac{\sum L_m}{F}, \quad км/км^2 ;$$

L_m – the total length of the network (km),

F – the surface area of the suburban territory (km²).

In large cities, the network density should generally range between 2 and 2.5km/km²..

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NAMANGAN-KOSONSOY YO‘NALISHDA HARAKATLANISH JADVALINI QAYTA ISHLAB CHIQISH

Anatatsiya. *Ushbu maqolada Namangan–Kosonsoy yo‘nalishidagi jamoat transporti harakat jadvalini qayta ishlab chiqish, transport oqimini tahlil qilish va yo‘lovchilar uchun qulay shart-sharoit yaratish masalalari yoritilgan. Tadqiqot jarayonida mavjud yo‘nalish tahlil qilinib, harakat intervallari va bekatlar tizimi logistika prinsiplari asosida qayta tashkil etildi.*

Kalit so‘zlar. *Transport logistikasi, yo‘lovchi oqimi, harakat jadvali, interval, yo‘nalish samaradorligi, Namangan, Kosonsoy.*

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REVISION OF THE NAMANGAN-KOSONSOY ROUTINE

Abstract. *This article discusses the issues of redevelopment of the public transport schedule on the Namangan-Kosonsoy route, analysis of traffic flow and creation of favorable conditions for passengers. In the course of the research, the existing route was analyzed, and the system of traffic intervals and stops was reorganized based on the principles of logistics.*

Keywords. *Transport logistics, passenger flow, traffic schedule, interval, route efficiency, Namangan, Kosonsoy.*

1. Kirish

Namangan viloyati aholisi sonining o‘sishi va shaharlararo iqtisodiy aloqalarning kengayishi jamoat transportiga bo‘lgan ehtiyojni sezilarli darajada oshirdi. Ayniqsa, Namangan – Kosonsoy yo‘nalishi aholi tomonidan eng ko‘p foydalaniladigan yo‘nalishlardan biri bo‘lib, bu erda harakat zichligi kunning ma’lum soatlarida yuqori darajaga etadi. Shu sababli, harakat jadvalini qayta ko‘rib chiqish va transport vositalaridan samarali foydalanish muhim vazifa sifatida belgilandi.

Hozirda Namangan–Kosonsoy yo‘nalishi bo‘yicha kun davomida o‘rtacha 6 ta reys amalga oshiriladi. Bir yo‘nalishda harakat vaqti o‘rtacha 45–50 daqiqa bo‘lib, transport vositalari orasidagi interval 10–15 daqiqa atrofida.

Ammo ertalabki (07:00–09:00) va kechki (17:00–19:00) soatlarda yo‘lovchi oqimi keskin ko‘payib, transport etishmasligi kuzatiladi. Bu esa bekatlarda ortiqcha navbat va vaqt yo‘qotishga sabab bo‘ladi [1].

2. Materiallar va metodlar

Harakat jadvalini optimallashtirishda yangi tahlillar asosida avtobuslar harakat intervali ertalab va kechqurun paytlarida 6 daqiqa, kunduzgi vaqtda esa 10–12 daqiqa qilib belgilandi. Bu yo‘lovchilarning kutish vaqtini qisqartirishga va transport vositalarining to‘liq yuklanishini ta’minlashga xizmat qiladi.

Yuqoridagilardan kelib chiqib Namangan - Kosonsoy yo‘nalishidagi jamoat transporti harakatlanish jadvalini qayta ishlab chiqishni maqsadida quyidagilarni ko‘rib chiqamiz.

1-jadval

Bekatlar bo‘yicha passajirlar taqsimoti

№	Bekatlar nomi	Chorsu, passajir	Bekatlar orasidagi masofa, km
1.	**Do‘lik avtobekati**	194	0
2.	**Do‘slik**	18	0,9
3.	**6-kichik tuman**	93	0,9
4.	**Nurobod**	85	0,7
5.	**Buloq**	157	0,7
6.	**Qo‘qimboy**	41	0,8
7.	**Gurmiron**	29	0,9
8.	**Bog‘ishamol**	10	1,4
9.	**Kasonsoy**	29	1,3
Jami:		**2367**	**18,1**

Izoh: *jadvaldagi qiymatlarni Sutka soatlari bo‘yicha bekatlardagi yo‘lovchi taqsimoti qiymatlari orqali to‘ldiradi. Shuningdek, bekatlar orasidagi masofa* ***GEOTREKER*** *ilovasi orqali chizish jarayonida aniqlanadi yoki mazkur ilovadan olinsa bo‘ladi.*

2-jadval

Teskari yo‘nalish bekatlar bo‘yicha passajirlar taqsimoti

№	Bekatlar nomi	Yuksalish, passajir	Bekatlar orasidagi masofa, km
1.	**Kasonsoy**	161	0
2.	**Bog‘ishamol**	16	1,8
3.	**Gurmiron**	57	1,7
4.	**Qo‘qimboy**	356	1,3
5.	**Buloq**	16	1,3
6.	**Nurobod**	41	1,4
7.	**6-kichik tuman**	94	0,9
8.	**Do‘slik bozori**	10	0,8
9.	**Do‘lik avtobekati**	695	0,7
Jami:		**2026**	**18,2**

Yo‘lovchi tashish yo‘nalishlarini rivojlantirish

3-jadval

Jamoat transportlarida tashishni tashkil etish bo‘yicha dastlabki ma’lumotlar

№ variant	Kunlik xarakat hajmi		Yo‘nalish uzunligi	To‘xtash bekatlari soni to‘xtaydi	Texnik tezlik	Bekatlarda o‘rtacha turib qolish vaqti	Boshlang‘ich va oxirgi bekatda turib qolish vaqti	Nolinchi qatnov vaqti	
	O_{AB}	Q_{BA}	L_m	n_{op}	V_t	t_{op}	t_{ok}	L_{01}	L_{02}
	ming kishi		km	ta	km/s	min	min	min	min
1	**2,55**	**2,07**	**12,8**	**22**	**18**	**1,0**	**10,0**	0	0

Kunlik yo‘lovchi tashish hajmi:

Q_{AB} = 2,55 ming yo‘lovchi;

Q_{BA} = 2,07 ming yo‘lovchi;

E*slatma: Q_{AB} va Q_{BA} qiymatlarini yuqoridagi 1-jadvaldan olinadi.*

Yo‘nalish uzunligi l_m= 12,8 km;

Oraliq to‘xtashlar soni o‘rt = 22;

Avtobusning texnik tezligi V_t= 18 km/ch;

Oraliq bekatlardagi o‘rtacha bo‘sh vaqt o‘rt = 1,0 min;

Boshlang‘ich va oxirgi bekatdagi o‘rtacha bo‘sh vaqt o‘rt = 10,0 min.

Nolinchi qatnov vaqti yo‘nalishga chiqish L_{01}=0

Yo‘nalishdan qaytish L_{02}=0

L_{01} va L_{02} larning qiymatlarini 1-jadvaldan olinadi [2].

Eslatma: Bu ko‘rsatkichlarni qiymati GEOTREKER programmasidan olinadi.

Hisob-kitoblarni amalga oshirgandan so‘ng 3-jadvalni to‘ldiramiz.

4-jadval

Avtobuslar soni, ular orasidagi interval kunning bir qismidagi transport hajmi bo‘yicha tashiladi

Sutka soatlari	X,% tarqatish	Yo‘lovchi odimi, kishi		Hisoblash natijalari			
		Q_{AB}	Q_{BA}	Q_{AB}		Q_{BA}	
				A_m	I_p, min	A_m	I_p, min
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
6-7	3	78	68	5	31,17	4	38,71
7-8	11	271	238	17	8,54	14	10,53
8-9	9	220	196	14	10,43	12	12,90
9-10	8	201	166	13	11,76	10	14,46
10-11	5	128	104	8	18,75	6	23,08
11-12	3	70	62	5	31,17	4	38,71
12-13	3	71	62	5	31,17	4	38,71
13-14	4	198	83	6	23,53	5	28,92
14-15	6	191	114	10	15,69	8	19,35
15-16	6	151	124	10	15,69	8	19,35
16-17	8	201	156	13	11,76	10	14,46
17-18	10	251	205	16	9,41	13	11,59
18-19	9	225	183	14	10,43	12	12,90
19-20	8	201	166	13	11,76	10	14,46
	100	**2650**	**2078**				

3. Tadqiqot natijalari

3.1.Biz marshrutda ishlaydigan avtobusni tanlaymiz

Yo‘lovchilarni tashish uchun turli model va sig‘imdagi avtobuslardan foydalanish mumkin. Biroq, agar nominal sig‘im yo‘nalishdagi haqiqiy yo‘lovchi zichligiga mos kelmasa, ulardan foydalanish samaradorligi bir xil emas. Yo‘lovchi tashish hajmi katta bo‘lgan kichik sig‘imli avtobuslardan foydalanish zarur bo‘lgan transport vositalari sonini ko‘paytiradi, ko‘chalardagi yukni va haydovchilarga bo‘lgan ehtiyojni oshiradi. Kam sig‘imli yo‘lovchi oqimi bo‘lgan yo‘nalishlarda katta sig‘imli avtobuslardan foydalanish avtobus harakatining sezilarli oraliqlariga va yo‘lovchilarning kutish vaqtining ortiqcha sarflanishiga olib keladi [3-5].

Grafik-analitik usul quyidagilardan iborat. Shovqin vaqtida yo‘lovchi tashish hajmiga qarab, avtobus sig‘imining taxminiy qiymati 5-jadvalga muvofiq tanlanadi.

Keyin 5-jadvalga asosan ikkita turdagi avtobuslar tanlanadi, ular uchun kattaroq (q_n) va kichikroq (q_{cpas}) sig‘imli shartli nomdagi avtobuslar qiyoslanadi.

5-jadval
Avtobusning sig‘im xususiyatlari

Avtobusning markasi va modeli	**O‘rindiqlar soni, q_{pas}**	**Umumiy quvvat avtobus q_n, o‘tish. γ=1 uchun**
Isuzu NP-37	14	37
Isuzu NC-38	16	40
Isuzu NC-45	20	45
Isuzu SAZ-NP-26	26	26
Isuzu LE-60	32	60
Isuzu SAZ-ND-50	50	50

“Isuzu NC-40” shahar avtobusi nominal sig‘im bilan tanlangan ko‘prik q_{pas} = 17 kishi, va eng yuqori soatlarda q_n = 40 kishi.

Kunning tig‘iz soatlarida 200 dan ortiq odam harakatlanishi bilan eng past soatlar qabul qilinadi.

$$A_{m\,min} = t_{ob} \cdot 60/J_{dop}, \qquad (5)$$

J_{dop} – fuqaroning avtobus bekatida kutish vaqti tufayli avtobuslar orasidagi maksimal interval, J_{dop} =0,20 soat (15min);

$$A_{m\,min} = 2{,}03 \cdot 60/15 = 6{,}09; \qquad (6)$$

qabul qilingan $A_{m\,min}$ = 6 dona avtobus.

Yo‘nalishdagi avtobuslardan (saroydan) maksimal foydalanish koeffitsenti α bilan belgilanadi: hamma variant uchun 0,9 ga teng.

A_{rtax} -yo‘nalishga chiqariladigan avtobuslar soni:

$$A_{mtax} = A_{rtax} * \alpha = 20*0{,}9 = 18 \text{ dona avtobus}; \qquad (7)$$

α - Avtobus saroyidan foydalanish koeffitsienti, (KIP);

Diagrammaning maydoni avtobus soatlarida ΣTm transport ishining hajmini belgilaydi:

$$\Sigma Tm = T^1+T^2+\ldots T^n = \text{ soat}; \qquad (8)$$

bunda; T^1,T^2- 1-2-grafikdagi avtobuslarni ish vaqti

Yo‘nalish bo‘ylab avtobuslarning umumiy smenalari aniqlanadi [6]:

$$d = (t_{ob} \cdot A_{m\,max} + \Sigma T_m)/D_t \text{ avtobus-smen.}; \qquad (9)$$

bunda; *Dt* - o‘rtacha avtobus smenasining davomiyligi, D_t = 8 soat;

d = (2,03·18+180)/8 = 27,06, kishi

Taxminan d = 27 kishi.

Avtobuslar yo‘nalishdagi ishining smenaliligini aniqlash

$$DA_m = (2 \cdot A_{m\,max})/\, d = 2 \cdot 20 \backslash 27 = 1{,}48 \approx \text{2-x smenali;} \qquad (10)$$

Hisob-kitoblardan kelib chiqadiki

$$2 \cdot A_{m\,max}\, d = 40 - 27 = 13 \text{ smen.} \sim 12 \text{ smen.;} \qquad (11)$$

Qabul qilamiz: 6 ta avtobus bir smenali, 12 avtobus esa ikki smenali.

Sutkaning soatiga A_m avtobuslar sonining tuzatish qiymati 2-jadvalga kiritilgan.

l_p avtobuslari orasidagi harakat oralig‘i quyidagi formula bilan aniqlanadi:

$$l_p = (t_o/Am) \cdot 60, \text{ min;} \qquad (12)$$

bunda; l_p jadvalga kiritiladi.

3.2. Faoliyatning asosiy ko‘rsatkichlarini aniqlash yo‘nalishdagi avtobuslar

Sutka soatlari bo‘yicha yo‘lovchi tashishning bir xil bo‘lmagan K_t koeffitsienti aniqlanadi

$$K_t = Q_{max}/\, Q_{o'rt.max}; \qquad (13)$$

bunda: Q_{max} – soatiga tashiladigan yo‘lovchilarning maksimal soni soat tig‘iz, odamlar;

$Q_{o'rt.max}$ – soatiga tashiladigan o‘rtacha yo‘lovchilar soni; kunlar, odamlar;

$$Q_{ort} = Q_c/T_r, \text{ kishi;} \qquad (14)$$

bunda: Q_c – yo‘nalishlar bo‘yicha avtobus harakati paytida maksimal trafik hajmi;

T_r – avtobus soatlari, T_r=17soat;

$Q_{ort}AB$ =10000/17=588 kishi;

$Q_{ort}BA$ =8000/17=471 kishi;

K_tAB = 1100/588=1,87;

K_tBA = 880/471=1,87;

Xulosa sifatida shuni aytish mumkinki Namangan–Kosonsoy yo‘nalishida harakatlanish jadvalini qayta ishlab chiqish natijasida transport tizimidagi vaqt yo‘qotishlar kamayib, yo‘lovchi oqimi barqarorlashadi. Pik soatlarda qo‘shimcha reyslarni joriy etish, bekatlardagi to‘xtash vaqti va intervallarni qayta ko‘rib chiqish harakat tizimini zamonaviy talablarga moslashtiradi.

Bunday yondashuv nafaqat iqtisodiy samaradorlikni, balki ekologik va ijtimoiy barqarorlikni ham ta’minlaydi.

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MA'LUMOTLAR BAZASIDA KIBER XAVFSIZLIK TUSHUNCHASI

Annotatsiya: *Ushbu maqolada ma'lumotlar bazasida axborot xavfsizlikgini ta'minlash va kiberxavfsizligi tushunchasi tahlili keltirilgan.*
Kalit so'zlar: *Kiberjinoyatchilik tushunchasi,ma'lumotlar bazasi, kiberxavfsizlik, ma'lumotlar bazasini ta'minlash, kiber makon tushunchasi*

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CONCEPT OF CYBER SECURITY IN DATABASES

Abstract: *This article provides information security in the database and an analysis of the concept of cyber security is presented.*
Keywords: *Concept of cybercrime, database, cyber security, database security, concept of cyberspace.*

Axborot xavfsizligi tushunchasi kundan kunga glaballashib bormoqda, ayniqsa kundan-kunga axborot xurujlari va kiberjinoyatlar sonining ortib borishi xavfsizlik tushunchasining qanchalik glabal ekanligini ko'rsatmoqda. Axborot turli shakilda
va turli saqlovchilarda saqlanishi mumkin, - bu axborotni saqlashning yangi texnologiyalarini ishlab chiqishni talab qiladi. Axborotni ma'lumotlar bazasida himoylash murakkab va texnologik jarayondir.

Kiberjinoyatchilikning, bizga ma'lum bo'lgan virusli dasturlarni tarqatish, parollarni buzib kirish, kredit karta va boshqa bank rekvizitlaridagi mablag'larni o'zlashtirish talon-toroj qilish, shuningdek, internet orqali qonunga zid axborotlar, xususan, bo'hton, ma'naviy buzuq ma'lumotlarni tarqatish bilan bashariyat hayotiga katta xavf solayotganidan ko'z yuma olmaymiz.

"Kiberjinoyatchilik" tushunchasi - axborot-kommunikatsiya texnologiyalari vositalaridan foydalangan holda, virtual tarmoqda dahshat solish, virus va boshqa zararli dasturlar, qonunga zid axborotlar tayyorlash va tarqatish, elektron xatlarni ommaviy tarqatish (spam), xakkerlik hujumi, veb-saytlarga noqonuniy kirish, firibgarlik, ma'lumotlar butunligi va mualliflik huquqini buzish,

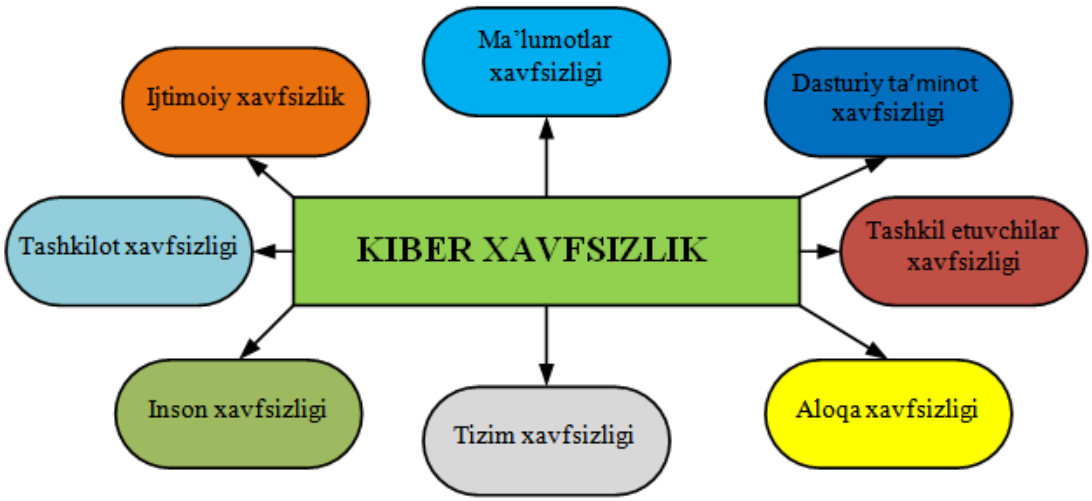
kredit kartochkalari raqami hamda bank rekvizitlarini o‘g‘irlash *(fishing va farming)* va boshqa turli huquqbuzarliklar bilan izohlanadi.

Ma’lumotlar bazasi xavfsizligi deganda – ma’lumotlar bazasining maxfiyligi, yaxlitligi va mavjudligini o‘rnatish va saqlash uchun mo‘ljallangan vositalar, boshqaruv vositalari va chora-tadbirlar majmuasi tushuniladi.

Axborotni ma’lumotlar bazasida xavfsizligi quyidagilarni hal qilishi va himoya qilishi quyidagilardan iborat:

- Ma’lumotlar bazasidagi ma’lumotlar;
- ma’lumotlar bazasini boshqarish tizimi (DBMS);
- har qanday bog‘liq ilovalar;
- jismoniy ma’lumotlar bazasi serveri *va/yoki* virtual ma’lumotlar bazasi serveri va asosiy uskuna;
- ma’lumotlar bazasiga kirish uchun foydalaniladigan hisoblash *va/yoki* tarmoq infratuzilmasi.

Ma’lumotlar bazasi xavfsizligi axborot xavfsizligi texnologiyalari va amaliyotlarining barcha jihatlarini o‘z ichiga olgan murakkab va qiyin ishdir. Bundan tashqari, bu ma’lumotlar bazasidan foydalanishga to‘g‘ri kelmaydi. *Ma’lumotlar bazasi qanchalik qulay va foydalanish mumkin bo‘lsa,* u xavfsizlik tahdidlariga nisbatan zaifroq bo‘ladi, ma’lumotlar bazasi tahdidlarga qanchalik daxlsiz bo‘lsa, unga kirish va undan foydalanish shunchalik qiyin bo‘ladi.



1-rasm. Kiberxavfsizlikning bilim sohalari.

Kundan-kunga takomillashib ketayotgan kiberjinoyatchilikka qarshi kiberxavfsizlikni ta’minlashda quyidagi asosiy talablarni bajarish orqali ulardan himoyalanish, ya’ni kiberxavfsizlikni ta’minlashimiz mumkin:

- xodimlarga axborot xavfsizligi asoslarini o‘rgatish;
- foydalanayotgan dasturiy mahsulotlarning zaifliklarini doimiy sinovdan o‘tkazish;

- ishonchli antivirus dasturidan foydalanish;
- litsenziyalangan rasmiy dasturlardan foydalanish;
- axborot tizimlarini himoyalashda ko‘p faktorli autentifikatsiyadan foydalanish;
- parollardan foydalanishda kuchli parolni saqlash siyosatiga rioya qilish;
- muntazam ravishda kompyuter qattiq disklaridagi ma’lumotlarni shifrlash.

Ko‘pgina dasturiy ta’minotning noto‘g‘ri konfiguratsiyasi - zaifliklar yoki ehtiyotsizlik yoki noto‘g‘ri foydalanish shakllari buzilishlarga olib kelishi mumkin.

Quyida ma’lumotlar bazasi xavfsizligi hujumlarining eng keng tarqalgan turlari yoki sabablari va ularning sabablari keltirilgan:

- Ichki tahdidlar;
- **Insayder tahdid**- bu ma’lumotlar bazasiga imtiyozli kirish huquqiga ega bo‘lgan uchta manbadan birining xavfsizlikka tahdididir;
- zarar yetkazmoqchi bo‘lgan yomon niyatli insayder;
- ma’lumotlar bazasini hujumga qarshi himoyasiz qiladigan xatolarga yo‘l qo‘yadigan beparvo insayder;
- **Infiltrator**-bu qandaydir tarzda fishing kabi sxema orqali yoki hisob ma’lumotlari, ma’lumotlar bazasiga kirish orqali hisob ma’lumotlarini oladigan begona shaxs;

ma’lumotlar bazasiga xos tahdid bo‘lib, ular veb-ilovalar yoki HTTP sarlavhalari tomonidan xizmat ko‘rsatadigan ma’lumotlar bazasi so‘rovlariga o‘zboshimchalik bilan SQL yoki SQL bo‘lmagan hujum satrlarini kiritishni o‘z ichiga oladi. Xavfsiz veb-ilovalarni kodlash amaliyotiga rioya qilmaydigan va muntazam zaiflik sinovlarini o‘tkazadigan tashkilotlar ushbu hujumlarga ochiq.

Ma’lumotlar bazasi xavfsizligi axborot xavfsizligi texnologiyalari va amaliyotlarining barcha jihatlarini o‘z ichiga olgan murakkab va qiyin ishdir.

Bundan tashqari, bu ma’lumotlar bazasidan foydalanishga to‘g‘ri kelmaydi.

Ma’lumotlar bazasi qanchalik qulay va foydalanish mumkin bo‘lsa, u xavfsizlik tahdidlariga nisbatan zaifroq bo‘ladi, *ma’lumotlar bazasi tahdidlarga qanchalik daxlsiz bo‘lsa,* unga kirish va undan foydalanish shunchalik qiyin bo‘ladi.

Ruxsatlarni boshqarish - axborot tizimlari va axborot texnologiyalarining barcha resurslaridan foydalanishni tartibga solish orqali himoyalash usuli. Bunday usullar, axborotga bo‘lgan barcha ruxsat etilmagan kirish imkoniyatlarini bartaraf eta olishi lozim. Ruxsatlarni boshqarish quyidagi himoya funksiyalarini o‘z ichiga qamrab oladi:

foydalanuvchilarni, xodimlarni va tizim resurslarini identifikatsiyalash (har bir ob’ektga shahsiy identifikator berish);

ob’ekt yoki sub’ektlarni ularga berilgan identifikator orqali tanib olish (haqiyiyligini ta’minlash);

foydalanish huquqiga egaligini tekshirish;

himoyalangan resurslarga bo‘lgan murojaatlarni ro‘yhatga olish;

ruxsat etilmagan kirishlarga urinish harakatlari bo‘lgan vaqtda sezish (signalli ogohlantirish, tizimni o‘chirish, tizim ishini to‘htatib qo‘yish, so‘rovlarga javob bermaslik).

Identifikatsiya va autentifikatsiya

Identifikatsiya va autentifikatsiyani xavfsizlikning muhim dasturiy-texnik vositasi deb hisoblash mumkin, modomiki qolgan servislar sub’ektlarning o‘zigagina mo‘ljallangan. Identifikatsiya va autentifikatsiya - bu korxonaning axborot maydoniga kirishning, boshlang‘ich himoya chizig‘idar.

Identifikatsiya va autentifikatsiya protsedurasining birgalikda bajarilishini **avtorizatsiya protsedurasi** deb qabul qilingan**.**

Identifikatsiya sub’ektlarga (foydalanuvchilarga, jarayonlarga, ma’lum bir foydalanuvchi nomidan harakat qiluvchilarga) o‘zini kimligini ma’lum qilish imkonini beradi. Autentifikatsiya orqali ikkinchi tomonni aslida kim ekanligini bilish imkonini beradi. Ba’zan "autentifikatsiya" iborasining sinonimi sifatida "haqiqiyligini tekshirish" iborasi ishlatiladi.

Autentifikatsiya ikki hil bo‘ladi, bir tomonlama (odatda klient haqiqiyligini serverga isbotlaydi) va ikki tomonlama (ikki tomon ham bir birini haqiqiyligini isbotlaydi) bo‘ladi. Bir tomonlama autentifikatsiya protsedurasiga misol qilib foydalanuvchilarning tizimga kirish holatini keltirish mumkin.

Ochiq tarmoq muhitida tomonlar o‘rtasidagi identifikatsiyalash, autentifikatsiyalashda ishonchli marshrut mavjud emas. Tarmoqlarda passiv va aktiv bo‘lgan tinglashlardan, ya’ni ma’lumotlarni **ushlab qolish**, **o‘zgartirish** va **qayta ishlashdan** himoyalashni ta’minlash zarur hisoblanadi.

Zamonaviy identifikatsiya va autentifikatsi vositalari, tarmoqqa markazlashtirilgan holda kirish konsepsiyasini qo‘llashi kerak. Tarmoqga markazlashtirilgan holda kirish - bu, birinchi o‘rinda foydalanuvchilarga qulaylik yaratish talabi hisoblanadi. Agar korporativ tarmoqda ko‘plab axborot servislar, murojatlarni bir-biridan mustaqil ravishda amalga oshirsa, u holda identifikatsiya va autentifikatsiyalash juda qiyin kechadi.

Kompyuter tizimlarida autentifikatsiya usullaridan biri, foydalanuvchi identifikatorini kiritish orqali, oddiy nom bilan aytganda login (inglizcha - foydalanuvchining ro‘yhatga olinuvchi nomi) va parol - qandaydir maxfiy ma’lumot hisoblanadi. Ishonchli parol va login juftligi maxsus ma’lumotlar bazasida saqlanadi.

Rivojlanayotgan IT muhiti ma’lumotlar bazalarini tahdidlarga nisbatan sezgirroq qiladi. Ma’lumotlar bazalariga hujumlarning yangi turlariga olib kelishi mumkin bo‘lgan yoki yangi mudofaa choralarini talab qilishi mumkin bo‘lgan tendentsiyalar:

O‘sib borayotgan ma’lumotlar hajmi - saqlash, ma’lumotlarni yig‘ish va qayta ishlash deyarli barcha tashkilotlarda eksponent ravishda o‘sib bormoqda. Har qanday ma’lumotlar xavfsizligi amaliyoti yoki vositalari uzoq va yaqin kelajakdagi talablarni qondirish uchun yuqori darajada kengaytirilishi kerak.

Tarqalgan infratuzilma - tarmoq muhitlari murakkablashib bormoqda, ayniqsa korxonalar ish yuklarini gibrid bulut yoki ko‘p bulutli arxitekturaga

o‘tkazar ekan, bu xavfsizlik yechimlarini joylashtirish, boshqarish va tanlashni qiyinlashtiradi.

Borgan sari qat’iy tartibga soluvchi talablar - butun dunyo bo‘ylab tartibga solishga muvofiqlik landshafti murakkablashib bormoqda, shuning uchun barcha mandatlarga rioya qilish yanada qiyinlashmoqda.

Kiberxavfsizlik bo‘yicha ko‘nikmalar yetishmasligi - global kiberxavfsizlik bo‘yicha malakali mutaxassislarning etishmasligi va tashkilotlar xavfsizlik rollarini to‘ldirishda qiynalmoqda. Bu muhim infratuzilmani, jumladan ma’lumotlar bazalarini himoya qilishni qiyinlashtirishi mumkin.

Xulosa

Bugungi kunda mamlakatimizda joriy etilayotgan zamonaviy raqamli texnologiyalar, fuqarolarimizga qator qulayliklar va imkoniyatlar eshigini ochmoqda.

Shu o‘rinda ma’lumotlar bazasida kiber xavfsizlik, kiberterrorizm va uning jamiyat hayotiga solayotgan xavfining ko‘lami ham oshib borayotganini ta’kidlash joiz. Kiberterroristik harakat (kiber hujum)-kompyuterlar va axborot kommunikatsiya vositalari yordamida amalga oshirilgan, odamlarning hayoti va sog‘lig‘iga bevosita xavf tug‘diradigan yoki potensial xavf tug‘dirishi mumkin bo‘lgan, moddiy ob’ektlarga katta zarar yetkazishi yoki shunga olib kelishi mumkin bo‘lgan, ijtimoiy xavfli oqibatlarning boshlanishi yoki maqsadi bo‘lgan siyosiy sababdir. Zamonaviy terrorchilar uchun kibermakondan foydalanishning jozibadorligi kiberhujumni amalga oshirish katta moliyaviy xarajatlarni talab qilmasligi bilan bog‘liq. Kiberxavfsizlikni ta’minlash, sodir etilishi mumkin bo‘lgan kiberjinoyatlarning oldini olish va unga qarshi kurashish masalasi hisoblanadi.

Foydalanilgan adabiyotlar ro‘yxati.

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QASHQADARYO VILOYATI MINERAL RESURSLARIDAN FOYDALANISH VA TEJAMKORLIK BILAN O‘ZLASHTIRISH MASALALARIGA DOIR

Annotatsiya. *Ushbu maqolada mineral resurslaridan foydalanish va tejamkorlik bilan o‘zlashtirish* ishlari *ilmiy jihatdan tahlil qilinadi. Avvalo, hududda mineral resurslar tarqalishi tabiiy geografik va geologik tarqalishi masalalari tahlil qilingan. Bundan tashqari, geologik qidiruv ishlari natijasida foydali qazilmalar namoyonlanishi xususan neft-gaz, polimetallar, yonuvchi slanets va fosforit ma’danlashuvining jihatlari tahlil qilingan, ya’ni hududdagi fodali qazilmalar o‘zlashtirilishiga oid xulosa va tavsiyalar berilgan.*

Kalit so‘zlar: *geologik qidiruv ishlari, mineral xom ashyo, zaxira, tabiiy gaz, gaz kondensati, neft, osh tuzi, polimetal, qurilish materiallari, oltingugurt, kon, fosforit, sanoat korxonalari.*

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ON ISSUES OF USE AND ECONOMIC DEVELOPMENT OF MINERAL RESOURCES OF THE KASHKADARYA REGION

Abstract. *This article provides a scientific analysis of the use and economical development of mineral resources. First of all, the issues of the natural-geographical and geological distribution of mineral resources in the region were analyzed. In addition, as a result of geological exploration, the*

manifestations of minerals were analyzed, in particular, aspects of oil and gas, polymetallic, oil shale, and phosphorite mineralization, i.e., conclusions and recommendations were made regarding the development of minerals in the region.

Keywords: *geological exploration, mineral raw materials, reserves, natural gas, gas condensate, oil, table salt, polymetallic, building materials, sulfur, mining, phosphorite, industrial enterprises.*

Kirish

Ko‘p yillik geologik qidiruv ishlari Qashqadaryo viloyati hududida sanoat ahamiyatiga ega bo‘lgan turli mineral xom ashyo zaxiralarining mavjudligidan dalolat beradi. Viloyatdagi asosiy foydali qazilmalarni tabiiy gaz, gaz kondensati, neft, osh va kaliy tuzlari, qurilish materiallari tashkil etadi. Shuningdek, marganetsning hamda toshko‘mirning uncha katta bo‘lmagan zaxiralari aniqlangan. Bundan tashqari, geologik qidiruv ishlari natijasida polimetallar, yonuvchi slanets va fosforit ma’danlashuvining namoyon bo‘lishi aniqlangan.

Muhokama

Tabiiy gaz, gazkondensati va neft. O‘zbekiston hududi geologik – tektonik xususiyatlariga ko‘ra 5 ta (Ustyurt, Buxoro – Xiva, Janubiy – G‘arbiy Hisor, Surxondaryo va Farg‘ona) neft – gazli mintaqaga kiradi. Qashqadaryo viloyati hududi bu mintaqalardan ikkitasi doirasida - Buxoro – Xiva va Janubiy – G‘arbiy Hisor neft – gazli mintaqalarda joylashgan bo‘lib, ular SHo‘rtan va Muborak guruhlariga kiruvchi konlardir. Tabiiy gaz, gazkondensati va neft asosan yura davrining ilk dengiz yotqiziqlari orasidagi marjon poliplarining toshga aylangan korallit ohaktoshlari yotqiziqlaridan - kollektorlardan 1,5 - 3,5 ming metr chuqurlikdan qazib olinmoqda.

XX asrning 50 – yillaridan boshlab yoqilg‘i berayotgan gaz va gazli kondensatining Pachkamar, Gumbuloq, Odamtosh, Qizilbayroq, Tandirchi va boshqa yirik zaxiralari konlari G‘uzor tumanining Qarshi cho‘liga tutashib ketgan Hisor tog‘ tizmasining tog‘oldi hududlarida joylashgan. Beshkent va Beshkent shahridan g‘arbda Qamashi gaz konlari joylashgan. Qarshi cho‘lining janubi – g‘arbida Kultog‘, Olang, Pomiq, Zevardi kabi gaz, gazkondensat va neft - gazli konlar mavjud. Mazkur maydonlarning Turkmaniston Respublikasi va Buxoro viloyati hududlari bilan tutash joylarda Dengizko‘l, Ko‘kdumaloq singari neft – gaz konlari joylashgan.

Qashqadaryo viloyatining shimoli – g‘arbida Buxoro viloyati bilan tutash maydonlarda ko‘pdan buyon qazib olinayotgan Setalantepa, Jarqoq, Shimoliy Muborak, Janubiy Muborak kabi gaz konlari qatoriga yaqinda ishga tushirilgan va foydalanishga topshirilgan Karim, Xo‘jahayron, SHo‘rtepa, Qoraqum, Qizil Rabot, Qorabayir va boshqa konlar qo‘shildi. Bu konlar geologik adabiyotlarda Buxoro – Xiva neftgazli provinsiya nomi bilan ataladigan janubiy havzaning bir bo‘lagidir. Qo‘ng‘irtog‘dan shimoliy – g‘arbdagi Qoraxitoy koni Qarshi shahrining, Chiroqchi tumani hududidagi Uvada va Saricha konlari Shaxrisabz tumanining gazga bo‘lgan ehtiyojini ta’minlagan. Bulardan tashqari, viloyat hududidagi O‘rtabuloq, Toshli, Sharqiy Qorayel, Nour, Boyburak sanoat

ahmiyatiga ega bo‘lgan neft konlaridan xom ashyo olinmoqda, ayrimlari esa foydalanishga tayyorlanmoqda.

Qashqadaryo zaminida davlat balansi hisobidagi 100 dan ziyod gaz, gazkondensat va neft konlari aniqlangan.

Viloyatning gaz konlari negizida mamlakatimizdagi salmoqli o‘ringa ega bo‘lgan Muborak gazni qayta ishlash zavodi milliy iqtisodiyotimizda muhim ahamiyatga ega bo‘lgan 251,5 ming tonna oltingugurt ishlab chiqarmoqda, 35 mlrd. m3 dan ziyod tabiiy gazni qayta ishlab bermoqda.

Qashqadaryo viloyatida xorijiy firmalar ishtirokida yirik sanoat korxonalaridan biri bo‘lgan Ko‘kdumaloq konini ishga tushirilishi gazni kompleks tayyorlovchi qurilma, neftni tayyorlash qurilmasi, neft qatlamlariga suvni haydovchi nasos stansiyasi kabi moslamalar qurilib, kondan qazib olinayotgan neftni va gazkondensatni Farg‘ona va Buxoro neftni qayta ishlash zavodlariga yuborilishi mamlakatimiz neft maxsulotlariga bo‘lgan ehtiyojni ta’minlagan holda neft mustaqilligiga erishish imkonini berdi.

Hozirgi paytda Qashqadaryo viloyati mamlakatda qazib olinayotgan tabiiy gazning 88 foizini, gazkondensatning 99 foizini va neftning 90 foizini bermoqda. Bu yerdagi tabiiy gaz manbalarining etan moddasiga boyligi kimyoviy moddalar olish, polimer va plastmassa tayyorlash uchun SHo‘rtan gaz – kimyo majmuasini bunyod etish imkonini berdi. Nafaqat mamlakatimizda, balki MDH hududida ham yagona bo‘lgan bu ulkan sanoat kompleksi yiliga 125 million tonna polietilin, 137 ming tonna suyultirilgan gaz, 130 ming tonna yengil kondensat, 4,2 mlrd. m^3 gaz mahsuloti va 4 ming tonna oltingugurt ishlab chiqaradi. Shuningdek, mamlakatimizda paxta sanoati, plastmassa, plyonka, kabel tayyorlash, qadoqlashda ishlatiladigan mahsulotlar ishlab chiqarishning keskin o‘sishiga imkon beradi.

Qashqadaryo viloyati hududida sanoat ahamiyatiga ega bo‘lgan ko‘mir konlari yo‘q. Viloyatning ko‘mirga bo‘lgan ehtiyojini Yakkabog‘ tog‘laridagi Vori va Zarmas qishloqlari orasidagi toshko‘mir koni qisman qondirishi mumkin.

Dehqonobod tumanining janubi – sharqida Dehqonobod, Xo‘jaarna, Qizilcha, Dardara, Kan va boshqa konlarda yonuvchi slanetslarning namoyon bo‘lishi aniqlangan. Ammo ularning sanoat ahamiyati hozircha aniqlanmagan.

Qashqadaryo viloyati hududi kaliy va osh tuzining katta zaxiralariga ega. Taqribiy hisoblarga ko‘ra, Qashqadaryo viloyati ulushiga kaliy tuzlarining O‘zbekistonda bashoratlashtirilgan zaxiralarining 70 foizga yaqini va balansdagi zaxiralarining qariyb 100 foizi to‘g‘ri keladi (Ekonomicheskiy potensial, 1982 – yil). Hisor tizmasining janubi – g‘arbiy tarmoqlarida Oqbosh – Tepaqo‘ton , Kaypantov va Pachkamar tuzli maydonlari aniqlangan. Ular orasida eng yirigi Dehqonobod qo‘rg‘onchasidan 30 km shimoli – sharqda joylashgan Tepaqo‘ton konidir. Bu kondagi kaliy tuzlarining bashoratlashtirilgan zaxiralari 500 million tonani tashkil etadi.

Tepaqo‘ton kaliy tuzlari koni negizida chet ellik investorlar bilan hamkorlikda “Dehqonobod kaliyli o‘g‘itlar” korxonasi ishlab turibdi. Tuzlarni

kompleks qayta ishlash bromli temir, magnezit, gips va boshqa materiallarni yo‘l – yo‘lakay olish imkonini beryabdi.

Hisor provinsiyasi Dehqonobod tuzi havzani ham o‘z ichiga oladi. Bu havza doirasida Boybichakon, Hamkon va boshqa tuzli strukturalarni o‘z ichiga oladi. Bu yerda Boybichakon va Tepaqo‘ton osh tuzining yirik konlari aniqlangan. Butun havza doirasida qatlamlarning qalinligi 200 – 600 metrni tashkil etadi.

Boybichakon osh tuzi konida (Qamashi tumanida Langar qishlog‘idan 12 km janubi - sharqda) tuzlarning C_1 toifasi balans zaxirasi 234,6 million tonna, C_2 toifasi bo‘yicha esa 4385,1 mllion tonnani tashkil etadi. Osh tuzining istiqbolli zaxiralari juda ulkan.

Osh tuzi shuningdek Tepaqo‘ton kaliy tuzli konida ham mavjudligi aniqlangan. Bu yerda osh tuzining zaxirasi 6,1 million tonnani tashkil etadi.

Hisor tizmasining janubi – g‘arbiy tarmoqlari orasida Dehqonobod tumanida bashoratlashtirish zaxirasi 213 million tonnani tashkil etadigan fosforit konlarining mavjudligi aniqlangan. Bu kon ochiq usulda foydalanilishi mumkin. Konda P_2O_5 ning miqdori 6 %.

Geologik qidiruv ishlari natijasida Qoratepa tog‘larining yonbag‘irlarida (Chiroqchi shahridan 30 km shimoli - sharqda) pegmatitning Lolabuloq koni aniqlangan bo‘lib, unda pegmatining bashoratlari zaxirasi 7 million tonnani tashkil etadi.

Qashqadaryo viloyati hududi qurilish materiallariga juda boy. Qazib olinayotgan marmar, dolomit, ohaktosh, keramzit kabi pardozlash, haykaltaroshlik, qurilish xom ashyosi bo‘lgan noma’dan boyliklar yonilg‘i-enrgetika resurslaridan keyingi ikkinchi o‘rinda turadi. Viloyatdagi Bodomzor, Iskana, Sevaz, Tomchiota, Xazornova, Birkunlik va boshqa konlarda xilma – xil tovlanuvchi marmar qazib olinmoqda. Bu konlardagi marmarning umumiy zaxirasi 4 million km^3 dan ortiqroqdir. Viloyatdagi marmar konlarining xomashyosi Kitob va Makrid toshga ishlov berish kombinatlarida marmar bloklari va maydalangan uvoqlarini ishlab chiqarishda foydalanilmoqda. Bu kombinatlarning texnologik asbob – uskunalari mustaqillik yillarida xorijdan keltirilgan zamonaviy asbob – uskunalar bilan almashtirildi.

Dolomitli ohaktoshning zaxiralari ham ancha katta bo‘lib, Dehqonobod va Pachkamar konlarida ayniqsa batafsil o‘rganilgan. Dehqonobod konida devorbop dolomitlarning zaxirasi 6, 4 million m^3, Pachkamar konida esa 4, 7 million m^3 ni tashkil etadi. Hozirgi paytda bu konlarning ham xom ashyosi devorbop toshlar va o‘tga chidamli xom ashyo sifatida foydalanilmoqda. Bundan tashqari, ulardan Samarqand va Toshkent chinni zavodlariga ham xom ashyo yuborilmoqda.

Ohaktoshning Zarafshon tizmasi janubiy tarmoqlaridagi Qaynar II va Hisor tizmasining janubi – g‘arbiy tarmoqlaridagi Langar konlari aniqlangan. Qaynar konida karbonatli qatlamining qalinligi 640 – 1150 metr bo‘lib, umumiy zaxirasi 8862, 0 ming tonnani tashkil etadi.

Langar qishlog‘i yaqinidagi ohaktosh konida chuqurligi 30 metrgacha bo‘lgan 15 million tonnalik bashoratlashtirilgan zaxiralari aniqlangan.

Sement xom ashyosi sifatida foydalanish mumkin bo‘lgan ohaktoshlar Kitob shahridan 12 km shimolroqda joylashgan Qoratepa konida topilgan ($C_1 + C_2$ toifalari bo‘yicha zaxirasi 326 million. t, C_1 bo‘yicha - 215 million tonna).

Ganch – alebasterning xom ashyosi bo‘lgan gipsning katta zaxirasi Pachkamar, Langar, Oloviddin, Kalkama, Maymanoq, Kosontog‘ kabi konlarda to‘plangan. Ular orasida gipsning eng yirik konini Pachkamar koni hosil qiladi. Bu yerdagi birinchi navli gips qatlamining qalinligi 6 m hisoblanganda uning zaxirasi 1692 ming tonnani tashkil etadi.

Qashqadaryo viloyatida qurilish uchun zarur bo‘lgan qum - shag‘al va pishiq g‘isht tayyorlash uchun zarur bo‘lgan tuproq – grunt zaxiralari juda katta. Hozirgi paytda viloyat va mamlakatimizning boshqa hududlari ehtiyoji uchun foydalanilayotgan eng yirik Tanxoz qum – shag‘al koni bazasida Tanxoz shag‘al saralash zavodi maxsulot bermoqda. Tanxoz konidagi qum – shag‘al zaxirasi 29, 2 million m^3 .

Chiroqchi tumanidagi donador qumli Chiyal koni (zaxirasi 38,97 million m^3 bo‘lgan) beton va qurilish uchun katta miqdoorda xom ashyo berishi mumkin.

Xulosa

Qashqadaryo viloyatining katta zaxiralariga ega bo‘lgan turli mineral resurslaridan samarali foydalanishni yo‘lga qo‘yish va mamlakatimizning mineral resurslarga bo‘lgan ehtiyojlarini imkoni boricha qondirish maqsadida mustaqillik yillarida ulkan bunyodkorlik ishlari boshlandi: mavjud korxonalar tubdan rekonstruksiya qilindi, xorijdan keltirilgan zamonaviy asbob – uskunalar bilan qayta jihozlandi va ayni paytda yangi sanoat korxonalari barpo etildi, zamonaviy texnologiya asosida qazib oluvchi korxonalarni xorijiy sheriklar ishtirokida barpo etish va maxsulot ishlab chiqarish loyihalari ishlab chiqildi va qisman amalgam oshirila boshlandi (masalan, Sho‘rtan gaz – kimyo kompleksi).

Qashqadaryo viloyati mineral resurslarini xo‘jalik ahamiyatiga ko‘ra 3 guruhga ajratish mumkin. Birinchi guruhni gaz qazib olish tashkil etadi. Qazib olinayotgan gaz nafaqat mamlakatimizdagi ishlab chiqarish korxonalaridagina emas, balki qo‘shni mamlakatlarni ham gaz bilan ta’minlashda muhim.

Ikkinchi guruhga neft, kelajakda osh tuzi. Kaliy tuzi, neft – kimyo tarmoqlari uchun kerak bo‘lgan mineral resurslar ishlab chiqarish kiradi. Uchinchi guruhni esa qurilish materiallari (marmar, g‘isht tayyorlash uchun xom ashyo, shag‘al, qum, mergel, gipsva boshqalar) tashkil etadi. Bu mineral resurslar asosida viloyatda o‘tgan asrning 60 – yillaridan boshlab Qarshi cho‘lini o‘zlashtirish munosabati bilan yirik qurilish industriyasi vujudga keldi.

Viloyat mineral resurslaridan samarali foydalanish muammosi bugungi kunda atrof muhitni muhofaza qilish bilan bog‘liq bo‘lgan muammodir.

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ROBOTOTEXNIKANING TA’LIM JARAYONIDAGI YUTUQLARI

Annotatsiya: *Ushbu maqolada robototexnikaning ta’lim jarayoniga ta’siri, o‘quvchilarning bilim olishga bo‘lgan qiziqishini oshirishdagi roli va ilmiy-texnikaviy yutuqlari tahlil qilinadi. Robototexnika STEM fanlarini (matematika, muhandislik, texnologiya va fizika) interaktiv va amaliy o‘rgatish imkoniyatini yaratib, o‘quvchilarning ijodiy fikrlash va muammolarni hal qilish ko‘nikmalarini rivojlantirishga xizmat qiladi. Shuningdek, xalqaro musobaqalar va maxsus dasturlar orqali yoshlarning texnologiyaga bo‘lgan qiziqishini oshirishga yordam beradi. Maqolada, shuningdek, robototexnikaning kelajakdagi rivojlanish yo‘nalishlari va ta’lim tizimida uning joriy etilishining ahamiyati yoritiladi.*
Kalit so‘zlar: *robototexnika, ta’lim texnologiyalari, STEM ta’limi, interaktiv o‘qitish, ijodiy fikrlash, raqamli savodxonlik.*

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ACHIEVEMENTS OF ROBOTOLOGY IN THE EDUCATIONAL PROCESS

Annotation: *This article analyzes the impact of robotics on the educational process, its role in increasing students' interest in learning, and scientific-technical achievements. Robotics provides an opportunity to teach STEM subjects (mathematics, engineering, technology, and physics) interactively and practically, fostering students' creative thinking and problem-solving skills. Additionally, international competitions and specialized programs help increase young people's interest in technology. The article also discusses the future development of robotics and its importance in the education system.*
Keywords: *robotics, educational technologies, STEM education, interactive learning, creative thinking, digital literacy.*

Zamonaviy texnologiyalar ta’lim tizimini tubdan o‘zgartirib, o‘quv jarayonining samaradorligini oshirishga xizmat qilmoqda. Ayniqsa, robototexnika sohasidagi innovatsiyalar ta’lim jarayonini yanada interaktiv, qiziqarli va natijador qilishda muhim rol o‘ynamoqda. Ushbu maqolada robototexnikaning ta’lim tizimidagi yutuqlari, uning afzalliklari va istiqbollari yoritiladi.

Robotlar insonga nima beradi?

Zamonaviy fan va texnologiyalar inson faoliyatining barcha sohalariga chuqurlashib kirib borgan bo‘lsa-da, insonlar va mashinalar haligacha teng hamkorlik asosida o‘zaro aloqaga kirishgani yo‘q.

Avtozavodlarda robot va ishchi bir safda turibdi. Ya’ni bitta ishni robot ham, inson ham bajarmoqda. Mehnatning bunday taqsimoti inson va mashina uyg‘unligida erishish mumkin bo‘lgan salohiyatni ancha chegaralab qo‘yadi. Dunyo inson va mashina yakdil texnologiya sifatida ishlaydigan davrga qarab o‘zgarib bormoqda.

Sun’iy idrok – ma’lumotni qabul qilib, uni qayta ishlagan holda muayyan funksiyani bajaruvchi tizim. Sun’iy idrok insonning o‘rnini egallash, uning vazifalarini mutlaqo tortib olishni maqsad qilmaydi. Balki inson imkoniyatlarining chegarasini kengaytirishga xizmat qiladi [N. Shaxinpur (1990) “Kurs robototexnika” nomli maqola 5-bet].

Sun’iy idrok ustida ishlovchi novator kompaniyalar inson va mashinaning o‘zaro aloqasini kuchaytirgan holda original simbiozga erishishga intilishmoqda. Mazkur simbioz quyidagi vazifalarni bajarishi mumkin:

Robototexnikaning ta’limga ta’siri:

1. Robototexnika ta’lim jarayoniga quyidagi yo‘nalishlarda sezilarli ta’sir ko‘rsatayotganini aytib o‘tish o‘rinli bo‘lmoqda:
2. Amaliy mashg‘ulotlarni rivojlantirish – An’anaviy nazariy ta’lim bilan bir qatorda, amaliy mashg‘ulotlar orqali o‘quvchilarning texnik ko‘nikmalarini oshirish va shakllantirishga yordam beradi.
3. STEM fanlarini o‘qitishda innovatsiyalar – Robototexnika matematika, fizika, dasturlash va birqancha muhandislik fanlarini yanada tushunarli va qiziqarli o‘rganishga aktiv xizmat qiladi.
4. Ijodiy fikrlash va muammolarni hal qilish ko‘nikmalarini shakllantirish – O‘quvchilar muayyan vazifalarni bajarish jarayonida tahlil qilish, muammolarni hal qilish va ijodiy yondashuv ko‘nikmalariga ega bo‘ladilar.
5. Raqamli savodxonlikni keng rivojlantirish – Dasturlash va avtomatlashtirish asoslarini o‘rganish orqali talabalar (o‘quvchilar) zamonaviy texnologiyalar bilan tanishadilar.
6. Jamoaviy ishlash madaniyatini shakllantirish – Robotlarni yaratish va dasturlash guruhda ishlashni talab qiladi, bu esa hamkorlik va muloqot ko‘nikmalarini munosib ravishda rivojlantiradi.
7. Robototexnika yordamida ta’limda erishilgan yutuqlar:
8. Talabalar (o‘quvchilar) bilim olishga bo‘lgan qiziqishini oshirish – Interaktiv ta’lim usullari sababli, an’anaviy usullarga qaraganda talabalar (o‘quvchilar) bilim olishga ko‘proq qiziqish bildirishmoqda.
9. Xalqaro tanlovlarda muvaffaqiyatli ishtirok – Yosh dasturchilar va muhandislar uchun tashkil etiladigan First Lego League, RoboCup, World Robot Olympiad kabi tanlovlar orqali talabalar (o‘quvchilar) o‘z iqtidorlarini namoyon etish imkoniyatlariga ko ‘proq ega bo‘lishmoqda.

10. Yangi ta’lim metodikalarining yaratilishi – Robototexnikani o‘rgatishga mo‘ljallangan maxsus dasturlar, masalan, Arduino, Raspberry Pi, LEGO Mindstorms, VEX Robotics kabi platformalar ta’lim jarayonida munta’zam ravishda keng qo‘llanilmoqda.
11. Maxsus ehtiyojli bolalar uchun inklyuziv ta’lim imkoniyati – Robotlar yordamida maxsus ehtiyojga ega bo‘lgan bolalarning o‘qish, o‘zlashtirish jarayonlari sezilarli darajada yengillashtirilmoqda.

Xulosa

Robototexnika ta’lim jarayonini samarali va qiziqarli qilishda muhim o‘rin tutadi. Kelajakda bu soha yanada rivojlanib, virtual reallik (VR), sun’iy intellekt (AI) va IoT texnologiyalari bilan uyg‘unlashgan holda ta’lim jarayoniga yanada katta ta’sir o‘tkazishi kutilmoqda. Shu bois, ta’lim tizimida robototexnika bo‘yicha chuqurlashtirilgan kurslarni joriy etish, o‘qituvchilarni maxsus tayyorgarlikdan o‘tkazish va zamonaviy laboratoriyalarni yaratishda muhim ahamiyat kasb etadi.

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TEXNIKA OLIY O‘QUV YURTLARIDA KOMPYUTER TEXNOLOGIYASI VOSITALARI ASOSIDA O‘QITISH

Annotatsiya: *Maqolada texnika oliy oquv yurtlarida kompyuter texnologiyasi vositalari asosida o‘qitish, hamda elektron o‘quv majmua va darsliklarga qo‘yiladigan asosiy talablar haqida fikr yuritilgan. Shuningdek, kompyuterli o‘qitish texnologiyasining asosiy xususiyatlari va afzallik jihatlarini ochib berilgan.*

Kalit so‘zlar. *Kompyuterli o‘qitish vositalari, elektron o‘quv majmua, elektron darslik, virtual tajriba, elektron o‘quv-uslubiy nashrlar.*

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TEACHING BASED ON COMPUTER TECHNOLOGY TOOLS IN TECHNICAL HIGHER EDUCATIONAL INSTITUTIONS

Abstract: *The article discusses the main requirements for teaching in technical universities based on computer technology tools, as well as for electronic educational complexes and textbooks. Also, the main features and advantages of computer-based teaching technology are revealed.*

Keywords. *Computer teaching tools, electronic educational complex, electronic textbook, virtual experience, electronic teaching-methodical publications.*

Bugungi texnika oliy o’quv yurtlarida professor – o‘qituvchilaridan talabalarning mustaqil ishlash faolligini oshirish, ularning ijodiy qobiliyatlarini rivojlantirish ilg‘or pedagogik texnologiyalaridan foydalanishni talab etadi. Axborot va kommunikatsiya texnologiyalarining jamiyatimizda muhim o‘rinni egallashi bilim uzatilish va qabul qilishining yangi shakllari va vositalarini ishlab chiqishini taqozo etadi. Bunday shakllardan biri kompyuterli o‘qitish texnologiyalari asosida o‘qitishdir. Elektron ta’lim zaxiralari vositalari asosida ta’lim berish kompyuterli o‘qitish texnologiyasi deb yuritiladi. Kompyuterli o‘qitish texnologiyasining asosiy xususiyatlari va afzallik jihatlari quyidagilardan iborat:

- o‘qitish jarayonida axborot ma’lumotlari va zaxiralarining faol holatdagi integratsiyasining ta’minlanishi;

- talabalarning ta’lim olishga qiziqishining faolligining ortishi;
- ta’lim olishning qulayligi va natijaviyligi ta’minlanishi;
- kompyuterli texnologiya ta’lim oluvchining mustaqil fikrlashi, ijodiy qobiliyatlarini rivojlantirish va ishlab chiqarish jarayoniga yo‘naltirilganligi;

Kompyuterli o‘qitish texnologiyasini joriy etishda asosan elektron o‘quv uslubiy majmualar va elektron o‘quv darsliklardan foylaniladi. Elektron o‘quv majmua va darsliklar (EO’MD) quyidagilarni o‘z ichiga oladi:

1) kursni o‘rganish bo‘yicha nazariy materiallar;

2) masala va mashqlarni yechish uchun amaliy mashg’ulot bo‘yicha praktikum;

3) kursni o‘rganish bo‘yicha (tajriba ishlarini) bajarish uchun uslubiy ko‘rsatmalar;

4) izohli lug‘at va atamalar;

5) Tarqatma materiallar, nazorat uchun testlar va umumiy nazorat savollari;

EO’MDlar fanning mazmuni va mohiyatiga diqqatni jalb etgan holda ko‘p sondagi ma’lumotlarni qarab chiqish va ko‘proq amaliy mashg‘ulotlarni bajarishga imkon yaratadi. Talaba bilim oluvchilarni murakkab hisoblashlar va almashtirishlardan xalos etadi. O’rganishning barcha bosqichlarida o‘z-o‘zini test orqali tekshirib ko‘rish uchun keng imkoniyatlar yaratadi. EO’MD tajribali prof - o‘qituvchi vazifasini, cheklanmagan tushuntirishlarni, sanoqsiz takrorlashlarni, eslatishlarni taqdim etgan holda bilimlar taqdim etadi.

EO’QDda talabalarning bilim va ko‘nikmalarini baholash hamda nazorat qilish uchun tuzilgan avtomatlashtirish dasturlari mavjud bo‘lishi zarur. EO’MD talabalarda real borliqning rivojlanishi qonunlarini tushunish, talabalarni mamlakatimizda bo‘layotgan islohotlar, boyliklardan faxrlanishiga o‘rgatadi. O‘z Vatanini ko‘z qorachig‘idek asrash, bir so‘z bilan aytganda, talabalarning huquqiy madaniyatini shakllantiruvchi his-tuyg‘usini kamol toptirishi uchun xizmat qilishi kerak. Elektron o‘quv majmua va darslikda jamiyat taraqqiyoti, inson kamolotida yaratuvchanlik, mehnatning tutgan o‘rnini ko‘rsatishga alohida ahamiyat beriladi.

EO’MD mazmuni o‘quv dasturiga muvofiq ravishda yoritilishi, ayni paytda har bir mavzuni bayon etishda undan ma’lum darajada chetga chiqishi, me’yorlangan bilim va ko‘nikmalarni puxta o‘zlashuvini ta’minlashi lozim. Shuning bilan bir qatorda fan asoslarining muhim tomonlari, talabalarning amaliy faoliyatida egallagan bilimlardan muvaffaqiyatli Elektron o‘quv majmua va darsliklarda mukammal bayon etiladi.

Xulosa qilib aytganda, EO’MD o‘quv dasturi va elektron o‘quv-uslubiy nashrlarga qo‘yilgan talablarga javob berishi, o‘rganilayotgan fan mazmunini ochib berishi kerak. O‘quv-uslubiy maqsadlarga erishishi uchun yetarli bo‘lgan hajmga va yetarli illyustrativ elementlarga ega bo‘lishi (ya’ni kompyuterning multimediali va boshqa imkoniyatlaridan imkon qadar ko‘proq foydalanish), zarurat tug‘ilganda tashqi WEB-manbalarga va resurslarga murojat qilish imkoni bo‘lishi maqsadga muvafiq. Talabaning yoritilgan materialni o‘zlashtirish darajasini mustaqil baholashi uchun o‘z-o‘zini tekshirish imkonini beruvchi

nazorat savollariga ega bo‘lishi hamda talabalarning huquqiy bilimini, madaniyati va yangi g’oyalar shakllantirishga xizmat qilishi lozim.

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IQTISODIYOTDA SAVDO HAMDA RIVOJLANISH KONSEPSIYALARIGA BERILGAN TA’RIFLAR

Annotatsiya: *Ushbu maqolada iqtisodiyotda savdo faoliyati va rivojlanish konsepsiyalarining nazariy hamda amaliy jihatlari umumiy yoritilgan. Savdo tushunchasining iqtisodiy mohiyati, rivojlanish konsepsiyalarining turlari, ularning iqtisodiy tizimdagi o‘rni hamda o‘zaro bog‘liqligi tahlil qilinadi. Shuningdek, eksportga yo‘naltirilgan, import o‘rnini bosuvchi, innovatsion, barqaror va inklusiv rivojlanish modeli kabi yondashuvlarning afzalliklari ilmiy manbalar asosida ochib beriladi. Tadqiqot natijalari savdo iqtisodiy o‘sishning asosiy drayveri ekanini, rivojlanish konsepsiyalari esa iqtisodiy siyosatni shakllantirishda muhim nazariy asos bo‘lib xizmat qilishini ko‘rsatadi.*

Kalit so‘zlar: *Savdo, iqtisodiy rivojlanish, barqaror rivojlanish, innovatsion iqtisodiyot, eksport strategiyasi, iqtisodiy o‘sish, global bozor, iqtisodiy siyosat.*

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DEFINITIONS OF THE CONCEPTS OF TRADE AND DEVELOPMENT IN ECONOMY

Abstract: *This article provides a general overview of the theoretical and practical aspects of trade activity and development concepts in the economy. The economic essence of the concept of trade, types of development concepts, their role in the economic system and their interrelationships are analyzed. Also, the advantages of such approaches as export-oriented, import-substituting, innovative, sustainable and inclusive development models are revealed based on scientific sources. The results of the study show that trade is the main driver of economic growth, and development concepts serve as an important theoretical basis for the formation of economic policy.*

Keywords: *Trade, economic development, sustainable development, innovative economy, export strategy, economic growth, global market, economic policy.*

Kirish

Savdo insoniyat tarixida eng qadimgi iqtisodiy faoliyatlardan biri bo‘lib, uning mavjudligi jamiyatning iqtisodiy munosabatlarini shakllantirishda asosiy omil bo‘lib xizmat qilgan. Bugungi globallashuv sharoitida savdo nafaqat tovarlar almashinuvi jarayoni, balki iqtisodiyotning modernizatsiyasi, texnologiyalar transferi, investitsiya oqimlari, yangi ish o‘rinlarining yaratilishi va iqtisodiy o‘sishning muhim tarkibiy qismi sifatida qaraladi.

Savdoning paydo bo‘lishi tovar ishlab chiqaruvchilar o‘z ehtiyojlarini qondirish uchun zarur bo‘lganidan ko‘proq mahsulot ishlab chiqara boshlagan jamiyatning rivojlanish jarayoniga tegishli. Savdo milliy iqtisodiyot tarmog‘i sifatida ulgurji va chakana savdo korxonalarining kengaytirilgan tarmog‘iga ega bo‘lib, oziq-ovqat hamda nooziq-ovqat tovarlari guruhlari mahsulotlarini saqlash, tashish va sotishni ta’minlaydi. Shuningdek, iste’molchilarga tegishli xizmat ko‘rsatishni tashkil etadi va hokazo. Savdoning holati va rivojlanish darajasi xo‘jalik yurituvchi subyektlar soni, ular faoliyatining hajmi, xaridorlar tomonidan tovarlarni iste’mol qilish tarkibi bilan tavsiflanadi.

Savdo milliy iqtisodiyotning boshqa tarmoqlariga (sanoat, qishloq xo‘jaligi va h.k.) va iste’molchilar miqdorini o’sish va kamayishiga ta’sir ko‘rsatadi. Savdoning va, birinchi navbatda, uning tarkibiy qismi bo‘lgan chakana savdoning muhim ahamiyati shundaki, uning korxonalari faoliyat ko‘rsatishi iste’molchilarning ehtiyojlarini qondirishga yordam beradi. Bundan tashqari, chakana savdo korxonalarining asosiy roli mahsulotlarni ishlab chiqaruvchidan xaridorga yetkazish bo‘yicha ishlab chiqarish va iste’mol o‘rtasidagi vositachilik vazifasi bilan belgilanadi. Bu funksiyani amalga oshirishning ahamiyati raqobat sharoitida, xo‘jalik yuritish sharoitlari ichki va tashqi muhitning turli omillari ta’sirida o‘zgarib turganda ayniqsa, iste’molchilarning to‘lovga qobil talabi doimo o‘zgarib turadigan sharoitda yanada ortadi.

Iste’molchilarning ehtiyojlarini qondirish vazifalarini muvaffaqiyatli hal etish va vositachilik vazifasini amalga oshirish uchun chakana savdo korxonalari o‘z faoliyatini doimiy ravishda takomillashtirib borishi, faoliyat ko‘rsatish samaradorligini oshirishi va yanada rivojlantirish masalalarini hal etishi lozim. Bu esa, o‘z navbatida, O’zbekiston Respublikasini iste’mol bozorida chakana savdo korxonalarining samarali faoliyat yuritishi va rivojlanishini ta’minlashning tegishli konseptual asoslarini ishlab chiqishni taqozo etadi. Buning uchun birinchi navbatda, kategorial apparatni aniqlash, xususan, chakana savdo korxonalari uchun “konsepsiya”, “faoliyat yuritish”, “rivojlanish” va “ta’minot” kabi atamalarning mohiyatini aniqlash maqsadga muvofiqdir.

Rivojlanish konsepsiyalari esa mamlakatning uzoq muddatli iqtisodiy strategiyasini belgilovchi nazariy asosdir. Ular iqtisodiy o‘sishni barqarorlashtirish, texnologik rivojlanishni jadallashtirish, innovatsiyalarni qo‘llash, ishlab chiqarish samaradorligini oshirish va aholi farovonligini yaxshilashni maqsad qilgan.

So‘nggi yillarda savdo siyosatini strategik yondashuvlar bilan uyg‘unlashtirish muhim bo‘lib qoldi. Chunki savdo global iqtisodiy jarayonlarga

integratsiyaning asosiy mexanizmlaridan biri bo‘lib, rivojlanish konsepsiyalari bilan birgalikda mamlakatning raqobatbardoshligini oshiradi. Ayniqsa, O‘zbekiston misolida savdo liberallashtirilishi va eksport siyosatining faol amalga oshirilishi iqtisodiy yuksalishning asosiy omillaridan biriga aylandi.

Mazkur maqolada savdo va rivojlanish konsepsiyalarining iqtisodiy mohiyati, o‘zaro bog‘liqligi hamda zamonaviy rivojlanish jarayonlaridagi o‘rni tizimli tahlil qilinadi.

Adabiyotlar tahlili

Shuningdek, ilmiy nashrlarni o‘rganish hozirgi vaqtda “faoliyat yuritish” atamasini talqin qilishda bir xillik yo‘qligini ko‘rsatdi [1]. E.M. Korotkov fikriga ko‘ra, “faoliyat yuritish - bu hayotiy faoliyatni qo‘llab-quvvatlash, rejimni saqlash, bu firma faoliyatini belgilovchi barcha ishlab chiqarish funksiyalarini amalga oshirish, bu erishilgan sifat doirasidagi ishdir” [2]. L.G. Melnik funksionallik tizimning hayotiy faoliyat jarayonlarini ko‘p marta ko‘paytirish va takror ishlab chiqarishda ifodalanadi, deb hisoblaydi [3]

S. V. Suxov faoliyatni noyob, oldindan aytib bo‘lmaydigan (stoxastik) maqsadli jarayon sifatida ko‘rib chiqadi, uning doirasida korxona bir holatdan boshqasiga o‘tadi (tabaqalar makonida harakatlanadi) [4] T. I. Lepeyko va O.V. Mazorenkolarning fikricha, faoliyat ko‘rsatish – bu korxonaning asosiy funksiyalarini amalga oshirish, joriy maqsadlarga erishish, uning yaxlitligini saqlash va barqarorligini ta’minlashga qaratilgan tizimning miqdoriy va sifat o‘zgarishlarida ifodalanadigan korxonadagi moslashuv jarayonlari yig‘indisidir [5].

Metodologiya

Nazariy tahlil

Bizning fikrimizcha, faoliyat yuritish – bu joriy ish, korxonaning hayot faoliyatini davom ettirish uchun majburiy bo‘lgan an’anaviy funksiyalarni bajarishdir. Faoliyat ko‘rsatish deganda, nisbatan o‘zgarmas sharoitlarda harakat qilish, vazifalarni bajarish, standart operatsiyalarni bajarish tushuniladi.

“Rivojlanish” kategoriyasiga kelsak, rivojlanish g‘oyasi ilk bor antik davr faylasufi Geraklit tomonidan shakllantirilgan. Ammo har bir alohida olingan bilim sohasidagi rivojlanish mexanizmini tushuntiruvchi universal rivojlanish nazariyasini yaratishga urinishlar hanuzgacha ijobiy natija bermayapti [6]. Falsafiy fanlar rivojlanishni sifat jihatidan yangilikning paydo bo‘lishi, quyidan yuqoriga, murakkabdan oddiyga ko‘tarilishning ilgarilanma jarayoni natijasi bo‘lgan o‘ziga xos o‘zgarish jarayoni sifatida talqin qiladi. [7]

Tadqiqotda klassik iqtisodiyot vakillari — Adam Smit, David Rikardo, J. Stiglitz, P. Krugman kabi olimlarning xalqaro savdo va iqtisodiy rivojlanish nazariyalari o‘rganildi. Savdo mexanizmi, bozor liberallashuvi, erkin bozor va komparativ ustunlik kontseptsiyalari asosiy nazariy manba sifatida tanlandi.

Qiyosiy tahlil

Rivojlanayotgan va rivojlangan mamlakatlar savdo siyosati tahlil qilindi:

- Janubi-Sharqiy Osiyo mamlakatlarining eksportga yo‘naltirilgan modeli,

- Lotin Amerikasi davlatlarining import o‘rnini bosuvchi strategiyasi,
- Yevropa Ittifoqining raqamli bozor modeli.

Natijalar asosida turli savdo konsepsiyalarining iqtisodiyotga ta’siri solishtirildi.

Empirik metodlar

Makroiqtisodiy ko‘rsatkichlar (YaIM, eksport-import hajmi, jahon savdosidagi ulush, aholi bandligi, investitsiya oqimlari) bo‘yicha ilmiy statistik ma’lumotlar tahlil qilindi.

Tizimli yondashuv

Savdo va rivojlanish konsepsiyalari iqtisodiyotning tarkibiy elementlari (sanoat, xizmatlar sohasi, logistika, transport, moliya sektori) bilan bog‘liq holda tizimli ko‘rib chiqildi.

Natijalar

Savdo tushunchasining ilmiy ta’rifi

Savdo — bu ishlab chiqarilgan tovarlar va ko‘rsatiladigan xizmatlarning almashinuvi, ular iste’molchiga yetib borishini ta’minlovchi iqtisodiy faoliyat bo‘lib, iqtisodiy resurslarni samarali taqsimlashga xizmat qiladi. Savdoning asosiy funksiyalari:

- bozor talabini qondirish,
- ishlab chiqarishni rag‘batlantirish,
- mahsulot oqimini ta’minlash,
- davlat byudjetiga tushum keltirish,
- iqtisodiy raqobatni kuchaytirish.

Rivojlanish konsepsiyasining mohiyati

Rivojlanish konsepsiyasi — iqtisodiy o‘sish jarayonini tizimli boshqarish, mamlakatni modernizatsiya qilish va aholi farovonligini oshirishga qaratilgan strategik ilmiy yondashuvlar majmuasidir.

Ular quyidagi omillarni o‘z ichiga oladi:

- texnologik yangilanish,
- innovatsion iqtisodiyot,
- ekologik barqarorlik,
- inson kapitalini rivojlantirish,
- raqamli transformatsiya.

Asosiy rivojlanish konsepsiyalari

Eksportga yo‘naltirilgan rivojlanish modeli

Bu model Janubiy Koreya, Yaponiya, Singapurda keng qo‘llanilgan. Uning afzalliklari:

- sanoat ishlab chiqarishi tez o‘sadi;
- texnologiyalar modernizatsiya qilinadi;
- eksportdan katta daromad olinadi;
- milliy brendlar shakllanadi.

Import o‘rnini bosuvchi rivojlanish konsepsiyasi

Lotin Amerikasi davlatlari qo‘llagan ushbu modelning asosiy maqsadi — mahalliy ishlab chiqarishni rivojlantirish, tashqi tovarlarga qaramlikni kamaytirish.

Innovatsion rivojlanish konsepsiyasi

Oliy texnologiyalar, ilmiy-tadqiqot faoliyati, raqamli iqtisodiyot, startaplar rivojlanishini ta’minlaydi.

Barqaror rivojlanish modeli

Ekologik xavfsizlik, yashil iqtisodiyot, energiya tejash, chiqindilarni kamaytirish tamoyillariga asoslanadi.

Inklusiv rivojlanish modeli

Iqtisodiy o‘sish imkoniyatlari jamiyatning barcha qatlamlariga teng taqsimlanadi. Bu model:

- kambag‘allikni kamaytiradi,
- ijtimoiy tenglikni kuchaytiradi,
- iqtisodiy faollikni oshiradi.

Savdoning iqtisodiy rivojlanishga ta’siri

Tahlillar savdoning quyidagi natijalarga olib kelishini ko‘rsatdi:

- YaIM o‘sish sur’atlari oshadi;
- bandlik kengayadi;
- yangi texnologiyalar kirib keladi;
- investitsion muhit yaxshilanadi;
- eksport hajmi va valyuta tushumi ortadi;
- iqtisodiy raqobat kuchayadi.

Muhokama

Tadqiqot shuni ko‘rsatadiki, savdo faoliyati milliy iqtisodiyotning rivojlanishida hal qiluvchi omildir. Savdo siyosati to‘g‘ri tanlangan rivojlanish konsepsiyasi bilan uyg‘unlashganda iqtisodiy barqarorlik ta’minlanadi.

Tizimlarning iqtisodiy rivojlanish nazariyasiga ko‘ra, transformatsiyalarning kuchi va mazmuniga ko‘ra rivojlanish jarayoni ikki evolyutsion va inqilobiy shaklda ifodalanadi. Rivojlanishning evolyutsion shakli tizimning asta-sekin miqdor va sifat o‘zgarishlari bilan tavsiflanadi, bu uning tarkibi va tuzilishini tubdan o‘zgartirmaydi. Ushbu rivojlanish davri tizimning moslashuvchanlik, refleksivlik, egiluvchanlik va barqarorlik kabi xususiyatlari bilan tavsiflanadi. Taraqqiyotning inqilobiy shakli bir sifat holatidan ikkinchisiga sakrash yo‘li bilan o‘tishni nazarda tutadi.

Agar ushbu ta’rifni bir vaqtning o‘zida ochiq ijtimoiy-iqtisodiy tizim bo‘lgan muayyan korxona va tashkilotlarga nisbatan qo‘llaydigan bo‘lsak, uning so‘nggi qismini quyidagicha ifodalash mumkin: “... tashkilot rivojlanishining o‘ziga xosligi, birinchi navbatda, ularning asosiy elementi bo‘lgan xodimlarning rivojlanish darajasiga, ularning ijodiy va innovatsion faollik ko‘rsatish qobiliyatiga bog‘liq. Demak, ta’kidlash mumkinki, rivojlanish korxonaning muhim xususiyatidir.

I.O.Bogatirev korxonaning rivojlanishini turli iqtisodiy tabiat, yo‘nalish, intensivlikdagi o‘zgarishlar yig‘indisi sifatida ta’riflaydi. Bunday o‘zgarishlar

obyektiv ravishda ijtimoiy-iqtisodiy tizimlarda tashqi va ichki omillar ta’sirida sodir bo‘ladi. Natijada, bunday o‘zgarishlar korxonaning nisbatan barqaror xususiyatga ega bo‘lgan turli tashkiliy-iqtisodiy holatlarga o‘tishiga olib keladi [8].

V.M.Koshelnik olimlarning korxona rivojlanishi haqidagi fikrlarini umumlashtirib, uning ta’rifini iqtisodiy ishlab chiqarish tizimining yangi miqdoriy va sifat xususiyatlariga ega bo‘lishi, faoliyat ko‘rsatish samaradorligi ko‘rsatkichlarini yaxshilash hamda korxonaning salohiyatini oshirish natijasida o‘z hayotiyligini saqlab qolgan ekzogen va endogen muhitdagi o‘zgarishlarga moslashishga yordam beradigan jarayon sifatida taqdim etadi.

S.Mocherniy iqtisodiy rivojlanishni ishlab chiqarish texnologik usulining (ishlab chiqarishning ashyoviy va shaxsiy omillarining texnik-iqtisodiy uyg‘unligiga asoslangan ishlab chiqarish usuli, texnik-iqtisodiy munosabatlar tizimidagi ishlab chiqaruvchi kuchlarning ashyoviy elementlari o‘rtasidagi texnik-texnologik munosabatlar majmuasi) qaytmas, qonuniy o‘zgarishlari sifatida ta’riflaydi [9].

Chakana savdo tashkilotlarining rivojlanshi ortidan hududning iqtisodiy-ijtimoiy holati yanada taraqqiy topadi. Biroq iqtisodiy rivojlanishdan farqli o‘laroq, iqtisodiy o‘sish uchun yuqorida keltirilgan belgilar xos emas, chunki tebranishlarning davriyligiga ko‘ra o‘sish iqtisodiy pasayish bilan almashinishi mumkin. Iqtisodiy o‘sish, uning teskari xarakterini hisobga olmaganda, iqtisodiy rivojlanishning tarkibiy qismi bo‘lib, uning uchun asta-sekin tub o‘zgarishlarni keltirib chiqaradigan o‘zgarishlarni to‘playdi.

Zamonaviy sharoitda savdoning o‘zgarishi

- elektron savdo (e-commerce),
- raqamli to‘lov tizimlari,
- logistikaning avtomatlashtirilishi,
- global savdo zanjirlarining shakllanishi,

savdoning yangi bosqichga o‘tganini ko‘rsatadi.

Rivojlanish konsepsiyalarining amaliy ahamiyati

Tahlillar quyidagi xulosalarni berdi:

- Innovatsion model iqtisodiy o‘sishni tezlashtiradi.
- Barqaror rivojlanish ekologik xavfsizlikni oshiradi.
- Eksportga yo‘naltirilgan strategiya tovarlar raqobatbardoshligini kuchaytiradi.
- Inklusiv rivojlanish ijtimoiy barqarorlikni ta’minlaydi.

Savdo va rivojlanishning o‘zaro ta’siri

Savdo iqtisodiy rivojlanishni tezlashtiradi, rivojlanish konsepsiyalari esa savdoning samaradorligini oshiradi. Ular o‘zaro bir-birini to‘ldiradi.

Xulosa

Tadqiqot natijalariga ko‘ra, savdo iqtisodiyotning eng muhim bo‘g‘inlaridan biri bo‘lib, mamlakatning uzoq muddatli rivojlanish strategiyasini shakllantirishda hal qiluvchi o‘ringa ega. Rivojlanish konsepsiyalari savdo jarayonlarini

boshqarish, modernizatsiya qilish, innovatsion texnologiyalarni joriy etish va iqtisodiy barqarorlikka erishishning nazariy poydevorini yaratadi.

Quyidagi xulosalarga kelindi:

1. Savdo iqtisodiy resurslarning optimal taqsimlanishiga yordam beradi.
2. Rivojlanish konsepsiyalarining to‘g‘ri tanlanishi iqtisodiy o‘sishni barqarorlashtiradi.
3. Eksportga yo‘naltirilgan strategiya milliy iqtisodiyotning raqobatbardoshligini oshiradi.
4. Innovatsion rivojlanish modeli iqtisodiy modernizatsiyaning asosiy drayveri hisoblanadi.
5. Inklusiv va barqaror rivojlanish iqtisodiy tizimni uzoq muddatga mustahkamlaydi.

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QISHLOQ XO'JALIGINI RAQAMLASHTIRISHNI TAKOMILLASHTIRISH

Annotatsiya: *Bugungi kunda raqamli iqtisodiyotning jadallik bilan rivojlanib borayotganligi, bizdan uni barcha sohalarga tatbiq qilishimizni talab qiladi. Qishloq xo'jaligi ham bundan holi emas. Ayniqsa, ushbu tarmoqni rivojlantirishda ,mahsulotlarni yetishtirishdan tortib, iste'molchiga yetkazib berishgacha bo'lgan jarayonda raqamlashtirishning o'rni katta.Yer holati, suv manbasi, ekin turlarini iqlimga joylashtirish, hosildorlikni oshirish usullari, sarf va xarajatlarini aqlli qishloq xo'jaligi asoslarini raqamlashtirishsiz tasavvur qilish qiyin. Bu maqolada qishloq xo`jaligini raqamlashtirishning dolzarbligi, undagi muammolar va ularni hal qilish yo`llari haqida ma'lumot beriladi.*

Kalit so'zlar: *Raqamli texnologiya, elektron bozor, "CropAgro", "Agroplatforma", Raqamli agrobiznes, Texnika, texnologiya, efito.uz.*

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IMPROVING DIGITALIZATION OF AGRICULTURE

Abstract: *Today, the rapid development of the digital economy requires us to apply it to all areas. Agriculture is no exception. Especially in the development of this industry, digitization has a great role in the process from production of products to delivery to the consumer. It is difficult to imagine land conditions, water resources, crop climates, ways to increase productivity, costs and expenses without digitalization of the basics of smart agriculture. This article provides information about the relevance of digitization of agriculture, its problems and ways to solve them.*

Key words: *Digital technology, Electronic market, "KropAgro", "Agroplatform", Digital agribusiness, Technical technology, "efito.uz".*

Kirish

Qishloq xo`jaligi mamlakatimiz iqtisodiyotida muhim ro`l o`ynaydi. Qishloq xo'jaligi ishlab chiqarilishini rivojlantirish, mahsulot yetishtirish jarayonini osonlashtirish, iste'molchiga yetkazib berish jarayonini takomillashtirish mamlakatimiz iqtisodiy holatini yaxshilashning muhim shartlaridan biridir. Ammo qishloq xo`jaligini raqamlashtirishda bugungi kunda bir qator muammolar yuzaga kelmoqda. Masalan infratuzilmaning talab darajasida emasligi, ko‘plab qishloq joylarida Internet va boshqa kommunikatsiya infratuzilmasi yetarlicha rivojlanmaganligi, bu esa raqamli texnologiyalarni joriy etishda to‘siq bo‘lmoqda. Moliyaviy muammolar, qishloq xo‘jaligini raqamlashtirish uchun zarur bo‘lgan texnologiyalar va dasturlarga investitsiyalar qilish imkoniyatlari cheklangan. Kichik fermerlar uchun bunday xarajatlar qiyin bo‘lishi mumkin. Yana bir dolzarb muammolardan biri kadrlar malakasining yetishmasligi. Raqamli texnologiyalarni qo‘llash uchun zarur bo‘lgan malakali mutaxassislar yetishmaydi. Bu, o‘z navbatida, raqamli vositalarni samarali ishlatishda muammolarni keltirib chiqaradi. Qishloq xo`jaligini raqamlashtirishdagi muammolarni hal etish, uni yuqori texnologiyalar bilan ta'minlash mamlakatimizni, xalqimizni iqtisodiy faravonlikka yetaklaydigan muhim qadamlardan biri. Bugungi kunda bu sohada yangi texnologiyalarni joriy qilish, ularni takomillashtirishda chet el tajribasini o'rganib, tatbiq qilish bo'yicha keng ko'lamli ishlar joriy etilmoqda. O‘zbekiston hukumati va prezidentining qishloq xo‘jaligini raqamlashtirishga qaratilgan qarorlari bu sohani rivojlantirishga keng imkoniyatlar yaratmoqda. Masalan, 2023-yil 3-avgustda qabul qilingan "Qishloq xo‘jaligi sohasiga ilg‘or raqamli texnologiyalarni joriy qilish chora-tadbirlari to‘g‘risida"gi Prezident qarori qishloq xo‘jaligida raqamli yechimlarni kengaytirishga qaratilgan. Shuningdek, "Raqamli O‘zbekiston - 2030" dasturida qishloq xo‘jaligini raqamlashtirishga alohida e'tibor qaratilgan. Dasturda: "Qishloq xo‘jaligida raqamli texnologiyalarni joriy etish orqali samaradorlikni oshirish va resurslardan samarali foydalanishni ta'minlash" maqsad qilib qo‘yilgan. Ushbu dastur doirasida innovatsion yechimlarni, masalan, aqlli qishloq xo‘jaligi va avtomatlashtirilgan boshqaruv tizimlarini rivojlantirish ko‘zda tutilgan. Xususan, Prezidentimizning “Raqamli O'zbekiston -2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora tadbirlari to'g'risida”gi Farmoni bilan agrasanoatni rivojlantirishga qaratilgan bir qancha loyihalarni amalga oshirish belgilangan.[1]

Adabiyotlar Tahlili

Qishloq xo`jaligini raqamlashtirish global masala hisoblanadi. Bu ish ustida ko`plab mamlakat olimlari ish olib bormoqda. Quyida bir nechta misollar keltiramiz.

Xitoylik olimlar X. Zhang va H. Chen 2021-yilnda “Journal of Agricultural Science and Technology” jurnalida chop etilgan "Digital Transformation in Agriculture: Challenges and Opportunities" nomli maqolasida: "Raqamli texnologiyalar qishloq xo‘jaligi samaradorligini oshirishda muhim rol o‘ynaydi."[2] degan fikrni bildirgan. Hindistonlik olimlar S. Kumar va R. Singh

"The Role of Digital Technologies in Agricultural Innovation" nomli maqolasida raqamlashtirishning yangi imkoniyatlari haqida batafsil ma'lumot berib o`tgan. Jumladan "Qishloq xo'jaligida raqamli innovatsiyalar yangi imkoniyatlar yaratadi." degan fikrni ilgari surgan va yetarlicha asoslab bergan[3]. Ingliz olimi A. Smith o`zining "Digital Agriculture: The Future of Farming" nomli maqolasini "Agricultural Economics" jurnalida chop etgan. Bu maqolada raqamlashtirish fermerlarga qanchalik yordam berishi batafsil yoritilgan. Xususan "Raqamli qishloq xo'jaligi fermerlarga qaror qabul qilish jarayonida yordam beradi." degan fikrni bildirib o`tgan.[4] Xitoy olimlari qishloq xo`jaligini raqamlashtirish sohasida sezilarli izlanishlar olib brogan va yutuqlarga erishmoqda. Y. Liu va L. Wang 2022-yilda "Big Data Analytics in Agriculture: A Review" nomli maqolasini chop etgan. Bu maqola qishloq xo`jaligida ma'lumotlar tahlili sohasida raqamli texnologiyalarni joriy qilish, ularning afzalliklari haqida yozilgan. "Katta ma'lumotlarni tahlil qilish qishloq xo'jaligida strategik qarorlar qabul qilishda asosiy ahamiyatga ega".[5] J. Perez, va R. García raqamli texnologiyalarni qishloq xo`jaligida qo`llash ustida ilmiy izlanishlar olib borishgan va natijalarini "Smart Farming: Integrating IoT and Big Data" nomli maqolada bayon qilishgan. Ularning fikriga ko`ra "IoT texnologiyalari qishloq xo'jaligida samaradorlikni oshirishga yordam beradi."[6] Ba'zi olimlar qishloq xo`jaligini raqamlashtirishning ijtimoiy-iqtisodiy hayotga ta'sirini ham o`rganishgan. A. Mishra "The Impact of Digital Tools on Rural Development" nomli maqolasini chop etgan. Bu maqolada raqamli texnologiyalarning insonlarning ijtimoiy-iqtisodiy hayotini yaxshilashi haqidagi quyidagi fgikrlarni bildirib o`tgan: "Raqamli vositalar qishloq hududlarida ijtimoiy-iqtisodiy rivojlanishni tezlashtiradi."[7] M. Davis olib brogan izlanishlari bilan boshqa olimlardan biroz farq qiladi. U qishloq xo`jaligida blokcheyn texnologiyasi joriy qilish ustida ish olib borgan. Uning "Blockchain Technology in Agriculture: Benefits and Challenges" nomli maqolasida "Blockchain texnologiyasi qishloq xo'jaligida shaffoflikni oshirishda yordam beradi." degan fikr ilgari surilgan[8]. C. Fernández "Agricultural Systems" jurnalida chop etilgan "Agricultural Robotics and Automation: The Future of Farming" nomli maqolasida qishloq xo`jaligini avtomatlashtirish va unda robotlardan foydalanish ustida olib borilgan ilmiy izlanish haqida yozilgan maqolasida bu haqida aytilgan ko'plab fikrlar keltirilgan.Masalan, avtomatlashtirish va robototexnikaning qishloq xo'jaligida ishchi kuchidan samarali foydalanishdagi muhim ahamiyati,uni boshqarishdagi roli haqida yetarlicha iqtiboslar keltirilgan.[9] Bundan tashqari "Precision Agriculture" jurnalining 2022-yilda chop etilgan "Precision Agriculture ;Technologies and Practices" nomli maqolasida texnologik resurslardan samarali foydalanish, qishloq xo'jaligini yangi texnologiyalar bilan yetarlicha ta'minlash,ulardan unumli foydalanish uchun malakali mutaxassislarni tarbilayash haqida jiddiy muhokama olib boriladi va bu bo'yicha muammolar va ularni oldini olish bo'yicha yechimlar ko'rsatilgan.[10] Bundan tashqari, bugungi kunda agrasanoat tizimida ish olib boradigan xodimlarning raqamli savodxonligini oshirish,ularga zarur axborotlarni yetkazish raqamli qishloq xo'jaligini yuqori

cho’qqilarga olib boradigan muhim poydevordir. Bu fikrlarni George Thomas Johnson va Lewis Edward Lawes “Agricultural Educational” jurnalida chop etilgan “Digital Literacy in Agriculture; Bridging the Gap” maqolasida yetarlicha yoritib berishgan.Unda yozilishicha raqamli texnologiyalarni keng yoyish,uni targ’ib qilishdan oldin raqamli savodxonlikni o’stirish masalalari olib borilishi kerak.[11]. Milkha Singh va Rahul Kapoor agrosanoat haqidagi hind jurnalida ‘Raqamli platformalar fermerlarga resurslarni yaxshiroq boshqarish imkonini beradi’ degan g’oyani ilgari suradi.[12] Binobarin, bu bo’yicha bir qancha qo’llanmalar ham keltirilgan.O’z o’rnida aytib o’tish kerakki, yurtimizda qishloq xo’jaligi xodimlari va oddiy aholi ham yaxlit, yuritish oson bo’lgan platformalarga ehtiyoji yuqori. R. Naylor, W. Falcon ‘Food Security and Digital Technology” maqolasida raqamli texnologiyalarning oziq-ovqat xavfsizligini ta’minlashdagi muhim o’rin tutishi haqida yetarlicha fikrlar keltirilgan[13].”Raqamli yechimlar barqaror qishloq xo’jaligini rivojlantirishda muhim rol o’ynaydi” deb yoziladi Sustainable Agriculture jurnalining 2023 yilda chop etilgan ‘ ‘Sustainable Agriculture and Digital Solutions”nomli Aphirup Kumar va Peeretika Joshi tomonidan yozilgan maqolada.[14]

2023-yilda X.Xonqulov va X. Akbarov tomonidan yozilgan ‘Qishloq Xo’jaligiga aqlli texnologiyalarni joriy qilish” nomli maqolasida qishloq xo’jaligi ekin yerlari va suvdan samarali foydalanishda raqamli texnologiyalarni,issiqxona xo’jaliklarida avtomatlashtirish tizimini o’stirish qishloq xo’jaligi tizimining porloq kelajagi sari muhim yo’l bo’lishi ta’kidlangan[15]. 2023-yilda nashr qilingan ‘Agrar sohada raqamli texnologiyalarning ahamiyati’ maqolasida ‘Aholini sog’lom oziq-ovqat mahsulotlari bilan ta’minlash va uning tizimini rivojlantirish kafolati innovatsion texnologiyalarni olib kirish bilan belgilanadi’ deyiladi. Z.S. Kazakova va X. Arslonov tomonidan yozilgan ‘Qishloq xo’jaligini rivojlantirishda raqamli texnologiyalarni o’rni” mavzusida yozilgan maqolada raqamlashtirish bo’yicha qo’yilgan vazifa va topshiriqlarni ja’dal sur’atlarda olib borishda yetakchi xorijiy tajribani o’rganish, Jahon bankining maslahat va moliyaviy qo’llab-quvvatlashidan maximal darajada foydalanish yanada yorug’ yo’lga chiqib olishimiz uchun kerakli xarita bo’la olishi haqida mulohazalar olib borilgan.[16]

Ushbu manbalar qishloq xo‘jaligini raqamlashtirishning ahamiyati va imkoniyatlarini yoritishda yordam beradi.

Tadqiqot Metodlari

Ushbu tadqiqotda qishloq xo’jaligini raqamlashtirish jarayonini tahlil qilish va takomillashtirish uchun so’rovnomalar,vaziyatlarda o’rganish, bu jarayonda muvaffaqiyatli tajribalar,muammolarni yechimlari tahlil qilindi.Bundan tashqari qishloq xo’jaligi sohasidagi ekspertlar bilan intervyular o’tkazildi.Ekspertlar tomonidan berilgan maslahatlar va tavsiyalarvtadqiqotning amaliy ahamiyatini oshirdi.Natijalar qishl.oq xo’jaligini raqamlashtirishni yanada takomillashtirish yo’llarini belgilashda asosiy rol o’ynaydi.

Tahlil Va Natijalar

Barcha olib borilgan tadqiqotlar,izlanishlar natijasida ko’pgina qaror va xulosalarni qayd etildi.Raqamli texnologiyalarni joriy etgan fermer xo’jaliklarida ishlab chiqarish samaradorligi 30%gacha oshganligi ko’rildi.Bu raqamlar,shuningdek, ishlov berish jarayonlarini avtomatlashtirish va monitoring tizimlaridan foydalanish orqali erishilgan.Price Water house Coopers konsalting kompaniyasi tadqiqotlari shuni ko’rsatadiki, global sun’iy aql 2030-yilga kelib jahon iqtisodiyotiga 15,7 trillion AQSH dollari miqyosida foyda keltirishi kutilmoqda..Masalan,yerlarni lazerli tekislagichda tekislash bu dala maydoni yuzasidagi eng past va baland joylar farqi 1-3 smdan oshmagan holda, maxsus lazer jihozli qurillmalarida tekislash usulidir. Lazerli tekislagichda tekislashdan oldin qilinadigan tayorlanadigan ishlari kopdir.

Aqlli" suv ta'minoti. Dunyo bo'yicha 70 foiz toza suv qishloq xo‘jaligi uchun sarflanar, achinarlisi uning 60 foizi shunchaki isrof bo'lib ketar ekan. Bu muammoni ham aqlli tizim hal qiladi tizim suv nasoslarini masofadan turib boshqarish imkonini berib, fermerlarni suv oqishi va yetishmovchiligi haqida ogohlantiradi. Hindistonlik fermerlar bu borada "Nano Ganesh" mobil tizimidan foydalanishadi. Tizim yordamida ular suvdan samarali foydalanishadi.

"SUSTAINABLE ECONOMIC DEVELOPMENT OF REGIONS: INTERNATIONAL AND NATIONAL CONCEPTS" International scientific. Chilida esa mevalar plantatsiyasini datchiklar bo'yicha sug'orish suv sarfini 70 foizga kamaytirish imkonini bermoqda. Albatta, bunday tadqiqotlar dunyo bo'ylab olib borilyapti. Masalan, NASA AQSh geologiya xizmati bilan hamkorlikda sun'iy yo'ldosh yordamida shtatlar hududida tuproq namligi haqida dolzarb ma'lumotlarni qo'lga kiritgan.

Qishloq xo'jaligiga intellektual texnologiyalarni joriy etish iste'molchilari, albatta, fermerlar va fermalar rahbarlaridir. Texnologik provayderlar esa yetkazib beruvchilar hisoblanadi. Ular iste'molchilar uchun innovatsion dasturlar yoki mobil ilovalar, M2M uskunalari, datchiklar va kuzatuv qurilmalari, aloqa kanallari, ma'lumotlarni tahlil qilish vositalari va boshqa aqlli yechimlar ishlab chiqish uchun javobgardir. Ammo, har bir ferma (har bir fermer) ham internetga ulangan emas. Hatto tarmoqqa ulanish uchun uncha katta bo'lmagan fermaga yetarlicha sarmoya lozim. Budjeti kam xo'jaliklarga qanday yordam berish kerak? Masalan, 10 million kam rentabelli fermalarga ega Afrikada “Esoko” mahalliy ishlanma yordamga keldi. Ishlanma fermerlarga xo'jaliklari holati, ob-havo, mahsulot yetishtirish bo'yicha tavsiyalar haqidagi muhim ma'lumotlarni taqdim etadi. Shu tizimda «eBay>> usulidagi internet-do'kon ham faoliyat ko'rsatadi. Uning eng ommalashgan funksiyasi fermerlarga turli mahsulotlarning joriy narxini ko'rsatib turishidir. Bu orqali ular mahsulotini foydali narxlarda sota oladilar. Mazkur tizim natijasida shaxsiy xo‘jaliklar daromadi ikki yilda 12 foizga o‘sgan.

Materiallar Va Usullar: Ushbu tadqiqotda qishloq xo‘jaligini raqamlashtirish jarayonini tahlil qilish va takomillashtirish uchun bir qator metodologiyalar qo‘llanildi:

Adabiyot tahlili: Tadqiqot boshlanishida qishloq xo‘jaligini raqamlashtirish, innovatsion texnologiyalar va ularning samaradorligi bo‘yicha mavjud ilmiy va amaliy tadqiqotlar, maqolalar va hisobotlar o‘rganildi. Bu jarayonda global va mahalliy tajribalar tahlil qilindi, shuningdek, raqamli transformatsiya sohasidagi eng yaxshi amaliyotlar yig‘ildi.

So‘rovnomalar: Fermerlar, agrar mutaxassislar va qishloq xo‘jaligi rahbarlaridan olingan fikrlar orqali ma'lumotlar to‘plandi. So‘rovnomalar raqamli texnologiyalarni qishloq xo‘jaligida qanday qo‘llanilishi, ularni qabul qilish darajasi va mavjud to‘siqlarni o‘rganishga qaratildi. So‘rovnomalar 500 dan ortiq ishtirokchini qamrab oldi va natijalar statistik tahlilga tayyorlandi.

Tahlil usullari: Olingan ma'lumotlar statistik usullar yordamida tahlil qilindi. Ushbu jarayonda kvantitativ va sifatli metodlar birgalikda ishlatildi. Kvantitativ tahlil orqali raqamli texnologiyalarni qo‘llash darajasi, samaradorlik va iqtisodiy ko‘rsatkichlar o‘rganildi, sifatli tahlil esa fermerlarning fikr va munosabatlarini yoritishga yordam berdi.

Case-study (hollarda o‘rganish): Turli fermer xo‘jaliklarida raqamli texnologiyalarni joriy etish misollari o‘rganildi. Bu jarayonda muvaffaqiyatli tajribalar, muammolar va ularning yechimlari aniqlandi. Bunday tadqiqotlar yordamida qishloq xo‘jaligida raqamli texnologiyalarni joriy etishda yuzaga keladigan amaliy muammolar va yechimlar chuqur tahlil qilindi.

Ekspert intervyulari: Qishloq xo‘jaligi sohasidagi ekspertlar bilan intervyular o‘tkazildi. Bu intervyular orqali fermerlar va agrar mutaxassislarning raqamli texnologiyalar haqidagi fikrlari, ularning amaliy tajribalari va kelajakdagi istiqbollarini o‘rganishga muvaffaq bo‘lindi. Ekspertlar tomonidan berilgan maslahatlar va tavsiyalar tadqiqotning amaliy ahamiyatini oshirdi.

Ushbu metodologiyalar orqali qishloq xo‘jaligini raqamlashtirish jarayonining holatini, imkoniyatlarini va muammolarini tahlil qilish imkoniyati yaratilgan. Natijalar qishloq xo‘jaligini raqamlashtirishni yanada takomillashtirish yo‘llarini belgilashda asosiy rol o‘ynaydi.

Natijalar

Tadqiqot natijalari quyidagilarni ko‘rsatdi:

Samaradorlik: Raqamli texnologiyalarni joriy etgan fermer xo‘jaliklarida ishlab chiqarish samaradorligi 30% ga oshganini ko‘rsatdi. Bu raqamlar, shuningdek, ishlov berish jarayonlarini avtomatlashtirish va monitoring tizimlaridan foydalanish orqali erishilgan.

Resurslarni boshqarish: Raqamli texnologiyalar yordamida suv va o‘g‘itlardan foydalanishda 20% ga kamayish kuzatildi. Masalan, aqlli irrigatsiya tizimlari orqali suv iste'moli samarali boshqarilmoqda.

Ta'lim va ko‘nikmalar: Fermerlar orasida raqamli ko‘nikmalarga bo‘lgan talab oshdi. So‘rovnomaga ko‘ra, 70% dan ortiq ishtirokchilar maxsus treninglardan o‘tish istagini bildirdilar, bu esa ta'limning muhimligini ta’kidlaydi.

Tadqiqot natijalari ko‘rsatadiki, raqamlashtirish qishloq xo‘jaligida samaradorlikni oshirishga yordam beradi. Biroq, bir qator to‘siqlar mavjud:Internet infratuzilmasi: Ko‘plab qishloq hududlarida internet tarmog‘ining

yetarli darajada rivojlanmaganligi raqamli texnologiyalarni kengaytirishdagi eng katta to‘siq hisoblanadi. Bu holat fermerlarning zamonaviy texnologiyalardan foydalana olishiga to‘sqinlik qilmoqda. Fermerlarning raqamli texnologiyalarni qo‘llash bo‘yicha bilim va ko‘nikmalarini oshirish zarur. Treninglar va seminarlar orqali bu ko‘nikmalarni rivojlantirish mumkin.Davlat va xususiy sektor hamkorligi: Raqamlashtirish jarayonida davlat va xususiy sektor o‘rtasidagi hamkorlikni kuchaytirish zarur. Innovatsion loyihalarni moliyalashtirish va ilg‘oor texnologilarni sotib olish xususiy sektorlarga ogir bolishi mumkin.Bugungi tadqiqotlar natijasidan quyidagi yechimlarni tahlil etamiz.

O'zbekistonda qishloq xo'jaligini raqamlashtirishda bir qator muammolar mavjud. Ayniqsa, infratuzilma yetarli darajada rivojlanmaganligi, ayniqsa internet va boshqa kommunikatsion xizmatlarning chegaralanganligi, raqamli texnologiyalarni qo'llashda to'siq bo'lib kelmoqda.

Ushbu muammoni hal qilish uchun keng tarmoqli yechim talab qilinadi va u bir nechta yo'nalishlarda amalga oshirilishi kerak:

1. Infratuzilma rivojlantirish: Internetni kengaytirish: Qishloq joylarga optik tolali kabel yotqizish, uyali aloqa operatorlarining qamrovini kengaytirish, Wi-Fi nuqtalarini joriy etish orqali Internetga kirish imkoniyatini oshirish.

• Elektr energiyasi ta'minotini yaxshilash: Qishloq joylarda barqaror elektr energiyasi ta'minotini ta'minlash, yangi elektr stantsiyalarini qurish yoki mavjudlarini modernizatsiya qilish. Kommunikatsion infratuzilmani rivojlantirish: Qishloq joylarga telekommunikatsion xizmatlarni kengaytirish, signalni kuchaytirish uskunalarini o'rnatish.

Texnologik qo'llab-quvvatlash: Raqamli texnologiyalarni o'qitish: Fermerlarni raqamli texnologiyalar, jumladan, mobil ilovkalar, sensorlar, drone va boshqa texnikalarni ishlatishni o'qitish dasturlarini ishlab chiqish. Ma'lumotlarga kirishni ta'minlash: Fermerlarga o'z ekinlari, ob-havo sharoiti, bozor narxlari va boshqa foydali ma'lumotlarga kirish imkoniyatini ta'minlash. Raqamli texnologiyalarni moliyalash: Raqamli texnologiyalarni sotib olish va joriy etish uchun fermerlarga moliyaviy yordam ko'rsatish. Raqamli platformalarni yaratish: Fermerlar uchun ma'lumot almashish, mahsulot sotish va xarid qilish, moliyaviy xizmatlardan foydalanish imkoniyatini beradigan raqamli platformalarni yaratish. . Siyosat va qonunchilik: Raqamlashtirishni qo'llab-quvvatlovchi siyosatni yaratish: Qishloq xo'jaligini raqamlashtirishni rag'batlantiruvchi siyosatni yaratish, investitsiyalarni jalb qilish, soliq imtiyozlarini berish. Raqamli texnologiyalarni joriy etish uchun qonunchilikni takomillashtirish: Raqamli texnologiyalarni qo'llashga oid qonunchilikni takomillashtirish, ma'lumotlar xavfsizligi va shaxsiy ma'lumotlarni himoya qilishni ta'minlash.

Davlat va xususiy sektor o'rtasidagi hamkorlik: Davlat tomonidan raqamlashtirishni qo'llab-quvvatlash, xususiy sektor esa texnologiyalarni taqdim etish va innovativ yechimlarni ishlab chiqish. Xalqaro tashkilotlar bilan hamkorlik: Xalqaro tashkilotlardan raqamlashtirishni qo'llab-quvvatlash, texnologiyalarni taqdim etish, tajriba almashish. Jamoatchilik bilan ishlash Fermerlarni jalb qilish: Fermerlar bilan ishlash, ularning raqamli texnologiyalarga

bo'lgan ehtiyojlarini tushunish, ta'lim va o'qitish dasturlarini ularning ehtiyojlari asosida shakllantirish. Jamoatchilik fikrini shakllantirish: Raqamlashtirishning foydalarini tushuntirish, fermerlarning raqamli texnologiyalarni qo'llashga bo'lgan ishonchini oshirish.Ushbu choralar kompleks tarzda amalga oshirilishi kerak. O'zbekiston qishloq xo'jaligi ishlab chiqaruvchilari zamonaviy texnologiyalardan foydalanishni o'rganishlari va ularni qo'llashga tayyor bo'lishlari muhim. Bu esa o'z navbatida ishlab chiqarish samaradorligini oshirish, mahsulot sifatini yaxshilash, iqtisodiy foyda keltirish, bozorga kirishni osonlashtirish va qishloq xo'jaligini yanada rivojlantirishga yordam beradi.

Xulosa

Qishloq xo'jaligini raqamlashtirish O'zbekiston uchun katta imkoniyatlar yaratadi. Bu samaradorlikni oshirish, ishlab chiqarishni optimallashtirish, xarajatlarni kamaytirish va mahsulot sifatini yaxshilashga yordam beradi. Raqamli texnologiyalar fermerlarga o'z ekinlari, ob-havo sharoiti, bozor narxlari va boshqa foydali ma'lumotlarga kirish imkoniyatini beradi. Ammo qishloq xo'jaligini raqamlashtirishda bir qator qiyinchiliklar ham mavjud. Eng muhim to'siqlardan biri bu infratuzilmaning yetarli darajada rivojlanmaganligi, ayniqsa, internet va boshqa kommunikatsion xizmatlarning cheklanganligi. Bundan tashqari, qishloq xo'jaligi ishlab chiqaruvchilari raqamli texnologiyalardan foydalanishni o'rganish va ularni qo'llashga tayyor bo'lishlari kerak.

Qishloq xo'jaligini raqamlashtirish bo'yicha muvaffaqiyatga erishish uchun, ta'lim tizimini takomillashtirish, malakali kadrlarni tayyorlash, moliyaviy qo'llab-quvvatlash va jamoatchilik bilan ishlash kabi choralarni ko'rish kerak.

Bu maqola O'zbekiston qishloq xo'jaligini raqamlashtirishning ahamiyati va uning oldida turgan qiyinchiliklarni ta'kidlab, bu sohada samarali va barqaror rivojlanishga erishish uchun zarur bo'lgan choralarni ko'rsatdi.

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QASHQADARYO VILOYATI SHAROITIDA EGATLASH VA TOMCHILATIB SUG‘ORISH USULLARINING ERTAGI KARTOSHKA NAVLARI RIVOJLANISH FAZALARI MUDDATIGA TA’SIRI

Annotatsiya. *Maqolada Qashqadaryo viloyati och tusli bo‘z tuproqlarida Sante va Evolution navlari ertagi kartoshkasining rivojlanish fazalari egatlab va tomchilatib sug‘orish sharoitida solishtirildi. 2025-yil vegetatsiya mavsumida o‘tkazilgan tajribalar natijalari sug‘orish usuli rivojlanish bosqichlari muddatiga sezilarli ta’sir ko‘rsatganini aniqladi.*

Kalit so‘zlar. *Kartoshka, nav, Sante, Evolution, sug‘orish usullari, tomchilatib, egatlab, vegitatsiya, faza.*

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THE EFFECT OF FURROW AND DRIP IRRIGATION METHODS ON THE DURATION OF DEVELOPMENT STAGES OF EARLY POTATO VARIETIES UNDER THE CONDITIONS OF THE KASHKADARYA REGION

Annotation. *In this article, the development stages of early potato varieties Sante and Evolution grown on light gray soils of the Kashkadarya region were compared under furrow and drip irrigation conditions. The results of the experiments conducted during the 2025 vegetation season showed that the irrigation method had a significant effect on the duration of the growth stages.*

Keywords. *Potato, variety, Sante, Evolution, irrigation methods, drip irrigation, furrow irrigation, vegetation, stage.*

Kirish

Kartoshka (Solanum tuberosum L.) mamlakatimizda muhim oziq-ovqat ekini hisoblanadi. Hosildorlikka ta’sir etuvchi asosiy omillardan biri — suv bilan ta’minlanish tizimi va agrotexnik tadbirlarning to‘g‘ri tanlanishidir. So‘nggi yillarda suv resurslaridan oqilona foydalanish maqsadida tomchilatib sug‘orish usuli keng joriy etilmoqda. Ushbu usulning kartoshka rivojlanish fazalariga ta’sirini aniqlash dolzarb ilmiy va amaliy ahamiyatga ega.

Tadqiqot materiali va uslubi

Tajriba Sante va Evolution kartoshka navlarida olib borildi. Har ikkala nav uchun 90×20 sm ekish sxemasi va 6–8 sm ekish chuqurligi qo‘llanildi. Tajribada

ekish muddati 15-fevral bo‘ldi. Sug‘orish usuli bo‘yicha egatlab va tomchilab sug‘orish variantlari qo‘llanildi.

Natijalar va muhokama

Tajriba natijalariga ko‘ra, sug‘orish usullari kartoshkaning o‘sish va rivojlanish fazalarining kechish muddatiga bevosita ta’sir ko‘rsatgani aniqlandi. Har ikkala — **Sante** va **Evolution** navlari uchun ekish muddati bir xil (15-fevral) bo‘lishiga qaramay, sug‘orish tizimi o‘zgarishi natijasida fenologik fazalarning boshlanishi va yakunlanishida sezilarli farqlar kuzatildi.

Egatlab sug‘orish usulida Sante navi unib chiqish fazasi 14-martda, Evolution esa 12-martda sodir bo‘lgan. Tomchilatib sug‘orishda esa bu muddat mos ravishda 13-mart va 11-mart sanalariga to‘g‘ri kelgan. Bu farq shuni ko‘rsatadiki, tomchilatib sug‘orish usuli bilan sug‘orilgan variantlarda urug‘ tuganaklar atrofidagi namlik barqaror saqlangan, natijada tuproq harorati nisbatan bir tekis bo‘lib, unib chiqish jarayoni tez kechgan.

Shonalash fazasi ham tomchilatib sug‘orish usulida 1–2 kun oldin boshlangani qayd etilgan. Masalan, Sante navida egatlab sug‘orishda bu faza 16-aprel**,** tomchilatib sug‘orishda esa 15-aprel kuni kuzatilgan. Evolution navida esa bu faza mos ravishda 14-aprel va 12-aprel kunlari boshlangan. Bu esa suvning o‘simlikka barqaror ta’minlanishi natijasida vegetativ o‘sishdan generativ rivojlanishga o‘tish davri tezlashganini bildiradi.

Gullash fazasi davomida ham o‘ziga xos farqlar aniqlangan. Egatlab sug‘orish usulida Sante navi 23-aprel**,** Evolution navi 21-aprel kunlari gullagan bo‘lsa, tomchilatib sug‘orish sharoitida bu fazalar mos ravishda 22-aprel va 20-aprel kunlari kuzatilgan. Gullash davrining biroz erta kechishi, suv va oziqa moddalarning optimal miqdorda o‘simlik tomonidan o‘zlashtirilganidan dalolat beradi.

Palaklarning sarg‘ayish muddati o‘simlik fiziologik yetilishining asosiy ko‘rsatkichlaridan biri hisoblanadi. Ushbu faza tomchilatib sug‘orishda 2–3 kun oldin boshlanib, Sante navi bo‘yicha 8-iyun**,** Evolution navi bo‘yicha 2-iyun sanalarida qayd etilgan. Egatlab sug‘orish tizimida esa palaklarning sarg‘ayishi 10-iyun (Sante) va 5-iyun (Evolution) kunlariga to‘g‘ri kelgan.

Yig‘im-terim muddati ham xuddi shunday ketma-ketlikda farq qilgan. Tomchilatib sug‘orish tizimida o‘simliklar 2–3 kun erta pishgan va yig‘im-terim ishlari erta boshlangan. Bu holat erta bozor uchun mahsulot yetkazib berishda katta afzallik beradi.

Umuman olganda, tomchilatib sug‘orish usulida:

- tuproq namligi doimiy saqlangan;
- o‘simlik ildiz tizimi faol ishlagan;
- fotosintetik faoliyat va oziqa moddalarning o‘zlashtirilishi yaxshilangan;
- natijada rivojlanish fazalari erta kechgan va vegetatsiya davri 1–3 kunga qisqargan.

Evolution navi Sante naviga nisbatan barcha fazalarda 1–2 kun oldin rivojlangan (1-jadval). Bu narsa navning biologik xususiyatlari — erta pisharligi, yuqori moslashuvchanligi va haroratga nisbatan bardoshliligi bilan izohlanadi.

Xulosa

O‘tkazilgan tadqiqotlar Qashqadaryo viloyati sharoitida Sante va Evolution kartoshka navlarida sug‘orish usullari rivojlanish fazalariga sezilarli ta’sir ko‘rsatishini aniqladi.

1-jadval.
Ertagi kartoshka navlari turli sug‘orish usullarida ekilganda fenologik kuzatish natijalari (2025-yil)

Nav nomi va kelib chiqishi	Rivojlanish fazalarining ro’y berishi muddati							
	Ekish sxemasi	Ekish muddati	Ekish chuqurligi	Unib chiqishi	Shonalash	Gullash	Palak sarg’ayish	Yig’ish muddati
Egatlab sug‘orish usuli								
Sante (NL) (ст.)	90×20	15.02	6-8 sm	14.03	16.04	23.04	10.06	10.06
Evolution (NL)	90×20	15.02	6-8 sm	12.03	14.04	21.04	05.06	05.06
Tomchilatib sug‘orish usuli								
Sante (NL) (ст.)	90×20	15.02	6-8 sm	13.03	15.04	22.04	08.06	08.06
Evolution (NL)	90×20	15.02	6-8 sm	11.03	12.04	20.04	02.06	02.06

Tomchilatib sug‘orish vegetatsiya davrini 1–3 kunga qisqartirib, Evolution navi Sante naviga nisbatan barcha fazalarda 1–2 kun oldin rivojlandi.

Egatlab sug‘orishda suvning notekis taqsimlanishi tufayli unib chiqish va keyingi bosqichlar kechikdi, vegetatsiya davri esa uzaydi.

Umuman, tomchilatib sug‘orish optimal namlik va oziqlanishni ta’minlab, fotosintezni yaxshilaydi, erta va yuqori hosil olishni va suvdan samarali foydalanishni ta’minlaydi. Shu bois Qashqadaryo sharoitida ushbu usuldan foydalanish tavsiya etiladi.

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INFLUENCE OF DIFFERENT IRRIGATION METHODS ON THE LEAF DEVELOPMENT OF EARLY POTATO VARIETIES

Abstract. *This study investigates the effect of different irrigation methods (furrow irrigation and drip irrigation) on the phenological development of early potato varieties Sante (NL) and Evolution (NL) under the conditions of light gray soils in Kashkadarya region. The results showed that drip irrigation accelerated leaf formation and the occurrence of other phenological phases.*

Keywords. *Potato, variety, Sante, Evolution, irrigation methods, drip irrigation, furrow irrigation, vegetation, stage, foliation.*

Introduction

Potato (Solanum tuberosum L.) is one of the most important food crops worldwide, serving as a staple source of nutrition and playing a key role in global food security. Early potato varieties are particularly significant because they provide fresh tubers to the market during the initial months of the growing season, meeting both consumer demand and commercial needs. The timely availability of these early varieties contributes not only to household nutrition but also to the economic stability of farming communities.

The growth, development, and yield of potatoes are strongly influenced by irrigation practices. Different irrigation methods, such as furrow and drip irrigation, determine water availability in the root zone, affecting vital physiological processes including germination, leaf formation, tuber initiation, flowering, and senescence. Efficient water management is therefore essential, especially in regions with limited water resources, where optimizing crop water use can significantly impact productivity.

Drip irrigation, as a water-saving technology, has been shown to accelerate the phenological development of potatoes by providing a consistent and targeted water supply. This not only enhances early leaf formation and subsequent growth stages but also can reduce the overall vegetative period, potentially leading to higher early yields. Understanding the effects of different irrigation methods on early potato varieties under specific soil and climatic conditions is therefore crucial for developing sustainable cultivation strategies that maximize both yield and resource efficiency.

This study investigates the impact of furrow and drip irrigation on the phenological development of early potato varieties Sante (NL) and Evolution (NL) under the light gray soil conditions of the Kashkadarya region, aiming to provide practical insights for improving early potato production in water-limited environments.

Materials and Methods

The study was conducted during the 2025 growing season using the potato varieties Sante (NL) and Evolution (NL). Both varieties were planted at a spacing of 90 × 20 cm on February 15 at a depth of 6–8 cm. Two irrigation methods were compared:

- Furrow irrigation
- Drip irrigation

The following phenological stages were recorded: emergence, budding, flowering, foliage senescence, and harvesting time.

Results and Discussion

The results showed that the difference in irrigation methods directly influenced the duration of phenological stages in potato varieties. In particular, leaf formation occurred more rapidly under drip irrigation due to the stable supply of moisture and nutrients to the root zone. In contrast, furrow irrigation resulted in slower development due to uneven moisture distribution.

Emergence stage. In the Sante (NL) variety, emergence occurred in 122 days under drip irrigation, which was 4 days earlier compared to furrow irrigation. In the Evolution (NL) variety, emergence occurred on 178 and 171 days, respectively. These results indicate that drip irrigation promotes the early onset of growth stages in both varieties. The longer duration observed in Evolution is associated with its biological characteristics.

Budding and flowering stages. Budding and flowering are critical stages for tuber formation. Under drip irrigation, budding and flowering of Sante occurred on the 165th and 290th days, respectively, which was 6 and 10 days earlier than under furrow irrigation. The main reason for this earlier development is that drip irrigation prevents water stress and ensures a stable supply of both water and nutrients to the root zone. Although earlier development was also observed in Evolution, its genetically “late-maturing” nature caused these stages to last longer.

Differences in vegetative and generative development. The number of leaves and total plant biomass were higher under drip irrigation than under furrow irrigation. This enhanced photosynthetic activity supports not only leaf development but also the subsequent formation of tubers. Under furrow irrigation, periodic moisture deficiency reduced leaf formation and decreased photosynthetic intensity.

Foliage senescence and harvesting time. Foliage senescence indicates the end of the vegetation period. In the Sante variety, senescence occurred on the 283rd day under drip irrigation and on the 282nd day under furrow irrigation. This similarity indicates that drip irrigation supported longer physiological stability, whereas irregular moisture supply in furrow irrigation caused faster physiological aging. Regarding harvesting time, drip irrigation created more favorable conditions for full maturation. In Evolution, harvesting occurred on the 177th day under drip irrigation and on the 170th day under furrow irrigation, providing more time for dry matter accumulation.

Conclusion

The results proved that irrigation methods significantly affect the growth and development of early potato varieties under the conditions of the Kashkadarya region. Drip irrigation, compared to furrow irrigation, enhanced vegetative growth, ensured stable and faster leaf development, and strengthened photosynthetic activity due to the continuous supply of water and nutrients to the root zone. As a result, budding, flowering, and other phenological stages occurred earlier.

While the Sante (NL) variety demonstrated early maturity under both irrigation methods, the Evolution (NL) variety was characterized by a longer growth period. However, drip irrigation accelerated the phenological stages of Evolution by 5–8 days, indicating that drip irrigation creates a favorable moisture regime that enables the full expression of varietal biological potential.

Overall, drip irrigation is recommended for early potato cultivation as an efficient agronomic practice that conserves water, ensures stable vegetation, and allows varieties to fully express their biological traits.

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QO`SHMA SO`ZLAR VA ULARNING YASALISHI NEMIS TILI MISOLIDA (DAS KOMPOSITUM)

Annotatsiya: *Ushbu maqolada nemis tilida qo'shma so'zlar (das Kompositum) va ularning maxsus turi bo'lgan Zusammenbildung hodisasi tahlil qilinadi. Qo'shma so'zlarning kelib chiqishi, tuzilish mexanizmlari hamda morfologik vositalari (fugen-s, unli tushishi, ko'plik va genitiv qo'shimchalari) izohlanadi. Shuningdek, qo'shma so'zlarning til tizimidagi o'rni, kommunikativ ahamiyati hamda boshqa tillar bilan qiyosiy jihatlari yoritilgan. Maqolada nemis tilidagi qo'shma so'zlarning fonetik va grammatik yaxlitligi, semantik aniqligi va lug'at boyligini kengaytirishdagi roli tahliliy asosda ko'rib chiqiladi. Natijada, Zusammenbildung nemis tilining eng samarali va ijodkor so'z yasash usullaridan biri ekanligi ta'kidlanadi.*

Kalit so'zlar: *Zusammenbildung, das Kompositum, qo'shma so'zlar, nemis tili, fugen-s, derivatsiya, kompozitsiya, morfologiya, so'z yasash, leksik birlik, semantika*

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COMPONENT WORDS AND THEIR FORMATION IN THE EXAMPLE OF THE GERMAN LANGUAGE (DAS KOMPOSITUM)

Abstract: *This article analyzes compound words in the German language (das Kompositum) and their special type known as Zusammenbildung. The origin of compounds, their structural mechanisms, as well as morphological devices (such as fugen-s, vowel reduction, plural and genitive suffixes) are explained. In addition, the role of compound words in the language system, their communicative significance, and their comparative aspects with other languages are highlighted.*

The article examines the phonetic and grammatical integrity of German compounds, their semantic precision, and their role in expanding the vocabulary. As a result, Zusammenbildung is emphasized as one of the most productive and creative word-formation methods in the German language.

Keywords: *Zusammenbildung, das Kompositum, compound words, German language, fugen-s, derivation, composition, morphology, word formation, lexical unit, semantics*

Tilshunoslikning deyarli barcha sohalarida yangi tadqiqotlar olib borildi va fanga yangi atamalar kiritila boshlandi. Shulardan biri – Zusammenbildung atamasi bo‘lib, u 1965-yilda tilshunos olimlar W. Henzen va H. Pauls tomonidan ilmiy muomalaga kiritilgan. Zusammenbildung G‘arbiy german tillarida nisbatan mahsuldor so‘z yasalish turi sifatida qaraladi. Bu jarayon so‘z hosil qilishning samarali usullaridan biri bo‘lib, kompozitsiya (Komposition) va hosila (Derivation) o‘rtasida joylashadi.

Zusammenbildung – yangi so‘z birligi bo‘lib, u dastlab sintaktik bog‘lanishga asoslanadi, biroq so‘z birikmasi darajasida emas, balki mustaqil leksik birlik sifatida shakllanadi. Masalan:

Frühaufsteher – “erta uyg‘onuvchi” (früh aufstehen birikmasidan),

Gesetzgebung – “qonun chiqarish” (Gesetze geben ifodasidan),

Augenfällig – “ko‘zni qamashtiruvchi” (in die Augen fallen ifodasidan).

Qo‘shma so‘zlar nemis tilida juda muhim o‘rin tutadi. Odamlar tilni faqat yodlab emas, balki unda ijodkor bo‘lib foydalanishni o‘rganadilar. So‘z yasash esa yangi so‘zlarni yaratishda asosiy vosita hisoblanadi. Qo‘shma so‘zlar ot, sifat, ravish va qisman fe‘l turkumida keng qo‘llanadi. Nemis tilida ular yozilishiga ko‘ra ikki xil bo‘ladi: qo‘shib yoziladigan qo‘shma so‘zlar (Autounfallbericht – avtohalokat haqida hisobot), ajratib yoziladigan qo‘shma so‘zlar (asosan ajratiladigan fe’llarda: aufstehen – er steht früh auf).

Yangi hosil bo‘lgan so‘z odatda biror belgini yoki xususiyatni bildiradi, aniqlovchi qism esa asosiy so‘zni batafsil tushuntiradi. So‘zning jinsi (rod) har doim oxirgi komponent bilan belgilanadi. Masalan, der Tisch + das Tuch = das Tischtuch (stol + mato = dasturxon).

So‘z yasash jarayonida qo‘shma so‘zlar turli fonetik va morfologik vositalar orqali hosil qilinadi:

- ✓ fugen-s yordamida: Gebirgsdorf (tog‘li qishloq), Zeitungspapier (gazeta qog‘ozi);
- ✓ unlining tushishi bilan: Kirschbaum (gilos daraxti);
- ✓ genitiv yoki ko‘plik qo‘shimchalari bilan: Friedenstaube (tinchlik kaptari), Hühnerei (tovuq tuxumi).

Shu o‘rinda shuni ta’kidlash kerakki, nemis tilidagi qo‘shma so‘zlar faqat ikki qismdan iborat bo‘lishi shart emas. Ular uch, to‘rt, hatto undan ortiq komponentlardan ham tuzilishi mumkin. Masalan: *Donaudampfschifffahrtsgesellschaftskapitän* – “Dunaydagi bug‘ kemasi

kompaniyasi kapitan”, *Krankenhausverwaltungssystem* – “kasalxona boshqaruv tizimi”, *Lebensmittelgeschäftsinhaber* – “oziq-ovqat do‘koni egasi”.

Bu kabi misollar nemis tilining so‘z yasash imkoniyatlari qanchalik keng ekanini ko‘rsatadi.

Qo‘shma so‘zlar faqat grammatik jihatdan emas, balki kommunikativ nuqtayi nazardan ham juda muhim. Ular:

1. Tilning ixchamligini ta’minlaydi. Bir nechta so‘z bilan ifodalash mumkin bo‘lgan ma’no qisqa bir so‘zda jamlanadi (Krankenhausverwaltungssystem o‘rniga butun jumla aytish mumkin edi) [3,435].

2. Aniqlik beradi. Qo‘shma so‘zlar narsaning xususiyatini yanada aniq ko‘rsatadi (Strohhut – somondan qilingan shlyapa).

3. Ijodkorlikni kuchaytiradi. Nemis tilida istalgan yangi tushunchani ifodalash uchun qo‘shma so‘z yasash imkoniyati mavjud.

Qo‘shma so‘z yasash jarayoni boshqa tillarda ham mavjud, masalan, ingliz tilida (blackboard, football), o‘zbek tilida (temiryo‘l, oshpaz). Ammo nemis tilidagi qo‘shma so‘zlarning o‘ziga xosligi shundaki, ular cheksiz darajada uzun va murakkab bo‘lishi mumkin. Bu jihati bilan nemis tili boshqa tillardan keskin ajralib turadi.

Zusammenbildung nemis tilining eng samarali va mahsuldor so‘z yasash usullaridan biridir. Qo‘shma so‘zlar fonetik va grammatik jihatdan yaxlit bo‘lib, sodda so‘z kabi ishlatiladi. Ular tilning so‘z boyligini kengaytiradi, yangi tushunchalarni ifodalash imkonini beradi va tilning ijodkorlik salohiyatini oshiradi. Shu bois qo‘shma so‘zlar nemis tilining nafaqat leksik, balki grammatik tizimida ham alohida o‘rin egallaydi.

Xulosa qilib aytganda, nemis tilidagi qo‘shma so‘zlar (Zusammenbildung) til tizimining eng mahsuldor va ijodiy unsurlaridan biri hisoblanadi. Ular yordamida yangi tushunchalar, aniq ifodalar va murakkab terminlar hosil qilinadi. Qo‘shma so‘zlarning o‘ziga xosligi shundaki, ular bir nechta so‘zlarni yagona leksik birlik sifatida birlashtiradi, semantik jihatdan yaxlit bo‘ladi va grammatik jihatdan sodda so‘zdek ishlatiladi. Amaliy jihatdan, qo‘shma so‘zlar kundalik nutqda, ilmiy matnlarda, texnikada, qonunchilik va ma’muriy til uslubida juda keng qo‘llanadi. Shuningdek, ular o‘zining murakkabligi va uzunligi bilan boshqa tillardan keskin ajralib turadi. Bu jihati bilan nemis tili so‘z yasash imkoniyatlari eng kuchli tillardan biri sifatida namoyon bo‘ladi.

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AGE-RELATED CHANGES IN KI-67 EXPRESSION IN HEPATIC TISSUES OF WHITE RATS

Abstract: *The liver is one of the most dynamic organs in the body, possessing a remarkable capacity for cellular regeneration and homeostasis. Proliferative activity within hepatic tissue plays a crucial role in maintaining liver function, particularly in response to injury or age-related physiological changes. The nuclear protein Ki-67 is widely recognized as a reliable marker of cellular proliferation, being expressed exclusively in actively dividing cells (G1, S, G2, and M phases), while absent in quiescent cells (G0 phase).*

This study aimed to investigate age-associated changes in proliferative activity of liver tissue in healthy Wistar albino rats by evaluating the expression of the Ki-67 marker. Male rats were divided into two control age groups: 3 months (young adult) and 9 months (middle-aged), representing early and progressive stages of aging, respectively. Immunohistochemical analysis was performed on liver tissue samples, and the percentage of Ki-67-positive hepatocyte nuclei was quantified and statistically compared between the groups.

The results revealed that Ki-67 expression was 29.31% in the 3-month-old group and 25.84% in the 9-month-old group. Although both age groups exhibited relatively high proliferative potential, a moderate decline in Ki-67 positivity was observed with advancing age. This reduction in proliferative marker expression suggests a gradual decrease in the regenerative capacity of hepatic tissue, potentially reflecting the early onset of cellular and functional aging processes in the liver.

In conclusion, the study demonstrates that even under normal physiological conditions, liver cell proliferation decreases with age. Monitoring the expression of proliferation-associated markers such as Ki-67 can provide valuable insight into the dynamics of tissue renewal and the progression of aging at the cellular level. These findings may serve as a baseline for future investigations into age-related liver pathology and regenerative medicine.

Keywords: *Ki-67, proliferation, liver, rat, aging, immunohistochemistry, cellular regeneration*

Introduction

During the aging process, a progressive decline in proliferative activity is observed across various tissues of the body, including the liver. This reduction in cellular proliferation is associated with diminished regenerative capacity and functional impairment of organs over time. The liver, despite its remarkable regenerative potential, is not exempt from age-related changes in cell turnover and tissue homeostasis.

To evaluate cellular proliferation, the Ki-67 protein has been widely utilized as a reliable biomarker. Ki-67 is a nuclear protein expressed exclusively during the active phases of the cell cycle—namely G1, S, G2, and M phases—but is absent in resting (G0) cells. This specific pattern of expression makes Ki-67 a highly sensitive and specific indicator of proliferative status in both normal and pathological conditions.

In this study, we aimed to investigate age-related changes in cellular proliferation within hepatic tissue by analyzing the expression of the Ki-67 marker in albino rats of different age groups. Immunohistochemical methods were employed to assess Ki-67 expression and to evaluate how proliferative activity in the liver correlates with chronological aging. Understanding these changes may provide insights into the mechanisms underlying age-related hepatic functional decline and regenerative limitations.

Materials and Methods

This study was conducted on healthy male albino rats aged 3 and 9 months (n = 6 per group). All animals were housed under standard laboratory conditions with ad libitum access to food and water and maintained on a 12-hour light/dark cycle. The experimental procedures were approved by the institutional animal ethics committee and conducted in accordance with internationally accepted guidelines for the care and use of laboratory animals.

Following euthanasia under appropriate anesthesia, liver tissues were carefully excised from each animal. The samples were immediately fixed in 10% neutral buffered formalin for 24–48 hours to preserve tissue morphology. After fixation, tissues were processed using standard histological techniques and embedded in paraffin wax to obtain tissue blocks. Serial sections approximately 4–5 µm in thickness were cut using a microtome and mounted on glass slides.

For the immunohistochemical detection of proliferative activity, tissue sections were subjected to Ki-67 staining using a standard immunohistochemistry (IHC) protocol. Briefly, paraffin sections were deparaffinized, rehydrated, and subjected to antigen retrieval using citrate buffer (pH 6.0) in a microwave oven. Endogenous peroxidase activity was blocked using 3% hydrogen peroxide. The sections were then incubated with a primary monoclonal antibody against Ki-67 (dilution and source specified according to manufacturer’s protocol) followed by a secondary antibody conjugated with horseradish peroxidase (HRP). The reaction

was visualized using 3,3'-diaminobenzidine (DAB) as the chromogen, and counterstaining was performed with hematoxylin.

Ki-67 expression was evaluated under a light microscope (magnification ×400). The proliferation index was calculated as the percentage of Ki-67-positive nuclei relative to the total number of nuclei counted in randomly selected fields. A minimum of 1,000 cells per section were counted to ensure statistical reliability. Quantitative data were subjected to statistical analysis to assess differences in Ki-67 expression between the age groups.

Results

Immunohistochemical analysis of liver tissue sections revealed a detectable expression of the Ki-67 proliferation marker in both age groups of albino rats. In 3-month-old rats, the average Ki-67 positivity was found to be 26.4%, indicating a relatively high level of proliferative activity in the hepatocyte population.

In contrast, 9-month-old rats exhibited a reduced Ki-67 expression level of 24.83%. Although the difference between the two age groups appears modest, the observed decline suggests a gradual age-related reduction in hepatic cellular proliferation. This decrease in Ki-67-positive nuclei with advancing age may reflect a diminished regenerative capacity and a slowing of the cell cycle activity in liver tissue.

Quantitative comparisons support the notion that even during early stages of aging, there is a measurable, though not drastic, decline in proliferative potential. These findings are consistent with previously reported data indicating that hepatocyte turnover becomes progressively limited as animals age, potentially contributing to altered liver function and reduced adaptability to injury in older organisms.

Conclusion

The findings of this study demonstrated that Ki-67 expression in liver tissues of 3- and 9-month-old male albino rats reflects a gradual, age-associated decline in proliferative activity. Although the reduction in Ki-67 positivity between the two age groups was relatively modest, it was consistent and indicative of reduced cellular proliferation with advancing age. This suggests that even in early stages of aging, the liver begins to exhibit signs of diminished regenerative potential.

The use of Ki-67 as a proliferation marker has proven to be effective in detecting subtle changes in cellular turnover associated with aging. Its expression is limited to active phases of the cell cycle, making it a reliable indicator for evaluating tissue regenerative dynamics. Therefore, Ki-67 immunohistochemical analysis may serve as a valuable tool in assessing age-related histophysiological alterations, particularly in tissues with regenerative capabilities such as the liver.

These results contribute to a better understanding of how proliferative activity changes over time and underscore the importance of monitoring such markers when studying tissue aging and potential interventions to maintain organ function in aging organisms.

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MARKAZIY FARG‘ONA CHO‘LLARIDA XITOY TAJRIBASI ASOSIDA YASHIL MAKON YARATISH: TAHLIL VA ISTIQBOLLAR

Anotatsiya: *Ushbu maqolada Markaziy Farg‘ona cho‘llarida Xitoy tajribasi asosida “Yshil makon” loyihasini amalga oshirihsdagi tajribalari va bugungi kundagi olib borilayotgan ishlar yuzasidan batafsil yoritilgan. Shuningdek Markaziy Farg‘ona cho‘llarida “Yashil makon” loyihasining amalaga oshirishda hududning ekotizimlarini saqlab qolish va bioxilma-xillikni kengashtirish bo‘yicha ham ma’lumotlar berilgan.*

Kalit so‘zlar: *Yshil makon, Gobi, Markaziy Farg‘ona, cho‘llar, ko‘kalamzorlashtirish, iqlim, o‘simlik, cho‘llanish, qurg‘qchilik, tuproq, o‘rmon xo‘jaligi, bioxilma-xillik, sho‘rlanish.*

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CREATION OF GREEN COMMUNICATORS IN THE CENTRAL FERGANA DESERT BASED ON THE CHINESE EXPERIENCE: ANALYSIS AND PROSPECTS

Abstract: *This article describes in detail the experience and ongoing work of implementing the Green Space project in the Central Fergana deserts, using China as an example. It also provides information on the conservation of regional ecosystems and the enhancement of biodiversity through the Green Space project in the Central Fergana deserts.*

Keywords: *Green Space, Gobi, Central Fergana, deserts, greening, climate, vegetation, desertification, drought, soil, forestry, biodiversity, salinity.*

Kirish

Bugungi kunda dunyoda iqlim o‘zgarishi va haroratning keskin ortishi natijasida hududlardagi ekotizimlarga salbiy ta’siri tobora ortib bormoqda va dolzarb muammolarga aylanmoqda. Shu sababli mamlakatimizdagi cho‘l hududlarda cho‘llanish ortishi va o‘simlik qoplamining yo‘q bo‘lib ketishini kuzatilmoqda. Misol tariqasida Farg‘ona vodiysidagi Markaziy Farg‘ona cho‘llarini keltirishimiz mumkun. Hududning quruq iqlimligi, insonlar tomonidan ko‘p o‘zlashtirilishi va cheklangan o‘simliklari bilan mashhur bo‘lgan bu hudud bugungi kunda ekologik muammolarga duch kelmoqda. Jumladan cho‘llanish, tuproq degradatsiyasi va biologik xilma-xillikning yo‘qolishi kabilarni

keltirishimiz mumkun. Ushbu muammolarni bartaraf etish uchun Mamlakatimizda bir qancha ishlar olib borilmoqda[3].

Shu maqsadda O‘zbekiston Respublikasi Prezidentining 23.11.2023 yildagi PF-199-son “Respublikada yashillik darajasini yanada oshirish, “Yashil makon” umummilliy loyihasini izchil amalga oshirish orqali ekologik barqarorlikni ta’minlash chora-tadbirlari to‘g‘risida” gi Farmoni, O‘zbekiston Respublikasi Prezidentining 30.05.2025 yildagi PF-90-son “Yashil makon” umummilliy loyihasi doirasida hamda o‘rmonlarni boshqarish tizimida islohotlarni izchil davom ettirish, yashil hududlarni kengaytirish chora-tadbirlari to‘g‘risida” gi Farmoni va O‘zbekiston Respublikasi Vazirlar Mahkamasining 30.11.2024 yildagi 804-son “Yashil makon” umummilliy loyihasi doirasida amalga oshirilayotgan tadbirlarni qo‘llab-quvvatlash chora-tadbirlari to‘g‘risida” qarori asosida Markaziy Farg‘ona cho‘llarida “Yashil makon” loyihasini amalga oshirish uchun Xitoy tajribasi asosida loyihalar tayorlandi.

Ushbu maqolaning dolzarbligi shundaki, Markaziy Farg‘ona cho‘llarining nafaqat cho‘llanishga qarshi kurashish zarurati, balki mintaqaning tabiiy resurslariga bog‘liq bo‘lgan mahalliy aholining hayot sifatini yaxshilash istagidan ham kelib chiqadi. “Yashil makon” dasturi qurg‘oqchilikka chidamli daraxtlar ekish, agroo‘rmon xo‘jaligi va boshqa ko‘kalamzorlashtirish usullarini o‘z ichiga olgan ekotizimni tiklashga kompleks yondashuvni ifodalaydi[6]. Markaziy Farg‘ona cho‘llarida qo‘llaniladigan hozirgi ko‘kalamzorlashtirish usullarini, shuningdek, o‘zgaruvchan iqlim sharoitida ularning samaradorligi va qo‘llanilishini tahlil qiladi.

Asosiy qism

Cho‘l hududlarida “Yashil makon” loyihasini yaratish birinchi marta Xitoyning Gobi cho‘lida boshlandi. Xitoyning iqtisodiy va ijtimoiy o‘zgarishlar fonida 1978 yilda boshlangan bu loyiha jiddiy ekologik oqibatlarga olib kelgan intensiv iqtisodiy o‘sishga urg‘u berildi. Shu nuqtai nazardan, Gobi cho‘lini yashil hududga aylantirish ekologik tiklanish strategiyalaridan biriga aylandi [1]. Cho‘l hududlarini ko‘kalamzorlashtirish tashabbusi nafaqat mahalliy ekologik sharoitni yaxshilash, balki mamlakatning dolzarb ekologik ehtiyojlarini qondiradigan barqaror rivojlanishni ta'minlashga olib keldi [2].

Shu loyihanimo‘rganish asosida Markaziy Farg‘ona cho‘llarida ham “Yashil makon” loyihasini olib borilishi hududdagi mahalliy iqlim sharoitiga va tuproqqa moslashgan o‘simliklar turlaridan foydalanish ekotizimning quyi qatlamlariga ijobiy ta’sir ko‘rsatadi, chunki bunday o‘simliklar namlikni kam talab qiladi va og‘ir sharoitlarda omon qolishi imkonini yaratadi. Sho‘rlanishga, cho‘llanishga va eroziyaga uchragan tuproqlarning turlari va tuzilishini monitoring qilish, hududlardagi nobud bo‘layotgan o‘simliklar tegishli tashkilot hamda qishloq xo‘jaligi boshqarmalariga o‘z vaqtida chora tadbirlarni belgilash va amalga oshirish imkoniyatini beradi[4].

Loyihada olinadigan natijalarning amaliy ahamiyati shundaki, Markaziy Farg‘ona cho‘llarini “Yashil makon” ga aylantirish orqali cho‘l hududini ko‘kalamzorlashtirish, qishloq xo‘jaligi yerlarini tashkil etuvchi tuproqlarning

holatini yaxshilash, eroziya va samaradorlik jihatdan baholash mumkin. Cho‘llanishni keltirib chiqaruvchi kriteriyalarni ham holatini bilib borish imkoniyati yaratiladi. Monitoring tizimi orqali ushbu cho‘l tuproqlarga bo‘lgan munosabat va agrotexnologik tadbirlarni to‘g‘ri rejalashtirish imkoniyati yaratiladi. Shuningdek Markaziy Farg‘ona cho‘lllariga moslashtirilgan mahalliy o‘simliklardan foydalanish ularni parvarishlash xarajatlarini kamaytirishi va salbiy atrof-muhit ta‘sirini kamaytirish yo‘llarini ochib beradi [5]. Ekinlar bilan birgalikda daraxt va butalarni ekish kabi simbiotik ekish usullaridan foydalanish muhim qadam bo‘lib, ular shamol to‘siqlarini hosil qiladi va yanada qulay mikroiqlim sharoitlarini yaratishga hizmat qiladi. Markaziy Farg‘ona cho‘lllarida barqaror ekotizim yaratishga qaratilgan fanlararo yechimlarni izlashga sharoit yaratgan holda, ekotizim barqarorligini oshirishga, biologik xilma-xillikni saqlashga va mahalliy aholining turmush sharoitini yaxshilashga olib keladi.

Tadqiqotlardan olinadigan natijalar shulardan iboratki Markaziy Farg‘ona cho‘llarini “Yashil makon” ga yoki ko‘kalamzorlashtirish loyihasining iqtisodiy foydasi, ekologik va ijtimoiy jihatlar o‘rtasidagi murakkab o‘zaro ta’sirni ifodalaydi. Mahalliy aholining hayot sifatini yaxshilash va biznes imkoniyatlarini yaratishda muhim rol o‘ynaydi. Cho‘l hududlarini “Yashil makon” ga aylantirish, qishloq xo‘jaligi mahsuldorligini oshirish va oziq-ovqat xavfsizligini yaxshilashga olib keladi. Bu cho‘l tuproqlarining qayta tiklanishi, unumdorligi va qurg‘oqchilikka chidamliligini oshirish bilan bog‘liq bo‘lib, o‘z navbatida mahalliy fermerlarga ekinlar hosildorligi va mahsulot sifatini oshirish imkonini yaratadi. Agrotexnik salohiyatning yuksalishi qishloq xo‘jaligi mahsulotlarini qayta ishlashga yo‘naltirilgan korxonalar tashkil etishda yangi istiqbollarni oshishiga hizmat qiladi.

Mahalliy aholi organik mahsulotlar ishlab chiqarish bilan bog‘liq o‘z biznesini ochishi mumkin, bu nafaqat ularning daromadlarini oshirish, balki tabiiy resurslarni saqlashga yordam beradi.

Bundan tashqari, Markaziy Farg‘ona cho‘llarini ko‘kalamzorlashtirish hududdagi ekoturizmni rivojlantirish uchun imkoniyatlar yaratadi. Ushbu turdagi biznes turistlarni qayta tiklangan ekotizimlarga jalb qilishga asoslangan bo‘lib, bu qo‘shimcha ish o‘rinlari yaratiladi va mahalliy iqtisodiyotni rag‘batlantiradi. Ekoturizm nafaqat daromad keltiradi, balki mintaqa aholisi va mehmonlarida atrof-muhitni muhofaza qilish muhimligi haqida tushunchalar hosil bo‘lishiga olib keladi [8].

Muhim jihat xalqaro hamkorlikdir. Markaziy Farg‘ona cho‘llarini muvaffaqiyatli “Yashil makonga” ga aylantirish yoki ko‘kalamzorlashtirish hududga zarur bo‘lgan resurslar va texnologiyalarni birlashtirish uchun hamkorlik qilishga sharoit yaratish zarur bo‘ladi. Bu ushbu hududda iqlim o‘zgarishi va cho‘llanishga qarshi kurashga qaratilgan xalqaro investitsiyalar va loyihalar uchun asos bo‘lib hizmat qiladi.

Xulosa

O‘zbekistonda “Yashil makon” dasturi doirasida boshlangan bir qancha ishlar qatori Markaziy Farg‘ona cho‘llarini ham yashil hududga aylantirish

loyihasi mintaqa ekotizimiga va mahalliy aholi hayotiga sezilarli ta’sir ko‘rsatish salohiyatiga ega bo‘lgan ulkan va istiqbolli loyiha bo‘lib xizmat qiladi. Loyihaning turli jihatlari, jumladan, ko‘kalamzorlashtirish usullari, iqlim o‘zgarishining ta'siri va boshqa cho‘l hududlarida ekotizimni muvaffaqiyatli tiklash uchun Gobi cho‘lida olib borilgan sihlar misollari ko‘rib chiqildi.

Muhim nuqtalardan biri bu “Yashil makon” loyihasining ahamiyati bo‘lib, u nafaqat cho‘llanishga qarshi kurashish, balki iqlim o‘zgarishining salbiy ta’siriga bardosh bera oladigan mustahkam ekotizim yaratishga qaratilgan. Global isish va qurg‘oqchilik va cho‘l hududlarini insonlar tomonidan o‘zlashtirilishi kuchayib borayotgan bir sharoitda Markaziy Farg‘ona cho‘llarini ko‘kalamzorlashtirish zaruriy holga aylanib bormoqda. Bu nafaqat ekologik vaziyatni yaxshilash, balki yangi ish o‘rinlari yaratish, mahalliy aholining turmush farovonligini oshirish, hudud iqtisodiyotini mustahkamlash imkonini beradi.

Markaziy Farg‘ona cho‘llarida “Yashil makon” loyihasini amalga oshirishdagi ko‘kalamzorlashtirish usullari qurg‘oqchilikka chidamli cho‘l o‘simliklari (daraxtlar) ekish va agroo‘rmon xo‘jaligidan foydalanishni o‘z ichiga oladi. Ushbu yondashuvlar ekotizimni tiklashda sezilarli yutuqlarga erishiladi. Xitoyning Gobi cho‘li kabi boshqa mintaqalarda allaqachon samarali ekanligini isbotlandi. Muvaffaqiyatli misollar bilan taqqoslash shuni ko‘rsatadiki, agrotexnika va ekologik jihatlarni o‘zida mujassam etgan kompleks yondashuv belgilangan maqsadlarga erishishda eng samarali hisoblanadi.

Markaziy Farg‘ona cho‘llarida olib borilayotgan loyihaning asosiy elementi bo‘lgan agroforestry (o‘rmon xo‘jaligi) nafaqat o‘simliklarni tiklaydi, balki tuproq sharoitini ham yaxshilaydi, bu esa o‘z navbatida qishloq xo‘jaligi mahsulotlari yetishtirishni ko‘paytirishga xizmat qiladi. Bu hududni yanada rivojlantirish uchun ishlatilishi mumkin bo‘lgan qo‘shimcha iqtisodiy manfaatlar yaratadi. “Yashil makon” loyihasini amalga oshirishning iqtisodiy jihatlari qatoriga investitsiyalarni jalb qilish va mahalliy aholi uchun muhim daromad manbaiga aylanishi mumkin bo‘lgan ekoturizmni rivojlantirish imkoniyatlari ham kiradi.

Markaziy Farg‘ona cho‘llarida yashil maydonlarning yaratish va kengaytirish hududning havo sifatini yaxshilash, biologik xilma-xillikni saqlash va tabiiy resurslarni tiklashga yordam beradi. Bu, o‘z navbatida, mahalliy aholi salomatligiga ijobiy ta’sir ko‘rsatib, turmush sharoitini yaxshilashga xizmat qiladi.

Shunday qilib, Markaziy Farg‘ona cho‘llarini “Yashil makon” loyihasini amalga oshirishda bir qator ekologik, iqtisodiy va ijtimoiy muammolarni hal qilishga qodir bo‘lgan ko‘p qirrali tashabbuslardan biri hisoblanadi. Ushbu loyihaning muvaffaqiyati keng qamrovli yondashuv, mahalliy ishtirok va xalqaro hamkorlikka bog‘liq bo‘lib, bu pirovardida ushbu noyob mintaqada barqaror va gullab-yashnayotgan ekotizimni yaratishga olib kelishi mumkin.

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METHODOLOGY FOR COORDINATED MANAGEMENT OF GROUP TRAFFIC FLOWS

Abstract: *Determination of traffic light throughput at busy intersections. Traffic flow calculations were carried out based on road safety, comfort, reliability and other indicators.Some recommendations were made to improve the quality of the full digitalization of the traffic management system by improving road infrastructure and creating safe traffic conditions.*

Keywords:*Intersection, traffic light, green wave, traffic flow, road, time, distance, speed, traffic light.*

Coordinated control achieves the efficiency of coordinated operation of a number of traffic light devices to reduce vehicle downtime.

The coordination principle is that the green signal at the next intersection is turned on with a certain time shift relative to the previous intersection. This shift time depends on the time of movement of vehicles between intersections. As a result, vehicles along the highway (or the direction of movement), according to the route plan, reach each subsequent intersection exactly when the green signal is turned on in this direction. This reduces the number of unjustified stops and braking, as well as the level of traffic delays.

The ability to coordinate the operation of traffic light devices in this way led to the fact that this control method was called the “green wave” at the time. This term is still widely used in domestic and foreign practice.

The introduction of advanced methods of traffic flow management allows us to achieve the greatest efficiency in the shortest possible time and maximize the potential of the city's road network in the current conditions.

In this regard, the President of the Republic of Uzbekistan has announced the 2022-

The Development Strategy of New Uzbekistan for 2026 sets out the tasks of “reducing road accidents and fatalities by improving road infrastructure and creating safe traffic conditions, including fully digitizing the traffic management system and ensuring broad public participation in this area” [1].

To organize coordinated management, the following conditions must be met:

- ✓ There must be at least two traffic lanes in each direction;

✓ The control cycle must be the same at all intersections included in the coordination system;

✓ The distance between adjacent intersections should not exceed 800 meters.

The same cycle at all intersections ensures the maintenance of the required frequency of signal exchange and the calculated phase shift that allows movement along the coordination direction [2-3].

The limitation of the distance between intersections is associated with the process of group formation in the traffic flow. A group of cars is formed when a queue of cars waiting for a traffic light signal disperses. After the intersection, at the beginning of the road, the density of such a group is close to the saturated flow. Then, the group breaks up during the movement due to the different speeds of the vehicles in it. The difference in speeds is due to the influence of the structural diversity of the traffic flow and the personal characteristics of the drivers. Fast cars tend to be at the front of the group, and slow cars tend to be at the back or behind it. This process intensifies as the group moves away from the previous intersection, the group's travel time increases, and its average density decreases. Figure 1.1 shows a typical example of the dispersion of a group of cars. The horizontal axis shows time T, and the vertical axis shows the average number of cars on a street section located at a certain distance from the stop line in the direction of traffic [4-6].

Observations show that at a distance of 600 meters from the intersection, the length of the group in time more than doubles.

- The dispersion of the group occurs due to the different speeds of the cars
- As the distance increases, the shape of the group stretches and its density decreases
- This process has a significant impact on the efficiency of the "green wave"
- Changes observed at a distance of 600 meters are important for understanding traffic flow dynamics [7].

An attempt was made to translate in a scientific manner, clearly and intelligibly. The terminology of the transport sector was observed, while the text was adapted to the speech rules of the Uzbek language. As a result of numerous observations, it was found that a group of cars completely disperses at distances of more than 800-1000 meters. The arrival of cars at an intersection located at a distance of more than this distance from the previous intersection is random, and the flow connection between neighboring intersections is interrupted.

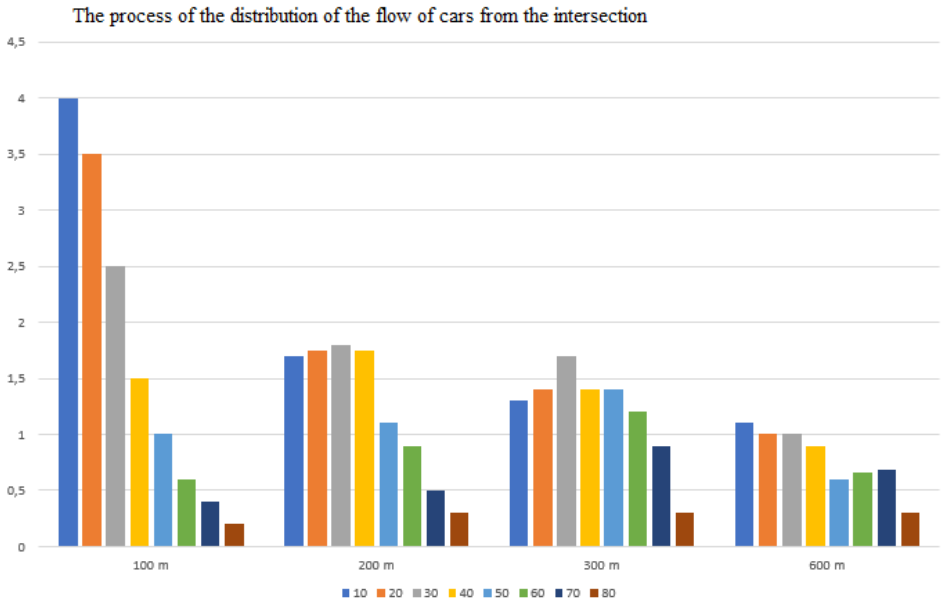


Figure 1 The process of dispersal of the flow of cars through the intersection

Numerous observations have shown that a group of cars completely disperses at distances of more than 800-1000 meters. The arrival of cars at an intersection located further from the previous intersection is random, and the flow connection between neighboring intersections is interrupted.

The following factors influence the dynamics of this process:

1. Structure of the transport flow
2. Individual characteristics of drivers
3. Number of lanes in the direction of traffic
4. Intensity of movement
5. Availability of public transport stops
6. Important places for pedestrians, etc.

To quantitatively assess the dispersion of a group of cars, an empirical formula was proposed by Russian scientists as a result of processing a large amount of experimental data.

$$t_x = t_r * e^{0,008} * t_d$$

here is the tx – the length of time (minutes) of the flow of cars at a section located at a distance x from the intersection.

tr – the amount of time it takes for a flow of cars to exit the intersection (minutes).

td – the amount of time (minutes) for the flow of cars to reach the next intersection from one intersection.

time duration – the total time it takes for a stream of cars to pass a given point (for example, if 10 cars pass in 2 seconds, the group length is 2 seconds).

The movement of traffic flows in groups is important in a coordinated control system. As the distance between intersections decreases, the probability of the group of vehicles breaking up decreases, and thus the time required to pass

through the next intersection decreases. If the length of the group increases during the process of breaking up, then it is necessary to extend the green signal at the next intersection (which limits the rights of the opposing direction) or to pass only part of the group and stop the moving vehicles. Vehicles stopped at the stop line due to a red light at a traffic light can pass through the intersection only in the next cycle (together with the next group) [8].

A coordinated control method is also used, but the first method (extending the green signal) is used only to a limited extent to clear the stopped part of the previous group. This ensures that the main part of the next group does not interfere with the unstoppable passage [9-11].

When the distance between intersections exceeds 800 meters, the group completely disperses and the number of stopped vehicles increases sharply. As a result, the efficiency of coordinated control decreases significantly.

Computational and graph-analytical methods of coordination programs are widespread due to their simplicity, but due to the high labor intensity of the calculation and graphic operations, they are considered effective when there are a relatively small number of traffic light objects. The essence of the method is to construct a road-time graph, which is executed in a rectangular coordinate system, if possible, on millimeter paper. The scale is chosen arbitrarily and depends on the length of the highway and the number of traffic light objects. On the horizontal axis, time is indicated in seconds, and on the vertical axis, the distance is indicated in meters.

The intersection with the largest cycle duration is considered the busiest intersection and is called the key intersection. Since the cycle duration should be the same at all intersections under coordinated control, the key intersection cycle is taken as the calculation cycle. Thus, the optimal control cycle occurs only at the key intersection, and at the other intersections this cycle is considered redundant.

It should be noted that in multi-program coordinated control, different intersections may be key for different times of the day. Accordingly, the computational cycle duration and computational speed may also differ for different programs [12].

After a single calculation cycle is determined for the highway, the durations of the main cycles for each intersection are determined in accordance with this cycle.

In the graph representation, a simplified plan of the highway is drawn to the left of the vertical axis (with the distances between intersections and the regulation modes indicated). Lines parallel to the horizontal axis are drawn through the intersection boundaries. For key intersections, cycle parameters are placed from left to right on the horizontal axis.

The left border represents the first vehicle movement in the group, and the right border represents the last vehicle movement in the group (Figure 2).

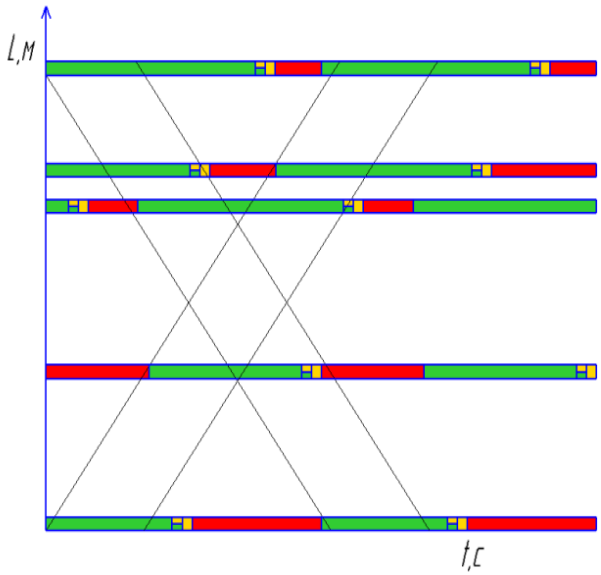


Figure 2 – Coordinated control graph.

As the cycle duration increases, the duration of the main cycles also changes proportionally. For each intersection, the duration of the main cycles and the phase shifts in the main direction are determined. The process of constructing the coordination graph is completed by constructing continuous motion tapes in both directions.

On the left, the sequence of traffic light signals along the highway: green — yellow — red — the duration of the red and yellow signals, s, is shown in a repeating sequence along the highway, observing the horizontal scale.

From the beginning of the green signals and to the right at a distance of Тв = (0.4 ÷ 0.5) Тс, oblique lines are drawn relative to the horizontal. The tangent of the angle of deviation of these lines corresponds to the calculated speed and is calculated by the following formula:

$$tg\alpha = \frac{V_{kth} * M_{vm}}{3.6 * M_{rm}}; \text{ km/h}$$

here: V_{kth} — calculated speed for coordination, km/h;

M_{vm} — time scale, s/cm;

M_{rm} — distance scale, m/cm.

The tn indicator determines the width of the interval, which is called the time band. If the car's traffic graph is located inside this band, it is guaranteed to move without stopping. For the opposite direction, the time band is also taken with the same width, but it has the opposite deviation, and this deviation is determined by the formula for the calculated speed of this direction [13].

The effectiveness of coordinated management is usually assessed after the system is implemented. The main indicator is the degree of reduction in the time taken by a vehicle to travel from the starting point to the end point on the highway

where the coordination system is implemented. According to numerous observations, travel time is usually reduced by 15–20%.

The relative width of the timing belt (recall that its minimum width should not be less than 0.3Тц) and the coefficient of non-stop passage can also be taken as efficiency indicators.

$$\beta = (N - Z) / N_0$$

Here:

N — traffic intensity passing through the intersection on this route of the highway, vehicles/hour,

N0 — the number of vehicles stopped at this intersection in this direction, per hour.

The β coefficient is determined at each intersection, in both the forward and reverse directions, by natural observation. It is also possible to determine the average value of the β coefficient for the entire highway.

Coordinated control is considered effective if $\beta \geq 0.8$. This means that 80% of vehicles passing through the intersection pass without stopping.

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BIOXILMA - XILLIK VA ULARNI MUHOFAZA QILISH (YAKKABOG' TUMANI MISOLIDA)

Annotatsiya: *Mazkur maqolada Qashqadaryo viloyatining Yakkabog' tumanidagi bioxilma- xillik holati, uning tarkibiy jihatlari, tahdid ostidagi turlar hamda muhofaza choralarning samaradorligini tahlil qilingan. Maqolada bioxilma - xillikni saqlashning ekologik, iqtisodiy va ijtimoiy ahamiyatini ilmiy asoslab berishga qaratilgan.*

Kalit so'zlar: *Bioxilma - xillik, Yakkabog' tumani, ekotizim, Qizil kitob, muhofaza choralari, endemik turlar, ekologik barqarorlik.*

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BIOPHILMA - CHILIC AND THEIR PROTECTION (IN THE EXAMPLE OF YAKKABOG' DISTRICT)

Abstract: *This article analyzes the state of biodiversity in Yakkabag district of Kashkadarya region, its structural aspects, threatened species, and the effectiveness of conservation measures. The article aims to scientifically substantiate the ecological, economic, and social importance of biodiversity conservation.*

Keywords: *Biodiversity, Yakkabag district, ecosystem, Red Book, conservation measures, endemic species, ecological sustainability.*

Bioxilma - xillik – yer biosferasining barqarorligini ta'minlovchi asosiy omillardan biridir. Bioxilma-xillik (yoki biologik xilma-xillik) — bu Yer yuzidagi tirik organizmlar va ularning yashash muhitlarining xilma-xilligini bildiradi. U tabiiy muhitning barqarorligini saqlab turuvchi eng muhim omillardan biridir.

Bioxilma-xillik turlari: Genetik xilma-xillik — bir tur ichidagi genlar farqliligi. Masalan, bug'doyning turli navlari yoki itlarning turlari. Turlar xilma-xilligi — ma'lum bir hududda yashaydigan turlar soni va ularning nisbati. Masalan, o'rmonlarda daraxtlar, qushlar, hasharotlar, hayvonlar kabi turli turlar yashaydi. Ekotizim xilma-xilligi — turli yashash joylari va ekotizimlarning (o'rmon, cho'l, dengiz, tog' va hokazo) xilma-xilligi.

Bioxilma-xillikka tahdidlar, o‘rmonlarning kesilishi, ifloslanish, iqlim o‘zgarishi, qishloq xo‘jaligi va sanoatning haddan tashqari kengayishi, noyob turlarning yo‘q bo‘lib ketishi.

O’zbekiston Respublikasi ham xalqaro shartnomalarga (masalan, “Bioxilma xillik to’g’risida” Konvensiyasi) muvofiq, mintaqaviy darajada ham bioxilma xillikni saqlashga intilmoqda. Shu jihatdan bu borada viloyatlar, ayniqsa, tabiiy resurslarga boy bo’lgan tumanlarning roli oshib bormoqda. Yakkabog’ tumanining iqlim-sharoit, relyef va ekotizimlari xilma – xilligi tufayli u O’zbekistondagi eng boy bioxilma xillikga ega hududlardan biri hiosblanadi. Biroq, so’nggi yillarda inson faoliyati, sug’orish tizimlarining noto’g’ri boshqarilishi, yaylovlarning buzilishi, aholi punktlarining ko’payishi kabi omillar tufayli tabiiy muhitga bosim ortib bormoqda.

Yakkabog’ tumanidagi biologik xilma xillikni saqlash uchun ilmiy asoslangan monitoring tizimini joriy etish, aholini ekologik tarbiyalash hamda qonuniy tartibga solish choralarini kuchaytirish zarur.

Yakkabog’ tumanida tog’, cho’l, dasht hamda suv havzalari kabi turli ekotizimlar mavjud bo’lib ular har xil biologik turlarning yashash muhitini ta’minlaydi. Misol uchun, Yakkabog’ tumanidan oqib o’tuvchi daryo havzalarida suv qushlari, baliq turlari, o’simliklar ko’plab uchraydi. Misol uchun, Anas platyrhynchos qushi, karp, somon baliqlari, hamda lotus, nymphaea kabi suv o’simliklari bunga yaqqol dalil. Shuningdek, tuman hududida “Qizil kitob” ga kiritilgan Tulipa kaufmanniana (Qashqadaryo lolasi) kabi o’simliklar ham saqlanib qolgan. Tog’li hududlarda bozg’on, qo’y, tovuq, qushlar va endemik o’simliklar uchraydi. Dasht va yaylov zonalari esa qo’y, echki, tovuq, quyon, va muhim o’simliklar (masalan, Artemisia absinthium, Ferula caspica) uchun yashash joyi hisoblanadi. Bu ekotizimlar bir – biriga bog’liq va ularning har biri bioxilma xillikni saqlashda muhim rol o’ynaydi. Agar bir ekotizim buzilsa, boshqa ekotizimlar ham ta’sirlanadi.

Tumanda yovvoyi o‘simliklar va hayvonot dunyosi turli-tuman: tog‘ o‘rmonlari, yaylovlar, dorivor o‘simliklar hududlari mavjudligi bilan ajralib turadi.

O‘rmon xo‘jaligi tomonidan aynan «tog’ bioxilma-xilligini asrash loyihasi» amalga oshirilmoqda. Bu hududdagi o‘simlik va hayvonot turlarini saqlashga qaratilgan. Hududdagi geograflik sharoitlar — toglar, cho‘l-dasht o‘zaro aralashganligi, iqlim o‘zgaruvchanligi — bioxilma-xillikni kuchaytiradi.

Yakkabog‘ tumani bioxilma-xilligi jihatidan muhim hududdir. Bu hududda tog‘ va o‘rmon ekotizimlari, dorivor va yovvoyi o‘simliklar, hayvonot dunyosi mavjud bo‘lib, ularni saqlash va barqaror foydalanish katta ahamiyatga ega. Biroq, ekologik tahdidlar — o‘rmonlarning kamayishi, degradatsiya, iqlim o‘zgarishi — bioxilma-xillikni xavf ostiga qo‘yishi mumkin.

O‘rmon kesishlar, huquqsiz foydalanish holatlari va boshqa anthropogen omillar hududdagi tabiiy muhitga salbiy ta’sir ko‘rsatmoqda.

Yer degradatsiyasi, yaylovlarning haddan tashqari kengayishi va iqlim o‘zgarishi bioxilma-xillikka tahdid soladi.

Tumandagi ekotizimlarni barqaror boshqarish, monitoring va himoya choralarining yetishmasligi muammolarni yanada oshiradi.

Xulosa: Shunday qilib, Yakkabog' tumanidagi bioxilma xillik tabiiy sharoitlarining xilma xilligi tufayli boy, lekin inson faoliyati, sug'orish tizimlarining noto'g'ri boshqarilishi va aholining ekologik bilim darajasining pastligi tufayli tahdid ostida. Shu sababli, ilmiy asoslangan monitoring tizimini joriy etish, maktab va oliy o'quv yurtlarida ekologik modullarni kengaytirish, fermer xo'jaliklariga barqaror qishloq xo'jaligi amaliyotlarini qo'llash bo'yicha grantlar ajratish kerak. Faqat shunday yondashuv orqali Yakkabog'ning noyob va o'ziga xos tabiiy boyliklari kelajak avlodlarga yetkaziladi.

Yakkabog‘ tumani tabiiy sharoitining o‘ziga xosligi, tog‘ va vodiylarning bir-biriga tutashganligi tufayli bu hududda o‘simlik va hayvonot dunyosining boy bioxilma-xilligi shakllangan. Tuman hududida noyob o‘simliklar, dorivor butalar, yovvoyi hayvonlar va qushlarning ko‘plab turlari uchraydi. Shu bilan birga, oxirgi yillarda antropogen omillar — o‘rmonlarning kesilishi, chorvachilikning haddan tashqari kengayishi, yerlarning degradatsiyaga uchrashi va iqlim o‘zgarishlari — bu tabiiy xilma-xillikka salbiy ta’sir ko‘rsatmoqda.

Shu bois Yakkabog‘ tumanida bioxilma-xillikni asrab-avaylash, noyob turlarni saqlab qolish va tabiiy muhitni barqarorlashtirish dolzarb masalaga aylangan. Tadqiqotlar shuni ko‘rsatadiki, tabiiy resurslardan oqilona foydalanish, ekologik nazoratni kuchaytirish va aholining ekologik madaniyatini oshirish orqali bioxilma-xillikni saqlab qolish mumkin.

Taklif va tavsiyalar

1. Qo‘riqlanadigan hududlar sonini ko‘paytirish: Yakkabog‘ tumanida mavjud tabiiy hududlarni o‘rganib, noyob o‘simlik va hayvon turlari yashaydigan joylarda yangi qo‘riqxonalar tashkil etish zarur.
2. Ekologik monitoringni yo‘lga qo‘yish: Hududdagi bioxilma-xillik holatini muntazam kuzatib borish, ekologik monitoring tizimini yaratish tavsiya etiladi.
3. Aholining ekologik ongi va madaniyatini oshirish: Maktab va kollej o‘quvchilari, mahalliy aholiga ekologik ta’lim berish, bioxilma-xillikni muhofaza qilish bo‘yicha targ‘ibot tadbirlarini ko‘paytirish lozim.
4. Barqaror qishloq xo‘jaligini rivojlantirish: Kimyoviy o‘g‘it va pestitsidlardan foydalanishni kamaytirish, ekologik toza dehqonchilik usullarini joriy etish zarur.
5. Noyob turlarni ko‘paytirish va qayta tiklash ishlari: Yo‘qolish xavfi ostida turgan o‘simlik va hayvonlarni sun’iy yo‘l bilan ko‘paytirish, ularni tabiiy muhitga qaytarish bo‘yicha ilmiy ishlarni kengaytirish kerak.
6. Mahalliy aholining ishtirokini ta’minlash: Bioxilma-xillikni saqlash dasturlariga fuqarolarni, fermerlarni va jamoat tashkilotlarini jalb etish samarali natija beradi.

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QUYI AMUDARYO MINTAQASIDA EKOLOGIK TURIZMNI RIVOJLANTIRISHDA TABIIY SHAROIT VA QADIMIY OBIDALARNING O'RNI

Annotatsiya: *Mintaqaning ijtimoiy iqtisodiy rivojlanishida ekologik turizmning ahamiyati alohida o'rin tutadi. Quyi Amudaryo mintaqasi O'zbekistonning eng muhim tabiiy va tarixiy hududlaridan biri bo'lib, ekologik turizmni rivojlantirishda katta salohiyatga ega. Mazkur maqolada mintaqaning tabiiy sharoiti, iqlim xususiyatlari, relyef tuzilishi, suv resurslari hamda o'simlik va hayvonot dunyosining o'ziga xosligi tahlil qilingan. Shu bilan birga, qadimiy obidalar – "Arda Xiva", "Qo'sha darvoza", "G'ovuk ko'l", "Kalta Minor" va boshqa tarixiy yodgorliklarning ekologik turizmni shakllantirishdagi o'rni yoritilgan. Tadqiqotda mintaqaning ekologik barqarorligini ta'minlash, tabiiy muhitni asrash va tarixiy merosni himoya qilish bilan bog'liq masalalarga alohida e'tibor qaratilgan. Maqola natijalariga ko'ra, ekologik turizm Quyi Amudaryo aholisi uchun yangi ish o'rinlari yaratish, hudud iqtisodiyotini rivojlantirish, shuningdek, yoshlar orasida ekologik madaniyatni oshirishda muhim omil bo'la oladi. Muallif mintaqada zamonaviy ekoturizm infratuzilmasini shakllantirish, transport va xizmat ko'rsatish tizimini yaxshilash, tabiiy hududlarni muhofaza qilish bo'yicha takliflar bergan. Shu jihatdan maqola ekologik turizmni barqaror rivojlantirishga qaratilgan amaliy ahamiyatga ega ilmiy ish sifatida e'tirof etiladi*

Kalit so'zlar: *ekologik turizm, Arda Xiva, tabiiy muhit, ekologik barqarorlik, favvora, Qo'sha darvoza, gondol, G'ovuk ko'l, Kalta Minor, Neolit.*

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THE ROLE OF NATURAL CONDITIONS AND ANCIENT MONUMENTS IN THE DEVELOPMENT OF ECOLOGICAL TOURISM IN THE LOWER AMU DARYA REGION

Abstract*: The Lower Amudarya region is one of the most important natural and historical areas of Uzbekistan, possessing great potential for the development of ecological tourism. This article analyzes the region's natural conditions, climate characteristics, relief, water resources, and biodiversity. In addition, it highlights the role of ancient monuments such as "Arda Khiva," "Qo'sha Gate," "G'ovuk Lake," and "Kalta Minor" in forming ecological tourism. The study*

emphasizes issues of ensuring ecological stability, preserving the natural environment, and protecting historical heritage. The results show that ecological tourism can create new jobs, stimulate economic growth, and enhance environmental awareness among the local population of the Lower Amudarya. The author also presents proposals for developing modern ecotourism infrastructure, improving transport and service systems, and protecting natural territories. Thus, this article is recognized as a scientific work of practical importance aimed at the sustainable development of ecological tourism in the region.

***Keywords**: Ecological tourism, Arda Khiva, natural environment, ecological sustainability, fountain, Double Gate, gondola, Govuk Lake, Kalta Minor, Neolithic. ecological tourism, recreation zones, environment, ecological sustainability, Ustyurt, Aral sea area, muddy salt, neolith period, Qiyat, Katkal'a,Tup'rakkal'a.*

Kirish

Insoniyatning iqtisodiy, texnikaviy, madaniy rivojlanishi hamda kishilar turmush darajasining yaxshilanishi bevosita turizmga ishtiyoqni uygotadi. Xususan, keyingi yillarda dunyo miqyosida turizmning ulushida ekoturizmning xissasi 12 foizdan ortib ketdi va shu sohada uning istiqbolli yo'nalish ekanligidan dalolat bermoqda. Jahon turizm industriyasi tahlillariga nazar tashlaydigan bo'lsak, tematik sayohatlarga talab oshib borayotganligini ko'rish mumkin. Binobarin, azaldan tabiat insonni o'ziga jalb qilib kelgan. Shuning uchun tabiatga sayohat qilish, qolaversa, tabiatning biror turi bo'yicha turistik marshrutlarga chiqish istagi yildan-yilga kuchayib bormoqda. Butun dunyo miqyosida keyingi yillarda ekoturizm sayyohlikning istiqbolli yo'nalishlaridan biriga aylanib bormoqda. Butun turizm ulushida ekoturizmdan keladigan daromad 12% dan oshib ketdi. Buning asosiy sabablaridan biri tabiatga sayohat inson uchun xuzr-xalovat bagishlaydi. Shuning uchun xam jahon turizm industriyasida tabiat ob'ektlariga sayohat qilishga talab kundan-kunga oshib bormoqda.

Ekoturizm – yangi va eng harakatchan turoperatorlarni aniq harakatga boshlovchi yo'l bo'lib, bunda sayohatchilar o'zlarini tabiat bilan uyg'ulikda his qiladilar va ona tabiatga bo'lgan ijobiy qarashlar shakllanadi. Shularni hisobga olgan holda ekoturizmning maqsadi – turizm orqali hozirgi va kelajak avlodlarning ekologik xavfsizligi va barqaror rivojlanishni ta'minlash uchun tabiatdan turistik yo'nalishda oqilona foydalanishni o'z ichiga oladi.

Ekoturizm daromad keltirishi, bandlikni yaxshilash va shu yo'llar orqali mahalliy aholining turmush darajasini yaxshilashdan tashqari tabiatni muhofaza qilish maqsadlarini ham ehtiborga olishi lozim. Unga ta'sir etadigan quyidagi omillarni hisobga olish maqsadga muvofiqdir. strukturaga mosligini ta'minlash, ekologik toza qurilish materillarini qo'llash, maishiy, mahalliy mahsulotlar bilan bevosita ta'minlash, chiqindilarni kamaytirish choralarini qo'llash, mavsumiy oziq-ovqat mahsulotlarini konservatsiyalash va ikkilamchi ishlatish,biologik usullarda yetishtirilgan oziq- ovqatlarni ko`paytirish, ekologik moslashgan

takliflar berish, muhofazadagi o'simliklar va xayvonlarni ko'rsatish, bilim va estetik jihatdan qiziqarli tabiat manzaralarini taklif qilishdan iborat.

Ishning maqsadi va vazifalari

Quyi Amudaryo hududida ekologik turizmning keng yo'lga qo'yilishi chet ellik mehmonlarning vohaning boy va betakror tabiati to'g'risidagi tassavurga ega bo'lishlari, fuqarolarining o'z Vatani bilan yaqindan tanishishlari, o'zlarida ona yurtiga nisbatan milliy iftixor hamda g'urur tuyg'usini shakllantirishlariga zamin yasaydi.

Mavzuning dolzarbligi esa ekologik turizm salohiyatining oshishi turli xil ijtimoiy, iqtisodiy, siyosiy va ekologik funktsiyalarning bajarilishida muhim ahamiyat kasb etadi.

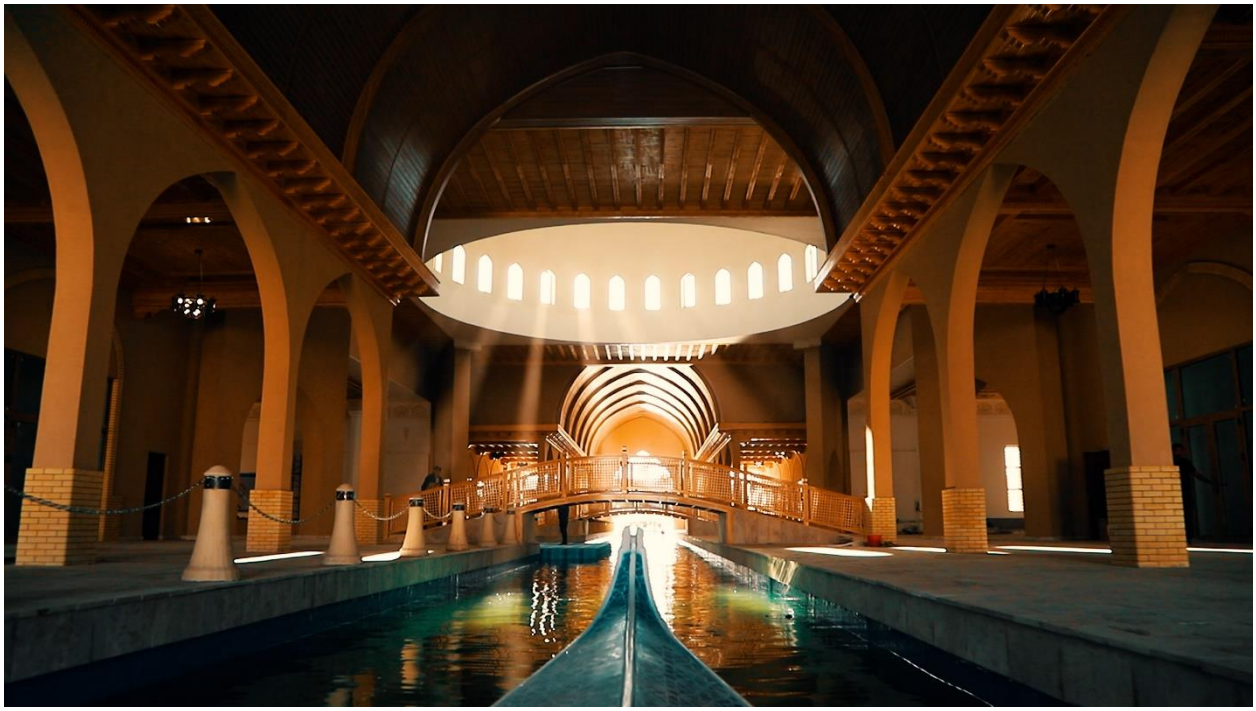
Ekologik turizmni rivojlantirish zarurati uning faqat foyda keltiradigan soha deb xisoblash mumkin emas. Bu faoliyat turi agar maqsadga muvofiq doirada amalga oshirilmasa, uning qoidalari va talabalariga rioya qilinmasa tabiatga jiddiy salbiy ta'sir qilishi va noxush oqibatlarga olib kelishi tabiiy [1]. Uning salbiy oqibatlarini eng avvalo, o'simliklar nobud va payxon bo'lishida ko'ramiz. Bundan tashqari yerlar o'piriladi va zichlashib ketadi, xayvonlar bezovtalanadi, qochishga tushadi ular notabiiy to'planadi, suvda yashaydigan xayvonlarning hayot tarzi o'zgaradi, suv o'simliklariga ziyon yetadi, suvning ifloslanishi yuz beradi, noyob turlar kamayadi, xayvonlarning hayot tarzi o'zgaradi, qoyalar yemiriladi. Demak, ekoturizm doimo davlat, jamoat tashkilotlari nazoratida bo'lishi, unga doir qonunchilikka og'ishmay amal qilishi lozim.

Asosiy qism

Ustyurt ekoturistik hududini oladigan bo'lsak, u O'zbekistonning shimoliy-g'arbi-Qoraqalpoqistonda joylashgan plato bo'lib, uning umumiy maydoni 200 ming km^2 ni tashkil etadi. Bu joylar dunyoda eng katta 60-150 metrlik tik qoyali jarlari, davolash xususiyatiga ega bo'lgan juda katta-1000 km^2 li tuzli Borsakelmas sho'rxoki bilan mashhur. O'simlik dunyosi deyarli yo'q, osh tuzi va balchiqli tuzning qatlami 16-27,5 m gacha boradi. Yangi qurib bitkazilgan Qo'ng'irot soda zavodi aynan ana shu xom ashyo hisobiga ishlaydi. Neolit davridan qolgan "Ustyurt makoni" xam noyob tabiiy resurslardan biridir[1].

Ekoturistik marshrutlar bir paytning o'zida ham Orolning qurigan, ham uning ta'sirida bo'lgan Orol atrofi hududlarini qamrab oladi. Bunday hududlarda, bizning fikrimizcha ekoturlar nafaqat piyoda yoki tuya va otlarda, balki samolyot va vertolyotlar orqali ham amalga oshirilishi mumkin. Amudaryoning o'zaniga yaqin sohillardagi to'qayzorlardan iborat bo'lib, ular ekoturlar uchun juda qiziqarli, noyob landshaft hisoblanadi. Quyi Amudaryoning o'ng sohilida to'qay landshaftidagi qushlar va hayvonlarni muhofaza qilish uchun Badayto'qay qo'riqxonasi tashkil etilgan[17]. Ornitafaunani saqlash uchun Xorazm buyurtmaxonasi tashkil etilgan. Bulardan tashqari Qizilqumning g'arbiy qismida, Amudaryoning o'ng qirg'og'ida, kembriy va kembriygacha davrda burmalangan tog' jinslari ochilmalaridan iborat, balandligi 485 metrlik Sulton Uvays tog'lariga ekoturlar uyushtirish mumkin. Amudaryo rayonida O'zbekistonning ko'hna shaharlaridan biri Xorazm joylashgan, uning arxitektura yodgorliklari tarixiy

turizm markazlaridan biri hisoblanadi. Bunday joylarda ekoturlarni tarixiy turlar bilan kompleks olib borishni tavsiya qilish mumkin[2,18].



1-rasm „Ardaxiva majmuasi”

Quyi Amudaryo mintaqasida O’zbekistonning ko’hna shaharlaridan biri Xorazm joylashgan, uning arxitektura yodgorliklari tarixiy turizm yoki ekoturizmni rivojlantirish uchun katta imkoniyatlarga ega. Shu jihatlarini e’tiborga olib O’zbekiston prezienti tashabbusi bilan Afsonaviy Ichan qal’a yaqinida yangi turizm markazi — "Arda Xiva" sayyohlik majmuasi paydo etildi[16].Ushbu majmua xozirning o‘zida "Xivaning yo‘ldosh shahri" deb nom olgan. Qadimiy Xivani o’zida aks ettirgan “Arda Xiva” majmuasi 25 gektar maydonga teng bo’lib u Ichan qal’aning tarixiy uslubi asosida qurilgan. Majmuaning o‘ziga xos “Arda Xiva”, ya’ni “port shahri” deb tarjima qilinadigan nomi, uning joylashgan o‘rnidan kelib chiqqan. Bir vaqtlar bu yerda, Xiva yaqinida Amudaryo o‘zani o‘tgan, hatto bu o‘zan Kaspiy dengiziga quyilgan, degan ma’lumotlar ham bor. Bugungi kunda Amudaryodan bu yerda bir nechta yirik ko‘llar qolgan[15,19]. Ulardan biri 150 gektar maydonni egallagan. Mahalliy tarixchilarning ta’kidlashicha, G‘ovik ko‘li qadimgi hunarmandlar maskani bo‘lgan, aynan shu yerdan Ichan qal’a yodgorliklarini qurish uchun loy olib kelingan. Buyuk Ipak yo‘lining o‘ziga xos jozibasini qayta tiklash maqsadida G‘ovik ko‘li yaqinida, sayyohlik shaharchasi hududida suv rekreatsion zonalari va yirik savdo maydonchalari barpo etilgan[14]. Xivaning mashhur Ichan qal’asiga tashrif buyurishdan oldin ajoyib “Arda Xiva” sayyohlik majmuasida to‘xtab, qadimiy hunarmandchilik markazlari bo‘ylab gondolalarda sayr qilib, sharqiy Venetsiya muhitini his etishingiz mumkin. Tashrif buyuruvchilar Qo‘sh darvozaning yog‘och o‘ymakor eshigidan kirib, kichik Xivaga yo‘l oladilar[3,20]. Bu yerda mashhur

Kalta minor minorasining nusxasini va boshqa ko‘plab o‘rta asr uslubidagi me’moriy inshootlarni ko‘rish mumkin. “Arda Xiva”ning betakror inshootlarini ko‘zdan qochirmaslik uchun majmua bo‘ylab sayohatni butun hududga yoyilgan eshkak eshish kanallari bo‘ylab o‘tkazish maqsadga muvofiqdir. Ko‘ngilochar suv mashg‘ulotlari ixlosmandlari uchun “Arda Xiva” hududida umumiy sig‘imi 4000 kishigacha bo‘lgan katta va zamonaviy attraksionlarga ega yopiq va ochiq akvaparklar barpo etilgan. Suv mototurlari uchun maydonchalar ham mavjud. Bu oilaviy dam olish yoki do‘stlar bilan hordiq chiqarish uchun ajoyib imkoniyatdir. Xalq amaliy san’ati muxlislari uchun bu yerda zamonaviy hunarmandchilik ustaxonalari ochilgan[13]. Ganch, yog‘och o‘ymakorligi, kulolchilik va zardo‘zlik san’ati - bularning barchasini jonli ravishda ko‘rish, mahorat darslarida qatnashish va ko‘plab unutilmas taassurotlarga ega bo‘lish mumkin. Majmua hududida joylashgan “Ko‘hna Urganch” tarix muzeyi qadimiy Xorazmning boy madaniyatidan bahramand bo‘lishga yordam beradi[4]. “Arda Xiva”ning milliy va Yevropa oshxonasiga ixtisoslashgan shinam restoranlari qadimiy Xiva bo‘ylab qiziqarli gastronomik sayohatga chiqishingizga ko‘maklashadi. Bu yerda nafaqat xalq oshpazlarining eng sara taomlarini, balki Yevropa va aralash oshxona ixlosmandlari uchun ham keng turdagi taomlarni tatib ko‘rish imkoniyati mavjud. Restoranda o‘tirishga vaqti bo‘lmagan mehmonlar uchun “Arda Xiva”ning zamonaviy tezkor ovqatlanish maydoni keng assortimentdagi taomlarni taklif etadi. “Arda Xiva” majmuasi madaniy hordiq chiqarish uchun ajoyib maskandir[12]. Majmua markazida 3000 tomoshabinga mo‘ljallangan, katta sahnaga ega ulkan amfiteatr joylashgan. Bu yerda yirik madaniy tadbirlar: xalqaro festivallar, konsertlar va turli shou-dasturlar o‘tkazish rejalashtirilgan. Ulkan musiqiy favvora ko‘plab mahalliy va xorijiy mehmonlarni o‘ziga jalb etadigan maskanga aylanadi. Kino ixlosmandlari esa “Arda Xiva” majmuasi hududida barpo etilgan yangi kinoteatrlarda mahalliy va xorijiy kino sanoatining so‘nggi yangiliklari hamda o‘zbek kinosining durdonalaridan bahramand bo‘lishlari mumkin[11]. "Arda Xiva" "port shahri" degan ma’noni anglatadi, bu nom esa uning joylashuviga bevosita bog‘liq, chunki bir paytlar bu yerlar orqali Amudaryo oqib o‘tgan va afsonalarga ko‘ra, u Kaspiy dengizi sari yo‘l olgan. Bugungi kunda mazkur hududda bir necha yirik ko‘llar saqlanib qolgan bo’lib, ulardan eng kattasi G‘ovuk ko‘li, u 150 gektar maydonni egallaydi[5].



2-rasm Ardaxiva turizm majmuasi

G‘ovuk ko‘li turizimini rivojlantirish turistik mahsulotlarning asosiy tarkibiy qismi sifatidagi ekologik resurslardan foydalanishning to`g`ri muvozanatiga bo`g`liq bo`lib, turizmning atrof-muhit va tabiatga salbiy ekologik ta`sirini kuzatish mumkin. Ekoturizm va ko`l turizimi sayyohlik sanoatining eng tez rivojlanayotgan qismlaridan biri hisoblanganligi sababli, jamoat guruhlari,shuningdek, nodavlat, notijorat tashkilotlari o`z mintaqalarida turizmning barqaror rivojlanishiga ta`sir ko`rsata oladi[6].

Bu yerda buyuk Ipak yo‘li muhitini qayta yaratish maqsadida G‘ovuk ko‘li yaqinida dam olish hududlari, bozorlar va savdo maydonlari barpo etilgan. 3 million sayyohni qabul qilish. imkoniyatiga ega bo’lgan zomanaviy tipda barcha qulayliklari mavjud bo’lgan, bir vaqtning o‘zida 1000 nafar mehmonni qabul qila oladigan 20 ta mehmonxona qurilgan[7].

"Arda Xiva" da sayyohlik majmuasini rivojlantirish xamda ekologik turizmni yo’lga qo’yish maqsadida majmuali infratuzilmalar y’ani 2 ta akvapark, 3 000 o‘rinli amfiteatr, ko’ngilochar musiqali favvoralar, qadimiy hunarmandchilikni targ’ib qilqsh maqsadida 11 ta hunarmandchilik ustaxonasi, qadimgi Urganch muzeyi, manaviy dam olish ushun 5 ta kino va konsert zali, 9 ta milliy va xalqaro oshxona, zargarlik markazi va 70 ta do‘kondan iborat savdo galereyasi barpo etilgan[10]. Bundan tashqari faol hordiqni xush ko‘ruvchilar uchun suv motosikli va gondola-qayiqlarga moslashgan 2 km uzunlikda maxsus kanal qurilgan. Qo‘sha darvoza deb nomlangan o‘ymakor eshiklar orqali majmuaga kirilganda, mehmonlar haqiqiy Xivaning kichik namunasiga duch kelishadi, bu yerda Kalta Minor va boshqa ko‘plab arxitektura inshootlarining ko’rinishi aks etgan [8].

Sayyohlar Qo‘sh-Darvozaning o‘yilgan naqshlarini ko’rarkanlar ular o‘zlarini o‘rta asr Sharqi muhitida topadilar va tarix ruhini his qiladilar. Tor ko‘chalarda sayr qiladilar, hunarmandchilik ustaxonalarini ko‘rishadi va xuddi Sharqning Venetsiyasida bo‘lganidek, gondolda sayr qilishadi. Majmuaning asosiy kanali 2 kilometr uzunlikda bo'lib, u orqali sayyohlar hudud tuzilmalarning nusxalari, shu jumladan Kalta Minor miniatyurasi bo'ylab suzib o'tganlarida ekoturizmning mavjud ekanligiga duch keladilar. Umuman olganda Arda Xiva me'morchiligi qadimiy Ichan-qal'aning ko'rinishida tasvirlangan va zamonaviy tarzda aks ettirilgan. Ekologik tozalikka alohida e'tibor qaratilgan bo’lib, binolar quyosh batareyalari bilan jihozlangan va yagona iqlim nazorati tizimiga birlashtirilgan[9].

Metodologiya

Mazkur tadqiqot Quyi Amudaryo mintaqasida ekologik turizmni rivojlantirishda tabiiy sharoit va qadimiy obidalar o‘rnini o‘rganishga qaratilgan bo‘lib, unda quyidagi usullar qo‘llanildi:

1. Tahliliy-uslubiy yondashuv – mavjud ilmiy manbalar, maqolalar va hisobotlar asosida ekologik turizmning nazariy asoslari tahlil qilindi.

2. Geografik tahlil usuli – Quyi Amudaryo mintaqasining tabiiy-geografik sharoitlari (relyef, iqlim, suv resurslari, o‘simlik va hayvonot dunyosi) o‘rganildi.

3. Kartografik usul – mintaqaning turistik obyektlari, tarixiy yodgorliklari va ekoturizm yo‘nalishlari xarita asosida aniqlanib, ularning joylashuvi tahlil qilindi.

4. Kuzatuv va joyida o‘rganish – Xiva, G‘ovuk ko‘li, Arda Xiva majmuasi singari ob’ektlarda amaliy kuzatuvlar olib borildi, mahalliy aholi va sayyohlar fikrlari o‘rganildi.

5. Qiyosiy tahlil usuli – Quyi Amudaryo mintaqasi boshqa ekologik turizm hududlari bilan solishtirilib, o‘ziga xos jihatlar aniqlangan.

6. Statistik ma’lumotlardan foydalanish – Urganch davlat universiteti va Turizm qo‘mitasi ma’lumotlari asosida mintaqadagi sayyohlar oqimi, infratuzilma va iqtisodiy ko‘rsatkichlar tahlil qilindi. Natijada tadqiqot mintaqaning tabiiy imkoniyatlari, tarixiy merosi hamda ekologik turizm salohiyatini kompleks baholash imkonini berdi.

Xulosa

Qilib aytadigan bo’lsak tabiat qo’ynida dam oluvchilar uchun qulaylik yaratish bo’yicha quyidagilarni amalga oshirgan ma’quldir:

- tabiat bag’rida dam oluvchi sayyohlarga xushmanzara joylarda tunab qolish uchun maxsus joylar barpo qilish, barcha turdagi qulayliklarni yaratish, yo’lsiz tabiiy xududlarda harakatlanishlari uchun mahalliy transportlar- ot, eshak, tuyalar tashkil qilish, dam olishni maroqli o’tkazishlari uchun barcha qulayliklarga ega va anjomlari bilan baliqlantirilgan suv havzalari tashkil qilish, xorijiy yoki mahalliy sayyohlarni dam olishlarini maroqli o’tkazishlari uchun mintaqa osmoni butun kun va tun bo’yi ochiq bo’lishini e’tiborga olib, madaniy xordiq chiqarishlari uchun folklyor jamoalarini kontsert dasturlarini tashkil qilish va boshqalar.

Agar biz vohada ekoturizmni rivojlantirsak vatanimizga yaxshigina daromad va sarmoyalar kirib kelishi aniq va bu sarmoyalar tabiatimizni yanada go'zallashtirishga, tabiiy resurslarimizni qayta tiklashga, xalqimizning farovonligiga va ravnaqiga xizmat qiladi, bizning Orol bo'yi deb e'tirof etilgan hududiy muammolarimiz ham o'z yechimini topadi.

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IQTISODIY ISLOHOTLAR VA RAQAMLI TEXNOLOGIYALAR ASOSIDA IQTISODIY SAMARADORLIKNI OSHIRISH

Annotatsiya: *mazkur maqolada O'zbekistonda iqtisodiyotni raqamlashtirish sohasida amalga oshirilayotgang isloxotlarning iqtisodiy samaradorligi yoritib berilgan. Raqamli iqtisodiyot alohida faoliyat turini emas, balki ishbilarmonlik, sanoat ob'ektlari, xizmatlarda axborot texnologiyalaridan faol foydalanishni anglatadi. Raqamli iqtisodiyot raqamli texnologiyalarga asoslangan, elektron biznes, elektron tijorat bilan bog'langan, raqamli tovar va xizmatlar ishlab chiqarayotgan va taqdim etayotgan iqtisodiy faoliyatdir.*

Kalit so'zlar : *servis, strategiya, segment drayveri internet-banking, xufyona iqtisodiyot, innovatsion g'oyalar, texnologiyalar, trakzaktsion sektor, “axborotlashgan jamiyat”*

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INCREASING ECONOMIC EFFICIENCY THROUGH ECONOMIC REFORMS AND DIGITAL TECHNOLOGIES

Abstract: *This article highlights the economic effectiveness of the reforms being implemented in the field of digitalization of the economy in Uzbekistan. The digital economy is not a separate type of activity, but the active use of information technologies in business, industrial facilities, and services. The digital economy is an economic activity based on digital technologies, associated with e-business, e-commerce, and producing and providing digital goods and services.*

Keywords: *service, strategy, segment driver internet banking, hidden economy, innovative ideas, technologies, transactional sector, “information society”*

Kirish qismi

Rivojlangan davlatlarda raqamli iqtisodiyotni joriy etishga allaqachon kirishilgan. Jahon iqtisodiyotining globallashuvi va texnologiyalarning rivojlanishi sharoitida

O'zbekistonning iqtisodiy taraqqiyotiga raqamli iqtisodiyotni rivojlantirmasdan erishib bo'lmaydi. Bugun jadallik bilan kechayotgan raqamlashuv jarayoni “yangi iqtisodiyot”ni vujudga keltirdi. Kam o'rganilgan va kun sayin chuqur tomir otib borayotgan bu bozor segmenti ishlab chiqaruvchilarga biznesda samarali marketing kampaniyalari uyushtirish, minimal xarajat qilib, maksimal foyda olish, Tovar va xizmatlarni muvaffaqiyatli sotishning optimal usullarini taqdim etadi. Iste'molchi, xaridor va mijozlarga sifatli xizmat, qulaylik yaratiladi. Bu vaqtingiz tig'iz paytida Internet orqali tushlikka buyurtma berish, mobil ilova orqali taksi chaqirish, uzoqdagi yaqiningizga pul jo'natishdan ko'ra kengroq imkoniyatlar bo'lib, transchegaraviy biznes hamkorlik, elektron tijoriy maydon, masofaviy ofis kabilarni ham qamrab oladi. Prezidentimiz Sh.M.Mirziyoyev takidlaganidek: “Biz taqdim etayotgan strategiyada yuqori texnologiyalarga asoslangan, innovatsion va raqamli iktisodiyotga ustuvor ahamiyat beriladi. Insoniyat tarixida tosh asri toshlar tugaganligi uchun emas,balki yangi texnologiyalar kirib kelgani natijasida barham topgan. Bugunga qadar insoniyat uchta sanoat inqilobini boshdan kechirdi. Hozirgi davrimiz dunyoning yetakchi mamlakatlari “Turtinchi sanoat inqilobi”, “Aqlli iqtisodiyot”, “Innovatsion iqtisodiyot”ga o'tayotgani bilan xarakterlanadi. Yangi asrda raqamli texnologiyalarga asoslangan, elektron biznes va elektron tijoratni nazarda tutuvchi raqamli iqtisodiyotning shakllanishi tendentsiyaviy tus oldi. Jahonning yetakchi mamlakatlarida raqamli iktisodiyot yalpi ichki mahsulotning 4-5 foizini ta'minlamoqda, jahondagi savdo aloqalarining 15 foizdan kuprogi uning hissasiga to'gri kelmoqda. Bugungi kunda raqamli iqtisodiyot elektron savdo va servis bilan cheklanmasdan ta'lim, sog'liqni saqlash kabi sohalarni ham qamrab olmoqda. Fuqarolarga turli xizmatlar ko'rsatish amaliyoti ham elektron hukumat platformasiga o'tkazilmoqda. Pandemiya raqamlashtirish jarayonini yanada tezlashtirdi. Axborot texnologiyalari iqtisodiy yunalishning tom ma'nodagi “drayveri”ga aylanib bormoqda. “ Raqamli iqtisodiyot raqamli texnologiyalarga asoslangan, elektron biznes, elektron tijorat bilan bog'langan, raqamli tovar va xizmatlar ishlab chiqarayotgan va taqdim etayotgan iqtisodiy faoliyatdir.

Asosiy qism

Raqamli iqtisodiyot alohida faoliyat turini emas, balki ishbilarmonlik, sanoat ob'ektlari, xizmatlarda axborot texnologiyalaridan faol foydalanishni anglatadi. Agar oddiy iqtisodiyotda moddiy buyumlar asosiy resurs hisoblansa, raqamli iqtisodiyotda bu qayta ishlanadigan hamda uzatiladigan axborot, ma'lumotlar bo'ladi.Raqamli iqtisodiyot yirik sanoat ob'ektlari ish samaradorligini oshirish, ishlab chiqarishda o'sish, faoliyat shaffofligini ta'minlash, mahsulot tannarxini kamaytirish imkonini beradi. Davlat o'z fuqarolari uchun elektron xizmatlar ko'rsatishi va elektron mahsulotlarni taklif etishi — bu raqamli iqtisodiyotning asosiy qismi hisoblanadi. Mamlakatimizda ushbu sohani keng rivojlantirish korruptsiya illatiga barham beradi. O'zbekistonda “Raqamli O'zbekiston-2030” dasturini ishlab chiqilishi va hayotga tatbiq etilishi, eng avvalo, puxta va mukammal tashkiliy-huquqiy mexanizmlarni shakllantirish, qolaversa, innovatsion g'oyalar, texnologiyalar va ishlanmalarni joriy etish bo'yicha davlat

organlari va tadbirkorlik sub'ektlarining uzviy hamkorligini ta'minlash, barcha soha va tarmoqlarda ishlab chiqarish va xizmat ko'rsatishni raqamli texnologiyalar bilan qamrab olish, bu borada zamonaviy bilimlarni chuqur egallagan, intellektual salohiyatli kadrlarni yetishtirish, shu orqali, mamlakatda “axborotlashgan jamiyat” muhitini yaratishga xizmat qiladi. Mamlakatimizda 2020 yildan boshlab transport, geologiya, ta'lim, arxiv kabi sohalarni to'liq raqamlashtirilib, bu boradagi ishlar jadal olib borilmoqda. Aholi va tadbirkorlik sub'ektlarining davlat organlari bilan kontaktsiz aloqa shakllarini yanada rivojlantirish maqsadida Yagona interaktiv davlat xizmatlari portalining yangi versiyasi ishga tushirilgani raqamli iqtisodiyot rivoji yo'ldagi muhim qadamlardir.Normativ-huquqiy hujjatlar loyihalarini barcha manfaatdor vazirliklar, idoralar, mahalliy ijro etuvchi hokimiyat organlariga ko'rib chiqish, elektron raqamli imzodan foydalangan holda kelishish (viza qo'yish) uchun, shu jumladan bir vaqtning o'zida keng jamoatchilik va mutaxassislar muhokamasini o'tkazish va tezkor jo'natish uchun vaqtni va mehnat resurslarini sezilarli darajada tejash maqsadida yagona elektron tizimi “project.gov.uz” joriy etilgani ham quvonarli. “Raqamli tengsizlik tengsizliklarning doyasi” bo'lib turgan bir paytda iqtisodiyotning barcha sohalarini raqamlashtirish jahon hamjamiyatiga integratsiyalashuv, dunyo bozorida o'z o'rniga ega bo'lish, iqtisodiy ravnaq topish, aholiga qulayliklar yaratishning asosiy shartidir. Quvonarlisi, bu mamlakatimizda asosiy kun tartibidagi masala. Raqamlashtirish borasida O'zbekiston dadil odimlar bilan ildamlamoqda. “Jahon bozoridagi raqobatdoshligini yanada oshirish, uning soha va tarmoqlarini modernizatsiya va diversifikatsiya qilish, eksport salohiyatini kengaytirish, tadbirkorlikni rivojlantirish, investitsiyaviy faollikni kuchaytirish orqaligina istiqbolli dasturlarimizni samarali amalga oshirish mumkin.

Quyidagilar bunda ijtimoiy va iqtisodiy taraqqiyot yo'liga bosqichma-bosqich chiqish uchun asosiy shart va omillar sifatida ko'rsatilmoqda:

axborotlashtirish va davlat boshqaruvi organlari hamda munitsipal xizmatlarni integratsiyalash hisobiga elektron hukumat va raqamli shahar kontseptsiyalarini tatbiq etish;

• yangi texnologik avloddagi mahsulotlarni yalpi ishlab chiqarish (pilotsiz avtomobillar va boshqalar singari);

• o'ziga xos bezak va qurilish materiallari yordamida «aqlli» va ekologik uylarni barpo etishga oid g'oyalarni amalga oshirish;

• autsorsing, o'zini band etish va boshqalar orqali bandlikning muqobil shakllarini keng targ'ib qilish;

• muayyan vazifalarni bajarish uchun ishchi-frilanserlarni izlashga xizmat qiladigan professional tarmoqlarni yaratish.

• Yuqoridagilar barchasi biznesga ishlab chiqarish va boshqaruvda tovar va elektron xizmatlar integratsiyalanadigan zamonaviy platformalar yordamida xarajatlarni qisqartirishga imkoniyat beradi.

Raqamli sektorning iqtisodiy ahamiyati

Ta'kidlanishicha, raqamli texnologiyalar iqtisodiyotga bog'liq 50 foizdan ortiq sohalarni keskin o'zgartirib yuboradi. Ushbu qarash axborot texnologiyalari va raqamli platformalar biznes modellarni keskin o'zgartirib, ularning

samaradorligini vositachilarni bartaraf etishi va jarayonlarni optimallashtirishiga asoslangan. Ko'pincha IT sohasining rivojiga qo'shilgan hissa iqtisodiyotning rivojlanishi, yangi ish o'rinlarining yaratilishi, odamlar va biznes uchun yangi turdagi xizmatlarning paydo bo'lishi, elektron hukumat loyihalari doirasida xarajatlarining qisqarishiga zamin yaratadi. Shu bilan bir vaqtda, axborot texnologiyalarini tatbiq etishdan hosil bo'lgan umumiy effekt kutilganidan samarasizroq bo'lib chiqadi va bir xil tartibda taqsimlanmaydi. Bu kabi investitsiyalardan maksimal natija olish uchun texnologiyalarning Jahon banki tayyorlagan ma'ruzasida «analog to'ldiruvchilar» deb nomlangan boshqa omillar bilano'zaro ta'sirini yaxshi tushunish talab etiladi.

Ular qatorida:

• faol ishbilarmonlik muhitini qo'llab-quvvatlaydigan hamda biznes va insonlarga raqamli iqtisodiyot texnologiyalaridan raqobat va innovatsiyalar, xarajatlarni qisqartirish, shuningdek, turmush farovonligini oshirish uchun foydalanishga imkon beradigan normativ-huquqiy baza;

• biznes menejmenti va davlat xizmatchilarida axborot texnologiyalarini qo'llashga doir to'laqonli ko'nikmalar;

• axborot texnologiyalaridan foydalanish yo'nalishida konsalting xizmatlarini ko'rsatadigan institutlar (davlat va xususiy) o'rin olgan.

Raqamli iqtisodiyot hosil qiladigan effektlarni to'liq sanab o'tish ancha murakkab ish, binobarin, elektron servislar va metama'lumotlardan foydalanish imkoniyati iqtisodiy ob'ektlarga taqdim etadigan aloqalarni to'laqonli tarzda baholash ancha mushkuldir.

Xulosa

Raqamlashtirish – yangi iqtisodiy texnologiyalarning yo'ldoshi Axborot platformalarini birlashtirish natijasida paydo bo'lgan muloqot modellari yangi iqtisodiy texnologiyalarning (YaIT) paydo bo'lishiga turtki beradi.YaIT – bu tashkiliy boshqaruv tizimlariga biror maqsadga xizmat qiladigan axborot (ma'lumotlar, g'oyalar va bilimlar) mahsulotlarini yaratish, ularni uzatish, saqlash va aks ettirish uchun yaxlit texnologik platformaga birlashuvchi va iqtisodiy agentlar muloqotiga sarflanadigan trakzaktsion xarajatlarni maksimal darajada kamaytiruvchi ma'lumotlarni qayta ishlashga doir har jihatdan yangi «sozlanuvchi» vositalar va metodlar yig'indisidir. YaITning asosiy tamoyillari:

• tubdan yangi biznes modellarni yaratish;

• har xil IT xizmatlarni oqilona birlashtirish va ulardan foydalanish metodlarini

real iqtisodiyot sektoridagi tashkiliy va texnologik jarayonlarda qo'llash;

• tranzaktsion xarajatlar va ishlab chiqarishda qo'llaniladigan moddiy resurslarni

minimallashtirish.

Raqamli iqtisodiyotni rivojlantirishdagi eng muhim jihat va bir vaqtning o'zida eng murakkab bosqich – bu ishbilarmonlik muhitini soddalashtirish hamda odamlar va biznesning davlat bilan muloqotiga sarflanajak xarajatlarni maksimal qisqartirishdir.

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RAQAMLI TEXNOLOGIYALAR ASOSIDA TADBIRKORLIKNI RIVOJLANTIRISH

Annotatsiya. *Ushbu maqolada raqamli texnologiyalarning zamonaviy tadbirkorlik faoliyatidagi o‘rni va ahamiyati yoritilgan. Raqamli iqtisodiyot sharoitida biznes jarayonlarini avtomatlashtirish, elektron tijoratni rivojlantirish imkoniyatlari tahlil qilingan. Shuningdek, O‘zbekistonda raqamli tadbirkorlikni rivojlantirish bo‘yicha davlat siyosatining huquqiy va institutsional asoslari ko‘rib chiqilgan. Tadqiqot natijasida raqamli tadbirkorlikni samarali tashkil etish uchun kadrlar salohiyatini oshirish, infratuzilmani yaxshilash va kiberxavfsizlikni ta’minlash bo‘yicha tavsiyalar berilgan. Maqola raqamli iqtisodiyot sharoitida tadbirkorlikning yangi imkoniyatlarini ochib beradi.*

Kalit so‘zlar: *raqamli iqtisodiyot, raqamli tadbirkorlik, innovatsiya, elektron tijorat, axborot texnologiyalari, sun’iy intellekt, raqamli savodxonlik.*

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DEVELOPMENT OF ENTREPRENEURSHIP BASED ON DIGITAL TECHNOLOGIES

Abstract. *This article discusses the role and importance of digital technologies in modern business activities. The possibilities of automating business processes and developing e-commerce in the digital economy are analyzed. The legal and institutional framework of state policy on the development of digital entrepreneurship in Uzbekistan is also considered. As a result of the study, recommendations are made on increasing human resources capacity, improving infrastructure, and ensuring cybersecurity for the effective organization of digital entrepreneurship. The article reveals new opportunities for entrepreneurship in the digital economy.*

Key words: *digital economy, digital entrepreneurship, innovation, e-commerce, information technology, artificial intelligence, digital literacy.*

Kirish

Hozirgi global raqamlashuv davrida iqtisodiyotning barcha sohalarida raqamli texnologiyalarni joriy etish nafaqat samaradorlikni oshirish, balki yangi ishlab chiqarish va xizmat ko‘rsatish yo‘nalishlarini yaratishga ham zamin yaratmoqda. Tadbirkorlik sohasi ham raqamli iqtisodiyot sharoitida tubdan yangilanmoqda. Bugungi kunda raqamli biznes modellar, onlayn savdo tizimlari, sun’iy intellekt va blokcheyn kabi texnologiyalar tadbirkorlik faoliyatining ajralmas qismiga aylanib bormoqda.

1. Raqamli texnologiyalarning tadbirkorlikdagi o‘rni.

Raqamli texnologiyalar — bu axborotni to‘plash, qayta ishlash va etkazishni avtomatlashtiruvchi zamonaviy vositalar tizimidir. Ular tadbirkorlikda quyidagi imkoniyatlarni yaratadi:

- ish jarayonlarini avtomatlashtirish va xarajatlarni qisqartirish;
- klientlar bilan onlayn muloqotni yo‘lga qo‘yish;
- bozor tahlilini tez va aniq amalga oshirish;
- marketing va sotuvni raqamli kanallar orqali kengaytirish.

Masalan, e-commerce (elektron savdo) platformalari orqali kichik biznes ham xalqaro bozorga chiqish imkoniga ega bo‘lmoqda. Shuningdek, CRM (Customer Relationship Management) tizimlari mijozlar bilan munosabatlarni samarali boshqarishga yordam bermoqda.

2. O‘zbekistonda raqamli tadbirkorlikni rivojlantirishning huquqiy va institutsional asoslari.

O‘zbekiston Respublikasi Prezidentining “Raqamli iqtisodiyotni rivojlantirish chora-tadbirlari to‘g‘risida”gi farmoni (2020 yil 28 apreldagi PF–4699-son) hamda “Innovatsion rivojlanish strategiyasini amalga oshirish chora-tadbirlari to‘g‘risida”gi farmoni raqamli tadbirkorlikni jadal rivojlantirishda muhim ahamiyat kasb etdi.

Ushbu hujjatlar doirasida:

- “Yagona interaktiv davlat xizmatlari portali” kengaytirildi;
- “Digital Uzbekistan – 2030” strategiyasi qabul qilindi;
- Raqamli startaplar uchun soliq imtiyozlari va grant dasturlari joriy etildi;
- IT-parklar faoliyati kengaytirildi va yangilari tashkil etildi.

Natijada, mamlakatimizda 2024 yil yakuniga qadar 2500 dan ortiq raqamli startaplar faoliyat boshladi va ularning salmog‘i yil sayin ortayotgani kuzatilmoqda.

3. Raqamli tadbirkorlikning afzalliklari.

- bozorga tez kirish imkoni – onlayn marketpleyslar orqali mahsulot va xizmatni qisqa vaqtda sotish;
- tashqi bozorlarga chiqish osonligi – elektron eksport (e-export) orqali mahsulotni jahon bozorida sota olish;
- mijozlarning ehtiyojini aniqlash – Big Data tahlili yordamida bozor tendensiyalarini bashorat qilish;
- sarmoya jalb qilish imkoniyatlari – kraudfanding va fintex tizimlari orqali mablag‘ yig‘ish.

4. Raqamli tadbirkorlikni rivojlantirishdagi muammolar.

Shu bilan birga, raqamli tadbirkorlikni rivojlantirishda qator muammolar ham mavjud:

- internet infratuzilmasining ayrim hududlarda etarli darajada rivojlanmagani;
- kadrlar salohiyatining pastligi, ayniqsa IT sohasida mutaxassislar etishmasligi;
- kiberxavfsizlik masalalarining etarli darajada hal etilmagani;
- aholining raqamli savodxonligi past darajada ekanligi.

Bu muammolarni bartaraf etish uchun davlat va xususiy sektor hamkorligi, ta'lim tizimida raqamli kompetensiyalar bo'yicha dasturlarni kuchaytirish zarur.

5. Raqamli tadbirkorlikning istiqbollari.

Kelgusida raqamli tadbirkorlikning o'sish sur'atlari yanada tezlashishi kutilmoqda.

Ayniqsa, quyidagi yo'nalishlarda katta imkoniyatlar mavjud:

- finTech (moliyaviy texnologiyalar) — raqamli to'lov tizimlari va elektron bank xizmatlari;
- agroTech — qishloq xo'jaligida raqamli sensorlar, dronlar va avtomatlashtirilgan sug'orish tizimlari;
- eduTech — masofaviy ta'lim va onlayn o'quv platformalari;
- greenTech — ekologik texnologiyalar asosida ish yurituvchi raqamli startaplar.

Xulosa

Raqamli texnologiyalar tadbirkorlikni yangi bosqichga ko'tarib, iqtisodiyotning raqobatbardoshligini ta'minlamoqda. Ular orqali biznes jarayonlari shaffof, tezkor va samarali bo'lmoqda.

O'zbekistonda raqamli tadbirkorlikni rivojlantirish uchun huquqiy asoslar, infratuzilma va kadrlar salohiyatini yanada kuchaytirish zarur. Shu yo'l bilan milliy iqtisodiyot raqamli transformatsiya jarayonini to'liq amalga oshirishi mumkin.

Foydalanilgan adabiyotlar

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FUNCTIONAL DISORDERS OF CONGENITAL CLEFT LIP AND PALATE

Abstract: *Congenital cleft lip and palate is a severe malformation of the maxillofacial region accompanied by severe functional disorders. In addition, a feature of this pathology is a pronounced deformation of the nose in the form of a shortening of the nasal septum, flattening of the tip and wings of the nose. Pathologically attached muscles of the upper lip and nasal region further aggravate these deformities. This pathology is formed in the embryo up to 8-12 weeks due to the ungrown processes of the palate and lips on time. The purpose of this work is a comprehensive assessment of the quality of life of children with HCV and the identification of effective ways to improve it. The data obtained indicate a significant decrease in the indicators of emotional and social functioning in children with VGN, especially before the completion of surgical treatment. A model of multidisciplinary support is proposed, aimed at increasing the level of adaptation and social integration.*

Keywords: *congenital cleft lip and palate, quality of life, children, rehabilitation, multidisciplinary approach.*

Introduction

The process of correcting congenital cleft lip and palate and subsequent stages of rehabilitation is often complicated by a variety of combined pathologies from other organs, in particular the nervous system. Anatomical changes in the maxillofacial region led to a persistent functional defect in all departments of voice and speech production. A severe speech disorder, rhinolalia, develops, in which all sides of speech suffer: breathing, voice, changes in the muscles of the pharynx, mouth and face are observed, pathological articulation develops, phonemic hearing is impaired, auditory perception is distorted. The severity of anatomical and functional disorders is directly related to the type of cleft in the upper lip. Children with congenital cleft lip and palate are childhood invalids, and until the end of the formation of the maxillofacial region, up to 14-16 years old, they are usually under the constant attention of a surgeon, orthodontist, pediatrician, neurologist, speech therapist. However, with the clear, well-coordinated work of highly qualified specialists on the basis of specialized centers, with the active participation and support of parents, it is possible to significantly

reduce the period of disability of children. Congenital cleft lip and palate (IGN) is one of the most common congenital malformations, occurring, according to WHO, in 1 out of 700 newborns. This condition causes severe functional disorders of speech, breathing, nutrition, and hearing, and also has a significant impact on the child's psych emotional development and social adaptation. Modern approaches to the treatment of HCV are based on early surgical correction, orthodontic and speech therapy rehabilitation, however, the issue of quality of life remains insufficiently studied and is often underestimated in medical practice. Treatment of patients with cleft lip and palate (PHN) is one of the most difficult tasks of modern dentistry and maxillofacial surgery. Conducting comprehensive studies of congenital anomalies of the maxillofacial region in order to prevent them and actively participate in this work along with doctors of various specialties (geneticists, immunologists, obstetricians and gynecologists, pediatricians (neonatologists), neurologists, cardiologists, psychologists, sociologists, environmental doctors) and dentists. This will expand the child's health care and create favorable conditions for the formation of the maxillofacial system. The diagnosis of "congenital cleft lip and palate" is clinical and is established by a doctor on the basis of visual examination, anthropometric, X-ray and ultrasound examination methods.

The purpose of the study. To conduct a comprehensive assessment of the quality of life of children with congenital cleft lip and palate and identify the most effective ways to improve it, taking into account medical and psychosocial factors.

Research materials and methods. 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 lip and palate before uran- and chloroplast 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. In 1 group of infants, an improvement in the life status of children with congenital cleft lip and palate was determined using temporary silicone nipples and plates, the normal state of bite in children with congenital cleft lip and palate was determined depending on age, and speech defects in children with congenital cleft lip and palate improved using temporary silicone plates (obturators) than in the 2nd group of children with VGN (in the control group, over time, the same indicators returned to normal, but the period was long and the children were aware of their complexes).

Conclusion

Thus, the study showed that, based on a set of studies, for the first time, a comparative analysis of the condition and improvement of the life status of children with congenital cleft lip and palate using temporary silicone nipples and plates was carried out, and a positive effect was proved. 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. The changes studied 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. 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. The results obtained confirm that the quality of life of children with VGN is determined not only by medical, but also by psychological and social aspects. Effective care requires a multidisciplinary approach, including the participation of a surgeon, orthodontist, speech therapist, psychologist, and social worker.

Early informing of parents and their active participation in the treatment process plays a key role. An important area is the introduction of programs for psychological support and prevention of school maladaptation.

A number of foreign studies (Smith et al., 2021; Johansson et al., 2022) confirm that systemic rehabilitation and regular psychological correction contribute to improving emotional stability and increasing the level of social integration in such children.

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MODERN HISTORY STUDY TO HISTORIES TO DYNASTIES MANGITS

Annotation: *This article analyzes some of the issues and approaches in recent years' research on the rise of the Maghit dynasty and the activities of its representatives in state governance, conducted not only by local but also by Central Asian historians.*

Key words: *Bukhara Emirate, Ashtarkhanids, Mangit, Shahmurad, Amir Nasrullah, dynasty, Russian Emperian.*

The history of the rule of this dynasty, which succeeded the Mangids - Ashtar Khans, began with the assumption of power in the Bukhara Khanate by Muhammad Rakhimbiy, who was appointed as the khan of power in 1747, replacing his father Muhammad Hakimbiy, and his official accession to the throne (December 16, 1756). Muhammad Rahim Arkoni, with the fatwa of the state and clergy, ascended the throne of Bukhara in 1753 and declared himself the "emir". After his death, Fazil Tora (his daughter's son) and then Ubaydulla Khan were appointed as the heir to the throne, but the state was actually ruled by his uncle Daniyalbiy khan (1758 - 1785). In later periods, the Emirate of Bukhara was ruled by representatives of this family: Emir Shokhmurad (1785-1800), Emir Haydar (1800-1826), Emir Nasrullahkhan (1826-1860), Emir Muzaffar (1860-1885), Emir Abdulahad (1885-1910) and Emir Olimkhan (1910-1920) until the first quarter of the 20th century. The Emirate of Bukhara and its statehood processes, as one of the states that played an important role in the historical development of the peoples of Central Asia, continue to be of great importance today as one of the main topics of many scientific studies. Over the past quarter of a century, historians of the Central Asian states, which share a common history, have carried out a number of scientific studies on the processes of economic and political life, history of spiritual and cultural life, ethnography and other issues of the states and peoples that ruled Central Asia at different times, and published many monographs and scientific articles. Among these studies, it can be seen that the majority of studies are devoted to the history of the khanate period of the 16th-early 20th centuries, including the history of the Bukhara Emirate. Among them, one can mention not only the scientific works and works of historians of our republic, such as Sh.Vohidov, O.Masaliyeva, L.Muhammadjonova, Q.Rajabov, Y.Shukurillayev, but also the scientific works and works of a number of historians and researchers from Central Asia and Russia, such as N.Khotamov, B.Ismailova, A.Yorov, D.Djurabayev, S.K.Yelshibayev, A.G.Dankov, I.R.Tuliyev, O.Ye.Yegorenko.

In these studies, it can be seen that the activities of the Mangid dynasty and its representatives in state administration, the state processes and political

administration system of the Bukhara Emirate, legal relations and the history of military affairs, even studies devoted to the history of national issues in the Bukhara Emirate, and many other data were analyzed, and as an example, it is appropriate to cite the scientific research conducted by T.G. Yemelyanenko. The research conducted by T.G. Yemelyanenko mainly covered ethnographic issues. The researcher deeply analyzed the ethnic processes and their specific aspects in the Bukhara Emirate, in particular, the information recorded by authors who lived and worked in the second half of the 19th century - the beginning of the 20th century, the traditional, household, cultural ethnic aspects of the Bukhara Jews, the clothes of Bukhara male Jews in the indicated period and the ethnic characteristics of clothing as an object of scientific research, and the important aspects of the traditional clothing culture of the Bukhara Jews were shown based on the results of historical analysis.

One of such studies was carried out by O.Yegorenko, in which the author divided the history of the Bukhara Emirate and its research into two main periods from the point of view of periodization - the studies of the Bukhara Emirate during the colonial period of the Russian Empire and the studies of 1917-1991 as separate scientific problems. The first part of the work mainly draws on the research of Russian orientalists and some information from military personnel and local historians who participated in the military operations of the Russian Empire against the Bukhara Emirate, while the second part of the work is a somewhat broader analysis, which mainly studies the historiography of the Soviet period of the 20th century, divided into two periods - 1917-1959 and 1960-1991, and also discusses the research of Anglo-American historiography of the 20th century.

Among the studies, of course, the studies reflecting the activities and life path of the Mangid emirs in state administration attract special attention. Each representative of this dynasty, which ruled the Bukhara Emirate from 1756 to 1920, is considered to have a special place in the history of the statehood of the Bukhara Khanate. While some representatives of this dynasty pursued a policy of extreme rigidity in the process of implementing state governance, it can be observed that some in most cases made efforts to govern the state through reforms and bring development.

Among the representatives of the Mangid emirs of Bukhara, Amir Shahmurad is mentioned in many sources and scientific literature as one of the emirs with special qualities.

Abdulkarim Bukhari, the author of the work "History of Central Asia", which provides valuable information not only about the history of the Bukhara emirate, but also about the history of the Central Asian khanates, carried out important diplomatic work of the emirate during the reigns of Amir Shahmurad (1785-1800) and Amir Heydar (1800-1826), and traveled to Russia, Afghanistan, and Turkey as part of embassies. He spent the last years of his life in Istanbul and died in 1830/31. The work, in addition to covering the events that took place from the crisis of Abulfayzkhan (1711-1747) to the years of the reign of Emir Heydar, also contains extensive information on the history of the Khiva Khanate and the

Qoqand Khanate. In his work, this author devotes extensive space to the activities of Amir Shahmurod in state administration, the reforms he carried out in the economic and political spheres of the emirate, the development of Samarkand, and other activities.

Abu Takhirhoja, who lived in Samarkand in the 19th century and served as mufti in the 1940s, also provides a lot of information on the historical processes, economic and social life of Samarkand and its environs during the reign of the Mangids, the work carried out during the reign of Muhammad Rahimbiy and Amir Shahmurad, the 24 guzars in the city founded by Shahmurad, and much information about them. After Samarkand was conquered by the Russian Empire, Abu Takhirhoja (died 1874) moved to Karmana and worked there as chairman.

The history of Amir Shahmurad's rise to power and his activities in the management of the davat is also widely covered in modern historical research. According to sources and scientific literature, during the 27-year reign of the Bukhara Emir Daniyalbi (1758-1785), the country experienced a difficult situation. This chaos intensified after his death (1785).

After the death of his father, Shah Murad, who had accepted his title of "amirulumaro" and officially sat on the Bukhara throne, removed Genghis Abu'l-Gazi Khan from power and declared himself the Emir of Bukhara (June 9, 1785).

During the reign of Amir Shah Murad, the tendency to centralization increased in the Bukhara Emirate. The strengthening of centralized rule and the elimination of feudal fragmentation led to the stabilization of the economic situation in the emirate.

When Amir Shahmurad took the throne of the Bukhara Emirate, he removed Abul Fazilkhan from royal affairs, demoted him from the throne, and allocated him a courtyard in the Bazar Khoja guzara in Bukhara. Thus, Abul Fazilkhan received a pension from the emir's treasury until the end of his life.

Amir Shahmurad gave each of his ten brothers, Mahmud, Umar, Fazil, Sultanmurad, Rustam Ganji-ali, Muhammad Yaqub, Tokhtamysh Darvish, and Rajabali, one provincial governorship, putting an end to political disunity in the Bukhara Emirate. In 1785, Amir Shahmurad introduced a monetary reform in the emirate and minted coins from pure silver and gold. These coins first mentioned the title "emir". Starting from the time of Shahmurad, the Bukhara emirs, like the Arab caliphs and Ottoman Turkish sultans, considered themselves the religious rulers of the entire Muslim world and relied on the idea that "Bukhara is the support and power of the Islamic religion." In addition, Amir Shahmurad also carried out major reforms in the financial, administrative, judicial, and military spheres. He introduced the position of muhtasab (chief) and the position of qaziaskar in the army. That is why his contemporaries and future rulers refer to Shahmurad with the titles “Amiri ma’sum” – “Innocent Emir” and “Umari soniy” – “Second Umar”, “ghazi”.

Shahmurad not only strengthened political power, but also carried out a number of administrative, economic and cultural measures. This ruler, who lived his life in a modest manner typical of dervishes, restored the water systems in the

Zarafshan and Kashkadarya oases, on the banks of the Amu Darya, and built new structures, bridges, roads, etc. As a result of the reforms carried out by Amir Shahmurad in the financial, judicial, administrative and military spheres, political and economic life in the country was somewhat revived. Amir Shahmurad appointed Amir Haydar, the son of Amir, as the governor of the city of Karshi, which was considered the ancestral property of the Mangids and had great influence and position in the emirate. From then on, it became customary for the heirs of the Mangid dynasty to rule in Karshi.

In Amir Shah Murad's foreign policy, his military campaigns to Khorasan to return Merv, Balkh and other regions to Bukhara stand out. In the battles around Merv in 1785-1786, the city's governor, Bayramalikhan Qajar, was killed and his army was crushed.

A number of literatures emphasize that Amir Shah Murad, despite being an emir, lived a modest life. According to sources of that time, he dressed poorly, like an ordinary citizen. The total cost of Amir Shah Murad's clothing did not exceed seven tanga. However, his court officials and military commanders were royally dressed and lived a luxurious life. Amir Shah Murad's diet consisted of simple foods, including barley, bread, mash, yam, groats and goja. He did not accept gifts and tributes. Shahmurad is mentioned in the sources with the titles "Amiri ma'sum" ("Innocent emir") and "Umari soniy" ("Second Umar"), "ghazi". After the death of Amir Shahmurad on November 30, 1800, as his successor, on December 2, 1800, at the age of 22, he came to Bukhara from the Karshi region, ascended the emir's throne and received the title of "amir al-mu'minin". He ruled the Bukhara state for 26 years. He signed and sealed the decrees of Amir Haydar with the words "Abul Fath Sayid Amir Haydar Bokhadur padishakh".

One of the main factors behind Amir Haidar's long reign on the throne of the Bukhara Emirate and his successful rule of the country was the fact that Amir Shahmurod pursued a policy of unifying the country during his reign, ensuring the strength of the state and the strengthening of central power, and the reforms implemented in this regard ensured that the country would continue on its path of development for a long time.

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THE IMPACT OF TRAFFIC CONGESTION ON HUMAN PSYCHOLOGY

Abstract: *This article provides a scientific analysis of the impact of traffic congestion in urban areas on human psychological well-being and daily functioning. The study investigates key psychological factors that emerge during congestion—such as stress, irritability, fatigue, and reduced attention span—and evaluates their long-term implications for human health. Furthermore, the article examines how traffic congestion affects work productivity, emotional stability, and social interactions. Recommendations are proposed regarding psychological coping strategies aimed at mitigating the negative effects of congestion, as well as the role and significance of modern transport management systems in reducing traffic-related stress. The research findings offer valuable practical insights for enhancing urban transport system development and improving the overall psychological well-being of the population.*

Keywords: *Traffic congestion, transportation, automobile, pedestrians, oad traffic, modern transport, driver.*

The lower layers of the atmosphere are polluted with dust particles consisting of micro-particles of asphalt concrete, used rubber, abrasive materials, lead, and other substances. Some of these components possess carcinogenic and mutagenic effects. Such pollution negatively affects another category of road users – pedestrians. The highest concentration of harmful substances accumulates in the layer of air located 1 meter above the ground surface.

The negative consequences affect not only humans but also animals. Noise generated from highway roads is considered an adverse factor that leads to the deterioration of environmental indicators in cities. On highways where more than two thousand vehicles can travel per hour, the noise level exceeds 80 dB. To reduce this indicator, noise-barrier structures are installed and green plants are cultivated along the road [1]..

According to information presented in the Psychological Science journal, traffic congestion on roads negatively affects a person's psychological state. Such conditions have a serious impact on human health and, over time, may lead to the development of severe illnesses. This conclusion is based on research conducted by scientists from the University of California.

In the 1990s, scientists conducted surveys involving 800 participants aged between 25 and 74. All respondents answered questions related to their health conditions — such as anxiety, restlessness, lack of strength and energy, and how frequently these conditions occurred. In the 2000s, scientists conducted another similar survey.

According to the research results, human health is affected not so much by major stress events, but rather by minor negative influences (such as a minor traffic accident or traffic congestion). Scientists have proven that a person's negative reactions to events happening around them gradually accumulate and may eventually lead to serious psychological disorders.

It is known that traffic congestion in large cities tends to last long and cover long distances; therefore, drivers in Russia often display aggressive behavior toward one another [4]. Researchers emphasize that frequently being in traffic congestion can seriously harm human health. Studies conducted by Australian scientists show that after spending approximately one hour in traffic, a person's risk of experiencing a heart attack (myocardial infarction) increases. The main reasons for this are identified as a sharp rise in heart attack cases caused by exhaust gases, noise, and stress factors.

Remaining in traffic congestion for a long time causes excessive muscle strain in the driver, which negatively affects their physiological condition and overall work performance. As a result of such strain, the level of fatigue increases, and the driver's attention and reaction speed decrease. In addition, a driver's poor health condition or technical malfunction of the vehicle poses a direct threat to road traffic safety and may also negatively affect the movement of other road users.

Therefore, it is important to regularly monitor the vehicle's technical condition, ensure the full functioning of all its systems and components, and maintain the driver's psychophysiological state in a stable condition. Such preventive measures not only reduce stress but also contribute to improving overall road traffic safety [2].

According to E.M. Lobanov [3], the influence of human psychophysiological qualities on road traffic safety has been systematically summarized. Research results show that the psychophysiological characteristics of a driver's body change under the influence of external factors, particularly the complexity of road and transport conditions, the level of congestion, noise, lighting, temperature, and traffic intensity. These changes directly affect the driver's attention level, reaction speed, decision-making quality, and resistance to stress.

Taking into account the role and significance of the human factor in road traffic safety, Lobanov emphasizes the necessity of shaping traffic conditions in accordance with the psychophysiological capabilities of humans. This approach is essential for ensuring the stability of the transport process, reducing errors in driver activity, and preventing road traffic accidents.

Thus, psychophysiological characteristics are regarded as important indicators for assessing traffic conditions and determining the causes of road traffic accidents. Ignoring these factors leads to a decrease in traffic safety levels, an increase in operational errors, and, ultimately, the emergence of traffic congestion.

A person's psychological reactions and decision-making in evaluating a situation are not always accurate or objective. This process is directly influenced by an individual's physiological condition, age, driving experience, ability to concentrate, and resistance to stress. Human visual and auditory organs respond differently to external environmental influences, meaning that the same road-and-transport situation may be interpreted differently by different drivers. According to G. Knoflacher [3], a person is unable to fully and correctly perceive the real characteristics of a traffic flow—namely its intensity, safety level, and dynamics [49]. This leads to incorrect actions, delayed reactions, and the occurrence of dangerous situations.

In modern transport systems, traffic congestion is one of the most significant factors negatively affecting human mental and physical health. Prolonged congestion results in fatigue, irritability, decreased attention, increased heart rate, and elevated blood pressure. Additionally, excessive delays on the road negatively influence a person's work performance, educational process, or social relationships [5,6].

Even when a vehicle is stationary in traffic congestion, fuel consumption increases because the engine continues to run, exhaust gases are released into the atmosphere, and the vehicle's components wear out more quickly. This process also harms ecological balance and leads to a deterioration in air quality. As a result, stress, fatigue, and nervous tension among drivers and other road users intensify.

Thus, traffic congestion not only reduces the efficiency of traffic flow but also negatively affects a person's psychophysiological condition, health, work productivity, and ecological stability. Therefore, in managing road traffic, it is of significant scientific and practical importance to thoroughly study the psychophysiological aspects of the human factor, as well as to improve organizational and planning measures aimed at reducing congestion.

Traffic congestion is recognized in modern urban transport systems not only as a factor that decreases traffic efficiency but also as an important factor directly affecting drivers' psychological state. Research shows that prolonged periods spent in congestion lead to emotional instability, impatience, aggressive behavior, and increased stress in drivers. This is primarily due to the duration of the congestion, the lack of clear information about its causes, and the inability to fully perceive the overall traffic situation.

This psychological pressure reduces the driver's attention, slows down decision-making, and decreases reaction accuracy. As a result, these conditions increase the risk of road traffic accidents and negatively affect overall traffic safety. Therefore, in managing road traffic, it is of significant scientific and

practical importance to implement comprehensive measures aimed at stabilizing the driver's psychophysiological state, in particular by improving systems that provide drivers with accurate and timely information about traffic conditions.

In modern conditions, people's psychological stability and stress tolerance have significantly decreased. Alongside social, economic, and ecological factors, the complexities of the transport system place additional pressure on human mental health. Therefore, the emotional state of a driver is critically important from the perspective of road traffic safety.

A highly nervous or stressed driver loses the ability to make adequate decisions, and their level of attention and concentration decreases, which increases the risk of road traffic accidents. Consequently, a driver's negative emotional state should not affect their driving style or overall traffic behavior.

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MODERN METHODS OF RESTORATION OF TECHNOLOGICAL EQUIPMENT PARTS

Abstract: *This article examines the feasibility of using thermal spray coatings to restore worn parts of process equipment. The design features and technological capabilities of high-velocity flame spraying are discussed.*

Key words: *thermal spraying, protective coatings, restoration of parts, repair, technological equipment, high-speed spraying.*

Introduction

Thermal spraying is the process of heating, dispersing, and transferring condensed particles of a sprayed material using a gas or plasma flow to form a layer of the desired material on a substrate.

The following methods are collectively referred to as thermal spraying:

Flame spraying, high-velocity flame spraying, detonation spraying, plasma spraying, fusion spraying, electric arc spraying, and activated arc spraying.

Thermal spraying is essentially similar to welding; the difference lies in the functional purpose of the material being transferred.

The purpose of welding is to join structural elements of structures, while the purpose of thermal spraying is to protect surfaces from corrosion, wear, etc.

The term thermal spraying refers to all processes that apply coatings from materials in the form of wire, rod, or powder that do not decompose at high temperatures.

They are introduced into a high-temperature zone and atomized either by a gas jet or compressed air, creating fine particles that move at high speed and fall onto a pre-prepared surface, where they form a layer with the desired properties.

Currently, three main processes are most widely used in industry:

- wire metallization;
- powder flame spraying;
- plasma spraying of powdered materials.

Harsh operating conditions cause intense wear on the bearing seats of the main spinning machine shafts, the middle and lower shafts of the weaving machine, journals, necks, surfaces for the seating of pulleys, gears, and other components, keyways, threads, and other parts, bobbin cases, shuttle housings, thread take-up cranks, bushings, belt take-up, engagement levers, and switch rods of winding machines, bearing supports of dry cleaning and washing machines,

knitting mechanism components such as locking wedges, and the working surfaces of its main components and mechanisms. The large dimensions, significant metal consumption, and complex design of mining machinery, as well as their high cost, including the use of special wear-resistant steels, necessitate the maximum utilization of each component's service life.

Therefore, the organization of high-quality equipment repairs using modern, effective technological methods for restoring the dimensions and geometric shapes of worn components in the mining industry is quite pressing, and the costs of implementing new technologies are justified from both a technical and economic perspective.

To restore the functionality of worn parts in the repair of industrial machinery and equipment, various surfacing methods are widely used. However, the specific operation of textile and light industry machines, the nature of operational loads, and the extent of surface wear indicate that, in most cases, thermal spraying of functional coatings is preferable and more appropriate for restoring and strengthening components [1].

The main advantage of the latter over surfacing is the ability to repeatedly restore and strengthen the same part after the coating has been completely worn out.

For example, traditional flame spraying, successfully used to restore eccentric and spherical bearings, as well as other components, instead of electric arc surfacing, allows for the repeated regeneration of expensive parts after the antifriction coating has been worn out.

The main trends in the development of thermal spraying methods are to increase the energy and heating efficiency of the sprayed material particles, which ensures high adhesion strength of the coating to the substrate and minimizes coating porosity.

Other important aspects of thermal spraying development include the development of equipment for spraying complex composite materials, as well as maximum automation of the spraying process to ensure specified coating properties and process reproducibility in mass production.

One of the latest technological developments is the creation of equipment for high-velocity flame spraying using oxygen and air-fuel burners (HVOF - High Velocity Oxygen Fuel, and HVAF - High Velocity Air Fuel, respectively) [2]. The goal of developing this high-velocity method is to achieve coating quality comparable to detonation spraying in a continuous process.

This method utilizes supersonic spray particle velocities (ranging from 500 to 900 m/s), enabling the formation of dense coatings with porosity down to 0.1% and adhesion strengths exceeding 80 MPa. Furthermore, due to the low roughness of the sprayed surface, post-coating machining is either minimal or virtually unnecessary.

In high-velocity spraying, coatings are applied by heating and atomizing the sprayed materials in a supersonic jet of liquid or gaseous fuel combustion products

(kerosene, methane, propane, etc.) in oxygen (air) supplied to a chamber with a profiled nozzle [3].

The graph shows that a gear engagement consisting of a case-hardened wheel and a pinion subjected to ion nitriding has a longer service life than a gear transmission consisting only of case-hardened parts. It should be noted that in both gear transmissions, the pinion wears out faster than the gear wheel. Moreover, the service life of the nitrided gear turned out to be three times higher than that of the case-hardened one. This is due to the fact that the technological features of nitriding in glow discharge plasma make it possible to obtain a nitride layer with a fairly high concentration of dissolved nitrogen in the surface layer of 34KhN1M alloy steel to a fairly great depth in a relatively short time. As a result, in addition to iron nitrides, special nitrides are formed in the near-surface layers with the participation of alloying elements of the steel, in particular chromium and molybdenum [4-5]. Precipitated in a finely dispersed form, these nitrides contribute to a comprehensive reduction in brittleness, increased hardness and wear resistance of the surface, and also significantly improve temperature stability, maintaining the surface layer's hardness, and corrosion resistance. Due to their good wearability, these nitride coatings reduce damage to the contact surface of not only the nitrided gear but also the case-hardened gear working in conjunction with it.

Calculations showed that the service life of a gear paired with a pinion hardened by ion nitriding is almost 12% longer than that of a gear in a gear train where both parts are case-hardened, quenched, and tempered. Thus, high wear resistance and longevity of the friction pair were achieved through the use of hardening technologies such as case-hardening and glow discharge plasma nitriding. These surface hardening technologies enabled the optimal combination of gear components in terms of working surface hardness, thereby significantly increasing the service life of the gear train as a whole.

In this case, the acceleration and heating of the sprayed particles by the gas flow occurs in the extended acceleration channel of the burner nozzle, which is an integral part of its gas-dynamic tract. Special profiling of the burner nozzle ensures the required particle energy characteristics.

Depending on the oxidizer gas used, a distinction is made between high-velocity oxygen-fuel spraying (HVOF spraying) and high-velocity air-fuel spraying (HVAF spraying).

HVOF spraying technology (gas flow velocity of 2300 m/s, spray particle velocity of 400-900 m/s, process temperature of 3000°C) is primarily used to create wear-resistant, heat-protective, electrical insulating, and other coatings.

HVAF spraying technology (gas flow velocity up to 1800 m/s, spray particle velocity in the range of 300-600 m/s, process temperature of 2000°C) is optimal for applying anti-corrosion coatings to large steel structures during installation and repair. Therefore, high-speed spraying of wear-resistant hard alloys is primarily used for the centralized refurbishment of screw and centrifugal pump rotors, compressor piston rods, and for the refurbishment and corrosion protection of

plungers and other hydraulic system components used in light industry. The adhesion strength of the coating to the substrate exceeds 80 MPa.

Conclusions

The advantages of thermal spray coating methods include:

- a wide variety of applied materials and material combinations with melting points ranging from 300°C to 3500°C on steel, cast iron, and non-ferrous metal substrates;
- easy control of the coating process; - the ability to adjust the coating composition and its performance properties (hardness, corrosion resistance, wear resistance) by mixing different materials;
- the absence of thermal deformations and structural changes in the workpiece material during spraying due to the low heating;
- coating application to parts with no weight or size restrictions;
- economical use of materials and energy resources;
- the ability to replace expensive structural materials with cheaper ones through the application of special coatings.

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SABZAVOTCHILIK SEYALKASINING TORTISHGA UMUMIY QARSHILIGINI NAZARIY ANIQLASH

Annotatsiya. *Hozirgi kunda barcha sohalar kabi qishloq xo‘jaligida ham energiya va resurstejamkorlikka erishish muhim ahamiyat kasb etmoqda. Mashinalarda energiyatejamkorlikka erishish ikkita asosiy parametrga bog‘liqdir. Ular mashinaning tezligi va u engishi kerak bo‘lgan kuchdir. Mashina tezligini kamaytirish to‘g‘ridan-to‘g‘ri uning ish unumdorligini pasaytirib yuboradi. Shuning uchun tadqiqotlarni mashina yengishi kerak bo‘lgan kuchni kamaytirishga qaratish lozim.*

Kalit so‘zlar. *Kuch, qarshilik, tortish, mashina, agregat, bosim, tezlik, koeffitsiyent, egatochkich, zanjirli shleyft.*

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THEORETICAL DETERMINATION OF THE TOTAL DRAG RESISTANCE OF A VEGETABLE SEEDER

Abstract. *Nowadays, achieving energy and resource efficiency is becoming increasingly important in agriculture, as in all other sectors. Achieving energy efficiency in machinery depends on two main parameters. They are the speed of the machine and the force it has to overcome. Reducing the speed of the machine directly reduces its efficiency. Therefore, research should be focused on reducing the force the machine has to overcome.*

Keywords: *Force, resistance, traction, machine, aggregate, pressure, speed, coefficient, pulley, chain train.*

Ma’lumki, qishloq xo‘jaligida foydalaniladigan texnika va agregatlarni takomillashtirilganligini bildiruvchi ko‘rsatkichlar texnologik jarayonni bajarishga sarflanadigan energiya miqdori bilan belgilanadi. Bunda asosiy ko‘rsatkich sifatida har qanday texnika va agregatlarni tortishga qarshiligi qabul qilingan va bularga sarflanadigan energiyaning qariyb 35-40 foizi ularni ishlatish bilan bog‘liqligi uchun ularni tortishga qarshiligiga ta’sir etadigan omillarni va ularni kamaytirish yo‘llarini asoslash muhim hisoblanadi [1].

Sabzavotchilik seyalkalarining konstruksiyalarini tahlil etib, dehqon va fermer xo‘jaliklari uchun ixcham, tuzilish jihatdan sodda va massasi kichik bo‘lgan takomillashgan ratsional konsturksiya taklif etildi. Taklif etilgan sabzavotchilik seyalkasi ramasining old qismida ikkita tayanch-yurituvchi g‘ildiraklar o‘rnatilgan bo‘lib, ushbu tayanch g‘ildiraklardan zanjirli uzatmalar

orqali harakat ekish aparatlariga uzatadi. Urug‘ qutisidagi urug‘lar ekish apparati orqali nov ko‘rinishidagi urug‘ o‘tkazgichga tushadi va undan dala yuzasi bo‘ylab belgilangan kenglikda taqsimlanib sochilib tushadi. Shundan so‘ng, egatochkich bilan sug‘orish egatlari ochiladi. Sug‘orish egatlari ochilgandan keyin pushtalar shakllanadi, zanjirli shleyf yordamida urug‘lar tuproq bilan belgilangan chuqurlikda ko‘miladi.

Tavsiya etilgan sabzavotchilik seyalkasining tortishga umumiy qarshiligini 1-rasmda keltirilgan sxemadan foydalanib aniqlaymiz [2].

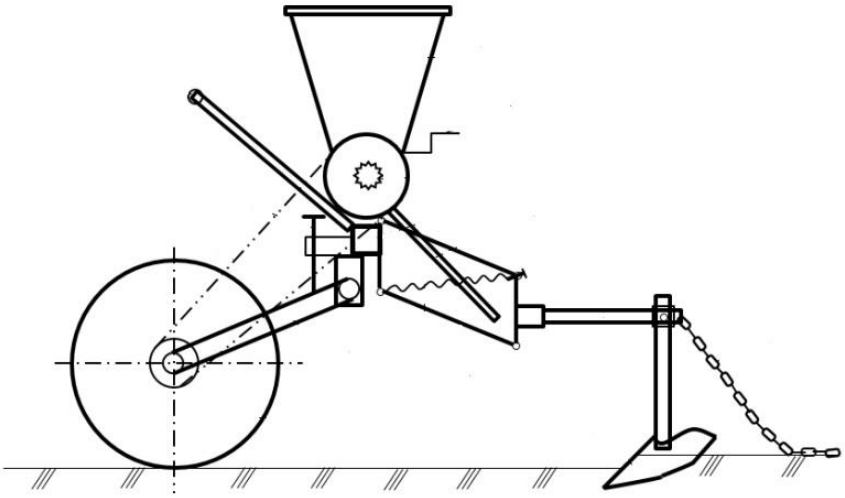
[3] da keltirilgan ma’lumotlarga ko‘ra, plugning umumiy tortishga qarshiligini V.P.Goryachkin ta’limotiga ko‘ra quyidagicha ifodalash mumkin

$$F = F_1 + F_2 + F_3, \quad (1)$$

bunda F_1- normal bosimga praportsional qarshilik, N;

F_2- tuproq palaxsasini deformatsiyalash bilan bog‘liq bo‘lgan qarshilik, N;

F_3-ishchi organ shakli va tezligiga bog‘liq bo‘lgan qarshilik, N.



1-rasm. Sabzavotchilik seyalkasining takomillashgan konstruksiyasi

Tadqiq etilayotgan sabzavotchilik seyalkasi ham tuproqqa ishlov berganligi sababli uning tortishga qarshiligini aniqlashda V.P.Goryachkin ta‘limotidan foydalanamiz. Bunda qarshilik kuchlarini quyidagicha ifodalaymiz. Birinchi navbatda normal bosim kuchi bilan bog‘liq bo‘lgan ishqalanish kuchini quyidagicha ifodalaymiz

$$F_1 = F_{1t} + F_{1sh}, \quad (2)$$

bunda F_{1t}-tayanch g‘ildirakning bosim kuchi bilan bog‘liq bo‘lgan ishqalanish kuchi, N;

F_{1sh}- zanjirli shleyft bosim kuchi bilan bog‘liq bo‘lgan ishqalanish kuchi, N.

Ushbu ishqalanish kuchlarini quyidagicha ifodalaymiz

$$F_{1t} = fm_s g, \quad (3)$$

$$F_{1sh} = zf_{sh}m_{sh}g\ , \qquad (4)$$

bunda *f*-tayanch g‘ildirak bilan tuproq orasidagi ishqalanish koeffitsiyenti;

m_s-sabzavotchilik seyalkasining massasi, kg;

g-erkin tushish tezlanishi, m/s^2;

f_{sh}-tuproq bilan zanjirli shleyft orasidagi ishqalanish koeffitsiyenti;

m_{sh}- zanjirli shleyftning massasi, kg;

z-seksiyalar soni.

Tuproq palaxsasini deformatsiyalash bilan bog‘liq bo‘lgan qarshilikni quyidagicha ifodalaymiz.

$$F_2 = (z+1)q_e a_e b_e\ , \qquad (5)$$

bunda q_e-egat ochishdagi solishtirma qarshilik, N/м^2;

a_e-egatochkichning tuproqqa botish chuqurligi, m;

b_e- egatochkichning qamrov kengligi, m.

Ishchi organ shakli va tezligiga bog‘liq bo‘lgan qarshilikni quyidagicha ifodalaymiz

$$F_3 = (z+1)\xi a_e b_e v_s^{\ 2}\ , \qquad (6)$$

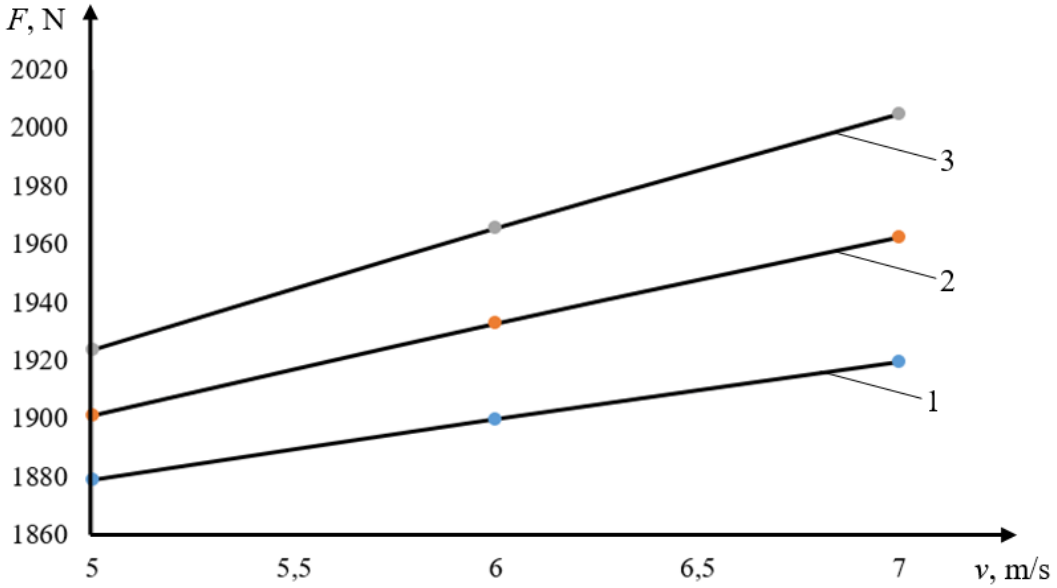
bunda ξ-tuproqqa ishlov beruvchi ishchi organlarning geometrik va friksion xususiyatlarini inobatga oluvchi koeffitsiyent;

v_s-sabzavotchilik seyalkasining harakat tezligi, m/s.

(2), (3), (4), (5) va (6) ifodalarni inobatga olib, (1) ifoda orqali sabzavotchilik seyalkasining umumiy tortishga qarshiligini quyidagicha ifodalaymiz

$$F = g(fm_s + zf_{sh}m_{sh}) + (z+1)(q_e a_e b_e + \xi a_e b_e v_s^{\ 2})\ . \qquad (7)$$

(7) dan ko‘rinadiki mashinaning umumiy tortishga qarshiligiga uning og‘irligi, ishchi organlarining geometrik parametrlari va ishqalanish kabi omillar ta’sir etar ekan. Shu sababli sabzavotchilik seyalkalari konstruksiyalarini ishlab chiqishda energiyatejamkorlikka erishish uchun imkon qadar massasini kamaytirish, tuproq bilan o‘zaro ta’sirlashadigan ishchi organlarning geometrik o‘lchamlarini ratsional qiymatlarini aniqlash va ishqalanish kuchini kamaytirishga erishish lozim.



1-egatochkichning tuproqqa botish chuqurligi 10 cm; 2- egatochkichning tuproqqa botish chuqurligi 15 cm; 3- egatochkichning tuproqqa botish chuqurligi 20 cm

2-rasm. Sabzavotchilik seyalkasining tortishga umumiy qarshilik kuchini uning harakat tezligiga bog‘liqlik grafigi

Tavsiya etilgan sabzavotchilik seyalkasining umumiy tortishga qarshiligini aniqlash uchun (7) ifodani sonli yechimini amalga oshiramiz. (7) ifodani sonli yechimini amalga oshirishda parametrlarining quyidagi qiymatlarini tanlab olamiz: [4] ga ko‘ra tayanch g‘ildirak bilan tuproq orasidagi ishqalanish koefitsiyentini f=0,5, tavsiya etilgan sabzavotchilik seyalkasining massasi m_s=350 kg, [5] ga ko‘ra tuproqning solishtirma qarshilik q_e=5 N/m^2, egatochkichning tuproqqa botish chuqurligi a_e=0,1 m, egatochkichning qamrov kengligi b_e=0,25 m, [6] ga ko‘ra tuproqqa ishlov beruvchi ish organlarning geometrik va friksion xususiyatlarini inobatga oluvchi koeffitsiyent ξ=150 Nc^2/m^4; sabzavotchilik seyalkasining harakat tezligi v_s=(5-7) m/s, zanjirli shleyftning massasi m_{sh}=3 kg, [7] ga ko‘ra tuproq bilan zanjirli shleyft orasidagi ishqalanish koeffitsiyenti f_{sh}=0,7 qabul qilamiz.

O‘tkazilgan sonli yechim asosida sabzavotchilik seyalkasining tortishga umumiy qarshilik kuchini uning harakat tezligiga bog‘liqlik grafigi qurildi (2-rasm).

Yuqoridagi grafikdan ko‘rinadiki, tavsiya etilgan sabzavotchilik seyalkasining umumiy tortishga qarshilik kuchi harakat tezligi ortib borishi bilan to‘g‘ri chiziqli qonuniyat bilan ortib borishini ko‘rishimiz mumkin. Bunda, sabzavotchilik seyalkasi egatochkichining tuproqqa botish chuqurligi 10 sm va harakat tezligi 5 km/h bo‘lganda uning umumiy tortishga qarshilik kuchi 1878,85 N, harakat tezligi 6 km/h bo‘lganda 1899,77 N, harakat tezligi 7 km/h ga ortganda esa 1919,43 N ga teng bo‘lar ekan. Egatochkichning tuproqqa botish chuqurligi 15 sm ga ortgada esa sabzavotchilik seyalkasining harakat tezligini ortishiga mos

ravishda umumiy tortishga qarshilik kuchi 1901,27 N dan 1962,15 N gacha ortib borar ekan.

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SOYA O‘SIMLIGIGA ZARAR KELTIRUVCHI KASALLIK TURLARI

Annotatsiya: *Ushbu maqola soya o‘simligining virojlanishi va hosildorligiga katta zarar keltiruvchi kasallik turlari va ularning o‘simlikka qanchalik ziyon keltirishi, kasallikning qulay sharoitga moslashuvi va ularga qarshi kurashish chora tadbirlari to‘g‘risida ma‘lumotlar keltirilgan.*

Kalit so‘zlar: *Glycine max (L.) Merill, fungitsid, Septoria glycines, Lezyonlar, Cercospora kikuchii, Sclerotinia sclerotiorum, sklerotia, Puthium, Fusarium, Semptomlar, Ayova, miselyum, lactofen, gerbitsid.*

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TYPES OF DISEASE DAMAGE TO SOY PLANTS

Abstract: *This article provides information about the types of diseases that cause great damage to the virulence and yield of soybeans, and about the harm they cause to the plant, the adaptation of the disease to favorable conditions and measures to combat them.*

Key words: *Glycine max (L.) Merrill, fungicide, glycine septoria, lesions, Kikuchiya cerospore, Sclerotinia sclerotia, Sclerotia, Putilium, fusarium, symptom, Quince, Miselium, lactofen, herbicide*.

Kirish

Soya (*Glycine max*) dunyodagi eng muhim donli ekinlardan biri bo‘lib, ozuqa moddalariga boy, yuqori sifatli oqsil manbai sifatida insoniyatning oziq-ovqat ta’minotida asosiy o‘rinni egallaydi. Biroq, soya hosildorligi va sifati har yili turli xil patogen kasalliklar tahdidi ostida qolmoqda. Ushbu kasalliklar ildiz tizimidan tortib, poya, barg va dongacha bo‘lgan barcha o‘simlik qismlariga zarar yetkazishi mumkin, bu esa sezilarli hosil yo‘qotishlariga va iqtisodiy zararlarga olib keladi. Ushbu maqolaning maqsadi soya o‘simligiga eng keng tarqalgan va xavfli zarar yetkazuvchi kasalliklarni, ularning qo‘zg‘atuvchilarini, belgilarini va asosiy tarqalish yo‘llarini ko‘rib chiqishdir. Kasalliklarni o‘z vaqtida aniqlash va

ularga qarshi samarali kurash chora-tadbirlarini ishlab chiqish, zamonaviy qishloq xo‘jaligida barqaror va yuqori hosil olish uchun eng muhim shartlardan biridir.

Asosiy qisim

Tamaki mozaykasi virusi((*Tobacco streak virus, TSV*) bu kasallik butun dunyo bo‘ylab ko‘plab madaniy va yovvoyi o‘simliklarda uchrab jiddiy zarar beradi. Ushbu virusli kasallik maxsus tarqalish usulidan foydalanadi va uning infektsiya darajasi harorat bilan ortadi. Atmosfera polen yoki, global isish va keng mezbon diapazoni bilan birlashganda jiddiy kasallikni keltirib chiqarishga qodir. Simptom hech qanday alomat ko‘rsatmasdan davom etishi mumkin bo‘lgan tamaki chizig‘i virusi kasalligi urug‘lar orqali ham yuqishi mumkin. Mualiflarning tadqiqotiga qaraganda soya o‘simligida turli belgilar keltirib chiqaradi. Soya o‘simligidagi tamaki virusi belgilariga yuqori kurtaklarning kuyishi, egilish, o‘smaslik, so‘lishi, pishib yetishning kechikishi, kurtak va barglar sonining ko‘payishi, ko‘chat sonining kamayishi va lovya rangining o‘zgarishi, shikastlangan va o‘lik barglarning mavjudligi kuzatiladi. [1].

Hozirgi kunda soya o‘simligini zararlovchi turli kasalliklar mavjud bo‘lib, ular orasida keng tarqalgani soya o‘simligini zararlovchi virusli kasalliklaridir. Mualiflar soya viruslarining zararli ekanligi haqidagi birinchi ilmiy ma‘lumotlar XX-asrning boshlarida paydo bo‘lgan deb hisoblashadi[2]. Ekspertlarning takidlashicha bugungi kunga kelib bu kasalliklar qishloq xo‘jaligiga katta zarar yetkazmoqda. Bulardan biri (Septoria glycines) Septorioz kasaligi deb ham yuritiladi bu kasallik o‘simliklarning boshida, urug‘ barglarida va oddiy barglarda, ba‘zan birinchi 3 bargda dog‘lar shaklida paydo bo‘ladi. Bu dog‘lar qirrali va ularning rangi qizil jigarrangdan to‘q jigarranggacha o‘zgaradi [3]. I.N.Novosadov va boshqalarning takidlashicha, lezyonlar birlashib, katta nekrotik dog‘lar hosil qilishi mumkin. Lezyonarda pustulalar hosil bo‘lmaydi va sporalar ko‘rinmaydi. Kuchli ta'sirlangan dalalarda hosil yo‘qotilishi odatda 8% dan 15% foizgacha bo‘lishi mumkin.

Genetik qarshilikning ma'lum manbalari mavjud emas, ammo ba'zi navlar jigarrang dog‘ga boshqalarga qaraganda yaxshiroq chidashi mumkin. "Soya kasalliklari diagnostikasi" o‘quv qo‘llanmasida Jigarrang dog‘ni nazorat qilishning eng yaxshi strategiyasi yerni almashtirib ekish maqsadga muofiq deb takidlangan[4]. "Loviyadagi Barg Kasalliklarini Boshqarish" nomli qo‘llanmadan olingan ma‘lumotlarga qaraganda urug‘ barglarida teshikli dog‘lar atrofida silindrsimon o‘simtalar bilan hosil bo‘ladi. Kasallikka chalingan urug‘ barglari quriydi va tushadi. Urug‘ barglari va barglaridagi dog‘lardan tashqari loviyalarda ham dog‘lar paydo bo‘ladi. Lovyadagi dog‘lar barglardagi dog‘lardan deyarli farq qilmaydi. Shu bilan birga binafsha rangli serkosporoz (*Cercospora kikuchii*), kasaligini ham aytib o‘taylik bu kasallik ilk marotaba 1998 yilda Amur viloyatida qayd etilgan, ammo aniqlanmagan. Hozirgi vaqtda bu holat soya o‘simligida tobora keng tarqalmoqda, bu yerda urug‘larning zararlanishi 10% gacha va undan yuqori bo‘lishi mumkun[3]. Bu kasallik o‘simlikning ‘yuqori qismidagi barglarga ta'sir qiladi. U yuqori haroratni afzal ko‘radi va barglarning yuqori yuzasida umumiy bronza yoki binafsha rang bilan ajralib turadi. Lezyonlar qizil-binafsha

rangga ega va lezyonlar birlashganda nekrotik dog‘lar paydo bo‘ladi. Va bu holatda hosilning yo‘qolishi mamlakat bo‘ylab 15-30 foizni tashkil qilishi mumkin. Kasallikni keltirib chiqaradigan qo‘ziqorin, shuningdek, urug‘larning binafsha rangini keltirib chiqaradi, bu ularning sifatini pasaytirishi va iqtisodiy yo‘qotishlarga olib kelishi mumkin. Mualliflarning tavsiyasiga ko‘ra navlarning virusga moyilligi haqida ma'lumot odatda urug‘lik kompaniyalarida mavjud[4].

K. B. N. Mariya Mustafina (don va dala ekinlari kasalliklari b o‘yicha katta texnik mutaxassis, “Singenta” kompaniyasi, Rossiya) ma’lumotlariga ko‘ra, Rossiyada soya kasalliklarini monitoring qilish va himoya qilish amaliyotida quyidagi holatlar kuzatilgan Bu kasalliklarning yana bir turi (*Sclerotinia sclerotiorum*) oq mog‘or yani poyaning chirishi bu bakteriya nam sharoitda va gullash paytida o‘rtacha haroratda paydo bo‘lishi mumkin. Bakteria soya gullariga hujum qiladi va birinchi alomatlar dukkaklarning rivojlanishi paytida paydo bo‘ladi. Namlangan poyalar yoki dukkaklilar ko‘rinishidagi dastlabki alomatlar ko‘pincha infektsiyalangan gullar yaqinida paydo bo‘ladi va barglar so‘lib, kulrang-yashil rangga aylanib, bo‘g‘ilib, nobud bo‘lishidan oldin paydo bo‘lishi mumkin. Bir necha kundan so‘ng, jarohatlangan o‘simlik nobud bo‘ladi, Infektsiyalangan o‘simlik qismlari odatda yuqori namlik sharoitida oq, loyqa miselyum (qo‘ziqorin o‘sishi) va sirt yoki poya to‘qimalarida sklerotiya (poya qotishi) shaklida qo‘ziqorin qo‘zg‘atuvchisi belgilariga ega. Tuproqqa ishlov berish va qisqa muddatli almashlab ekish infektsiya darajasini pasaytirmaydi fungitsidlarni qo‘llash kasallikka qarshi kurashda yordam berishi mumkin, ammo samarali nazorat qilish uchun gullash davrida to‘g‘ri qo‘llash vaqtini tanlash juda muhimdir. Kasallikning tarqalishi va og‘irligini kamaytirishga yordam beradigan boshqa nazorat usullari orasida ekishni kechiktirish, qatorlar orasidagi keng masofa, ekish zichligini kamaytirish va laktofen o‘z ichiga olgan gerbitsidlardan (begona o‘tlarni oldiruvci kimyoviy modda) foydalanish kiradi.



1-rasm. Oq Mug‘or kasalligi (*Sclerotinia sclerotiorum*)

Quriqlikda keng tarqalgan kasallikning yana bir turi ildiz chirish Rizoktoniya solani (rizoktoniya yoki qora po‘stloq qo‘ziqorin) va Puthium (ptosis) turlari tuproq zamburug‘lari bo‘lib, soya nihollarining ildiz chirishiga olib keluvchi eng katta sabablaridan biridir Putiumning ko‘p turlari so‘ya novdalarining ildiz chirishiga olib keladi va mo‘tadil iqlim mintaqalarida soya o‘simliklarining zichligini 30% ga kamaytirishi mumkin.

Yaqinda AQSh ning Ayova shtatida o‘tkazilgan tadqiqot natijalariga ko‘ra Puthium turlarining Rizoktoniya solani va Phytophthora sojae-ga qaraganda soya o‘simligiga Zarar

berish ta‘siri ko‘proq ekanligi aniqlandi va boshqa ikkita patogen bilan taqqoslaganda bu ekinlarning hosildorligiga ko‘proq ta'sir qilishini ko‘rsatdi. Bu kasallik salqin va nam sharoitlar, yerga yaxshi ishlov berilmagani va erta ekilishi bilan u ildiz chirishining rivojlanishiga olib keladi va bu soya novdalari zichligining pasayishiga sabab bo‘ladi. Soya novdalari odatda tuproq qobig‘ini teshishi kerak, ekin oyida urug‘larni chuqurroq ko‘mish, bu omon qolish darajasini va oxirgi o‘simlik zichligini kamaytirishi mumkin, chunki ushbu bosqichda patogen mikroorganizmlar o‘simliklarga ko‘proq hujum qilish imkoniyatini beradi [5].

Yana bir ildiz chirishi kasaligi fuzarioz(Fusarium) bu kasallik 1996-yidan 2024-yilgacha AQSH va Kanadada 176 million buta hosildorligini yoqotishga sabab boldi. Fusarium ildizi chirishi soya o‘sishining har qanday bosqichida simptomlarni keltirib chiqarishi mumkin. Fusarium ildizi chirishi haqida umumiy ma'lumotlarga ko‘ra dastlabki alomatlar orasida niholdan keyin so‘lib ketish (trefoil birinchi bosqichidan oldin), ildizlarning chirishi, ildizlarning ichki to‘qimalarining qizarishi va ildiz va gipokotilda qizil-jigarrang yoki qora rang paydo bo‘lishi kiradi. Yetuk o‘simliklarda zararlangan ildizlar ko‘pincha to‘q jigarrang yoki qora rangga ega bo‘lib, chirishi va ildiz ildizida yuzaki yoriqlar paydo bo‘lishi mumkin. Og‘ir holatlarda, ildizning o‘sib borayotgan uchi o‘lishi mumkin, bu esa o‘sishning sekinlashishiga, ildizning o‘limiga, tugun hosil bo‘lishining pasayishiga va ikkilamchi ildizlarning yomon rivojlanishiga olib keladi. Yer usti belgilari barg xlorozidan boshlanadi va infektsiyalangan o‘simliklarda barglarning to‘liq sarg‘ayishi va o‘sishi, so‘lishi va barglarning erta tushishiga olib kelishi mumkin. Semptomlarning og‘irligi ildizlarning shikastlanish darajasiga bog‘liqdir bu holatlarda, ildizning o‘sib borayotgan uchi o‘lishi mumkin, bu esa o‘sishning sekinlashishiga, ildizning o‘limiga, tugun hosil bo‘lishining pasayishiga olib keladi. Soya fasulyesi ildizlari Fusarium sporalarining unib chiqishini rag‘batlantiradigan tabiiy birikmalarni chiqaradi. Keyin qo‘ziqorin o‘simlikka kichik teshiklar yoki ildizlarning shikastlangan joylari orqali kiradi. Ichkariga kirgandan so‘ng, qo‘ziqorin ildiz hujayralari orasida o‘sadi va o‘simlikning suv kanallarini (ksilema) to‘sib qo‘yishi mumkin, bu esa ildizlarning qizarishiga va o‘simlikning so‘lishiga olib keladi. Infektsionning dastlabki belgilari ildizlarda to‘q jigarrang dog‘lar va uzunlamasına kesilganda poyaning pastki qismida rang o‘zgarishini o‘z ichiga oladi. Og‘ir holatlarda qo‘ziqorin ildizlarga katta zarar etkazishi, suvning so‘rilishini buzishi va, ehtimol, so‘lishi, barglarning sarg‘ayishi, barglarning erta tushishi va o‘simlikning o‘limiga yordam beradigan moddalarni chiqarishi mumkin [6].

Xulosa

Xulosa qilib shuni aytish mumkunkiy dunyo miqyosida o‘z o‘rniga ega bo‘lgan dukkakdoshlar oilasiga mansub “sariq oltin” nomi bilan mashxur bolgan soya o‘simligining hosildorligiga jiddiy zaraz keltiruvchi kasallik turlari juda ko‘p bo‘lib, bu kasalliklar har qanday sharoyitga qulay moslasha olishi va o‘ziga hos tarqalish xususiyatiga ega va harorat oshishi bilan uning infektsiyasi ortadi.

Ushbu virusli kasallik atmosfera gulchanglari, global isish va turli xil tashuvchilarning mavjudligi tufayli yuzaga keladi.

Bu bakteriyalar soyaning tomiridan guligacha hujum qilib soyaning nobut bo‘lishiga olib keladi. Bazi viruslar keltirib chiqaradigan kasallik hech qanday alomat ko‘rsatmasdan davom etishi mumkin, urug‘lar orqali ham yuqishi mumkin. Bu o‘z navbatida soya iqtisodiyotiga jiddiy Zarar beradi. Bugungi kunda bu kasalliklarga kurashish keng ko‘lamda olib borilmoqda. Kasallikka chidamli navlarni ekish, urug‘likni dorilash, dalani o‘z vaqtida va to‘g‘ri haydash, ekish muddatlariga rioya qilish, hosilni aylantirish tamoyiliga amal qilish asosiy profilaktik choralardandir. Kasallikning tarqalishi va og‘irligini kamaytirishga yordam beradigan boshqa nazorat usullari orasida ekishni kechiktirish, qatorlar orasidagi keng masofa, ekish zichligini kamaytirish,tuproqqa yaxshi ishlov berish va laktofen o‘z ichiga olgan gerbitsidlardan begona o‘tlarni oldiruvci kimyoviy moddalardan to‘g‘ri foydalanish yo‘lga qo‘yish zarur. Dalalarni muntazam monitoring qilish, kasallikning dastlabki belgilarini vaqtida aniqlash va zamonaviy diagnostika usullaridan foydalanish zararkunandalarning keng tarqalishining oldini olishga yordam beradi.

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KADASTRO ALANINDA DİJİTAL TEKNOLOJİLERİN ENTEGRASYON SÜREÇLERİ - TAŞKENT ŞEHRİ ÖRNEĞİ ÜZERİNE

Annatatsiya. *bu makalede dijital teknolojilerin kadastro alanina entegrasyon süreçleri ele alinmaktadir.*
Kalit so'z. *Dijital teknoloji, entegrasyon, kadastro verileri ve gayrimenkul.*

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INTEGRATION PROCESSES OF DIGITAL TECHNOLOGIES IN THE FIELD OF CADASTRE - BASED ON THE EXAMPLE OF TASHKENT CITY

Annotation. *This article discusses the integration processes of digital technologies into the field of cadastre.*
Key words. *Digital technology, integration, cadastral data, and real estate.*

Giriş yapmak

Devlet kadastro sisteminin dijitalleştirilmesi, kadastro verilerinin eksiksizliğini, doğruluğunu ve kullanıcı dostu olmasını sağlamanın yanı sıra devlet hizmetlerinin daha hızlı ve verimli bir şekilde sunulmasını da sağlar.

Dünya genelinde dijital teknolojiler hızla tüm alanlara ve insanların yaşamlarına giriyor. Bu alana zamanında giren ülkeler gelişirken, eski usulde çalışanlar geride kalıyor.

Ülkemizde bu yıl "Bilim, Aydınlanma ve Dijital Ekonominin Gelişimi Yılı" ilan edildi ve bu konuda büyük çalışmalar başlatıldı. Özellikle son zamanlarda kadastro sektöründe büyük değişimler yaşanıyor.

Ana bölüm.

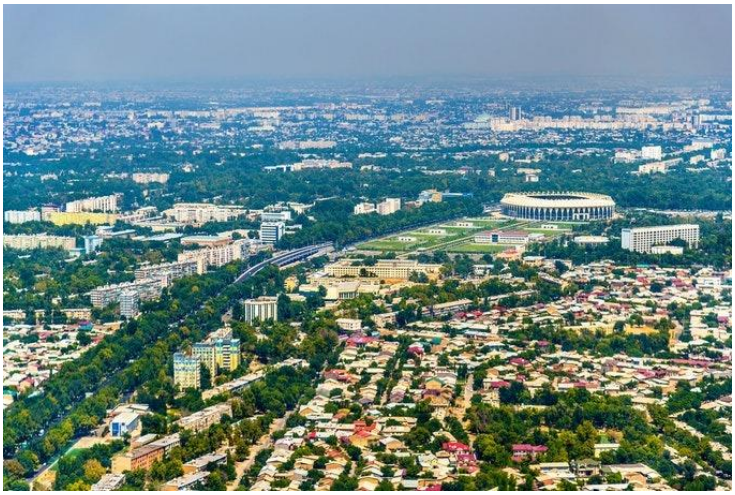
Bugünkü yazımızda, Taşkent şehri örneğinden yola çıkarak, kadastro sektöründe dijitalleşme konusunda yürütülen çalışmalar hakkında halkımızı bilgilendirmek istiyoruz.

Entegrasyon (Latince integratio - restorasyon, tamamlama, tam sayı - bütün) bir sistemin bireysel parçalarının ve işlevlerinin birbirine bağlı olma durumunu ve böyle bir duruma yol açan süreci ifade eden bir kavramdır.

Entegrasyon, bilgi sistemlerinin belirli bir amaç doğrultusunda birbirine bağlanması sürecidir. Kadastro bilgi sistemi, 9'dan fazla ilgili bakanlık ve dairenin bilgi sistemleriyle entegredir.

İlk Entegrasyon – Özbekistan Cumhuriyeti Devlet Vergi Komitesi

Entegrasyonun amacı, gayrimenkul nesneleri hakkında vergi bilgi sistemine bilgi sağlamaktır. Bunun nedeni, gayrimenkul nesneleri üzerindeki arazi ve mülklerin vergi hesaplamalarında vergi matrahı olarak gayrimenkul nesneleri olarak kabul edilmesidir.



Bu yılın son 9 ayında, 173 binden fazla nesne hakkında bilgi sağlanmıştır (sahip değişiklikleri, kadastro değeri ve alan gibi bilgiler gibi).

Kadastro ve vergi bilgi sistemlerinin entegrasyonunun ilk olarak 2008 yılında başlatıldığı unutulmamalıdır. Bu, bilgi sisteminin kadastroya ilk entegrasyonudur.

İkinci Entegrasyon – Noterlikler

Entegrasyonun amacı, gayrimenkuller, tapu kayıtları, yasaklar ve kısıtlamalar ile gayrimenkuller üzerinde noterlik işlemleri yapılırken sahipler ve belgeler hakkında elektronik ortamda bilgi sağlamaktır.

Bu yılın 9 ayında noterlik ile gayrimenkuller hakkında 280 bin bilgi alışverişi yapılmıştır.

Üçüncü Entegrasyon – İcra ve İflas Bürosu

Entegrasyonun amacı, gayrimenkulleri gerçek ve tüzel kişiler adına elektronik ortamda tespit etmek, gayrimenkullere yasaklar koymak ve gerekirse yasakları kaldırmaktır.

2020 yılının 9 ayında İcra ve İflas Bürosu ile elektronik bilgi alışverişi rakamlarına baktığımızda, toplam 3 milyon 12 bin bilgi alışverişi gerçekleştirilmiştir. Bunlardan bazıları:

Gerçek ve tüzel kişiler adına taşınmaz varlığı veya yokluğuna ilişkin 3 milyon 4157 anket alınmış ve yanıtlar otomatik olarak verilmiştir;

5 bininde bir taşınmaza yasak getirilmesi;

2.843' ünde bir taşınmaza yasak kaldırılması.Demakki, 3000ga yaqin fuqarolarimiz idorama-idora yurib, vaqtini sarflashiga sabab bo‘ladigan omillar kamaydi, desak ham bo‘ladi.

Dördüncü Entegrasyon - İçişleri Bakanlığı

Entegrasyonun amacı, vatandaşların elektronik ortamda geçici ve kalıcı kayıt ve kayıttan düşmelerini kolaylaştırmaktır (halk dilinde "bir propiska'ya yerleştirmek").

2020 yılının ilk 9 ayında 667 bin bilgi alışverişi gerçekleştirilmiş ve geçici ve kalıcı kayıt ve kayıttan düşme işlemleri için gayrimenkullere ilişkin anketlere verilen yanıtlar çevrimiçi olarak gönderilmiştir.

Beşinci Entegrasyon – Devlet Hizmetleri Ajansı ve Birleşik Etkileşimli Devlet Hizmetleri Portalı (YaIDXP)

Entegrasyonun amacı, Devlet Hizmetleri Ajansı'ndaki tüm işlerin konsolide edilmesidir. Önceki süreçte gayrimenkul sahipleri, kurumlar, inşaat şirketleri, noterler ve kadastro müdürlükleri arasında ofis ofis dolaşırken, yeni süreçte bu entegrasyon sağlanmıştır.

Ayrıca, portala yeni bir kullanıcının kaydı sırasında, sistem, vatandaşın kişisel verilerine dayanarak, gayrimenkul bilgi sistemindeki kullanıcının kişisel hesabında bu kullanıcı adına gayrimenkulleri görüntüleme olanağını otomatik olarak oluşturur.

Bu portalın sunduğu olanaklar sayesinde, kullanıcının doğrudan kendisine ait gayrimenkul hakkında, kamu hizmetleri kuruluşlarıyla entegre sistemler kullanarak sıcak su, elektrik, gaz temini gibi diğer bilgileri görüntüleme olanağına sahip olması özellikle önemlidir.

Bu entegrasyonlar sonucunda, 2020 yılının 9 ayında 400.000 bilgi alışverişi gerçekleştirilmiştir.

Yukarıda listelenen portal ile entegrasyon süreci, kamu hizmetlerini de kapsayabilir. Günümüzde gayrimenkul bilgi sisteminde altıncı ve yedinci sırayı kamu hizmetleri kuruluşları, yani Uzbekenergo A.Ş. ve Tashissiqquvati SUE, almaktadır.

Bu sistemlerle entegrasyonun amacı, belediye kuruluşlarının gayrimenkul işlemleri veya gayrimenkul bilgileri değiştiğinde güncel bilgilere sahip olmasını sağlamaktır.

Sistemlerin entegrasyonu sonucunda, 9 ay boyunca belediye kuruluşlarına gayrimenkul yapısında değişiklik olan 173 binden fazla nesne hakkında bilgi sağlandı.

Sekizinci Entegrasyon - COVID-19 Genel Merkezi

Bu yıl koronavirüs pandemisi tüm dünyayı tehdit ediyor. Enfeksiyonun yayılmasını önlemek amacıyla, kurumun veritabanından yapılacak bir sorgu yoluyla coğrafi konum verileri ve nesnelerin konum bilgilerinin bu merkeze iletileceği bir merkez kuruldu.

Dokuzuncu entegrasyon – Sicil bilgi sistemi

Entegrasyonun amacı, Özbekistan Cumhuriyeti Bakanlar Kurulu'nun 29 Aralık 2018 tarihli ve 1060 sayılı "Gayrimenkul Haklarının Devlet Kaydı

Prosedürünün İyileştirilmesine Yönelik Tedbirler Hakkında" Kararı uyarınca, gayrimenkul nesnelerine ilişkin hakların devlet tescilinin ve kadastro pasaportlarının oluşturulmasının sağlanmasıdır.

Bu sistem aracılığıyla 350 binden fazla bilgi alışverişi gerçekleştirilmiştir.

Gayrimenkul bilgi sistemi yukarıda listelenen 9 bilgi sistemiyle entegre olduğundan, bu yılın 9 ayında toplam 6.000.000'den fazla bilgi alışverişi gerçekleştirilmiştir.

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THE IMPORTANCE OF DIGITAL TECHNOLOGIES IN THE NATIONAL CADASTRE SYSTEM

Annatation. *This article examines the process of transitioning modern state cadastral systems from traditional methods to digital approaches. The study analyzes the main directions of state cadastral digitization, including the use of technologies such as geographic information systems (GIS), cloud technologies, artificial intelligence, and blockchain. The article examines the main advantages of digitization (acceleration of processes, reduction of errors, transparency of information) and the challenges encountered (technical infrastructure, data quality, development of the legal framework). It is emphasized that cadastral digitization is not only an important factor in optimizing land resource management, but also an important factor in economic development and attracting investments.*

Key words. *Cadastre, digitization, public administration, artificial intelligence, GIS, land cadastre, digital economy, database.*

Entry

In our republic, certain results are being achieved, along with the implementation of comprehensive measures in the field of cadastre, in particular, in the digitalization of agricultural management, along with the implementation of comprehensive measures in maintaining the land balance and its accounting in the National Geoinformation System.

Currently, the digitization of state cadastres, which are part of the Unified State Cadastre System (USCS), is being carried out at an accelerated pace. This will not only help to abandon traditional paper documents, but also to automate and optimize the entire process of creating, storing, editing and distributing cadastral information, converting data into digital form. This transition will significantly increase the efficiency, accuracy and transparency of land resource management.

The cadastres, which are part of the USCS, are considered a large database that affects the progress of economic reforms, which further increases the importance of using artificial intelligence (AI) in working with cadastral data.

According to the analysis of the “International Government AI Readiness Index” conducted by Oxford Insights, Uzbekistan is making great efforts to introduce AI technologies. For example, Uzbekistan ranked 95th in 2020, 93rd in

2021, 79th in 2022, 87th in 2023, and 70th in 2024. Thus, the country's position in the use of AI has improved significantly in five years. This is largely due to the use of AI in the cadastral sector.

Based on the Administrative Regulation on State Services for the Provision of Information on the History of Real Estate, a certificate on the history of real estate can be obtained directly at the State Services Center or through the unified interactive state services portal or the davreestr.uz website.

Materials and methods

Modern technological directions of digitization of the USCS system include integration of AI and geographic information systems (GIS) software, creation of an electronic database of cadastral objects, and interfaces and applications that display land monitoring information using the ArcGIS software:

−improvement of the automated system for geovisualization of attributive indicators of land users;

−substantiation of methods for digitizing the analysis of the geodatabase of lands;

−improvement of maintaining the register of addresses included in the land fund based on GAT;

−development of a method for analyzing seasonal USCS data in the geodatabase using a module created in the additional ArcGIS program.

− a method for organizing land accounting in settlements based on geoinformation technologies has been developed and modularized.

The research process consisted of the following stages:

1. Problem identification: limitations of traditional cadastral systems.

2. Data collection: collection of information on scientific articles, developments and practical projects.

3. Analysis: systematic analysis and generalization of the collected data.

4. Conclusion: development of conclusions and proposals based on the results obtained.

Results

The mainstay of the digitization of state cadastres based on GAT. It allows you to link each land plot with its spatial data (coordinates, boundaries) and legal data (owner, type of right, cadastral value). This creates the basis for creating clear and visual cadastral maps, easily updating them, and conducting complex analyses, planning the use of land resources.

Instead of traditional scattered databases, the transition to a single centralized or cloud platform ensures seamless data exchange between all state agencies (tax, judicial, architectural). As a result, the principle of “entering data once, using it many times” is implemented, and time and resources are saved.

AI is important in processing cadastral data. AI algorithms analyze high-resolution aerial photographs and satellite images to automatically determine the boundaries of land plots, identify buildings, and detect illegal construction. This reduces human error and makes monitoring more efficient.

Blockchain technology allows for the immutability and transparency of cadastral records. Each property registration transaction is recorded as a block on the blockchain, which prevents legal problems such as fraud and the sale of the same property to multiple people. This significantly increases citizens' trust in the state system.

The digital cadastre system will enable online services for citizens and businesses, such as property registration, obtaining cadastral certificates, paying taxes, and submitting applications online. This will streamline bureaucratic processes and facilitate access to government services.

Discussion

The use of artificial intelligence in the digitization of state cadastral systems will help solve a number of existing problems.

Firstly, it will help to raise the national cadastre to an international level. In all developed countries, as well as in many developing countries, the cadastre is the main source of information in ensuring the inviolability of private property.

Secondly, it will increase the authority of the cadastre as the main reliable legal source of guaranteeing ownership of real estate.

Thirdly, it will significantly reduce the level of corruption and the possibility of making "cadastral" errors, since the human factor in the formation and submission of cadastral data is excluded.

Fourthly, it will significantly reduce the time for decision-making. The introduction of AI technologies will allow for quick and high-quality processing and updating of large amounts of cadastral data. This will allow for online receipt and modification of information. In addition, it will help to avoid unreasonable costs for inefficient technical means of collecting and processing cadastral data and significantly reduce the time for forming the necessary content.

Thus, the introduction of artificial intelligence in the cadastre will help to obtain reliable information and results with complete and reliable data. This will also serve to increase the prestige of the cadastre.

Conclusion

In conclusion, the digitization of state cadastral systems is not only a technological upgrade, but also a strategic development task. It will increase the transparency of the land market, attract investment and contribute to sustainable economic growth. For successful implementation, high-level political will of the state, a phased approach and the involvement of all segments of society are essential.

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ISSIQXONADA POMIDOR YETISHTIRISHDA MINERAL O'G'ITLARNING SAMARADORLIGI

Annotatsiya. *Ushbu maqolada issiqxona sharoitida pomidor yetishtirishda mineral o'g'itlarning o'simlikning o'sishi, rivojlanishi va hosildorligiga ta'siri yoritilgan. O'simliklarning oziqlanish xususiyatlari, o'g'it turlarining biologik va iqtisodiy samaradorligi, shuningdek, o'g'itlarni berish usullari tahlil qilingan. Maqolada azot, fosfor, kaliy, kaltsiy va magniy elementlarining muvozanatli qo'llanilishi pomidor mevasining sifati va hosildorligini oshirishi haqida ilmiy asoslangan tavsiyalar berilgan.*

Kalit so'zlar: *pomidor, issiqxona, mineral o'g'it, hosildorlik, oziqlanish, azot, fosfor, kaliy, kaltsiy, magniy.*

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EFFECTIVENESS OF MINERAL FERTILIZERS IN GREENHOUSE TOMATO CULTIVATION

Abstract.*This article examines the effect of mineral fertilizers on the growth, development, and yield of tomatoes cultivated under greenhouse conditions. The study analyzes plant nutrition characteristics, fertilizer types and application rates, as well as their agronomic and economic efficiency. It is emphasized that the balanced application of nitrogen, phosphorus, potassium, calcium, and magnesium significantly improves tomato fruit quality and yield.*

Keywords: *tomato, greenhouse, mineral fertilizer, yield, nutrition, nitrogen, phosphorus, potassium, calcium, magnesium.*

Kirish

O‘zbekiston Respublikasi qishloq xo‘jaligi sohasida issiqxona xo‘jaliklari tobora muhim ahamiyat kasb etib bormoqda. So‘nggi yillarda aholi sonining ortishi va bozorlarda sabzavot mahsulotlariga bo‘lgan talabning yil davomida yuqoriligi tufayli issiqxona sabzavotchiligi iqtisodiy samaradorligi jihatidan eng foydali tarmoqlardan biriga aylandi.

Pomidor (*Solanum lycopersicum L.*) sabzavotlar ichida issiqxona sharoitida eng ko‘p yetishtiriladigan ekinlardan biridir. Uning mevalarida inson salomatligi uchun zarur bo‘lgan organik kislotalar, vitaminlar va minerallar mavjud. Shu bois, pomidorni issiqxonalarda yil davomida barqaror yetishtirish texnologiyasini takomillashtirish, ayniqsa o‘g‘itlash tizimini ilmiy asosda tashkil etish muhim masalalardan biridir.

Issiqxona sharoitida pomidor yetishtirishda o‘simlikning oziqlanishi ochiq maydondagidan farq qiladi. Harorat, namlik, yorug‘lik va sug‘orish sharoiti sun’iy boshqariladigan muhitda bo‘lganligi sababli, o‘g‘itlarning miqdori, navi va berish usuli to‘g‘ri tanlanishi zarur. Ayniqsa, mineral o‘g‘itlarning optimal miqdorda va muvozanatli qo‘llanilishi o‘simliklarning o‘sishi, meva sifati va hosildorligiga bevosita ta’sir etadi.

Pomidor o‘simligining oziqlanish xususiyatlari

Pomidor o‘simligi to‘liq rivojlanishi uchun tuproqdan hamda sug‘orish suvi orqali o‘zlashtiriladigan oziqa elementlariga — azot, fosfor, kaliy, kaltsiy, magniy va mikroelementlarga ehtiyoj sezadi.

Azot (N) — o‘simliklarning vegetativ o‘sishini, barg va poya hosil bo‘lishini ta’minlaydi. Lekin azotning ortiqcha miqdori o‘simlikning meva hosil qilishi jarayonini kechiktiradi, vegetativ o‘sishni haddan tashqari kuchaytiradi.

Fosfor (P) — ildiz tizimining rivojlanishini rag‘batlantiradi, meva to‘lish va urug‘ hosil bo‘lish jarayonida muhim ahamiyatga ega.

Kaliy (K) — pomidor mevalarining shakllanishi, pishishi, ta’mi va saqlanish sifatini belgilovchi asosiy elementlardan biridir.

Kaltsiy (Ca) — o‘simlikning hujayra devorini mustahkamlaydi, mevalarning yorilishining oldini oladi, barglarning sog‘lom bo‘lishini ta’minlaydi.

Magniy (Mg) — xlorofillning tarkibiy qismi bo‘lib, fotosintez jarayonida muhim rol o‘ynaydi.

Issiqxona sharoitida ushbu elementlarning balansini saqlash muhim, chunki ortiqcha yoki yetishmovchilik hosil sifatiga jiddiy ta’sir qiladi. Shuning uchun mineral o‘g‘itlarni qo‘llashda o‘simlikning rivojlanish bosqichlariga mos ravishda turli miqdorlarda berish talab etiladi.

Mineral o‘g‘itlarning ahamiyati va ularni qo‘llash tizimi

Issiqxona sharoitida pomidor ekinlarini o‘g‘itlash tizimi o‘simlikning fenologik bosqichlariga qarab tuziladi.

1. **Ko‘chat o‘stirish davrida** — asosan fosforli o‘g‘itlar qo‘llanadi. Fosfor ildiz tizimining o‘sishini kuchaytiradi, yosh o‘simliklarning tuproqqa tez moslashishiga yordam beradi. Bu bosqichda azot miqdori kam bo‘lishi lozim, chunki ortiqcha azot ko‘chatlarning cho‘zilishiga sabab bo‘ladi.

2. **Gullash davrida** — o‘simlikka azot va kaliy elementlari zarur bo‘ladi. Bu moddalar gul kurtaklari hosil bo‘lishini kuchaytiradi, to‘kilish darajasini kamaytiradi va gullarning to‘liq ochilishiga yordam beradi.

3. **Meva to‘lish va pishish davrida** — o‘simlikka kaliy va kaltsiy elementlari ko‘proq kerak bo‘ladi. Kaliy meva shakllanishini va shakar to‘planishini ta’minlaydi, kaltsiy esa mevaning yorilmasligi va uzoq muddat saqlanishini ta’minlaydi. Shu bosqichda azot miqdorini kamaytirish lozim, aks holda meva to‘lish jarayoni kechikadi.

Mineral o‘g‘itlarni tomchilatib sug‘orish tizimi orqali berish (fertigatsiya) issiqxona sharoitida eng maqbul usul hisoblanadi. Bu usul o‘g‘itlarning o‘simlik tomonidan to‘liqroq o‘zlashtirilishiga, suv resurslarining tejalishiga va oziqlanishning muvozanatli bo‘lishiga xizmat qiladi.

Mineral o‘g‘itlardan foydalanish samaradorligi

Issiqxona sharoitida o‘g‘itlardan foydalanish samaradorligi bir necha omillarga bog‘liq: tuproq tarkibi, harorat, namlik darajasi, sug‘orish tizimi va berilgan o‘g‘it turining kimyoviy xususiyatlari. Amaliy tajribalar shuni ko‘rsatadiki, kompleks o‘g‘itlardan (NPK) foydalanilganda pomidorning o‘sish sur’ati va hosil sifati sezilarli darajada oshadi.

Fosforli o‘g‘itlar pomidorning ildiz tizimini mustahkamlaydi, natijada o‘simlik suv va oziqa moddalardan yaxshiroq foydalana oladi. Kaliyli o‘g‘itlar mevalarning zichligi, rangi va ta’mini yaxshilaydi. Kaltsiyli o‘g‘itlar qo‘llanganda mevalar yorilmaydi, ularning tashish va saqlash sifati ortadi.

Tadqiqotlar natijalariga asoslanib, quyidagi umumiy xulosaga kelish mumkin: mineral o‘g‘itlarni o‘zaro muvozanatda qo‘llash pomidor hosildorligini o‘rtacha 25–40 foizgacha oshiradi, mevalarning tovar sifatini yaxshilaydi hamda yetishtirilgan mahsulotning bozorga chiqariladigan hajmini ko‘paytiradi.

Pomidor o‘simligining o‘sish bosqichlariga qarab o‘g‘it berish jadvali to‘g‘ri tuzilganda, o‘simlikning fiziologik holati yaxshilanadi, barglarning yashil massasi sog‘lom bo‘ladi va fotosintez jarayoni faol kechadi. Bu esa hosilning umumiy hajmi va sifati oshishiga olib keladi.

Ko‘plab issiqxonalarda kuzatilgan muammolardan biri — azotli o‘g‘itlarning ortiqcha qo‘llanilishi hisoblanadi. Bu holatda pomidor o‘simligi haddan tashqari ko‘p barg chiqaradi, lekin meva hosilining miqdori kamayadi. Shu sababli azotning me’yori qat’iy nazorat qilinishi kerak.

Mineral o‘g‘itlardan oqilona foydalanish nafaqat hosildorlikni oshiradi, balki iqtisodiy foydani ham ko‘paytiradi. O‘g‘it xarajatlari hosil miqdori va sifatining ortishi hisobiga to‘liq qoplanadi. Shuningdek, yuqori sifatli mevalarning bozor narxi yuqori bo‘lgani sababli sof daromad ham ortadi.

Issiqxona xo‘jaliklarida optimal o‘g‘itlash tizimi ishlab chiqilsa, har bir kvadrat metr maydondan olinadigan foyda ochiq maydondagidan 1,5–2 baravar

yuqori bo‘lishi mumkin. Bu esa issiqxona faoliyatining iqtisodiy barqarorligini ta’minlaydi.

Xulosa

1. Issiqxona sharoitida pomidor yetishtirishda mineral o‘g‘itlar o‘simlikning o‘sishi, rivojlanishi va hosildorligiga bevosita ta’sir ko‘rsatadi.
2. O‘g‘itlarning muvozanatli berilishi pomidor mevasining sifati, rangi va saqlanish muddatini yaxshilaydi.
3. Tomchilatib sug‘orish orqali o‘g‘it berish (fertigatsiya) eng yuqori samaradorlikni beradi.
4. Mineral o‘g‘itlarni o‘simlikning rivojlanish bosqichlariga moslab qo‘llash issiqxona xo‘jaliklarining iqtisodiy samaradorligini 30–40% gacha oshiradi.

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TAFAKKURNI RIVOJLANTIRUVCHI O‘YINLAR ORQALI 5K MODELIDAN FOYDALANISH USULLARI

Annotatsiya: *Maqolada tarbiya darslari jarayonida o‘quvchilarda tafakkurni rivojlantirishning samarali vositasi sifatida 5K modeli (Kreativlik, Kritik fikrlash, Kommunikativlik, Kooperatsiya, Kompetensiya)dan foydalanish metodikasi chuqur tahlil qilinadi. Tadqiqotda boshlang‘ich sinf o‘quvchilarining fikrlash jarayonlarini faollashtiruvchi didaktik va interfaol o‘yinlarning roli, ularning psixologik-pedagogik asoslari, shuningdek, 5K kompetensiyalarini shakllantirishdagi ahamiyati ilmiy dalillar va amaliy tajribalar orqali asoslab berilgan.*

Maqolada 5K modelining har bir komponenti tarbiya darslari mazmuni bilan bog‘lanadi, ularni rivojlantirishga xizmat qiluvchi o‘yin texnologiyalari (rol o‘yinlari, mantiqiy topshiriqlar, ijodiy konstruktor o‘yinlari, muammoli vaziyatli o‘yinlar, kommunikativ debat o‘yinlari va guruhiy kollaborativ mashg‘ulotlar)ning samaradorligi yoritiladi. Tadqiqot natijalari shuni ko‘rsatadiki, tarbiya darslarida o‘yinlardan kompleks foydalanish o‘quvchilarning mustaqil fikrlashi, o‘z fikrini asoslab berishi, muloqot madaniyatini shakllantirishi, jamoada ishlash ko‘nikmalarini rivojlantirishi va hayotiy kompetensiyalarni mustahkamlashga sezilarli ta’sir ko‘rsatadi.

5K modelini joriy etishning bosqichlari, o‘yin asosidagi ta’limning didaktik shartlari, o‘quvchilarning yosh xususiyatlariga moslashtirilgan metodik yondashuvlar, baholash mezonlari va kutilayotgan natijalar batafsil bayon etiladi. Empirik tadqiqotlar asosida ishlab chiqilgan metodik tavsiyalar tarbiya darslari samaradorligini oshirish, o‘quvchilarni faol o‘quvchi subyekt darajasiga ko‘tarish va zamonaviy pedagogik kompetensiyalarni shakllantirishga xizmat qiladi.

Maqola natijalari amaliyotga tatbiq etilganda tarbiya fanida innovatsion o‘quv muhitini yaratish, o‘yin asosidagi ta’lim yondashuvlarini standart dars jarayoniga integratsiya qilish, shuningdek, darslarning mazmunini kompetensiyaviy yondashuv asosida boyitish imkonini beradi. Tadqiqot o‘yinlar orqali 5K modelini qo‘llashning nazariy asoslari, metodik mexanizmlari va amaliy samaradorligini ko‘rsatib, tarbiya fanini o‘qitish metodikasiga yangi ilmiy va amaliy yondashuvlarni taklif etadi.

Kalit so‘zlar: *Tarbiya darslari, tafakkurni rivojlantiruvchi o‘yinar, 5K modeli, kreativlik, kritik fikrlash, kommunikativlik, kooperatsiya, kompetensiy*

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METHODS OF USING THE 5K MODEL THROUGH THINKING-DEVELOPING GAMES

Annotation: *This scientific article provides an in-depth analysis of the methodology for applying the 5C model (Creativity, Critical Thinking, Communication, Collaboration, Competence) in moral education classes through thinking-developing games. The study explores psychological and pedagogical foundations of game-based learning aimed at enhancing cognitive activity among primary school students, and presents evidence on the effectiveness of various didactic and interactive games in developing key 21st-century skills.*

Each component of the 5C model is examined in connection with the content of moral education lessons, highlighting game-based strategies that support these skills, such as role-playing games, logical challenges, creative construction games, problem-based situational tasks, communicative debate games, and collaborative group activities. The research results demonstrate that the integrated use of games in moral education significantly contributes to the development of independent thinking, the ability to justify personal viewpoints, communication culture, teamwork skills, and essential life competencies.

The article further outlines the stages of implementing the 5C model, didactic conditions for game-based learning, age-appropriate methodological approaches, assessment criteria, and expected outcomes. Methodological recommendations developed on the basis of empirical findings aim to increase the effectiveness of moral education lessons and enhance students' cognitive engagement.

The findings of the study can be applied in educational practice to create an innovative learning environment, integrate game-based strategies into the standard teaching process, and enrich lesson content with a competence-oriented approach. This research demonstrates the theoretical foundations, methodological mechanisms, and practical effectiveness of using the 5C model through thinking-enhancing games in moral education.

Keywords: *moral education lessons, thinking-developing games, 5C model, creativity, critical thinking, communication, collaboration, competence*

Kirish

Zamonaviy ta'lim jarayonida o'quvchilarda mustaqil fikrlash, tahlil qilish, muammoli vaziyatlarga kreativ yondashish, muloqotga kirisha olish va jamoada ishlash kompetensiyalarini shakllantirish dolzarb vazifalardan biri hisoblanadi. Ayniqsa, boshlang'ich ta'limda o'quvchilarning tafakkur rivojiga ta'sir etuvchi omillarni to'g'ri tashkil etish, ularning shaxsiy rivojlanishi, ijtimoiy ko'nikmalari va ma'naviy-axloqiy qarashlarining shakllanishida muhim ahamiyatga ega.

Tarbiya darslarida o‘qitish jarayonini faollashtirish, o‘quvchilarni o‘ylashga, izlashga, solishtirishga, o‘z fikrini asoslashga undovchi metodlarning qo‘llanilishi bu jarayonni samarali tashkil etishning zamonaviy yo‘nalishlaridan hisoblanadi.

So‘nggi yillarda ta’lim tizimida kompetensiyaviy yondashuvning keng joriy etilishi 5K modeli (Kreativlik, Kritik fikrlash, Kommunikativlik, Kooperatsiya, Kompetensiya)ning samaradorligini oshirdi. Bu model ta’lim jarayonini nafaqat bilim berishga, balki o‘quvchining fikrlash salohiyatini rivojlantirishga, ijtimoiy va ma’naviy ko‘nikmalarini shakllantirishga qaratilgan yondashuvni anglatadi. Tarbiya fani mazmunining axloqiy, ma’naviy, ruhiy tarbiya elementlari bilan bog‘liq ekanligi sababli, bu model orqali darslarni o‘yinlar bilan integratsiya qilish o‘quvchilarni faol va ongli ishtirokchi sifatida shakllantirishda alohida ahamiyat kasb etadi.

Tafakkurni rivojlantiruvchi o‘yinlar esa o‘quvchilarning aqliy faoliyatini rag‘batlantiruvchi, ularda mantiqiy fikrlash, muammoli vaziyatlarni hal qilish, ijod qilish va mustaqil xulosa chiqarish ko‘nikmalarini shakllantiruvchi metodlardan biridir. O‘yin faoliyati boshlang‘ich yoshdagi bolalar uchun tabiiy ehtiyoj bo‘lganligi sababli, tarbiya darslariga o‘yin mexanizmlarini uyg‘unlashtirish o‘quvchilarning darsga bo‘lgan qiziqishini oshiradi, o‘quv jarayonining samaradorligini ta’minlaydi.

Xususan, 5K modeli asosida loyihalashtirilgan o‘yinlar o‘quvchilar tafakkurining turli jihatlarini kompleks rivojlantirishga xizmat qiladi. Kreativlik yo‘nalishidagi o‘yinlar o‘quvchilarning tasavvuri va ijodkorligini faollashtirsa, kritik fikrlashni rivojlantiruvchi o‘yinlar ularni tahlil qilish va solishtirishga o‘rgatadi. Kommunikativ o‘yinlar muloqot madaniyatini shakllantiradi, kooperativ o‘yinlar esa jamoaviy hamkorlik va birgalikda qaror qabul qilish ko‘nikmalarini mustahkamlaydi. Kompetensiyaga yo‘naltirilgan o‘yinlar esa o‘quvchilarni hayotiy vazifalarni hal qilishga tayyorlaydi.

Tarbiya darslarida tafakkurni rivojlantiruvchi o‘yinlardan foydalangan holda 5K modelini qo‘llash metodikasining ilmiy asoslarini ishlab chiqish, amaliyotda qo‘llash yo‘llarini aniqlash, pedagogik jarayonning samaradorligini oshirishda muhim ilmiy-amaliy ahamiyatga ega. Mazkur tadqiqot aynan shu jarayonlarni tizimli o‘rganish, ularni nazariy va amaliy jihatdan asoslash hamda o‘quv jarayoniga joriy qilish bo‘yicha amaliy tavsiyalar ishlab chiqishga qaratilgan.

Adabiyotlar tahlili

So‘nggi yillarda ta’lim va tarbiya jarayonlarida o‘quvchilarda tafakkurni rivojlantirish masalasi ilmiy diqqat markazida turibdi. Pedagogik adabiyotlar tahlili shuni ko‘rsatadiki, tafakkur ko‘nikmalarini shakllantirishda interfaol va o‘yin asosidagi yondashuvlar samarali hisoblanadi. Xalqaro tadqiqotlar (Vygotsky, Piaget, Bruner) o‘yin orqali o‘quvchilarning ijodiy va tanqidiy fikrlashini rivojlantirish, kommunikativ va ijtimoiy ko‘nikmalarni mustahkamlashda muhim rol o‘ynashini ko‘rsatadi.

Milliy pedagogika adabiyotlarida (Abdullaeva, 2018; Tursunov, 2020) tarbiya darslarida o‘yinlardan foydalanish metodikasi, ularning yosh xususiyatlariga moslashuvi va didaktik shartlari batafsil yoritilgan. Shu bilan

birga, 5K modeli komponentlari - kreativlik, kritik fikrlash, kommunikativlik, kooperatsiya va kompetensiya - pedagogik jarayonda samarali qo‘llanilganda o‘quvchilarning shaxsiy va ijtimoiy rivojlanishiga sezilarli ta’sir ko‘rsatadi. Tadqiqotlar o‘yinlar va kompetensiyalarni shakllantirish o‘rtasidagi bog‘liqlikni, o‘quvchilarda mustaqil fikrlash va jamoaviy ishlash ko‘nikmalarini rivojlantirishda didaktik mexanizmlarni yoritadi. Shu bois, adabiyotlar tahlili 5K modelini o‘yinlar orqali tarbiya darslariga integratsiya qilishning nazariy va metodik asoslarini mustahkamlashga xizmat qiladi.

Tadqiqot metodologiyasi

Tadqiqotning asosiy maqsadi - tarbiya darslarida tafakkurni rivojlantiruvchi o‘yinlar orqali 5K modelining (Kreativlik, Kritik fikrlash, Kommunikativlik, Kooperatsiya, Kompetensiya) samarali qo‘llanilish usullarini aniqlash va ilmiy asoslashdir. Tadqiqot empirik, eksperimental va nazariy usullar asosida olib borilgan bo‘lib, unda pedagogik jarayonni tizimli tahlil qilish, o‘quvchilarning kompetensiyalarini baholash va interfaol o‘yinlar orqali 5K komponentlarini rivojlantirish mexanizmlari o‘rganilgan.

1. Tadqiqot usullari

Tadqiqot jarayonida quyidagi metodlar qo‘llangan:

Nazariy tahlil usuli**:** ilmiy adabiyotlar, pedagogik maqolalar, metodik qo‘llanmalar va xalqaro tadqiqotlar tahlil qilinib, o‘yinlar va 5K modelining ta’lim jarayonidagi ahamiyati o‘rganilgan.

Eksperimental metod: bosqichma-bosqich tajriba tashkil qilinib, tarbiya darslarida 5K modelining komponentlarini rivojlantirishga yo‘naltirilgan o‘yinlar sinovdan o‘tkazilgan. Eksperiment ikki bosqichda olib borildi: nazorat guruhi (an’anaviy darslar) va tajriba guruhi (o‘yin asosidagi 5K modeli bilan darslar).

Observatsiya va kuzatish: o‘quvchilarning dars jarayonidagi faoliyati, muloqot, guruh ichidagi hamkorlik va ijodiy faoliyatlari qayd etilgan.

Test va anketalar: o‘quvchilarning kreativlik, kritik fikrlash va kommunikativ ko‘nikmalarini aniqlash uchun maxsus ishlab chiqilgan testlar va so‘rovnomalar qo‘llanilgan.

Intervyu va baholash**:** o‘qituvchilar bilan suhbatlar o‘tkazilib, o‘yin asosida 5K modelini joriy etishning qiyinchiliklari va samaradorligi tahlil qilingan.

2. Tadqiqotning bosqichlari

Tayyorlov bosqichi: tadqiqot mavzusi, maqsad va vazifalar aniqlanib, adabiyotlar tahlil qilindi, 5K modelining har bir komponenti va unga mos o‘yinlar tanlandi.

Eksperimental bosqich**:** tajriba va nazorat guruhlarida tarbiya darslari o‘tkazilib, o‘yinlar orqali tafakkur va kompetensiyalar rivojlantirildi.

Baholash va tahlil bosqichi**:** o‘quvchilarning ko‘nikmalari va kompetensiyalari testlar, kuzatish va so‘rovnomalar yordamida baholandi.

Natijalarni umumlashtirish: tajriba natijalari statistik va sifat jihatidan tahlil qilinib, 5K modelini o‘yinlar orqali qo‘llashning samaradorligi aniqlangan.

3.Baholash mezonlari

Tadqiqot jarayonida o‘quvchilarning 5K kompetensiyalari quyidagi mezonlar bo‘yicha baholangan:

- **Kreativlik** - yangi g‘oyalarni ishlab chiqish va ijodiy yondashuvlar.
- **Kritik fikrlash** - muammoli vaziyatlarda mantiqiy yechimlar ishlab chiqish.
- **Kommunikativlik** - o‘z fikrini ifoda etish va tinglash ko‘nikmalari.
- **Kooperatsiya** - jamoada samarali ishlash va hamkorlik.
- **Kompetensiya** - bilim va ko‘nikmalarni amaliyotga tadbiq etish.

4. Tadqiqotning afzalliklari

- 5K modelini o‘yinlar orqali integratsiya qilishning amaliy tavsiyalari ishlab chiqilgan.
- O‘quvchilarda tanqidiy va ijodiy fikrlashni rivojlantirish, kommunikativ va ijtimoiy ko‘nikmalarni mustahkamlashning aniq mexanizmlari ko‘rsatildi.
- Tarbiya darslarining samaradorligini oshirishga xizmat qiladigan innovatsion yondashuvlar shakllantirildi.

Natijalar va muhokama

Tadqiqot natijalari shuni ko‘rsatdiki, tarbiya darslarida 5K modelini o‘yinlar orqali qo‘llash o‘quvchilarning tafakkurini rivojlantirish, kreativlik va kritik fikrlash ko‘nikmalarini mustahkamlash, shuningdek, kommunikativ va ijtimoiy ko‘nikmalarini yaxshilashda yuqori samaradorlikka ega. Eksperimental guruh bilan olib borilgan tajribalar asosida quyidagi asosiy natijalar qayd etildi:

1. Kreativlik: O‘yinlar orqali kreativlikni rivojlantirish natijalari sezilarli bo‘ldi. O‘quvchilar yangi g‘oyalar ishlab chiqish, ijodiy yechimlar topish va fantaziya orqali topshiriqlarni bajarishda faol qatnashdi. Misol uchun, “Ijodiy konstruktor o‘yini” va “Rassomlik topshiriqlari” o‘quvchilarda original yechimlar ishlab chiqish qobiliyatini oshirdi.

2. Kritik fikrlash: Muammoli vaziyatlarda mustaqil tahlil qilish va yechim topish qobiliyati sezilarli darajada yaxshilandi. “Mantiqiy va situatsion o‘yinlar” orqali o‘quvchilar masalalarni tahlil qilish, sabab-natija munosabatlarini aniqlash va muammoli vaziyatlarda tezkor qarorlar qabul qilish ko‘nikmalarini rivojlantirdi.

3. Kommunikativlik: O‘quvchilarning o‘z fikrini ifoda etish, tinglash va munozara qilish ko‘nikmalari sezilarli darajada oshdi. “Debat o‘yinlari” va guruhiy topshiriqlar orqali o‘quvchilar muloqot madaniyati, fikr almashish va argumentlash qobiliyatlarini mustahkamladi.

4. Kooperatsiya: Guruhda ishlash ko‘nikmalari ham yaxshilandi. O‘quvchilar birgalikda qaror qabul qilish, resurslarni taqsimlash va umumiy maqsadga erishish jarayonida faol qatnashdi. Bu jarayon “Hamkorlik o‘yinlari” orqali osonlashtirildi va ijtimoiy ko‘nikmalar rivojlandi.

5. Kompetensiya: O‘quvchilarning bilim va ko‘nikmalarini amaliyotga tadbiq etish qobiliyati oshdi. O‘yinlar yordamida olingan bilimlar real hayotiy

vaziyatlarda qo‘llanildi, bu esa o‘quvchilarning amaliy kompetensiyalarini rivojlantirdi.

Muhokama:Natijalarni tahlil qilganda aniq bo‘ldiki, o‘yinlar orqali 5K modelini integratsiya qilish tarbiya darslarini yanada interfaol va samarali qiladi. Eksperiment natijalari shuni ko‘rsatadiki:

- O‘quvchilarning tafakkur va ijodiy ko‘nikmalari oshadi.
- Muammoli vaziyatlarda mustaqil qaror qabul qilish qobiliyati rivojlanadi.
- Guruh ichidagi hamkorlik va muloqot ko‘nikmalari mustahkamlanadi.
- O‘quvchilarda bilim va ko‘nikmalarni amaliyotga tatbiq etish qobiliyati ortadi.

Tadqiqot davomida kuzatilgan qiyinchiliklar ham qayd etildi. Masalan, ba’zi o‘quvchilar dastlab yangi o‘yin shakllariga moslashishda qiyinchiliklarga duch keldi, bu esa o‘qituvchilarning yo‘naltirish va qo‘llab-quvvatlashining zarurligini ko‘rsatdi. Tadqiqot natijalari shuni isbotladi: o‘yin asosidagi 5K modeli nafaqat o‘quvchilarni faollashtiradi, balki tarbiya jarayonini yanada samarali va qiziqarli qiladi. Umuman olganda, 5K modelini o‘yinlar orqali tarbiya darslariga integratsiya qilish pedagogik jarayonni innovatsion va kompetensiyaviy yondashuv asosida boyitadi. Bu yondashuv o‘quvchilarning tafakkur, ijodiy va ijtimoiy kompetensiyalarini rivojlantirishga xizmat qiladi.

Xulosa

Tadqiqot natijalari shuni ko‘rsatdiki, tarbiya darslarida tafakkurni rivojlantiruvchi o‘yinlardan foydalanish orqali 5K modelining (Kreativlik, Kritik fikrlash, Kommunikativlik, Kooperatsiya, Kompetensiya) komponentlarini shakllantirish samarali bo‘ladi. O‘yinlar o‘quvchilarning ijodiy va tanqidiy fikrlash qobiliyatini rivojlantirish, muloqot madaniyati va guruh ichidagi hamkorlik ko‘nikmalarini mustahkamlash, shuningdek, bilim va ko‘nikmalarni amaliyotga tatbiq etish imkoniyatini beradi.

Empirik tadqiqotlar shuni isbotladi: o‘quvchilarning faoliyatiga o‘yin elementlarini integratsiya qilish ularning motivatsiyasini oshiradi, o‘qishga bo‘lgan qiziqishini kuchaytiradi va tarbiya jarayonini interfaol, qiziqarli va samarali qiladi. Shu bilan birga, 5K modeli nafaqat o‘quvchilarning shaxsiy rivojlanishiga, balki jamoaviy va ijtimoiy kompetensiyalarini rivojlantirishga ham xizmat qiladi.

Takliflar

1. **O‘qituvchilar uchun metodik tavsiyalar:** Tarbiya darslarida 5K modelini samarali qo‘llash uchun interfaol o‘yinlardan foydalanishni rejalashtirish, o‘quvchilarning yosh xususiyatlarini hisobga olish va o‘yin jarayonida qo‘llab-quvvatlash mexanizmlarini ishlab chiqish tavsiya etiladi.
2. **Dars rejalariga integratsiya:** O‘yin elementlarini dars rejalariga kiritish orqali tarbiya jarayonini kompetensiyaviy yondashuv asosida boyitish mumkin.

3. **Baholash tizimi:** 5K modelining har bir komponenti bo‘yicha baholash mezonlari ishlab chiqilib, o‘quvchilarning ko‘nikmalari muntazam kuzatib borilishi lozim.

4. **O‘quvchilarda individual yondashuv:** Ba’zi o‘quvchilar yangi o‘yin shakllariga moslashishda qiyinchiliklarga duch kelishi mumkin, shuning uchun individual yo‘naltirish va rag‘batlantirish usullarini qo‘llash zarur.

5. **Pedagogik innovatsiyalarni rivojlantirish:** Tadqiqot natijalari asosida o‘yinlar orqali 5K modelini kengaytirish va boshqa fanlar bilan integratsiya qilish mumkin, bu esa ta’lim jarayonining innovatsionligini oshiradi.

Tadqiqot 5K modelini o‘yinlar orqali tarbiya darslariga integratsiya qilishning nazariy va amaliy samaradorligini tasdiqlaydi va pedagogik amaliyotga innovatsion yondashuvlarni joriy etish imkoniyatlarini ochadi. Ushbu yondashuv o‘quvchilarning tafakkur, ijodiy va ijtimoiy kompetensiyalarini yanada rivojlantirishga xizmat qiladi.

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EHTIYOJMAND QATLAMLARNING IJTIMOIY HIMOYASINI KUCHAYTIRISH MEXANIZMLARI

Annotatsiya. *Kam daromadli oilalarning moddiy farovonligini oshirish, ularning munosib turmush kechirishi uchun aholining bu toifasiga davlat tomonidan moddiy yordam tayinlanadi. Ushbu maqolada mamlakatimizda ehtiyojmand qatlamlarning ijtimoiy himoyasini kuchaytirish mexanizmlari yoritib berilgan.*

Kalit so‘zlar: *ijtimoiy himoya, davlat, fuqarolar, ijtimoiy dastur, kam ta’minlangan, aholi, aholini ijtimoiy himoya qilish, tizim, “ijtimoiy himoya yagona reyestri”.*

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MECHANISMS FOR STRENGTHENING SOCIAL PROTECTION FOR LOW-INCOME CLASSES

Abstract. *To improve the material well-being of low-income families and ensure their dignified living, the state provides financial assistance to this population group. This article examines mechanisms for strengthening social protection for low-income groups in our country.*

Keywords: *social protection, state, citizens, social program, low-income groups, population, social protection of the population, system, "unified register of social protection."*

So‘nggi yillarda aholining ijtimoiy himoyasini kuchaytirish, davlat tomonidan fuqarolarga ijtimoiy xizmat ko‘rsatish ko‘lami va turlarini kengaytirish bo‘yicha tizimli ishlar amalga oshirilmoqda. Jumladan, ijtimoiy dasturlarni moliyalashtirish xarajatlari YAIMga nisbatan 2 baravarga oshib, kam ta’minlangan nafaqa oluvchi oilalar qamrovi 5 barobarga ko‘paydi hamda nogironligi bo‘lgan shaxslar va nogironligi bo‘lgan bolalarning parvarishi bilan band bo‘lganlar uchun yangi nafaqa turlari joriy etildi.

Yangi tahrirda qabul qilingan Konstitutsiyada mehnatga layoqatsiz va yolg‘iz keksalar, nogironligi bo‘lgan shaxslar hamda aholining ijtimoiy jihatdan

ehtiyojmand boshqa toifalarining huquqlari davlat himoyasida bo‘lishining belgilanganligi mazkur sohani yagona yondashuv asosida isloh qilish zarurligini taqozo etmoqda. Xususan, davlatning nogironligi bo‘lgan shaxslarning ishga joylashishi va ta’lim olishiga ko‘maklashishi bo‘yicha konstitutsiyaviy majburiyatlari bajarilishini ta’minlash maqsadida mazkur yo‘nalishda amalga oshirilayotgan chora-tadbirlarni samarali muvofiqlashtirish tizimi joriy etilishi talab etilmoqda.

Yangi tahrirdagi Konstitutsiyada e’lon qilingan «ijtimoiy davlat» tamoyillarini inobatga olgan holda, fuqarolarning ijtimoiy himoyaga oid huquqlarini va manfaatlarini so‘zsiz ta’minlash, aholiga ijtimoiy xizmatlarni ko‘rsatish sifatini tubdan oshirish hamda mazkur sohaga ilg‘or xalqaro standartlarga asoslangan mutlaqo yangi boshqaruv tizimini joriy etish maqsadida davlat tomonidan aholini manzilli himoya qilishning asosiy yo‘nalishlari belgilab olindi [1]. Xususan, kompleks yondashuv asosida professional ijtimoiy himoya tizimini joriy qilish; ijtimoiy himoya tizimi samaradorligi va manzilliligini oshirish orqali aholining ko‘makka muhtoj qatlami ijtimoiylashuvini ta’minlash; ijtimoiy himoyani mahalla darajasigacha tashkil etish, og‘ir hayotiy ahvolga tushib qolgan aholiga individual yondashuvga muvofiq ijtimoiy xizmat va yordam ko‘rsatishni yo‘lga qo‘yish kabilar.

Ma’lumki, kam daromadli oilalarning moddiy farovonligini oshirish, ularning munosib turmush kechirishi uchun aholining bu toifasiga davlat tomonidan moddiy yordam tayinlanadi. O‘zbekiston Respublikasi Vazirlar Mahkamasining 2021 yil 5 martdagi “Aholini ijtimoiy himoya qilish tizimini yanada takomillashtirish hamda sohaga zamonaviy axborot-kommunikatsiya texnologiyalarini keng joriy etish chora-tadbirlari to‘g‘risida”gi 122-sonli qarorida kam ta’minlangan oilalarni aniqlash mezonlari berib o‘tilgan [2]. Shuningdek, aholini ijtimoiy himoya qilish tizimini yanada takomillashtirish hamda sohaga zamonaviy axborot-kommunikatsiya texnologiyalarini keng joriy etish, ijtimoiy nafaqalar va himoyaning boshqa turlarini tayinlash va to‘lashda shaffoflikni oshirish, jarayonlarni elektronlashtirish hamda fuqarolarga qulaylik yaratish maqsadida qabul qilingan. Ushbu qaror orqali hududiy ijtimoiy himoya va nafaqalar tayinlash bo‘limlarining vazifalari kengaytirilgan va ularning moliyaviy nazoratdagi roli kuchaytirilgan. Ayniqsa, aholining ijtimoiy himoyaga muhtoj qatlamlariga ko‘rsatilayotgan yordamning sifatini yaxshilash va mahalla tizimi bilan integratsiyalashuvni amalga oshirish nazarda tutilgan.

O‘zbekiston Respublikasi Prezidentining 2021 yil 11 avgustda “Kam ta’minlangan oilalarga moddiy yordam ko‘rsatish hamda kambag‘allik bilan kurashish ko‘lamini yanada kengaytirish chora-tadbirlari to‘g‘risida”gi 6277-sonli Farmonida quyidagilar belgilanib berilgan [3]. Unda bola tarbiyalayotgan oilalarni qo‘llab-quvvatlash tizimining samaradorligini oshirish, ijtimoiy himoya va ko‘makka muhtoj oilalar moddiy ta’minotini kuchaytirish, ehtiyojmand oilalarni aniqlashda umume’tirof etilgan xalqaro standartlarni va avtomatlashgan shaffof elektron baholash mexanizmlarini joriy etish orqali nafaqalarni to‘lash tizimini

bolalar salohiyatini rivojlantirish va kambag‘allikni qisqartirishga qaratish masalasiga urg‘u berilgan.

Kam ta’minlangan oilalarni “Ijtimoiy himoya yagona reyestri” axborot tizimi orqali aniqlash hamda ularga ijtimoiy nafaqa va moddiy yordam tayinlash va to‘lash tartibi to‘g‘risidagi nizomda, O‘zbekiston Respublikasi hududida yashaydigan kam ta’minlangan oilalarni “Ijtimoiy himoya yagona rekestri” axborot tizimi orqali aniqlash hamda ularga 14 yoshgacha bolalari bo‘lgan oilalarga nafaqa, bola ikki yoshga to‘lguniga qadar uni parvarish qilish nafaqasi, kam ta’minlangan oilalarga moddiy yordam, hamda un va qolipli non xarid qilish bo‘yicha qo‘shimcha xarajatlarni qoplash uchun har oylik pulli kompensatsiyani tayinlash va to‘lash tartibini belgilaydi.

“Ijtimoiy himoya yagona tizimi” – ijtimoiy himoyani amalga oshirish uchun inson omilisiz oilaning (fuqaro) ijtimoiy himoyaga muhtojligini o‘zi aniqlaydigan, ijtimoiy himoyani amalga oshiradigan va uni nazorat qiladigan, xarajatlar hisobini yuritadigan avtomatlashgan axborot tizimidir [5]. Ushbu tizimning afzalligi shundaki, birinchidan, fuqarolarning ijtimoiy himoyadan foydalanishlari uchun zarur ma’lumotlar avtomatik tarzda yig‘iladi va bu borada fuqarolar sarson bo‘lishining oldi olinadi.

Ikkinchidan, kam ta’minlanganlikni e’tirof etish va ijtimoiy nafaqalarni tayinlash yoki rad etish jarayoni maksimal darajada shaffoflashadi. Nafaqani tayinlash yoki rad etish to‘g‘risida qaror faqat ushbu axborot tizimi tomonidan (unga kiritilgan mezonlar asosida) qabul qilinadi, bunda hech qanday inson omili mavjud bo‘lmaydi.

Uchinchidan esa, ushbu tizim ko‘rsatilayotgan ijtimoiy himoya choralarining ma’lumotlar bazasiga aylanadi va ushbu baza orqali avtomatik tarzda barcha ijtimoiy yordamga muhtoj oilalarni aniqlash va ularga manzilli yordam ko‘rsatish imkonini beradi.

Shuni ta’kidlash kerakki, ko‘plab mamlakatlar uzoq vaqtlardan beri ijtimoiy imtiyozlar va xizmatlarni oluvchilar to‘g‘risidagi ma’lumotlarni birlashtirish hamda mahalliy ma’lumotlar bazalari bilan masofadan turib ishlashga imkon beradigan yaxlit axborot tizimlarini yaratish yo‘lini bosib o‘tgan. Ularning bir qanchasida ijtimoiy himoya yagona reyestri ta’minot zanjiri vazifasini o‘tayotgan bo‘lsa, boshqalarida bu tizim murojaatlarni qabul qilish, ro‘yxatdan o‘tkazish va fuqarolarning bir yoki bir nechta ijtimoiy nafaqaga muvofiqligini aniqlash ishlarini bajarib keladi. Ular inklyuziv tizim sifatida ham ijtimoiy siyosat hamda axborot manbai ko‘rinishidagi amaliyot roliga ega.

Hozirgi kunda 20 dan ziyod mamlakatda (Ozarbayjon, Braziliya, Chili, Xitoy, Kolumbiya, Dominikan Respublikasi, Gruziya, Indoneziya, Makedoniya, Mali, Meksika, Chernogoriya, Pokiston, Filippin, Senegal, Turkiya, Yaman va boshqa davlatlarda) har xil ko‘rinishda ijtimoiy himoya reyestrlari axborot tizimi mavjud. Biroq ular faoliyatida reyestrlarni boshqarish va ishlatish, shuningdek, qamrov darajasi hamda axborot tizimlari bazasini yuritish ishlari bir-biridan sezilarli darajada farq qiladi [6].

Belgiya aholisini ijtimoiy himoya qilish tizimining boshqaruv modeli dastlab markazlashmagan, endilikda esa, yuqori darajada birlashtirilgan ma’lumotlar bazasiga ega. U ijtimoiy himoya dasturlaridan olingan axborotlarni emas, balki ijtimoiy sektor subyektlari tomonidan to‘plangan ma’lumotlarni qamrab olgan.

Belgiya rejalashtirish idorasining tadqiqotlariga ko‘ra, ushbu tizimning joriy etilishi ijtimoiy idoralar uchun ma’muriy xarajatlarni yiliga 1,7 milliard yevrogacha tejash imkonini berdi va 220 turdagi qog‘oz hujjatlar bekor qilindi. Bu tizim mamlakatda 30 yildan ortiq vaqt mobaynida samarali ishlab kelmoqda.

Turkiyada bu tizim yordamida ijtimoiy yordamni boshqarish bilan bog‘liq barcha xizmatlar amalga oshiriladi. Belgiyadan farqli ravishda, birmuncha markazlashgan va davlat muassasalarining 22 xildagi ma’lumotlari birlashtirilgan. Osongina kirish mumkin bo‘lgan bitta onlayn portalida 112 ta veb-xizmat, 10 dan ziyod ijtimoiy dasturlar taqdim etiladi.

Oldin Turkiyada ijtimoiy yordam olish uchun arizalarni tekshirish uchun 15-20 kun ketgan bo‘lsa, ushbu jarayon tatbiq etilgach, ishlar taxminan 1 daqiqada hal etiladigan bo‘ldi. 2010 yildan beri 30 million fuqaroning ijtimoiy yordam uchun murojaatlarini ko‘rib chiqdi va umumiy qiymati 13 milliard AQSH dollar bo‘lgan 311 million ijtimoiy yordam bitimlarini amalga oshirdi.

Ijtimoiy himoya yagona reyestrining vazirlik va idoralar ma’lumotlar bazasi bilan integratsiyalashuvining yanada kengayishi ariza berish jarayonida taqdim etish uchun talab qilinadigan hujjatlar soni qisqartirildi. Xususan, oila a’zolarining daromadlari, doimiy yashash uchun ro‘yxatdan o‘tganlik, oila tarkibi to‘g‘risidagi va mehnat organlari tomonidan taqdim etiladigan ma’lumotnomalar talab qilinmaydi. Ularning hammasi avtomatik tizimning o‘zi bajaradi.

Prezidentimizning 2020 yil 4 avgustdagi “Aholiga davlat ijtimoiy xizmatlari va yordam taqdim etish tartib-taomillarini avtomatlashtirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”gi [4] qarorida xuddi shunday ijobiy jihatlar inobatga olinib, Ijtimoiy himoya yagona reyestrini respublikaning barcha hududlarida bosqichma-bosqich joriy etish vazifasi qo‘yildi. Ushba vazifalar Birlashgan Millatlar Tashkilotining Bolalar jamg‘armasi va Jahon bankining moliyaviy, texnik va ekspert ko‘magi asosida amalga oshirildi.

“Yagona reyestr” axborot xizmatini ishlatish bo‘yicha milliy mutaxassislar jamoasi tashkil etildi. Buning natijasida barcha hududlarda mazkur tizim orqali kam ta’minlangan oilalarga ijtimoiy nafaqalar tayinlanib kelinmoqda. U 16 ta vazirlik va idoralarning ma’lumot bazalari bilan ulangan bo‘lib, ijtimoiy nafaqalarni qonunchilik hujjatlarida belgilangan mezonlarga asosan avtomatik ravishda amalga oshirilmoqda.

Eng muhimi, barcha ijtimoiy yordam bir xil mezon va bir xil hujjat asosida berilishi ta’minlanmoqda. Ijtimoiy nafaqa oluvchi oilalar soni 2020 yilning birinchi yarmida 600 ming nafar bo‘lsa, bu ko‘rsatkich ayni paytga kelib 1 million 600 mingdan oshgan.

2021 yil sentabr oyidan boshlab qayta ko‘rib chiqilgan bolalar nafaqalari Yagona reyestr orqali boshqarila boshlandi. Shuningdek, kambag‘allikni

qisqartirish va aholini ijtimoiy qo‘llab-quvvatlash choralari samaradorligini oshirish maqsadida kam ta’minlangan oilalarni aniqlashda daromad mezoni sifatida minimal iste’mol xarajatlari miqdorini qo‘llash tartibi yo‘lga qo‘yildi. Bular natijasida qisqa vaqt ichida kam ta’minlangan oilalarni aniqlashga va ularga nafaqalarni manzilli ravishda yetkazib berish imkoniyatini yaratdi. Misol uchun, Qoraqalpog‘iston Respublikasi, Jizzax, Qashqadaryo va Surxondaryo viloyatlarida har to‘rtinchi oila ijtimoiy nafaqa olmoqda. Taqdim etilgan davlat ijtimoiy yordami, birinchi navbatda, bolali oilalarning moddiy ahvolini yaxshilashga qaratilyapti.

Xulosa qilib aytganda, Ijtimoiy himoya yagona reyestri mamlakatda ijtimoiy himoya tizimini isloh qilishning umumiy strategiyasining bir qismi sifatida raqamli texnologik platformaning asosi sanaladi. Ushbu tizim moliyaviy yordamni davlat ijtimoiy, bandlik xizmatlari, nogironlik nafaqalari va boshqa imtiyozlar bilan samarali bog‘lash orqali ijtimoiy himoyani inklyuziv va har tomonlama ta’minlash uchun ajoyib imkoniyatni taqdim etadi. Bugungi kunga kelib “Yagona reyestr” axborot tizimi orqali ijtimoiy nafaqalarni avtomatik tarzda tayinlash tizimi to‘liq yo‘lga qo‘yilgan. Yangi O‘zbekistonning taraqqiyot strategiyasida belgilanganidek tariqasida ijtimoiy xizmatlarni yetkazishdagi boshqaruv jarayonlarni raqamlashtirish modulini ishlab chiqish, “Temir daftar”, “Ayollar daftari” va “Yoshlar daftari”ni integratsiya qilish ishlari olib boriladi. Shuningdek, tabiiy ofat, ijtimoiy-iqtisodiy kutilmagan vaziyatlar yoki boshqa sabablarga ko‘ra, favqulodda holatlar yuz berganida ijtimoiy himoya maxsus dasturlarini joriy etishni kiritish mumkin.

Demakki, “Ijtimoiy himoya yagona reyestri” axborot tizimi nafaqat ijtimoiy xizmatlar va yordamning manzilliligini oshirish imkoniyati, balki har qanday murakkab sharoitda ham aholining ehtiyojmand qismini qisqa muddatlarda aniqlash va ularni davlat tomonidan manzilli qo‘llab-quvvatlashning shaffof va samarali vositasiga aylanib boryapti. Ushbu raqamli ezgu tizimning faoliyat doirasi kengaytib borishi har yili millionlab ehtiyojmand oilalarning dardiga darmon, ro‘zg‘orlari butligiga ham kamarbasta bo‘ladi.

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ANALYSIS OF CHANGES IN THE CARDIOVASCULAR SYSTEM IN NON-ALCOHOLIC FATTY LIVER DISEASE (LITERATURE REVIEW)

Abstract: *According to projections by the World Health Organization (WHO), non-alcoholic fatty liver disease (NAFLD) is expected to become the most common liver disorder worldwide by 2026. Currently, NAFLD-related cirrhosis already represents the second most frequent indication for liver transplantation, surpassed only by viral cirrhosis. Patients with NAFLD experience markedly higher mortality during the first postoperative month compared with individuals transplanted for other causes of cirrhosis. They are also more prone to developing severe post-transplant complications, including sepsis, graft rejection, and cardiovascular disorders.*

The 2030 Agenda for Sustainable Development identifies noncommunicable diseases (NCDs) as a major obstacle to global progress. Within this framework, world leaders pledged to reduce premature mortality from NCDs by one-third through preventive strategies and appropriate treatment by the year 2030 (SDG Target 3.4). WHO plays a central coordinating role in global actions aimed at addressing NCDs and supporting progress toward this target. Clear diagnostic algorithms and standardized therapeutic strategies for NAFLD are still lacking; in practice, the condition is often diagnosed by excluding other hepatic diseases. Despite its high prevalence, the challenge of finding an effective treatment remains unresolved, and none of the currently used pharmacological therapies has a robust evidence base. Lifestyle modification — particularly weight control, correction of food-related behavioral patterns, and increased physical activity — remains the most reliable approach for preventing NAFLD progression and mitigating metabolic disturbances linked to severe type 2 diabetes and elevated cardiovascular risk. Present-day understanding defines NAFLD as a spectrum of liver abnormalities that range from simple steatosis to steatosis accompanied by inflammation and hepatocellular injury (non-alcoholic/metabolic steatohepatitis), and ultimately fibrosis, which may progress to cirrhosis. Current clinical guidelines advise treating these patients with statins at doses proven to reduce cardiovascular risk. Nonetheless, some individuals are unable to tolerate statins or fail to achieve cholesterol control even on maximal therapy, creating clinical limitations[1].

Management of NAFLD typically includes medications that offer antioxidant protection, stabilize hepatocyte membranes, exert immunomodulatory or anti-inflammatory effects, lower lipid levels, and reduce insulin resistance. The overarching goal of therapy is to prevent the development of cirrhosis and its complications. Although addressing components of metabolic syndrome —

particularly insulin resistance — is critical, these measures alone are insufficient for complete disease reversal; additional antioxidant and cytoprotective therapy is often required to counteract ongoing necroinflammatory damage and fibrosis.

Initial management should always focus on dietary modification and increased physical activity, especially in individuals with obesity or diabetes. When lifestyle interventions fail, pharmacologic options for treating morbid obesity can be considered, and in selected cases, bariatric surgery may be appropriate[2].

Guidelines issued by the European Association for the Study of the Liver (EASL), the European Association for the Study of Diabetes (EASD), and the European Association for the Study of Obesity (EASO) recommend initiating pharmacological treatment in patients with NASH, particularly those with significant fibrosis (≥F2). Even patients with milder forms of NAFLD may require medical therapy if they possess risk factors known to accelerate disease progression, such as diabetes, metabolic syndrome, or persistent elevations in ALT. The 2012 American guidelines on NAFLD diagnosis and treatment identified several recommendations with the highest evidence level (Grade 1A). To improve hepatic steatosis, a weight reduction of at least 3–5% is necessary, whereas a more substantial weight loss of about 10% is required to diminish necroinflammatory activity. These statements are supported by Level 1B evidence.

Keywords: *Non-alcoholic fatty liver disease, cardiovascular system, dyslipidemia, insulin resistance, endothelial dysfunction, atherosclerosis.*

Introduction

Non-alcoholic fatty liver disease (NAFLD) represents the hepatic manifestation of metabolic syndrome and is characterized by the pathological accumulation of triglycerides within hepatocytes as a result of impaired lipid metabolism. Over the past several decades, the prevalence of NAFLD has risen dramatically and is now recognized as one of the most common chronic liver diseases worldwide. In many industrialized nations, NAFLD affects an estimated 25–30% of the general population, making it a major global health burden. Importantly, the significance of this disease extends far beyond liver-specific outcomes; NAFLD is increasingly being identified as a major, independent risk factor for the development of cardiovascular diseases, which remain the leading cause of mortality among affected individuals.

NAFLD encompasses a broad spectrum of hepatic abnormalities that range from simple steatosis, which involves fat accumulation without significant inflammation, to non-alcoholic steatohepatitis (NASH), a more severe form characterized by hepatocellular injury, inflammation, and varying degrees of fibrosis. If left untreated, NASH can progress to advanced fibrosis, cirrhosis, and ultimately hepatocellular carcinoma (HCC). However, the majority of deaths in patients with NAFLD are not due to end-stage liver disease, but to cardiovascular complications such as coronary artery disease, stroke, and progressive heart failure. This shift in understanding has led to a broader conceptualization of

NAFLD as a multisystem disorder that reflects widespread metabolic dysfunction rather than a disease limited to the liver alone. The pathogenesis of NAFLD is complex and multifactorial, involving a combination of genetic predisposition, environmental influences, and metabolic abnormalities[3]. Insulin resistance—a hallmark of metabolic syndrome—is widely considered the central driver of disease development. When peripheral tissues such as muscle and adipose tissue become resistant to insulin, circulating insulin levels increase, promoting enhanced fatty acid flux to the liver. This influx overwhelms the liver's metabolic capacity, resulting in excessive triglyceride synthesis and deposition within hepatocytes. In addition, insulin resistance disrupts normal lipolytic pathways and alters adipokine secretion, further amplifying fat accumulation and hepatic inflammation. Dyslipidemia is another key contributor to disease progression. Many patients with NAFLD exhibit elevated levels of triglycerides, low levels of high-density lipoprotein cholesterol (HDL-C), and qualitative changes in low-density lipoprotein particles (LDL), particularly an increase in small, dense LDL fractions that are highly atherogenic. These lipid abnormalities not only exacerbate liver injury but also accelerate the development of atherosclerosis, thereby strengthening the link between NAFLD and cardiovascular disease. Indeed, the presence of NAFLD predicts an increased risk of myocardial infarction, carotid artery disease, hypertension, and overall cardiovascular mortality independent of traditional risk factors.

Genetic factors also play a major role in susceptibility to NAFLD. Variants in genes such as PNPLA3, TM6SF2, and MBOAT7 have been shown to influence lipid metabolism and hepatic fat storage, contributing to inter-individual differences in disease severity and progression. Likewise, lifestyle factors—particularly excessive caloric intake, diets high in saturated fats and fructose, and low levels of physical activity—compound the risk of disease onset and progression. The clinical implications of NAFLD are profound. As the disease progresses, patients may develop complications of chronic liver failure including portal hypertension, variceal bleeding, hepatic encephalopathy, and an increased risk of hepatocellular carcinoma—even in the absence of cirrhosis in some cases. However, for most patients, cardiovascular disease remains the dominant threat. Several longitudinal cohort studies have shown that individuals with NAFLD have significantly higher rates of major adverse cardiovascular events compared with those without the condition, even when adjusted for conventional risk factors such as smoking, obesity, and hypertension[4].

Literature review and analysis

Non-alcoholic fatty liver disease (NAFLD) is increasingly recognized as the hepatic manifestation of metabolic syndrome and represents a major public health concern due to its high prevalence and strong association with cardiovascular disease. Epidemiological and clinical research over recent decades has consistently demonstrated that patients with NAFLD are at significantly increased risk of developing a spectrum of cardiovascular disorders, including ischemic heart disease, arterial hypertension, left ventricular hypertrophy, cardiac

arrhythmias, and heart failure. Unlike traditional liver diseases, in which hepatic complications dominate the clinical course, the primary morbidity and mortality in NAFLD patients are frequently related to cardiovascular events, underscoring the systemic nature of this disease.

The pathogenesis of NAFLD is multifactorial, involving a complex interplay of metabolic, inflammatory, and oxidative processes. Insulin resistance serves as the central mechanism linking hepatic lipid accumulation with systemic cardiovascular risk. Impaired insulin signaling disrupts glucose homeostasis and lipid metabolism, leading to an increased flux of free fatty acids into the liver. Accumulation of triglycerides in hepatocytes results in hepatic steatosis, which may progress to non-alcoholic steatohepatitis (NASH) when combined with inflammation and hepatocellular injury. This state of metabolic dysregulation has systemic consequences. Elevated free fatty acids and hyperinsulinemia promote endothelial dysfunction, a critical early event in atherogenesis. Endothelial cells exposed to high levels of circulating lipids and inflammatory mediators lose their capacity to produce adequate nitric oxide, leading to increased vascular tone, impaired vasodilation, and the promotion of vascular stiffness. These changes facilitate the development of atherosclerotic plaques, increasing the likelihood of ischemic heart disease and cerebrovascular events. Inflammatory mediators secreted by the liver, such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α), further exacerbate vascular injury[5]. These cytokines induce chronic low-grade inflammation within the vascular wall, enhancing oxidative stress, promoting monocyte recruitment, and accelerating plaque formation. Moreover, this systemic inflammatory state contributes to left ventricular remodeling, myocardial fibrosis, and the eventual development of diastolic dysfunction, as observed in numerous imaging studies.

Dyslipidemia is another critical component of NAFLD-associated cardiovascular risk. Patients commonly exhibit elevated triglyceride levels, increased low-density lipoprotein (LDL), particularly small, dense LDL particles, and decreased high-density lipoprotein (HDL). These lipid abnormalities enhance lipid deposition within arterial walls, accelerating the progression of atherosclerosis and amplifying the risk of coronary artery disease and stroke. The combination of insulin resistance, dyslipidemia, and inflammation thus establishes a pathophysiological milieu conducive to cardiovascular complications[6].

Cardiac involvement in NAFLD extends beyond traditional risk factors. Ultrasonographic and echocardiographic studies reveal that NAFLD patients frequently exhibit impaired left ventricular relaxation, indicative of diastolic dysfunction. Reduced myocardial elasticity, increased ventricular stiffness, and altered ventricular geometry have been consistently reported. Notably, systolic function often remains preserved until late in the disease course, allowing subclinical cardiac changes to progress unnoticed. This silent progression underscores the importance of early detection and comprehensive cardiovascular risk assessment in patients with NAFLD. Metabolic cardiomyopathy represents a distinct clinical entity in NAFLD patients. Excessive lipid accumulation within

cardiomyocytes, coupled with mitochondrial dysfunction and oxidative stress, leads to impaired contractility and eventual heart failure. The deposition of lipid droplets within myocardial tissue not only disrupts cellular energetics but also promotes local inflammation and fibrosis. As a result, patients may develop subtle reductions in cardiac output, increased ventricular filling pressures, and clinical manifestations of heart failure over time[7]. Arterial hypertension is highly prevalent among individuals with NAFLD. Pathophysiological mechanisms underlying this observation include hyperactivation of the renin-angiotensin-aldosterone system (RAAS) and increased sympathetic nervous system activity. Elevated angiotensin II and aldosterone levels contribute to vasoconstriction, sodium retention, and vascular remodeling, further exacerbating cardiovascular risk. Endothelial dysfunction decreases nitric oxide bioavailability, thereby increasing systemic vascular resistance. The combination of these factors not only elevates blood pressure but also accelerates the progression of atherosclerosis and left ventricular hypertrophy.

NAFLD rarely occurs in isolation; it is strongly associated with components of the metabolic syndrome, including obesity, type 2 diabetes, and insulin resistance. The coexistence of these conditions compounds cardiovascular risk. Hyperglycemia and insulin resistance drive further hepatic lipid accumulation and systemic inflammation. Dyslipidemia, characterized by high triglycerides and low HDL, synergizes with endothelial dysfunction and pro-inflammatory signaling to promote atherogenesis. Collectively, these factors create a vicious cycle in which metabolic and cardiovascular pathologies reinforce one another[8].

The recognition of NAFLD as a multisystem disorder has profound clinical and public health implications. Given its high prevalence and strong association with cardiovascular disease, early screening and intervention are critical. Weight reduction through lifestyle modification, including dietary interventions and regular physical activity, remains the cornerstone of management. Clinical studies have shown that modest weight loss of 5–10% can significantly reduce hepatic steatosis, improve insulin sensitivity, and decrease systemic inflammation. Pharmacological therapies targeting insulin resistance, dyslipidemia, and inflammatory pathways are increasingly being investigated as adjuncts to lifestyle modification. Additionally, regular cardiovascular assessment, including echocardiography, blood pressure monitoring, and lipid profiling, is recommended in patients with NAFLD. Early identification of diastolic dysfunction or other subclinical cardiac abnormalities allows for timely intervention and may prevent progression to overt heart failure or ischemic events. Considering the systemic nature of the disease, a multidisciplinary approach involving hepatologists, cardiologists, endocrinologists, and primary care providers is essential.

Conclusion

NAFLD represents a significant global health challenge, not only because of its impact on liver function but also due to its profound effects on cardiovascular health. Insulin resistance, dyslipidemia, endothelial dysfunction, and chronic inflammation are central to the pathophysiology linking NAFLD to cardiovascular

disease. Structural and functional cardiac changes, including diastolic dysfunction and metabolic cardiomyopathy, highlight the multisystemic nature of this disorder. Early identification, lifestyle interventions, and targeted pharmacotherapy are critical for mitigating both hepatic and cardiovascular complications. As the prevalence of NAFLD continues to rise worldwide, addressing its cardiovascular consequences remains a priority for clinicians and public health policymakers alike.

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ПОВЫШЕНИЕ НАДЕЖНОСТИ И ЭФФЕКТИВНОСТИ СИСТЕМЫ ЭЛЕКТРОСНАБЖЕНИЯ ЗА СЧЕТ ИСПОЛЬЗОВАНИЯ СЕТЕЙ ГЛУБОКИХ ВВОДОВ

Аннотация: *В статье рассматриваются пути повышения надежности и эффективности системы электроснабжения путем применения сетей глубокого доступа в системах электроснабжения. На базе сетей глубокого ввода можно будет добиться бесперебойности подачи электроэнергии в систему электроснабжения за счет повышения надежности и энергоэффективности электроснабжения, а также за счет выбора правильных методов снижения потерь электроэнергии.*

Ключевые слова: *Глубоких вводов, система, мощность, напряжения, ток, линия, схема, сеть и электроснабжение.*

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INCREASING THE RELIABILITY AND EFFICIENCY OF THE POWER SUPPLY SYSTEM THROUGH THE USE OF DEEP ENTRY NETWORKS

Abstract: *This article discusses methods for increasing the reliability and efficiency of the power supply system by using deep penetration networks in power supply systems. Based on deep penetration networks, it is possible to achieve uninterrupted power supply in the power supply system by correctly selecting methods to increase the reliability and energy efficiency of power supply, as well as reduce electricity waste.*

Keywords: *Deep inputs, system, power, voltage, current, line, circuit, network and power supply.*

Введение

Одним из основных показателей, определяющих уровень развития любой страны, является её энергетическое развитие. В результате реформ, проводимых в Узбекистане в последние годы, а именно развития образа

жизни и использования различных инновационных современных технологий, спрос на электроэнергию продолжает расти [1].

В целях реализации приоритетных направлений ускоренного развития экономики разрабатываются и планируются меры по эффективному обеспечению электроэнергией и снижению потерь энергии в системе. В настоящее время на уровне правительства проводится программная работа по обеспечению прогнозируемой потребности в системе электроснабжения, а также по достижению эффективности и энергоэффективности в системе. На практике проводятся работы по реконструкции, замене и техническому перевооружению устаревших электроустановок и сетей, работающих с высокой нагрузкой. Поставлены также задачи по созданию дополнительных необходимых мощностей, включая строительство парогазовых установок, атомных электростанций, гидроэлектростанций и модернизацию существующих, обновление энергоблоков на тепловых электростанциях, а также по покрытию требуемых мощностей за счет внедрения государственно-частного партнерства в электроэнергетическую систему [2].

Реализация этих мер может потребовать значительных временных и финансовых затрат. Учитывая это, для удовлетворения потребностей в электроэнергии, а также повышения надежности и энергоэффективности системы электроснабжения необходимо в системе вновь строящихся заводов и фабрик, учреждений и жилых домов применять новые современные инновационные устройства и сети, основываясь на опыте зарубежных стран.

Методы

Рост нагрузок и энергопотребления в системе электроснабжения требует тщательного изучения и разработки соответствующих методов развития системы электроснабжения (СЭС).

Системы электроснабжения и их конструктивные особенности.

Под системой электроснабжения (СЭС) понимается комплекс электрических сетей и трансформаторных подстанций, расположенных на территории города и предназначенных для обеспечения его потребителей электроэнергией.

Городская электросеть включает в себя все электроустановки, расположенные на его территории, от главных подстанций и электростанций до вводов к отдельным потребителям, предназначенные для обеспечения города электроэнергией.

Структурная схема системы электроснабжения города зависит от города и численности населения. Разработаны системы электроснабжения крупных городов с учетом современного уровня плотности нагрузки, в основной структурной схеме которых условно можно выделить пять элементов:

- система внешнего электроснабжения города;
- высоковольтные (220-110-35 кВ) сети глубокого ввода (ГВ) - те же, включая подстанции глубокого ввода (ПГВ);

- распределительные сети среднего напряжения (6-10кВ), распределительные пункты;

- включая трансформаторы среднего напряжения в системе распределения

трансформаторные подстанции 6-10/0,4 кВ;

- распределительные сети низкого напряжения (до 1000 В) [3].

Результаты и обсуждение

Для повышения надежности и эффективности городских систем электроснабжения в основном применяются сети глубокого ввода (ГВ). Применение сетей глубокого проникновения связано с увеличением протяженности высоковольтной сети. При этом рост стоимости высоковольтной сети приводит к резкому снижению затрат на сеть среднего напряжения за счет уменьшения ее протяженности. При этом исключается строительство распределительных пунктов и линий электропередачи напряжением 6-10 кВ.

Одной из основных особенностей современного и перспективного развития системы электроснабжения является анализ и обоснование применения методов, позволяющих снизить потери электроэнергии, снизить материалоемкость, сократить количество промежуточных сетевых присоединений и улучшить режим работы потребителей электроэнергии за счет внедрения высоковольтных сетей глубокого ввода (ГВ) во вновь строящихся городах, а также ввода в эксплуатацию подстанций.

Исходя из опыта Российской Федерации, повышение надежности и энергоэффективности системы электроснабжения возможно с использованием сетей глубокого ввода (ГВ). Данный метод позволяет добиться этого за счет подачи напряжения 35 кВ от подстанций непосредственно к трансформаторам по воздушным и кабельным сетям, что исключает необходимость использования воздушных и кабельных сетей 6-10 кВ [4].

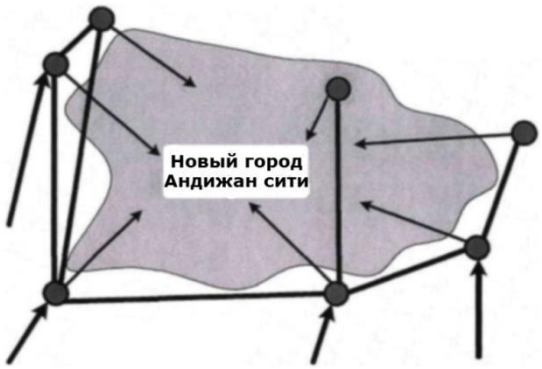


Рисунок 1. Расположение сетей глубокого ввода (ГВ) для обеспечения равномерности потоков энергии в города Андижан Сити.

Основные преимущества внедрения сетей глубокого ввода (ГВ) 35 кВ заключаются в следующем: сети глубокого проникновения 35 кВ позволяют приблизить электроэнергию к потребителю, что снижает потери в линиях электропередачи и обеспечивает устойчивость системы в случае возникновения аварийных ситуаций; ток при передаче по высоковольтным линиям 35 кВ меньше, что значительно снижает потери активной мощности в проводах, что приводит к повышению экономической эффективности; сети 35 кВ позволяют осуществлять автономное или частично автономное электроснабжение крупных предприятий, что повышает удобство электроснабжения и перспективы развития; в результате строительства сетей глубокого проникновения 35 кВ вместо сетей 6-10 кВ сокращается общее количество проводов и подстанций, а также снижаются затраты на строительство и обслуживание [4,5].

Построить экономичную городскую электросеть для передачи и распределения электроэнергии на уровне 6-10 кВ невозможно, так как это потребовало бы строительства сотен километров линий электропередачи напряжением 6-10 кВ от удаленных источников до потребителей. Кроме того, для передачи электроэнергии большой мощности используется большое количество цветных металлов.

При внедрении кабелей глубокого проникновения (ВН) 35 кВ вместо сетей электроснабжения 6–10 кВ появляется возможность выбора меньшего сечения кабеля. В результате сокращается длина кабельной линии, а также снижается токовая нагрузка, то есть вместо прежнего кабеля сечением 240 мм² может быть достаточно кабеля сечением 150 мм² или 120 мм².

Сечение кабеля определяет два фактора: уровень электрических потерь (в зависимости от значения R); стоимость кабеля и затраты на монтаж (цена возрастает с увеличением сечения S).

С экономической точки зрения при выборе сечения кабеля используется следующая формула:

$$C_{рас}=C_{каб}+C_{пот}$$

$C_{рас}$ - общие годовые расходы; $C_{каб}$ - стоимость покупки и установки кабеля;

$C_{пот}$ - оплата ежегодных потерь энергии.

Принцип экономического оптимума:

$$C_{пот} = P_{нет} \cdot T \cdot Ce$$

$P_{нет}$ - электрические потери (кВт); T - годовое количество рабочих часов (часов/год), обычно 7000–8000 соат; Ce - 1 кВт· почасовая цена энергии(сум /кВт)

Таблица-1

Показатель	До введения ГВ (10 км линия)	После введения ГВ (4 км линия)
Сечение кабеля	240 мм²	150 мм²
Цена 1 км кабеля	300 млн сум	220 млн сум
Сечение кабеля	240 мм²	150 мм²
Цена 1 км кабеля	300 млн сум	220 млн сум
Длина линии	10 км	4 км
Ежегодные потери энергии	56.5 кВт × 7500 час = 423 750 кВт· час	22.6 кВт × 7500 час = 169 500 кВт·час
Цены энергии (C_e)	800 сум /кВт· час	800 сум /кВт· час
Стоимость убытков	423 750 × 800 = 339 млн сум / год	169 500 × 800 = 135.6 млн сум /год
Стоимость покупки кабеля	10×300 = 3000 млн сум	4×220 = 880 млн сум

Мощная энергосистема позволяет строить многочисленные линии электропередачи для обеспечения большого объёма электроэнергии в недавно построенном городе. Примерами служат недавно построенные Ташкент и Андижан [6].

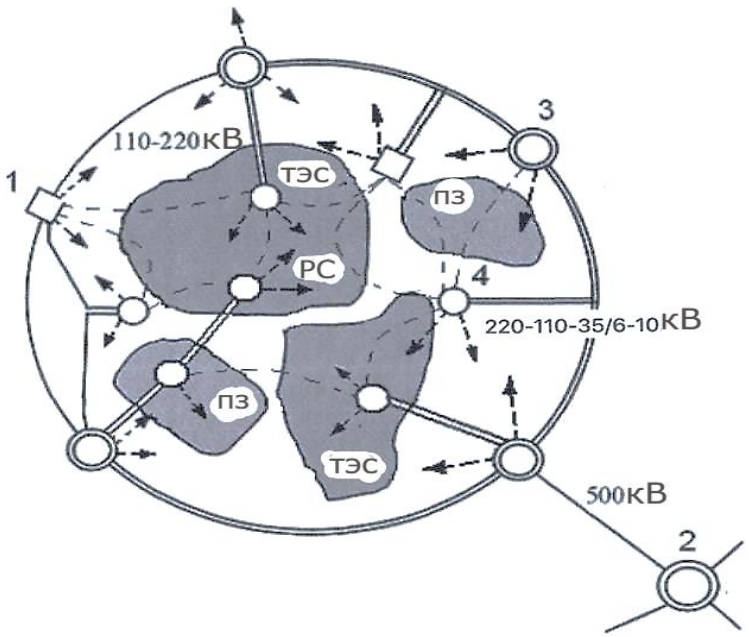


Рисунок 1. Схема системы электроснабжения крупного города.
1-тепловые электрические станции (ТЭС); 2-базовая подстанция системы электроснабжения; 3-базовая подстанция внешнего электроснабжения; 4-подстанция глубокого заложения; РС-распределительные сети; ПЗ - промышленные зоны; ЖД - жилые дома.

Исходя из представленных данных, решение этой проблемы возможно за счёт строительства сетей глубокого ввода (ГВ) от сильной сети к соседним участкам слабой сети. Учитывая, что модернизация существующей системы электроснабжения крупных городов трудоёмка и затратна, целесообразнее внедрять её в системы электроснабжения вновь строящихся городов.

Проектирование сетей электроснабжения должно осуществляться с учётом наибольшей эффективности, требуемой надёжности электроснабжения и соблюдения установленных норм качества электроэнергии [7].

Заключение

При грамотной организации надежности электроснабжения, энергоэффективности и применении методов предотвращения потерь энергии на основе сетей глубокого проникновения будет обеспечено бесперебойное электроснабжение в системе. Внедрение сетей глубокого проникновения на вновь строящихся объектах, в учреждениях и жилых массивах, а также правильный выбор устройств и сетей могут стать основой повышения энергоэффективности.

Использованные источники:

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СОВЕРШЕНСТВОВАНИЕ МЕТОДОЛОГИИ ПОДГОТОВКИ МАГИСТЕРОВ ТЕХНИЧЕСКОЙ СПЕЦИАЛИЗАЦИИ К НАУЧНО-ИССЛЕДОВАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ

Аннотация: *В статье раскрывается сущность и содержание педагогической модели формирования готовности магистрантов к исследовательской деятельности.*

Ключевые слова и понятия: *модель, магистратура, учебно-исследовательской деятельности, научно-исследовательской деятельности.*

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IMPROVEMENT OF THE METHODOLOGY OF TRAINING MASTERS OF TECHNICAL SPECIALIZATION FOR SCIENTIFIC RESEARCH ACTIVITIES

Annotation: *The article reveals the essence and content of the pedagogical model for developing the readiness of master's students for research activities.*

Key words and concepts: *model, master's degree, educational and research activities, scientific research activities.*

Во всем мире образование признано основным фактором, обеспечивающим устойчивое развитие. В условиях цифровой трансформации образования в мире все больше возрастает потребность общества в развитии талантов и способностей для подготовки магистров к научной деятельности. Образование – процесс привития знаний, умений и навыков, главное средство подготовки человека к жизни и труду. Образование признано главным фактором, обеспечивающим устойчивое развитие, а в международной концепции образования до 2030 года «создание возможности получать качественное образование на протяжении всей жизни» определено как неотложная задача. Это расширило возможности совершенствования методической системы подготовки к научно-

исследовательской деятельности магистратуры по специальности в системе образования. В развитых странах мира магистратура является образовательной ступенью, направленной на подготовку не только высококвалифицированных специалистов, но и будущих ученых, общий и профессиональный уровень подготовки которых постоянно меняется и отвечает требованиям общества. В связи с этим в таких развитых странах, как США, Великобритания, Германия, Франция, Китай, Япония, Южная Корея, обеспечение качества образовательного процесса на уровне магистратуры наряду с высокой профессиональной квалификацией, постановка научных задач, планирование научных исследований и проведения научно-исследовательской деятельности, проводится ряд научных исследований по проблемам подготовки творческих специалистов, умеющих анализировать первичные данные и оценивать результаты исследований. Качество послевузовского образования и развитие различных отраслей нашей экономики во многом связаны с подготовкой магистров технических специальностей к научной и исследовательской деятельности. Поэтому мы можем признать уровень развития научно-исследовательских компетенций у выпускников технических специальностей одним из важных факторов вывода нашей науки и экономики на новый уровень. В последние годы особое внимание уделяется формированию и развитию системы магистратуры, основанной на современных требованиях. В результате комплексных реформ, реализуемых в сфере образования, например, было усилено нормативно-правовое, научно-методическое и материально-техническое обеспечение магистратуры, разработаны Государственные образовательные стандарты магистерских специальностей и т.д. Помимо этого, подчеркивается необходимость совершенствования методологий, направленных на развитие научно-исследовательских компетенций магистерской деятельности. Важно также учитывать, что магистратура является базой для подготовки не только специалистов высокой профессиональной квалификации, но и будущих ученых, уровень общей и профессиональной подготовки которых должен быть адекватен требованиям постоянно изменяющегося общества. В этой связи выдвигается проблема обеспечения качества образовательного процесса в магистратуре, ориентированного на подготовку творческих специалистов, обладающих кроме высокой профессиональной квалификации, умением ставить исследовательские задачи, планировать проведение исследований, выполнять исследовательские действия, анализировать исходные данные и оценивать результаты исследований.

Анализ состояния и развития магистратуры в системе многоуровневого образования, научно-педагогической литературы, обобщение опыта данной области свидетельствует, что профессиональная подготовка магистров предполагает активное включение магистрантов в систематическую исследовательскую деятельность как основной вид учебной деятельности магистрантов, базируется на концептуальных идеях фундаментализации,

гуманизации, профессионализации, информатизации образовательного процесса. Результатом профессиональной подготовки будущих магистров является компетентность выпускника, включающая знания, умения, необходимые для осуществления профессиональной деятельности. В компетентности магистра выделяется характеристика, обеспечивающая качество подготовки выпускника магистратуры-исследовательская компетентность, которая детерминируется уровнем сформированное готовности магистранта к ИД. С этой точки зрения нами были определены ключевые понятия нашего исследования: «исследовательская деятельность магистранта», «готовность магистрантов к ИД» и «процесс формирования готовности магистрантов к ИД».

Изучив содержание магистерских образовательных программ мы пришли к выводу, что понятие «исследовательская деятельность» на уровне магистратуры является более широким понятием и представляет собой синтез учебно-исследовательской деятельности (УИД) и научно-исследовательской деятельности (НИД), которые различаются между собой степенью самостоятельности при выполнении исследования. Учитывая указанную специфику, под исследовательской деятельностью магистрантов мы понимаем специально-организованную деятельность по овладению методологией научного познания и организации исследовательского поиска, результатом которой является соответствующий уровень сформированности исследовательских знаний, умений и профессионально-значимых личностных качеств, обеспечивающих успешное функционирование этой деятельности.

При определении структуры исследовательской деятельности магистрантов мы опирались на концептуальную модель деятельности, разработанную А.Н.Леонтьевым. Структура исследовательской деятельности магистрантов представляет собой совокупность взаимосвязанных и взаимообуславливающих компонентов: потребность, мотив, цель, действия, операции, условия. Ее успешное выполнение предполагает у магистранта сформированность готовности к исследовательской деятельности, которая определяется в нашем исследовании как целостное личностное образование магистранта, отражающее отношение и результат его внутреннего интеллектуального и личностного развития, включающее мотивационно-ценностное отношение к исследовательской деятельности, систему методологических знаний и исследовательских умений, профессионально-значимые личностные качества, обеспечивающие успешность исследовательской деятельности.

Решение проблемы содержания готовности магистрантов к ИД нами осуществлялось через исследование наполнения содержания готовности к профессиональной деятельности. Мы разделяем точку зрения ученых (К.М. Дурай-Новаковой, В.А.Сластенина, Н.Д.Хмель и др.), которые рассматривают «готовность к профессиональной деятельности» как

целостное явление, интегрирующее не только направленность личности и определенные знания, умения, но и качества личности.

В структуре готовности магистрантов к ИД мы выделили следующие компоненты: мотивационно-ценностный, включает совокупность устойчивых мотивов (познавательных, личностных, социально-значимых, профессионально-ценностных), определяющих не только интерес, положительное отношение магистранта к ИД, но и отражающий общую направленность личности, его поисково-творческую, исследовательскую позицию, которая заключает в себе убежденность в профессиональной и социальной значимости исследовательской деятельности и в осознании необходимости активного участия в ней; когнитивно-операциональный, включает общенаучные методологические знания и умения, конкретно-научные исследовательские знания и умения, знания процедур и владение техникой научно-педагогического исследования; личностный, включает в себя систему сформированных профессионально -значимых личностных качеств педагога-исследователя, такие как: самоорганизация, самоконтроль, активность, способность к рефлексии. Совокупность этих компонентов составляет феномен готовности магистрантов к исследовательской деятельности.

Изучение состояния проблемы формирования готовности магистрантов к ИД в системе многоуровневого образования позволило сделать вывод о том, что готовность магистрантов к ИД не образуется самостоятельно, требуется целенаправленные усилия по ее формированию. При этом под формированием готовности магистрантов к ИД мы понимаем процесс, направленный на мотивационно-ценностное отношение магистрантов к ИД, овладение магистрантами методологическими исследовательскими знаниями и умениями; развитие профессионально-значимых личностных качеств, обеспечивающих успех и результативность исследовательской деятельности.

Определившись с основной терминологией, перед нами встала задача построения модели формирования готовности магистрантов к ИД. Определяющим при ее разработке является выбор теоретико-методологической стратегии, отражающей направление научного поиска и его результат. Рассматривая формирование готовности магистрантов к ИД как сложный и многоаспектный процесс, полноценное изучение которого не может осуществляться на основе одного подхода, мы опирались на сочетание системного, информационного и личностно-деятельностного подходов.

В качестве общенаучного уровня выбран системный подход, который обеспечивает комплексное изучение проблемы формирования готовности магистрантов к ИД и позволяет рассматривать данный процесс как педагогическую систему. Использование положений системного подхода позволило нам сделать следующие обобщения:

1) процесс формирования готовности магистрантов к исследовательской деятельности является подсистемой профессиональной

подготовки, что позволяет строить его с учетом общедидактических принципов;

2) процесс формирования готовности магистрантов к исследовательской деятельности как педагогическая система носит открытый, вероятностный характер, обладает гибкостью, динамичностью, управляемостью,

3) эффективность процесса формирования готовности магистрантов к исследовательской деятельности зависит от организации системных воздействий по подготовке магистрантов к образовательному процессу послевузовского образования и созданию специальных педагогических условий;

4) готовность к исследовательской деятельности может рассматриваться как педагогическая система, являющаяся целостным образованием специальных знаний, умений и качеств личности магистранта, обеспечивающая эффективность осуществления научно-педагогической и научно-исследовательской деятельности.

Указанные положения наиболее полно раскрываются в сочетании с информационным подходом, который является стратегией исследования на конкретно-научном уровне. Информационный подход в нашем исследовании позволяет сформулировать следующие обобщения:

1) процесс формирования готовности магистрантов к исследовательской деятельности является информационным по своей природе, качество информации определяет его эффективность;

2) информация, составляющая основу процесса формирования готовности к исследовательской деятельности, отражает опыт субъектов образовательного процесса, их целевые установки и ценностные ориентации;

3) с точки зрения информационного подхода процесс формирования готовности магистрантов к исследовательской деятельности является открытой системой, предполагающей постоянный обмен информацией с внешней средой;

4)информационное обеспечение процесса формирования готовности магистрантов к исследовательской деятельности должно включать необходимые теоретические знания о методологии исследовательской деятельности, использование современных информационных технологии в исследовательской деятельности.

Практико-ориентированной тактикой работы выступает личностно-деятельностный подход. Основными положениями личностно-деятельностного подхода в рамках проблемы формирования готовности магистрантов к ИД являются:

1) формирование готовности магистрантов исследовательской деятельности представляет собой педагогический процесс, в котором магистранты занимают субъектную позицию.

2) формирование готовности магистрантов к ИД как процесс строится на основе общедидактических принципов, с использованием методов активизации данного процесса.

3) формирование готовности магистрантов к исследовательской деятельности осуществляется на основе учета субъектного опыта и их индивидуальных особенностей, за счет субъект-субъектных отношений с педагогами.

На основе указанных положений системного, информационного и личностно-деятельностного подходов, с учетом структуры готовности магистрантов к ИД, нами сконструирована модель формирования готовности магистрантов к ИД, включающая три основных компонента: мотивационно-целевой, содержательно-технологический, результативно-оценочный.

Мотивационно-целевой компонент обеспечивает формирование у магистрантов исследовательской позиции, ценностного отношения к ИД, установки на ИД. Этот компонент выполняет функции целеполагающую мотивирующую, прогностическую.

Мотивационная составляющая предполагает перевод внешних мотивов во внутренние, осуществляемый посредством специально организованных стимулирующих воздействий на магистрантов, обеспечивающих формирование личностно значимых мотивов. Магистранты - это специалисты, уже имеющие высшее профессиональное образование (диплом бакалавра), определенный профессиональный опыт, имеют высокую мотивацию к обучению. Следовательно, магистрант рассматривается нами не как обучаемый, а как обучающийся: стремится к самостоятельности, самореализации, самоуправлению; обладает всесторонним опытом, который используется как источник обучения; обучается, чтобы решить важную жизненную проблему для достижения конкретной цели. Поэтому на уровне освоения магистерских программ в мотивационной составляющей должны быть актуализированы совершенно иные методы, приемы и средства, направленные на самообразовательную деятельность. Учитывая это, мы использовали мотивационно-ценностные личностные элементы, которые составляют неотъемлемую часть исследовательской деятельности: проблемность, критичность, открытость для дополнения, самоактуализируемую субъектность.

Выделим следующие принципы компетентностного подхода:

- смысл образования заключается в развитии, у обучаемых способности самостоятельно решать проблемы в различных сферах и видах деятельности на основе использования социального опыта, элементом которого является и собственный опыт учащихся;
- содержание образования представляет собой дидактически адаптированный социальный опыт решения познавательных, мировоззренческих, нравственных, политических и иных проблем;
- смысл организации учебно-воспитательного процесса заключается в создании условий для формирования у обучаемых опыта самостоятельного

решения познавательных, коммуникативных, организационных, нравственных и иных проблем, составляющих содержание образования;

- оценка образовательных результатов основывается на анализе уровней образованности, достигнутых учащимися на определённом этапе обучения.

Таким образом, можно резюмировать, что:

а) «знаниевый» подход в образовании стремится к тому, чтобы магистр получил как можно больше знаний. Однако уровень образованности, а тем более в современных условиях, нельзя определить через объем знаний. Компетентностный подход в образовании требует от магистра умения решать проблемы разной сложности, основываясь на имеющихся знаниях. Этот подход ценит не сами знания, а способность использовать их;

б) традиционный подход стремится к результату, который показывает, что нового узнает магистрант, а компетентностный подход дает понять, чему научился магистрант за период обучения в магистратуре. Оба подхода стремятся развить у магистранта определенные качества личности, сформировать систему ценностей. Различия связаны с разными представлениями о способах достижения желаемого. При традиционном подходе считается, что всего этого можно достичь путем приобретения новых знаний. Компетентностный подход в обучении рассматривает получение опыта при самостоятельном решении проблем.

Следовательно, решение проблем в «знаниевой» системе как способ закрепления знаний, а в компетентностном – это смысл всей образовательной деятельности.

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иқтисодиётда ахборот технологиялари
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КИЧИК ВА ЎРТА БИЗНЕСДА ИШ ЖАРАЁНИНИ РАҚАМЛИ ТЕХНОЛОГИЯЛАР ОРҚАЛИ САМАРАЛИ ТАШКИЛ ЭТИШ

Аннотация: *Биз янги давр – тўртинчи саноат инқилобига қадам қўйдик. Бунга ёрқин мисол тариқасида мобил банкинг ва тўлов тизимларини смартфонлар орқали бошқариш, сунъий интеллектнинг яратилиши ва хар бир сохада қўлланишидир. Бу инқилобнинг яна бир хусусияти даромадлилиги жихатидан йирик ишлаб чиқариш корхоналарининг ўз ўрнини "Amazon", "Meta", "SpaceX" сингари технологик компанияларга бўшатиб бераётганидир. Бу гигант компаниялар кундан-кунга даромадларини ошириш баробарида, унинг бир қисмини ўзлари учун алохида иш самарадорлиги оширишга хизмат қилувчи турли дастурлар яратишга ва иш жараёнига интеграция қилишга йўналтираяпди. Бироқ юқоридаги жараённи кичик ва ўрта хажмдаги корхоналар мисолида қарайдиган бўлсак, иш жараёнларини оптималлаштириш учун турли ички дастурлар яратиш кўп холларда имконсиз хисобланади. Мақолада ушбу масалага қандай қилиб самарали ишлаш услубларини турли "SaaS", "ERP", "IoT" тизимларини қуллаш орқали корхонага жорий этиш ечимларини тахлил қилади.*

Калит сўзлар: *Рақамли технологиялар, сунъий интеллект, рақамли платформалар, "SaaS", "ERP", технологик компаниялар, "BI Tools", автоматлаштирилган иш жойлари, "CRM", рақамли трансформация.*

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ENHANCING SMALL AND MEDIUM-SIZED BUSINESSES THROUGH DIGITALIZATION

Abstract: *We have entered a new era - the fourth industrial revolution. A vivid example of this is the management of mobile banking and payment systems via smartphones, the creation of artificial intelligence and its application in every industry. Another feature of this revolution is that large manufacturing enterprises are giving way to technology companies such as Amazon, Meta, and SpaceX in terms of profitability. These giant companies, while increasing their income day by day, are directing part of it to the creation of various programs that serve to*

increase their individual work efficiency and integrate them into the work process. However, if we consider the above process in the case of small and medium-sized enterprises, creating various internal programs to optimize business processes is often considered impossible. The article analyzes solutions to this issue, how to implement effective working methods in the enterprise using various "SaaS", "ERP", "IoT" systems.

Keywords: *Digital technologies, artificial intelligence, digital platforms, "SaaS", "ERP", technology companies, "BI Tools", automated workplaces, "CRM", digital transformation.*

Кириш

Рақамли технолгиялар сўнги 5-7 йилда хар бир сохада ўз самарадорлигини яққол намоён қилди. Иқтиодиётнинг исталган сохасига назар ташлайдиган бўлсак, кундалик иш жараёнига рақамли технолгияларни тўғри тадбиқ қилишни бошлаганидан сўнг, тез орада, биринчи навбатда фаолият юритиш билан боғлиқ бирламчи харажатлар ойлик иш хақи, ортиқча хомашёлар сотиб олиш каби харажатлар камайиб корхоналар даромади ошишини кўрзатишимиз мумкин. Иккинчидан, рақобатчиларга нисбатан сифатлироқ товарлар ва хизмат кўрсатишни таклиф қилишга эришилмоқда. Бу эса савдо хажмининг ўсишига олиб келганлигига доир кўплаб хаётий мисоллар бор. Ҳаёт суръати сезиларли даражада тезлашиб, Рақамли технологиялардан фойдаланиш имкониятлари кундан-кунга ортиб бораётган кунда тараққиёт билан ҳамнафас бўлиш ҳар доимгидан ҳам долзарбдир. Тўртинчи саноат инқилоби асрида дўконда сотаётган маҳсулотларни қоғоз-қалам билан ҳисоблашга ҳожат йўқ чунки рақамли технологиялар бор. Улардан фойдаланиш иш самарадорлигини оширишини тушуниб етган дўкон эгаси ёки корхона рахбари борки, корхонада кенгроқ миқёсда фойдалинишга харакатни аллақачон бошлаб юборган.

Президентимизнинг 2022-йил 24-декабрдаги “Янги Ўзбекистон маъмурий ислоҳотларини амалга ошириш чора-тадбирлари тўғрисида”ги ПФ-269-сонли фармонига кўра Ахборот технологиялари ва коммуникацияларини ривожлантириш вазирлиги негизида Рақамли технологиялар вазирлиги ташкил этилган бўлиб унинг асосий вазифалари қаторига рақобатдош дастурий маҳсулотларни мамлакатимизда ишлаб чиқарилишини ва ички бозорини ҳамда уларга кўрсатиладиган хизматларни ривожлантиришга кўмаклашиш, иқтисодиётнинг реал сектори тармоқларида ва истеъмолчиларда замонавий дастурий маҳсулотлардан фойдаланишни жорий этишга алохида этибор қаратилган [1]. Мамлакатимиз ялпи ички махсулотининг 47.9 фоизи қичик ва ўрта бизнесга тўғри келишини инобатга оладиган бўлсак, рақамли технологиялардан фойдаланишга улкан бозор борлигини кўришимиз мумкин [2]. Ушбу талабни қондириш учун мавжуд Дастурий махсулотлар ишлаб чиқариш фаолияти билан шуғулланувчи корхналар камлик қилади. Лекин улар ўз ички иш олиб бориш жарёнини сунъий интеллект ва турли хилдаги “SaaS”, “PaaS” рақамли платформалари

орқали ташкил этиш билан кўпроқ мижозларга хизмат кўрсатиши мумкин. Кундалик жарёнларни сунъий интеллект ва турли хилдаги “SaaS” платформалирда амалга ошириб самарадорликга интилиб, ташкилот ўзини рақамли трасформация қилишга эриша олади.

Адабиётлар тахлили

Таъкидлаш керакки, иш жараёнини рақамли технологиялардан фойдаланмасдан самарали ташкил эта олмаймиз. Айниқса фаолияти турли веб сайтлар, электрон дўконлар ва ФинТеч технологиялар яратиш бўлган хўжалик субектлари жараёнларни тезкор ва сифатли амалга ошира олмайди. Лекин шу ўринда жахон тажрибасига таяниб, халқаро миқёсидаги илмий изланишларнинг натижалари жамланган китоблардан ечимлар топиш имконига эгамиз.

Жахонга машхур бизнесмен “Siebel CRM” платформаси асосчиси Томас Сибелнинг китобида корхоналарнинг рақамли трансформациялашуви унинг рахбарларига кўп жихатдан боғлиқ экани айтилган. Улар бу жараённи турли “ERP”, “SaaS” ва “CRM” рақамли технологияларига таянган холда амалга оширади [3]. Айрим махаллий тадқиқотчилар фикрича, Рақамли трансформация орқали самарадорликга эришиш бу – ресурсларни бошқаришни рақамлаштириш, янги инновацияларни жорий этиш ва компаниялар бошқарувини замонга мос ўзгартириш демакдир [4]. Рақамли трансформациялашув орқали мутлақо янги бизнес модел ва индустрия яратган “Amazon”, “Google”, “Spotify”, “Uber” каби компанияларда иш самарадорлиги сезиларли даражада юқори. Сабаби компаниянинг хар бир ишчи бўлимига “SaaS” ва “ERP” рақамли платформаларидан фойдаланиб, кунлик одатий вазифалар автоматлаштирилган [5]. Хорижий олимлардан Tomas Haffenden қандай қилиб кичик корхоналар рақамли трансформациянинг устунликларини корхонага қўллаш хақида тушунчалар берган [6]. Ruben Sigala ўз китобида хозирда ташкилотларда мавжуд муаммоларга “SaaS”, “CRM” тизимлари орқали самарали эчимлар мавжудлиги ва бу рақамли трансформация жараёнини бошлашнинг зарурлигига алохида тўхталган [7]. Кичик ва ўрта хажмдаги АКТ ташкилотлари бошқа йирик технолигик гигантлар томиндан яратилган “SaaS”, “ERP” дастурларини иш жараёнига тадбиқ этишга асосий ечим сифатида қаралган [8]. Россиялик олимлар рақамли техгологияларни кундалик иш фаолиятига мақсадли жорий қилиш хақида таклифлар бериб, бизнесни рақамлаштириш ва рақамли трансформация масалаларини атрофлича ёритиб берган [9].

Тадқиқот методологияси: Мақолада ташкилотларда самарадорликни ошириш учун рақамли технологиялардан фойдаланиш усуллари жахон миқёсидаги олимларнинг илмий ишланмалари, мамлакатимиздаги изланиш натижаларининг очиқ базасига таянган холда статистик гурухлаш, таққослаш ва қиёсий тахлиллаш усулларидан фойдалниб текширилди. Ташкилотга мос рақамли технголия танлаб олиниб мавжуд қўлланмаларга асосан амалиётда синовдан ўтказилади.

Тахлил ва натижалар

Корхоналар рақамли трансформация замон талаби эканини тушунишни бошлади ва бу жараённи амалга ошириш учун ракамли технолгияларга мурожаат қилмоқда.

Жахонга машхур бизнесмен “Siebel CRM” платформаси асосчиси Томас Сибелнинг китобида корхоналарнинг рақамли трансформациялашуви унинг рахбарларига кўп жихатдан боғлиқ экани айтилган [3]. Улар бу жараённи турли “ERP”, “SaaS” ва “CRM” рақамли технологияларига таянган холда амалга оширади. Масалан, кичик тадбиркорлар, асосан чакана савдо, реклама, хизмат кўрасатиш сохаларида фаолият юритадиган ташкилотлар иш жараёнларни автоматлаштириш орқали самарадорликга эришиш йўллари имкониятлари келтириб ўтилган. Рақамли трансформациялашув орқали мутлақо янги бизнес модел ва индустрия яратган “Amazon”, “Google”, “Spotify”, “Uber” каби компанияларда иш самарадорлиги сезиларли даражада юқори. Сабаби компаниянинг хар бир ишчи бўлимига “SaaS” ва “ERP” рақамли платформаларидан фойдаланиб, кунлик одатий вазифалар автоматлаштирилган. "Digital Transformation: How to Organize Your Enterprise for the Digital Era" - Tomas Haffenden [4], "The Alignment Effect: How to Get Real Business Value Out of Technology" - Ruben Sigala [4], ушбу китоблар корхоналарни иш жараёнини самарали ташкил этишга ва мавжуд рақамли трансформация муаммоларига асосли ечим таклиф қилишда самара беради. Кичик ва ўрта хажмдаги АКТ ташкилотлари бошқа йирик технолигик гигантлар томиндан яратилган “SaaS”, “ERP” дастурларини иш жараёнига тадбиқ этишга асосий ечим сифатида қаралган. Бошқача қилиб айтганда, рақамли техгологияларни кундалик иш фаолиятига мақсадли жорий қилиш хақида таклифлар берилган.

Хулоса

Ҳар бир ташкилотда ахборот тизими мавжуд бўлиб, унинг муваффақиятли ишлаши кўп жиҳатдан бизнеснинг ривожланиши ва муваффақиятини белгилайди, бу еса ташкилотларни доимий равишда ахборот тизимларини такомиллаштиришга ва уйғун ўсишни таъминлайдиган янада самарали дастурларни яратиш муаммоларини ҳал қилишга мажбур қилади. Ташкилотга ташқи таъсирлар, унинг ички ўзгаришлари ва ўзгаришлари ахборот тизимида доимий ўзгаришларга еҳтиёж туғдиради, бу еса мавжуд тизимни ўзгартириш ёки янгисини яратиш тўғрисида қарор қабул қилиш жараёнини амалга оширади. Ташкилотнинг ахборот тизимини ўзгартириш жараёнини бошқариш вазифаси, айниқса бозорда турли етказиб берувчилардан таклиф қилинадиган жуда кўп йечимлар мавжуд бўлган замонавий шароитларда мураккаб ва қийин. Ҳар бир ташкилотда ахборот тизими мавжуд бўлиб, унинг муваффақиятли ишлаши кўп жиҳатдан бизнеснинг ривожланиши ва муваффақиятини белгилайди, бу еса ташкилотларни доимий равишда ахборот тизимларини такомиллаштиришга ва уйғун ўсишни таъминлайдиган янада самарали дастурларни яратиш муаммоларини ҳал қилишга мажбур қилади. Ташкилотга ташқи таъсирлар,

унинг ички ўзгаришлари ва ўзгаришлари ахборот тизимида доимий ўзгаришларга еҳтиёж туғдиради, бу еса мавжуд тизимни ўзгартириш ёки янгисини яратиш тўғрисида қарор қабул қилиш жараёнини амалга оширади. Ташкилотнинг ахборот тизимини ўзгартириш жараёнини бошқариш вазифаси, айниқса бозорда турли етказиб берувчилардан таклиф қилинадиган жуда кўп йечимлар мавжуд бўлган замонавий шароитларда мураккаб ва қийин. Шу боис ахборотлаштиришга сарфланадиган инвестицияларнинг муҳимлигини, айниқса давлат даражасида асослаш бир қадар қийин вазифа ҳисобланади. Ҳар бир ташкилотда ахборот тизими мавжуд бўлиб, унинг муваффақиятли ишлаши кўп жиҳатдан бизнеснинг ривожланиши ва муваффақиятини белгилайди, бу еса ташкилотларни доимий равишда ахборот тизимларини такомиллаштиришга ва уйғун ўсишни таъминлайдиган янада самарали дастурларни яратиш муаммоларини ҳал қилишга мажбур қилади.

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ЖАНУБИЙ СУРХОН СУВ ОМБОРИНИНГ ГЕОЭКОЛОГИК ҲОЛАТИ ВА УНИ БАҲОЛАШ

Аннотация. *Ушбу мақола Жанубий Сурхон сув омборининг қурилиш жараёнлари ва ўлчамлари ҳамда унинг қишлоқ хўжалиги, аҳоли ичимлик суви ва бошқа мақсадларда ундан фойдаланиш, ҳамда сув омборининг ҳозирги ҳолати таърифланган. Шунингдек, сув омбори а унинг атрофида содир бўлаётган ижобий ва салбий геоэкологик ҳолатлар ҳамда унинг олдини олиш борасида бажарилиши лозим бўлган ишлар борасида илмий таклиф, тавсиялар ёритилган.*

Калит сўзлар. *Сув омбори, сув сатҳи, музлаш ходисалари, иқлим, рекреация, тўғон, геоэкология, баҳолаш, эррозия, ёғин-сочин миқдори, грунт сувлар, гидрологик ҳолат, мониторинг.*

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GEO-ECOLOGICAL CONDITION OF THE SOUTHERN SURKHON RESERVOIR AND ITS ASSESSMENT

Abstract. *This article describes the construction processes and dimensions of the Southern Surkhon Reservoir, as well as its use for agriculture, drinking water supply, and other purposes, along with an assessment of its current condition. The paper also presents scientific proposals and recommendations concerning positive and negative geo-ecological processes occurring within the reservoir and its surrounding areas, and measures required to prevent adverse impacts.*

Keywords: *reservoir, water level, freezing processes, climate, recreation, dam, geo-ecology, assessment, erosion, precipitation amount, groundwater, hydrological condition, monitoring.*

Кириш

Ўзбекистон Республикаси ҳудудида барпо қилинган сув омборларининг ишлаб чиқариш кучларини жойлаштириш ва ривожлантириш ҳамда агросаноат мажмуасини такомиллаштиришдаги аҳамиятлари илмий нуқтаи-назардан атрофлича ўрганилган, лекин Жанубий Сурхон сув омборининг геоэкологик ҳолати, уни баҳолаш, таҳлил қилиш ва табиат мувозанатини сақлаб қолиш йўналишларининг илмий асосларини географик нуқтаи-назардан баҳолаш масалалари бўйича яхлит тадқиқот ўтказилмаган.

Жанубий Сурхон сув омбори атроф-муҳитга турли хил таъсирлар кўрсатади. Ижобий таъсирлар қишлоқ хўжалиги, саноат ва биодиверситетни қўллаб қувватлашда муҳим рол ўйнаса, салбий таъсирлар эса иқлим ўзгариши, сув сифатининг пасайиши ва экологик муаммоларга олиб келиши мумкин. Ушбу таъсирларни назорат қилиш, бошқариш ва олдини олиш ва бу борада амалга оширилиши лозим бўлган масалалар мақолада ёритилган.

Асосий қисм.

Жанубий Сурхон сув омбори Ўзбекистоннинг энг йирик сув омборларидан бири ҳисобланиб Қумқўрғон тумани ҳудудида Сурхондарё дарёсининг ўрта оқимида жойлашган. Сув омбор 1967 йилда ишга туширилган. Сув омборининг узунлиги 20км, максимал эни 6,2км, ўртача эни 2,96 км, максимал чуқурлиги 27 м, ўртача чуқурлиги 12 м, тўла сув сиғими 800млн $м^3$, фойдали сув сиғими 610млн $м^3$, сув юзаси майдони 65 $км^2$ [6].

Сув омборининг ер ости сувлари сатҳи ва режимига таъсири ҳам кучли бўлади. Сув омбори қурилгунга қадар дарё ер ости сувларини қабул қилувчи бўлган бўлса, сув омбори тўлдирилиб бориши билан ер ости сувлари сатҳи ҳам кўтарилиб боради ва яна сув омборига сув беради, бироқ сатҳини кўтариб олгунча, сув омбори хисобидан тўйинади. Ер ости сувлари сатҳининг кўтарилиши эса заминнинг дренаж хусусияти камаяди. Ер ости сувларининг димланиб босимининг кўтарилиши маҳаллий шароитга боғлиқ бўлиб, таъсир доираси қирғоқдан бошлаб бир неча километргача етиши мумкин.

Грунт сувлари сатҳининг кўтарилиши сув омбори атрофида жойлашаган бинолар фундаментлари, ер ости коммуникациялари, қишлоқ хўжалиги ерлари , ўрмончилик хўжаликлари ҳудудларида замин намлигининг ортиб кетиши ва айрим пастқам жойларда эса ботқоқланишга замин яратади. Бу каби ҳолатлар таъсирида ерларнинг шўрланишига олиб келади [5].

Жанубий Сурхон сув омборининг геоэкологик ҳолатини яхшилаш мақсадида қуйидаги чора – тадбирларни ишлаб чиқиш лозим;

- Сув ресурсларини бошқариш ва ундан оқилона фойдаланиш учун сув омборидаги сувдан қишлоқ хўжалиги, саноат ва ичимлик суви учун фойдаланишни самарали бошқариш. Қишлоқ хўжалигида томчилатиб суғориш ёки сувни тежовчи технологияларни жорий қилиш зарур;

- Сув омбори ифлосланиш даражаси ва сифатини мунтазам кузатиб бориш учун сувнинг физик-химиявий ва биологик хусусиятларни мунтазам кузатиб туриш учун замонавий мониторинг тизимларини ўрнатиш лозим. Мониторинг маълумотлари асосида сувнинг ифлосланишига қарши чора-тадбирларни ўз вақтида амалга ошириш муҳим;

- Сувнинг ифлосланиш даражасини мунтазам кузатиш ва у ерда яшовчи флора ва фауна ҳолатини баҳолаш учун мониторинг тизимларини ўрнатиш лозим. Бу тизимлар сув омбори ва ер ости сувлари ҳолатини мунтазам кузатишга имкон беради;

- Сув омбори ва дарё бўйлаб мониторинг станциялари ташкил этилиши лозим. Бу станциялар сув намуналарини олиб, уларни лаборатория шароитида таҳлил қилиш учун имкон яратади;

- Сувнинг ҳарорати, ўзлаштирувчанлик даражаси, ўсимлик моддаларининг миқдори, оғир металлар, нефть маҳсулотлари ва пестицидлар даражаси назорат қилиниши керак. Бу кўрсаткичлар сувнинг ичимлик учун яроқлилиги ва экологик муҳитга таъсирини баҳолашга ёрдам беради;

- Сувда мавжуд бўлган микроорганзмлар, планктонлар, балиқ популяцияси ва ўсимликлар тури ва сонини кузатиш орқали сувнинг биологик сифати баҳоланади. Организм турларининг камайиши ёки кўпайиши сувнинг экологик ҳолатидан дарак беради;

- Саноат корхоналаридан чиқаётган чиқинди сувлар ифлосланиш манбаи бўлиши мумкин. Мониторинг орқали бу каби корхоналар сувга чиқараётган чиқиндиларнинг экологик стандартларга мос келишини кузатиб бориш керак;

- Сув омбори яқинида яшовчи аҳолининг чиқиндиларини тўғри бошқариш орқали маиший чиқиндиларнинг сувга тушишини назорат қилиш керак. Бу эса сув ифлосланишини камайтиришга ёрдам беради;

- Сув сифатига оид миллий ва ҳалқаро экологик стандартларга амал қилиниши шарт;

- Агар сувнинг сифати паст эканлиги аниқланилса, ифлосланиш манбаларига қарши чора кўрилиши керак, кўрилган чора-тадбирлар орқали саноат корхоналари ва қишлоқ хўжалиги фаолиятлари атроф-муҳитга зарар етказмаслигига ишонч ҳосил қилиш мумкин;

- Сув омбори яқинида яшовчи аҳолини сувнинг сифати ва ифлосланиш хавфлари ҳақида хабардор қилиш зарур. Бу аҳолида сувдан оқилона фойдаланиш маданиятини шакллантиради ва атроф-муҳитни мухофаза қилиш бўйича масъулиятни оширади;

- Дрон ва сунъий йўлдош технологиялари ёрдамида сув омбори ва дарё бўйлаб узоқ масофадаги жойларни мониторинг қилиш ва сувнинг ҳолатини кузатиб бориш мумкин. Бу билан сувнинг сифати ва экологик

ҳолатини сақлаб қолиш, ифлослантиришни камайтириш ва соғлом экотизимни таъминлаш мумкин;

- Сув омборлари атрофларида тупроқ эрозиясининг олдини олиш чора тадбирларни кўриш зарур, акс холда сув омборига лой ва бошқа материаллар тушишига олиб келади, бу эса сув омборининг сиғими камайишига сабаб бўлади;

- Сув омбори яқинида нотўғри режалаштирилган қурилиш ва казиш ишлари экотизимни бузиши мумкин, шу сабабли сув омбори атрофида экологик баҳолашни талаб қилувчи меъёрларни жорий қилиш ва қурилиш жараёнларининг атроф-муҳитга таъсирини минималлаштириш керак. Экологик меёрлар асосида инфратузилмани ривожлантириш муҳим аҳамиятга эга.

Хулоса

Хозирги вақтда табиат ва жамият ўртасидаги алоқалар кучайиб ва кескинлашиб бормоқда. Айниқса сув ресурсларидан оқилона фойдаланиш, уни мухофаза қилиш каби масалалар долзарб ишлардан бўлиб ҳисобланади. Экстремал иқлимий шароитга эга бўлган Сурхондарё вилоятида сув хўжалигини сув омборлари барпо қилиш орқали ривожлантириш ҳамда сув омборларини иқтисодий, иқтисодий-географик ва геоэкологик жиҳатдан таҳлил қилиш муҳимдир.

Жанубий Сурхон сув омборининг атроф-муҳитга таъсирини бир неча жиҳатда кўриш мумкин, яъни, ирригация,биодиверситет, иқлим ва унинг ўзгариши, экосистема ўзгариши, сув сифатининг пасайиши, ер ости суви сатҳининг кўтарилиши тупроқ эрозияси ва шу каби бошқа таъсирларда кўриш мумкин. Бу каби ҳолатларни домий назорат қилиб туриш, ҳамда чора-тадбирлар ишлаб чиқиш учун доимий мониторинг тизимини йўлга қўйиш зарур.

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СТРУКТУРА ОПТИЧЕСКИХ ВОЛОКН И СОЗДАНИЕ ОПТИКО-ЭЛЕКТРОННЫХ УСТРОЙСТВ НА ИХ ОСНОВЕ

Аннотация: *При передаче света на большие расстояния важно сохранить его мощность. Для уменьшения потерь при передаче, во-первых, необходимо увеличить оптическую прозрачность при рассеянии света. При этом поглощение должно быть минимальным. Во-вторых, необходимо правильно выбрать траекторию распространения света. В связи с этим, первой задачей является использование чистого кварцевого стекла с применением высокочистой технологии. Второй задачей является правильное применение оптических законов. Благодаря эффекту полного отражения света излучение свободно распространяется от источника к потребителю.*

Ключевые слова: *оптическое волокно, прозрачный материал, лазеры, свет, волоконно-оптические кабели.*

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STRUCTURE OF OPTICAL FIBERS AND CREATION OF OPTIELECTRONIC DEVICES BASED ON THEM

Abstract: *When transmitting light over long distances, it is important to conserve its power. To reduce the loss during transmission, firstly, it is necessary to increase the optical transparency during the scattering process of light. In this case, the absorption should have a minimum value. Secondly, it is necessary to correctly select the trajectory of the light path. In connection with this, the first task is to use pure quartz glass using high-purity technology. The second task is to correctly apply optical laws. Based on the effect of total reflection of light, radiation moves freely from the source to the consumer.*

Keywords: *optical fiber, transparent material, Lasers, light, fiber optic cables*

Введение

Оптическое волокно — это прозрачный материал, то есть стекло, пластик, и представляет собой нить, используемую для передачи света

(рисунок 1). Это одно из важнейших достижений в развитии науки и техники. Оно передает свет с помощью находящихся внутри него атомов или молекул. В настоящее время оптические волокна широко используются для передачи различных типов данных. Передача данных таким способом была предложена в 50-х годах прошлого века. Открытие лазеров еще больше расширило возможности оптических волокон. Стеклянные оптические волокна изготавливаются на основе кварцевого стекла[1]. Другие материалы, фторциркониевые, фторалюминиевые и халькогеновые стекла, используются для передачи инфракрасных лучей. В настоящее время разработаны оптические волокна пластикового типа. Его сердечник изготовлен из полиметилметакрилата, а поверхность — из фторполимерных материалов. Рассмотрим принцип работы оптических волокон ниже.



Рисунок 1. Внешний вид оптических волокон

Анализ литературы

При передаче света на большие расстояния важно сохранить их мощность. Для уменьшения отходов при передаче, во-первых, необходимо увеличить оптическую прозрачность при рассеянии света. При этом поглощение должно иметь минимальное значение. Во-вторых, необходимо правильно выбрать траекторию пути света[2]. В связи с этим, первая задача - использовать чистое кварцевое стекло с использованием высокочистой технологии. Вторая задача достигается правильным применением оптических законов. Благодаря эффекту полного отражения света излучение свободно движется от источника к потребителю. Однако для этого необходимы две замкнутые системы с разной плотностью. В большинстве случаев в качестве таких двух замкнутых систем используют кварцевые стекла с разной плотностью. Волна передается в системе, которая относительно более плотная[3]. Чтобы разобраться в этой ситуации более подробно, рассмотрим схему оптического волокна (рис. 2).

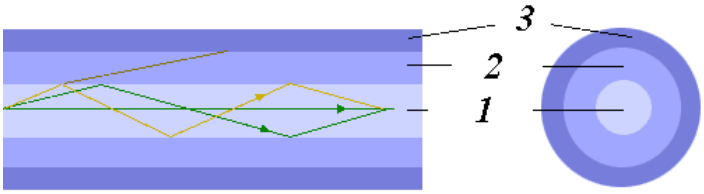


Рисунок 2. Его сердцевина представляет собой стекло относительно высокой плотности (1), пропускающее свет. Оно покрыто стеклом относительно низкой плотности (2). В нём сигналы полностью отражаются. Для защиты от механических воздействий на их поверхность нанесено специальное покрытие (3).

Метод исследования

Чтобы свет достиг потребителя, свет от источника направляется под определённым углом. В этом случае возникает эффект полного возврата, и теоретически световые сигналы полностью доходят до потребителя. Однако на практике определённый процент света преломляется. Это связано, во-первых, со сложностью реализации такой передачи света от источника. Во-вторых, со сложностью изготовления оптического волокна, соответствующего теоретическим требованиям[4]. В-третьих, с невозможностью прокладки оптического кабеля по такой прямой линии[5].

Конструктивно оптическое волокно имеет круглое поперечное сечение и состоит из двух частей: сердцевины и оболочки. Для увеличения внутреннего полного отражения показатель преломления сердцевины больше, чем у оболочки. Например, показатель преломления оболочки составляет 1,474, а сердцевины – 1,479. Свет направляется к сердцевине, где рассеивается. В связи с этим конструкция оптических волокон несколько сложнее. В качестве сердцевины и оболочки используются вторичные фотонные кристаллы[6]. Для плавного изменения показателя преломления сердцевина имеет форму цилиндра. Такая конструкция обеспечивает особые свойства волокна: дисперсию рассеянного света, снижение потерь, изменение полной дисперсии и другие свойства. Диаметр оптического волокна, используемого в телекоммуникациях, составляет 125±1 мкм. Размер сердцевины может варьироваться в зависимости от типа волокна. Волоконно-оптические кабели, используемые в телекоммуникациях, бывают различных форм. На рисунке 3 показаны типы волоконно-оптических кабелей[7-9].

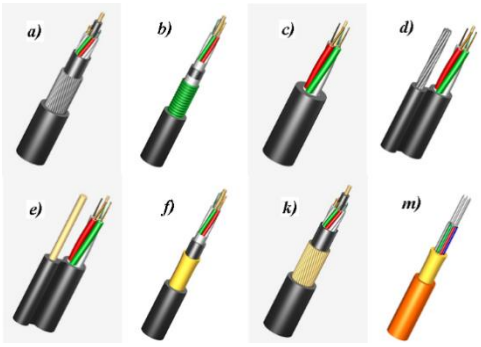


Рисунок 3. Структуры оптического волокна.

Анализ и результаты

На рисунке 4 показано рассеяние света в волокне. Для того чтобы свет рассеивался вдоль волокна, он должен падать под определённым критическим углом к оси волокна[10-12]. То есть, он должен распространяться в форме конуса, как показано на рисунке. Синус этого угла называется аппаратным числом светового пучка.

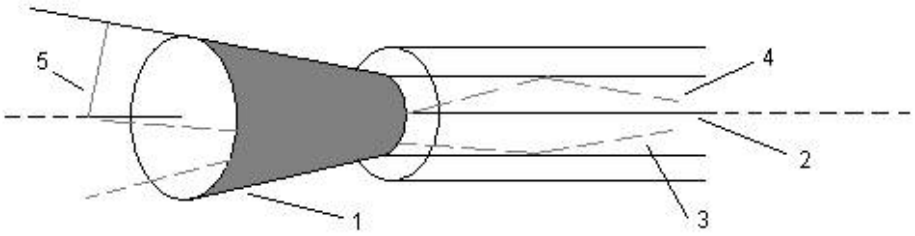


Рисунок 4. Свет, входящий в оптическое волокно. 1. Вход конуса, 2. Ось моды, 3. Нижняя часть моды, 4. Верхняя часть моды, критический угол.

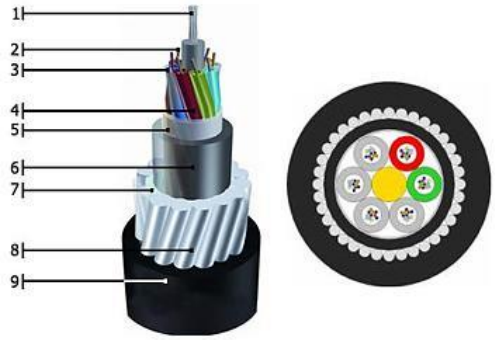


Рисунок 5. Внутренняя структура оптоволоконного кабеля. 1 – ось элемента, 2 – оптическое волокно, 3 – внутренний гидрофобный наполнитель, 4 – оптический модуль, 5 – гидроизоляция жил, 6 – промежуточное покрытие, 7 – гидроизоляция жил, 8 – металлическая броня, 9 – защитное покрытие.

Заключение

Показатель преломления сердцевины многослойного волокна отличается от показателя преломления оболочки на 1–1,5%. Например, если у сердцевины

n = 1,515, у оболочки он может быть n = 1,50. В этом случае апертурное число составляет 0,2–0,3, а угол падения света составляет 12–18°. Если показатель преломления волокна n = 1,505, то показатель преломления его оболочки будет n = 1,50. Апертурное число равно 0,122, а угол падения света составляет 7°. Чем больше апертурное число, тем легче направить свет в волокно. Однако при этом увеличивается дисперсия и сужается полоса пропускания света. Компоненты оптических каналов передатчика, источника и приемника излучения характеризуются апертурным числом.

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ОПТИЧЕСКИЕ КВАНТОВЫЕ ГЕНЕРАТОРЫ КВАНТОВЫЕ УСИЛИТЕЛИ

Аннотация: *Источником генерации в лазере является спонтанное излучение возбуждённой активной частицы. При распространении спонтанного излучения через активную среду, в результате взаимодействия с возбуждёнными частицами, происходит вынужденное (когерентное) излучение, при этом происходит когерентное усиление электромагнитного излучения. Излучение, распространяющееся вдоль оптической оси между активной средой конечных размеров и зеркалами оптического резонатора, усиливается до максимума. При этом усиление электромагнитного излучения за один проход через активную среду составляет*

Ключевые слова: *лазеры, свет, оптические квантовые генераторы, когерентные лучи*

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OPTICAL QUANTUM GENERATORS QUANTUM AMPLIFIERS

Abstract: *The source of laser generation is the spontaneous emission of an excited active particle. As spontaneous emission propagates through the active medium, stimulated (coherent) emission occurs as a result of interaction with excited particles, resulting in coherent amplification of the electromagnetic radiation. Radiation propagating along the optical axis between the finite-sized active medium and the mirrors of the optical resonator is amplified to its maximum. The gain of electromagnetic radiation per pass through the active medium is [unclear].*

Keywords: *lasers, light, optical quantum generators, coherent beams*

Введение

Для определения процессов увеличения амплитуды или интенсивности электромагнитной волны в квантовых усилителях и их возможностей рассмотрим процесс прохождения монохроматической электромагнитной волны через активную среду с K_0 и интенсивностью насыщения I_t.

Обозначим интенсивность электромагнитной волны на входе усилителя через I_0. При нулевых нерезонансных потерях изменение интенсивности волны, прошедшей через толщину dx такой среды, определяется выражением:

$$dI(x)/dx=k(x)\ I(x) \qquad (1).$$

можно определить по уравнению. Зная характер увеличения интенсивности I и изменения K, уравнение (1) можно представить в другой форме:

$$(1+I/I_t)\ dI/I=K_0\ dx \qquad (2)$$

Если проинтегрировать уравнение с учетом этого граничного условия (I/I_0), то получим трансцендентное уравнение, связывающее интенсивность электромагнитной волны на входе в среду I_0 и ее интенсивность в точке с координатой x (x);

$$\ln(I/I_0)+(I/I_t)-(I_0/I_t)=K_0x \qquad (3)$$

Решение этого уравнения для различных фиксированных значений безразмерного параметра (I_0 / I_t) представлено на рисунке 1.2[1].

Из этого рисунка 1 и уравнения (3) видно, что при малых интенсивностях усиливаемой электромагнитной волны, то есть при выполнении условий (I I<< I_t , I_0<< I_t I_t и при этом процесс вынужденного излучения не влияет на число частиц на возбуждённом уровне), интенсивность излучения экспоненциально растёт по мере прохождения через активную среду, но эффективность преобразования энергии покоя в когерентное излучение, равная отношению вероятности вынужденных переходов (~I) к вероятности тушения возбуждённого уровня за счёт всех остальных процессов (I_t), мала и составляет величину $\sim I/I_t$. С увеличением значения этого отношения I/I_t возрастает роль процесса вынужденного излучения и При выполнении условия I>> I_t shart bajarilganda amaliy jihatdan damlash energiyasining $(\sim I/I+I_t)$ qismi, на практике, часть энергии покоя $(\sim I/I+I_t)$ преобразуется в энергию когерентного излучения[2].

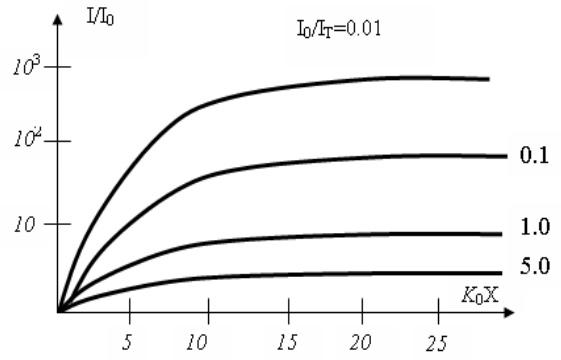


Рисунок 1. Изменение интенсивности электромагнитной волны, проходящей через среду с обратной заселенностью.

При этом скорость нарастания интенсивности уменьшается и получается следующее, определяемое только характеристиками активной среды:

$$\Delta I/\Delta x = I_t K_o \qquad (4)$$

В приведенных выше темах мы не учитывали нерезонансные потери излучения при прохождении через активную среду. В реальности они существуют. Во-первых, пучок излучения расширяется в поперечном сечении вследствие дифракции при распространении и выходит за пределы активной среды. В результате часть энергии теряется.

Анализ литературы

Если поперечное сечение пучка излучения равно 2ω, то его угол распространения равен $\theta_\alpha = \lambda/2\omega$. Радиус поперечного сечения пучка излучения, прошедшего расстояние L, увеличивается на величину $\theta_\alpha L$. Следовательно, все лучи, падающие на кольцо толщиной $\sim\theta_\alpha L$ и диаметром ~2ω, выйдут из активной среды. Относительная величина этих потерь составляет $\sim\lambda/\omega^2$ и достигает максимального значения в инфракрасном диапазоне. Для обычно используемого лазерного излучения (ω~1sm va λ=1¼10мкм) эти потери составляют $\sim(0{,}1¼1)10^{-3}$ $см^{-1}$. Это означает, что дифракционные потери излучения при прохождении через активную среду длиной 1 м находятся в пределах 1÷10%. Во-вторых, усилители также содержат оптические элементы, в которых теряется часть энергии излучения. Каждый оптический элемент может терять 1% излучения [3].

Реальная активная среда не является идеально однородной, и излучение при прохождении через такую среду может терять часть своей энергии вследствие рассеяния и преломления. Не вникая в физическую природу этих потерь, можно охарактеризовать их общим коэффициентом $\beta_0[sm^{-1}]$ на единицу длины.

Эти потери составляют $\beta_0 I$ часть излучения, прошедшего через активную среду единичной длины, и линейно возрастают с интенсивностью. Как уже упоминалось выше, с ростом интенсивности прирост энергии когерентного излучения, прошедшего через активную среду единичной длины, уменьшается и, наконец, становится равным величине ItK0 и остаётся неизменным. Следовательно, при прохождении когерентного излучения через активную среду его интенсивность увеличивается до тех пор, пока процессы усиления и ослабления не сравняются. После этого интенсивность усиленного излучения остаётся неизменной и достигает своего максимального значения.

$$I_{max}=I_t K_0 / \beta_0 \qquad (5)$$

Кроме того, высокая монохроматичность лазерного излучения дополнительно повышает монохроматичность квантового усилителя в переходном процессе. Это обусловлено тем, что значение коэффициента усиления активной среды достигает максимума на резонансной частоте, а

центральная часть спектра излучения усиливается сильнее периферийных участков.

В отличие от оптических усилителей, которые подают электромагнитное излучение на вход и усиливают его, оптический квантовый генератор, подобно радиочастотному генератору, генерирует когерентное электромагнитное излучение в оптическом диапазоне. Таким образом, оптический квантовый генератор или лазер представляет собой устройство с положительной обратной связью, генерирующее электромагнитное излучение путём когерентного усиления вынужденного излучения [4].

Для получения электромагнитного излучения активная среда или оптический усилитель помещается внутрь оптического резонатора, в котором генерируются стоячие электромагнитные волны, определяемые параметрами активной средых[5-6].

Рабочее тело 1 с инверсной шириной запрещенной зоны усиливает проходящее через него электромагнитное излучение посредством вынужденного излучения. Оптический резонатор, состоящий из двух зеркал 3 с коэффициентом пропускания 3, одно из которых полностью отражающее, а другое – плоское и частично **(**ξ**)**, расположенных параллельно друг другу, генерирует электромагнитную волну с частотами излучения, лежащими в пределах ширины линии усиления. Часть её излучается через выходное зеркало (3) [7-8].

Метод исследования

Пусть активная среда с параметрами (K_0 I_t) длины **(**L_f **)** и расстояния (L_r), проницаемостью (ξ) и коэффициентом потерь (**(**$\chi \cong 2L_f\beta_0$) помещена внутрь оптического резонатора.

Источником генерации в лазере является спонтанное излучение возбуждённой активной частицы. При распространении спонтанного излучения через активную среду, в результате взаимодействия с возбуждёнными частицами, происходит вынужденное (когерентное) излучение, при этом происходит когерентное усиление электромагнитного излучения. Излучение, распространяющееся вдоль оптической оси между активной средой и зеркалами оптического резонатора, имеющего конечные размеры, максимально усиливается. При этом коэффициент усиления электромагнитного излучения за один проход через активную среду равен (e^{2K0Lf}), и если этот коэффициент усиления больше потерь в зеркале с выходным коэффициентом (ξ**)** и в оптическом резонаторе (χ), в оптическом резонаторе возникают колебания электромагнитного поля и устанавливается стационарный режим.

Коэффициент усиления Кч в этом случае называется предельным коэффициентом усиления и определяется выражением:

$$e^{2KrLf}(1-\chi)(1-\xi)=1 \qquad (6)$$

Его значение определяется соотношением $\chi\xi<<1$ при выполнении условия

$$K_{ch}=\frac{1}{2L_{\phi}}\ln\frac{1}{1-\chi-\xi} \qquad (7)$$

будет равна сумме.

Здесь следует отметить, что предельный ($К_ч$) коэффициент усиления, в отличие от коэффициента ($К_0$), характеризующего усиление активной среды, определяет условия устойчивой генерации, исходя из реальной ситуации, и служит характеристикой оптического резонатора [6-7].

Таким образом, если коэффициент усиления активной среды $К_0$ больше предельного коэффициента усиления $К_ч$, в лазере наступает устойчивая генерация и он начинает излучать когерентные электромагнитные колебания.

Интенсивность излучения, испускаемого лазером, зависит от плотности фотонов, распространяющихся к выходному зеркалу внутри оптического резонатора, и коэффициента пропускания выходного зеркала и определяется по формуле:

$$I=h\nu_0 n_p c\xi/2 \qquad (8)$$

определяется выражением.

Учитывая выражения, связывающие интенсивность излучения I и коэффициент усиления активной среды K с плотностью фотонов, выражение (8) можно привести к следующему виду [6].

$$I=\frac{I_T\cdot\xi}{2}\left(\frac{K_0}{K}-1\right)$$

Установившийся коэффициент усиления активной среды K равен предельному коэффициенту усиления K_R, и с учетом выражения (8) получаем следующее:

$$I=\frac{I_T\cdot\xi}{2}\left[\frac{2K_0L_{\phi}}{\ln(1-\chi-\xi)^{-1}}-1\right] \qquad (9)$$

мы получаем выражение.

При малых значениях выражения 2^{KChLf} (т.е. когда yexr$2K_{Ch}L_f\approx1+2K_{Ch}L_f$) формула (9) упрощается до

$$I=\frac{I_r\xi}{2}\left(\frac{2K_0L_{\phi}}{\xi+\lambda}-1\right) \qquad (10)$$

следующего вида кажется.

Анализ и результаты

Как видно из приведенных выражений, при малых значениях величины ξ ($\xi<<\chi$) интенсивность излучения, выходящего из лазера, линейно возрастает с ростом коэффициента пропускания выходного зеркала, а при значениях величины ξ, удовлетворяющих условию (($\xi>>\chi$)), она убывает с ростом величины ξ [8-9]. Таким образом, с точки зрения мощности лазерного излучения, коэффициент пропускания ξ выходного зеркала имеет оптимальное значение ξ_{opt} opt, при котором мощность излучения лазера максимальна[10-12]. В общем случае значение ξ_{opt} opt рассчитывается

численно. В частности, когда усиление слабое, т. е. $2K_{ch}L_f<<1$ и exp $(2K_rL_f)\cong1+2K_{ch}L_f$, можно получить аналитическое выражение для расчета значения ξ_{opt} opt. Для этого устанавливаем νI/νξ на ноль и решаем следующее квадратное уравнение, чтобы определить оптимальный коэффициент пропускания зеркала.

$$\xi_{onm}^2 + 2\chi\xi_{onm} + \chi(\chi - 2K_0L_\phi) = 0$$

Оптимальный коэффициент пропускания выходного зеркала оптического

$$\xi_{onm} \approx \sqrt{2K_0L_\phi\chi} - \chi \qquad (11)$$

резонатора определяется выражением

Заключение

Лазерное излучение является когерентным. Основная причина этого свойства когерентности выражена в значении слова «лазер», то есть в усилении света вынужденным излучением. Вынужденное световое излучение и вынужденное световое излучение — это излучение с абсолютно одинаковыми параметрами. Их частоты, фазы и направления распространения одинаковы.

Поляризация лазерного излучения характеризует направление вектора напряжённости электрического поля в электромагнитной волне. Если в каждой точке светового пучка вектор напряжённости электрического поля $\vec{E}$ совершает колебания вдоль прямой линии в плоскости, поперечной направлению распространения излучения, такое излучение называется линейно или плоско поляризованным. Сумма двух линейно поляризованных излучений, плоскости поляризации которых поперечны друг другу, а разность фаз постоянна, даёт эллиптически поляризованное излучение.

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ОЛИЙ ТАЪЛИМ МУАССАСАЛАРИДА ЎҚИТУВЧИ ФАОЛИЯТИНИ БАҲОЛАШ МЕЗОНЛАРИ ХУСУСИДА

Annotatsiya: *ushbu maqolada oliy ta'lim tizimida baholash tizimini takomillashtirish xususiyatlari yoritilgan. Muallif ta'lim jarayonida innovatsion yondashuvlar va zamonaviy axborot-kommunikatsiya texnologiyalaridan samarali foydalanish orqali ta'lim sifatini oshirish zarurligini ta'kidlaydi. Ta'kidlanishicha, O'zbekiston Respublikasida qabul qilingan "ta'lim to'g'risida"gi qonun va kadrlar tayyorlash milliy dasturi ta'lim mazmuni va sifatiga yangi tamoyillar kiritdi.*

Kalit so'zlar: *oliy ma'lumot, baholash tizimi, reyting usuli, ta'lim sifati, testologiya, o'z-o'zini o'qitish, innovatsion texnologiyalar.*

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ON THE CRITERIA FOR ASSESSING THE ACTIVITY OF A TEACHER IN HIGHER EDUCATIONAL INSTITUTIONS

Abstract: *This article highlights the features of improving the assessment system in the higher education system. The author emphasizes the need to improve the quality of education through innovative approaches and the effective use of modern information and communication technologies in the educational process. It is noted that the law "On Education" and the national training program adopted in the Republic of Uzbekistan have introduced new principles into the content and quality of education.*

Keywords*: higher education, assessment system, ranking method, quality of education, testology, independent learning, innovative technologies.*

Бугунги кунда мамлакатимизда амалга оширилаётган туб ислоҳотларнинг моҳияти ижтимоий-иқтисодий ривожлантириш орқали фуқаролик жамиятини юқори даражада шаклланишини таъминлаш, аҳоли турмуш тарзини яхшилаш, оқилона бошқарув ва халқнинг интеллектуал салоҳиятини ошириш масалаларини ўзида акс эттиради. Ушбу ислоҳотлар самарасини янада ошириш, давлат ва жамиятнинг ҳар томонлама ва жадал ривожланиши учун шарт-шароитлар яратиш, мамлакатимизнинг иқтисодиётини модернизация қилиш ҳамда ҳаётнинг барча соҳаларини либераллаштириш бўйича устувор йўналишларни амалга ошириш мақсадида“2017-2021 йилларда Ўзбекистон Республикасини ривожлантиришнинг бешта устувор йўналиши бўйича Ҳаракатлар

стратегияси” ишлаб чиқилди ва барча соҳаларда кенг кўламли ўзгаришлар амалга оширилмоқда.

Ўзбекистон Республикаси Президентининг 2017 йил 20 апрелдаги “Олий таълим тизимини янада ривожлантириш чора-тадбирлари тўғрисида”ги ПҚ-2909 сонли ҳамда 2018 йил 5 июндаги “Олий таълим муассасаларида таълим сифатини ошириш ва уларнинг мамлакатда амалга оширилаётган кенг қамровли ислоҳотларда фаол иштирокини таъминлаш бўйича қўшимча чора-тадбирлар тўғрисида”ги ПҚ-3775- сонли қарорлари олий таълим тизимини тубдан такомиллаштириш, мамлакатимизни ижтимоий-иқтисодий ривожлантиришнинг устувор вазифаларига мос ҳолда кадрлар тайёрлашнинг маъно-мазмунини тубдан қайта кўриб чиқиш, халқаро стандартлар даражасида олий малакали мутахассислар тайёрлаш учун зарур шароитлар яратиш, шунингдек, илмий-тадқиқот ва инновация фаолиятини рағбатлантириш, илмий ва инновация ютуқларини амалиётга жорий этишнинг самарали механизмларини яратиш вазифаларини кўзда тутади.

Таълим-тарбия соҳасидаги ислоҳотларнинг самарадорлиги, хусусан таълим сифатини оширишда ўқитувчининг роли бўйича кўплаб тадқиқотлар амалга оширилган. Лекин шунга қарамай бу соҳадаги ишларни етарли деб бўлмайди, чунки қурилиш, ва бошқа ташкилий масалалар биринчи ўринга чиқиб, бевосита таълимнинг сифатини кўтаришга қаратилган ишларга эътибор етарлича берилмаяпти, ёки олдинги усулларни озроқ ўзгартириш билан чекланиб қолмоқдамиз. Ўқув жараёнини ташкил қилишдаги энг бош масала назария билан амалиётни уйғунлаштириш, талабани мустақил ишлашга ўргатиш, “Талаба-устоз” тандеми самарадорлиги ошириш, малакали педагогкадрлар тайёрлаш тизимини яратиш, хорижий тажрибаларни маҳаллий шароитлардан келиб чиққан ҳолда ўзлаштириш каби ташкилий ишларни бажариш лозим бўлади. Албатта таълим сифати ва самарадорлиги ўқитувчи ва талаба (ўқувчи) ҳамкорлигига узвий боғлиқ. Агар талаба билим олишни истамаса (фақатгина диплом олиш унинг асосий мақсадига айланган бўлса) ёки унинг мактабда олган билим ва мустақил таълим олиш қобилияти, шунингдек, физиологик хусусиятлари, шу мутахассислик ва бинобарин унинг таркибига кирувчи фанларни ўзлаштиришга етмаса, педагогнинг тасдиқланган дастур асосида таълим бериши самарали натижа бермайди. Бу ҳолда нима қилиш керак деган масала ҳанузгача ечимини топгани йўқ. Олий таълим муассасаларида ўқитувчилар фаолиятини ташхис қилиш ва баҳолаш педагогик фаолиятнинг моҳияти ва уни такомиллаштириш омилларини аниқлаш, шунингдек, педагогик жараёнларнинг комплекс ҳаракатини визуал тасаввур қилиш мумкин.

Маълумки, педагогик фаолият бир-бири билан узвий боғлиқ бўлган компонентлар, омиллар ва шарт-шароитлардан иборат. Жумладан, биринчидан:

- ўқитувчининг ўзига хос бўлган касбий ва шахсий фазилатлари;
- психологик хусусиятлари;
- касбий фаолияти объекти;

• мутахассислиги бўйича билим даражаси;
• касбий ва педагогик компетентлиги, креативлиги ва ҳ.к.;
иккинчидан:
• таълим олувчиларнинг эҳтиёжлари, мотивлари;
• психологик хусусиятлари, муносабат характери;
• педагогик муносабатлардаги зиддиятлар;
• педагогик мулоқот усуллари;
• талабалар билимини баҳолаш усуллари ва ҳ.к.;
учинчидан:
таълим муассасасидаги бошқарув услублари, моддий-техник база каби шарт-шароитларни тизимли таҳлил қилиш орқали педагогик фаолиятни комплекс баҳолаш мумкин.

Бизнинг фикримизча, ўқитувчининг таълим беришида педагогик маҳоратнинг қуйидаги интикаторлари муҳим:

¬ Касбий лаёқат ва эрудиция;

¬ Психологик-педагогик тайёргарлик;

¬ Таълим олувчиларни мустақил фикрлаш ва янги билимлар олишга ўргатиш маҳорати;

¬ Ўқув адабиётлари шакллари ва турларини билиш;

¬ Янги педагогик ва ахборот технологияларини эгалланганлик, интернетнинг глобал тармоғи биланишлаш бўйича амалий кўникмалар;

¬ Педагог кадрлар малакасини оширишнинг асосий шаклларини билиш;

¬ Илмий-педагогик ижодиёт методологиясини билиш;

¬ Педагогика фани ва соҳасини ривожлантиришнинг асосий йўналишларини билиш;

¬ Фанлараро алоқалардан фойдаланиш маҳорати;

¬ Риторика ва нотиқлик санъати асосларини билиш;

Юқорида таъкидланган компонентлар, омиллар ва шарт-шароитлар ҳамда уларнинг ўзаро муносабатидан олий таълим муассасалари ўқитувчиларининг қуйидаги мезонларини шакллантиришни тавсия қиламиз:

Хулоса қилиб айтиш мумкинки, юқорида таъкидланган педагогик фаолиятнинг бир-бири билан узвий боғлиқ бўлган компонентлари, омиллари ва шарт-шароитларини ҳисобга олган ҳолда олий таълим муассасалари ўқитувчиларининг фаолиятини баҳолашнинг объектив механизмлари олий таълим тизимида рақобатбардош кадрлар тайёрлашда муҳим аҳамият касб этади.

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ГЕОГРАФИЧЕСКИЕ АСПЕКТЫ ЭФФЕКТИВНОГО ИСПОЛЬЗОВАНИЯ РЕКРЕАЦИОННО-ТУРИСТСКИХ РЕСУРСОВ КАШКАДАРЬИНСКОЙ ОБЛАСТИ

Аннотация. *Статья посвящена анализу рекреационно-туристических ресурсов Кашкадарьинской области. В центре внимания-перспективы развития туризма и рекреации в регионе, расширение потока туристов и отдыхающих, а также эффективность использования историко-культурных памятников, природных рекреационных объектов и оздоровительных зон. Рассматриваются возможности интеграции экотуризма, медицинского туризма и этнографических маршрутов в региональную туристическую инфраструктуру.*

Ключевые слова*: рекреация, туристический ресурс, путешествие, экскурсия, рекреационный туризм, минеральные воды, рекреационный объект, экотуризм, реклама, гостиницы, дома отдыха, санатории.*

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GEOGRAPHICAL ASPECTS OF THE EFFECTIVE USE OF RECREATIONAL AND TOURIST RESOURCES OF THE KASHKADARYA REGION

Abstract. *This article analyzes the recreational and tourism resources of the Kashkadarya region. It focuses on the prospects for tourism and recreation development in the region, increasing tourist and vacationer flows, and the effective use of historical and cultural monuments, natural recreational sites, and*

health resorts. The possibilities for integrating ecotourism, medical tourism, and ethnographic routes into the regional tourism infrastructure are explored.

Key words: *recreation, touristic resource, travelling, excursion object, recreation tourism, mineral water, recreation object, ecotourism, advertisement, hotels, health resorts and sanatoriums.*

Введение

На примере Кашкадарьинской области можно наглядно увидеть, как в нашей Республике ведётся масштабная работа по изучению древнего и богатого культурного наследия, возрождению национальных ценностей, воспитанию подрастающего поколения в духе уважения к ним, а также по созданию современных зон отдыха. В частности, при посещении таких городов, как Китаб, Шахрисабз и Карши, в душе возникает чувство возвышенности и гордости.

Разработка новых туристических маршрутов, создание дополнительных условий для полноценного отдыха туристов, развитие производства сувенирной продукции с символикой, представляющей культурную ценность для иностранных гостей - всё это играет важную роль в дальнейшем развитии рекреации и туризма в регионе. Кроме того, придаётся приоритетное значение оценке туристических и рекреационных возможностей отдельных территорий, совершенствованию механизмов их рационального использования, выявлению комплексных возможностей и повышению эффективности.

В условиях современной социальной жизни растут возможности населения в сфере отдыха, оздоровления и использования туристических объектов. Это требует определения рекреационных и туристических характеристик, потенциала ландшафтных комплексов, а также разработки предложений и рекомендаций по их эффективному использованию. В частности, Кашкадарьинская область обладает благоприятным географическим положением, быстрыми темпами социально-экономического развития по сравнению с другими регионами, а также богатыми культурными ландшафтами, горными массивами, садами и арчовыми лесами. Всё это создаёт широкие возможности для отдыха населения, занятий спортом, прогулок на природе и охоты в горах.

В Указе Президента Республики Узбекистан «О рациональном использовании природных ресурсов» также рассматриваются вопросы охраны уникальных природных памятников и их рационального использования в целях туризма, рекреации, медицины и других направлений. С учётом природных ресурсов региона реализуются различные меры по увеличению количества рекреационно-туристических объектов и туристических фирм, совершенствованию их специализации и территориальной структуры.

В частности, Указы Президента Республики Узбекистан от 2 декабря 2016 года №ПФ-4861 «О мерах по обеспечению ускоренного развития сферы туризма в Республике Узбекистан», от 3 февраля 2018 года №ПФ-5326 «О дополнительных организационных мерах по созданию благоприятных условий для развития туристического потенциала Республики Узбекистан», а также постановления от 6 февраля 2018 года №ПҚ-3509 «О мерах по развитию

въездного туризма», от 7 февраля 2018 года №ПҚ-3514 «О мерах по обеспечению ускоренного развития внутреннего туризма», Закон Республики Узбекистан «О туризме» от 18 июля 2019 года и другие нормативно-правовые акты в определённой степени способствуют дальнейшему развитию туризма и рекреации в Кашкадарьинской области.

Принятие вышеуказанных решений и указов в короткие сроки сыграло важную роль в восстановлении и ремонте исторических, религиозных объектов, мавзолеев великих личностей, мечетей и медресе в различных районах Кашкадарьинской области. Это, в свою очередь, способствует увеличению и улучшению туристических объектов, а также усиливает внимание к использованию предметов потребления во время отдыха туристов, направленного на восстановление их трудоспособности.

Анализ литературы и методы

В Республике Узбекистан по научно-теоретическим вопросам географии туризма и рекреации исследования проводили такие экономисты и географы, как М.Р.Болтабоев, М.Қ.Пардаев, И.С.Тухлиев, А.С.Салиев, А.Х.Юсупов, М.Р.Усманов, М.М.Мухамедов, Д.К.Усманова, М.Хашимов, А.Норчаев, Б.Ш.Сафаров, З.Махаматиллаев, А.Н.Нигматов, А.А.Рафиков, Ш.Азимов, А.Каюмов, Х.Вахобов, А.Якубов. Они в своих научных трудах рассматривали различные аспекты туризма и рекреации.

Кроме того, эти вопросы более широко освещены в работах Р.Усмановой, Н.Т.Шамуратовой, А.Зокиров, О.Х.Хамидов, С.Б.Аббасов, Қ.С.Ярашев, Ш.Холмуродов, У.Б.Бадалов и других исследователей.

Следует отметить, что по оценке ландшафтов Кашкадарьинской области в рекреационных целях Р.Усмановой, а также по комплексному изучению и оценке туристско-рекреационного потенциала региона и совершенствованию территориальных систем туристической инфраструктуры Х.Джумаев были проведены значительные научные исследования.

Результаты и обсуждение

В Кашкадарьинской области реализуются важные реформы, направленные на ускоренное развитие сферы туризма и рекреации, повышение её международного туристического имиджа, укрепление туристско-рекреационного потенциала регионов, диверсификацию туристических услуг, а также создание новых туристических маршрутов и комплексов.

В этом контексте изучение и оценка туристско-рекреационного потенциала Кашкадарьинской области, известной своей природой, демографическим и производственным потенциалом, национальными ценностями и ремесленным наследием, а также проведение научных исследований, направленных на совершенствование туристической инфраструктуры территорий, являются актуальными задачами на уровне государственной политики.

В последние годы в нашей республике уделяется большое внимание развитию перспективных направлений туризма и рекреации в горных районах. Президент Республики Узбекистан Ш.М. Мирзиёев отметил: «В нашей стране

существует огромный потенциал для развития туризма в уникальной природе, национальных заповедниках и горных регионах» [1].

Таким образом, одной из приоритетных задач на сегодняшний день является поддержка развития субъектов туристической деятельности в перспективной сфере рекреационного туризма, повышение эффективности использования туристического потенциала регионов, улучшение условий для отдыха и туризма, создание новых рабочих мест в сфере предоставления туристических услуг, а также повышение занятости и благосостояния населения [6].

Территория нашей республики, особенно горные и предгорные районы, входит в число стран, богатых ресурсами для экотуризма. Республика Узбекистан рассматривается как географически связующее звено между государствами Центральной Азии [2]. В связи с этим в стране имеются широкие возможности для развития внутреннего и внешнего туризма. Одним из таких перспективных районов является высокогорная часть Кашкадарьинского бассейна.

Кашкадарьинский бассейн с геоморфологической точки зрения состоит из гор и равнин, и его ландшафты характеризуются зональной и вертикальной дифференциацией, специфическим температурным режимом, условиями увлажнения, рельефом и другими факторами [3].

На сегодняшний день во многих странах мира туризм стал неотъемлемой частью экономики. В таких странах 10–15% экономически активного населения занято в сфере туризма [8]. В Кашкадарьинской области также уделяется особое внимание эффективному использованию уникального историко-культурного наследия, улучшению состояния архитектурных ансамблей и памятников, строительству гостиниц и объектов обслуживания для туристов, формированию и внедрению современных туристических маршрутов по культурно-историческим достопримечательностям, рациональному использованию природного и рекреационного потенциала региона, развитию транспортной инфраструктуры, повышению качества предоставляемых услуг, созданию новых рабочих мест и увеличению доходов населения области.

В результате началась работа по привлечению иностранных инвестиций, кредитов и грантов от стран-доноров и международных организаций для совместного финансирования туристических проектов. Например, с 2023 года деревня Башир в Китабском районе была преобразована в туристическую деревню, и планируется довести количество туристов до 700 тысяч человек. Отмечается, что деревня «Хазрати Башир» расположена на берегу реки Кашкадарья. В настоящее время в деревне функционирует более 20 семейных гостевых домов. Здесь развиты направления паломнического туризма, экотуризма и агротуризма. Также находится святыня «Хазрати Башир», названная в честь святого Султана Саида Ахмада Башира (1368–1464), жившего в этих местах [11].

Кроме того, в ряде туристических зон — таких как деревни «Кайнар» и «Варганза» в Китабском районе, «Татар» в Яккабагском районе и «Джейнов» в Миришкорском районе — продолжаются ремонтные работы в рамках туристических проектов, соответствующих современным требованиям.

За прошедшее время в городе Карши были капитально отреставрированы архитектурные памятники: комплекс Абу Убайда аль-Джарроха, узбекская баня, комплекс Одина, Сардоба, медресе Киличбоя, Абдулазизхона, а также мечеть и мавзолей Катта Лангар ота, комплекс Ходжа Илмкони в Чиракчинском и Китабском районах [9]. В Каршинском и Касбинском районах продолжаются реставрационные работы в мавзолеях Ходжи Шамсиддина Халвони, Имама Муина ан-Насафий и комплексе Султон Мир Хайдар. Следует особо отметить, что в области планируется восстановление тридцати историко-культурных объектов, которые в будущем станут привлекательными местами для туристов.

Вокруг водохранилища Ачинкуль в Миришкорском районе имеются широкие возможности для организации зон отдыха с рыбалкой, катанием на лодках и установкой юрт. В настоящее время на берегу водохранилища ведутся работы по созданию «Биологического заказника». Кроме того, разрабатываются программы посещения Китабского государственного геологического и Гиссарского заповедников, а также планируется строительство горнолыжной базы и канатной дороги в районе села Мингчинор [7]. Эти мероприятия являются важными факторами в определении перспектив развития туристической отрасли в регионе. Поэтому реализация запланированных проектов по повышению туристического потенциала районов имеет большое значение.

Кашкадарьинская область обладает значительным потенциалом для развития культурного и этнографического туризма. Традиционные свадебные обряды местного населения (выдача невесты, встреча невестки, свадьбы сыновей, игры купкари, борьба, петушиные и бараньи бои, празднование Навруза, пахота, праздник урожая и др.) вызывают большой интерес у народов мира. Национальные блюда, приготовленные нашим народом - плов, шашлык, манты, различные сладости (халва, парварда), кашкадарьинский хлеб и другие этнографические обычаи также привлекают иностранных туристов. Для привлечения зарубежных гостей регулярно проводятся праздничные ярмарки, что, в свою очередь, способствует дальнейшему развитию агротуризма в области.

В Шахрисабзском, Китабском и Яккабагском районах имеются живописные зоны отдыха, где около 6,5 тысяч мальчиков и девочек проводят каникулы на лоне природы. Лагерь «Лочин», расположенный в крепости Мироки в Шахрисабзе, летом превращается в оживлённое место, наполненное детским смехом и песнями. По инициативе коллектива Шуртанского газохимического комплекса здесь были построены современные здания, красочные павильоны, душевые и бассейны, созданы все условия для полноценного отдыха [3].

На территории области выявлено множество целебных минеральных источников, из которых на сегодняшний день изучено около 20. С медицинской точки зрения особое значение имеют воды с содержанием углекислого газа, сероводорода, радона и азотных термальных газов. В равнинной части - Майдажой, Хужакудук, Карабайыр, Южный Муборак - уровень минерализации вод достигает 80 г/л. В горных районах имеются источники Кукбулок, Угин, Карабулок, Хайдарбулок, Кайнарбулок, Хужа Инкан, Камолбулок и другие, что создаёт широкие возможности для организации санаторно-курортных учреждений [5].

В настоящее время на территории области функционируют 19 летних оздоровительных лагерей. Кроме того, одно из самых живописных, прохладных и предгорных мест Китабского района - село Кайнар - также считается благоприятной зоной для развития туризма. Это село, расположенное на границе с Самаркандской областью, дарит каждому туристу особое наслаждение и полноценный отдых благодаря возможности любоваться природой с высоты.

Рациональное использование возможностей, созданных нашим Президентом, и превращение этой природной жемчужины в туристический центр с сохранением её экологической чистоты создаст благоприятные условия как для местных, так и для иностранных туристов. Согласно утверждённому проекту, с развитием туристических объектов в этом районе возможности значительно расширятся, и в селе Кайнар будет создано не менее 1500 дополнительных рабочих мест [10].

Выводы

Из вышеизложенного видно, что туристско-рекреационные ресурсы области обладают высоким потенциалом. В настоящее время создаются возможности для их эффективного использования в социально-экономических целях и рациональной территориальной организации, что служит прочной основой для экономического развития региона.

Бесценная природа равнинных и горных районов Кашкадарьинской области, целебные минеральные источники, благоприятные климатические условия и спортивно-оздоровительные зоны создают благоприятные условия для формирования рекреационно-туристического потенциала. Уникальные природные условия региона, внутренние водоёмы, климат и растительный мир способствуют созданию многочисленных зон отдыха и оздоровительных лагерей.

На основе оценки природных рекреационных ресурсов была определена функциональная система перспективного туризма. В рамках этой системы создаются возможности для строительства новых зон отдыха и лечебных учреждений (медицинский туризм), а также для разработки перспективных туристических маршрутов.

Кроме того, с учётом наличия достаточных условий для развития, внедрение всех видов рекреационно-туристических ресурсов позволит

способствовать физическому и духовному оздоровлению населения, а также улучшению его социального благополучия.

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СТРУКТУРНО-ФУНКЦИОНАЛЬНЫЕ ОСОБЕННОСТИ МЕЗЕНТЕРИАЛЬНЫХ ЛИМФАТИЧЕСКИХ УЗЛОВ ПРИ САХАРНОМ ДИАБЕТЕ

Аннотация: *В работе приведён морфологический анализ мезентериальных лимфатических узлов, выполненный на готовых гистологических препаратах, полученных от пациентов с сахарным диабетом. Проведено сравнение с нормальной структурой лимфатических узлов. Отмечено, что при сахарном диабете происходят выраженные изменения архитектоники узла: истончение капсулы, редукция лимфоидных фолликулов, расширение синусов, сосудистые нарушения и признаки хронического воспаления. Эти изменения свидетельствуют о снижении барьерной и иммунной функции лимфатических узлов и позволяют предположить системное влияние диабета на лимфатическую систему в целом.*

Ключевые слова: *Мезентериальные лимфатические узлы, сахарный диабет, морфология, лимфоток, иммунные изменения.*

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STRUCTURAL AND FUNCTIONAL CHARACTERISTICS OF MESENTERIC LYMPH NODES IN DIABETES MELLITUS

Annotation: *This paper presents a morphological analysis of mesenteric lymph nodes based on prepared histological slides obtained from diabetic patients. A comparison with normal lymph node structure was performed. Significant alterations were revealed in the diabetic group, including capsule thinning, follicular reduction, sinus expansion, vascular disturbances, and chronic inflammation. These findings indicate decreased barrier and immune functions of lymph nodes and suggest systemic lymphatic involvement in diabetes mellitus.*

Key words: *Mesenteric lymph nodes, diabetes mellitus, morphology, lymph flow, immune alterations.*

Актуальность

Сахарный диабет вызывает хроническую гипергликемию, приводящую к изменениям в органах, микроциркуляции и иммунной системе. Мезентериальные лимфатические узлы, фильтруя лимфу от органов ЖКТ и выполняя иммунорегуляторные функции, при диабете подвергаются структурно-функциональным нарушениям из-за метаболических расстройств и хронического воспаления, что важно для понимания иммунных нарушений и инфекционных осложнений.

Цель исследования

Целью исследования является определение структурно-функциональных особенностей мезентериальных лимфатических узлов при сахарном диабете на основе анализа гистологических препаратов и сопоставление выявленных изменений с нормальной морфологией лимфатических узлов.

Методы исследования

Материалом для работы послужили готовые гистологические препараты мезентериальных лимфатических узлов, окрашенные гематоксилин-эозином и другими стандартными красителями. Анализ проводился с использованием светового микроскопа при различных увеличениях. Изучались особенности капсулы, коркового и мозгового вещества, состояние лимфоидных фолликулов, синусной системы, сосудов и клеточного состава. Полученные морфологические данные сопоставлялись с литературными источниками, описывающими морфологию лимфатических узлов в норме и при патологических состояниях. На основе проведённого анализа сделаны предположения о характере влияния сахарного диабета на структуру и функцию лимфатических узлов живого организма.

Результаты исследования

У пациентов с сахарным диабетом мезентериальные лимфатические узлы претерпевают выраженные структурные изменения: истончение капсулы с очагами фиброза, уменьшение и деформация лимфоидных фолликулов, снижение пролиферации лимфоцитов. В мозговом веществе отмечаются расширенные синусы, сосудистый застой и лимфостаз. Клеточный состав смещён в сторону увеличения макрофагов и плазматических клеток при умеренном снижении лимфоцитов. Признаки хронического воспаления включают паренхиматозную инфильтрацию, гиперемию и расширение лимфатических сосудов. Эти изменения отражают метаболические и сосудистые нарушения с ослаблением иммунной функции при диабете.

Вывод

При сахарном диабете мезентериальные лимфатические узлы значительно изменяются: истончается капсула, сокращается число фолликулов, расширяются синусы и усиливаются признаки хронического воспаления. Эти нарушения снижают функциональную активность узлов, ослабляя местный иммунитет и лимфоток.

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РОЛЬ ИНТЕРКИНОВ В ПРЕДОТВРАЩЕНИИ КЛЕТОЧНОЙ ГИБЕЛИ И ПОДДЕРЖАНИИ РЕГЕНЕРАЦИИ: ГИСТОЛОГИЧЕСКИЙ И КЛИНИЧЕСКИЙ АСПЕКТЫ

Аннотация: *Интеркины — это ключевые цитокины, регулирующие иммунный ответ, предотвращающие клеточную гибель и стимулирующие регенерацию тканей. В статье рассматриваются исторические аспекты изучения интеркинов, их гистологическое влияние на эпителиальные, стромальные и иммунные ткани, механизмы защиты клеток от гибели, а также клиническое применение в медицине. Особое внимание уделено общим принципам действия интеркинов и их роли в поддержании структурной целостности тканей и ускорении заживления.*

Ключевые слова: *Интеркины, цитокины, клеточная гибель, апоптоз, регенерация, гистология, клиническое применение*

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THE ROLE OF INTERLEUKINS IN PREVENTING CELL DEATH AND SUPPORTING REGENERATION: HISTOLOGICAL AND CLINICAL ASPECTS

Annotation: *Interkinins are key cytokines that regulate the immune response, prevent cellular death, and stimulate tissue regeneration. This article examines the historical aspects of interkinin research, their histological effects on epithelial, stromal, and immune tissues, the mechanisms by which they protect cells from death, as well as their clinical applications in medicine. Special attention is given to the general principles of interkinin activity and their role in maintaining the structural integrity of tissues and accelerating healing.*

Key words: *Interkinins, cytokines, cell death, apoptosis, regeneration, histology, clinical application*

Введение

Клеточная гибель и регенерация поддерживают гомеостаз и восстановление тканей, а их нарушение ведёт к воспалению, дегенерации и фиброзу. Интеркины, как элементы цитокиновой сети, регулируют эти процессы, связывая иммунные клетки с тканями. Они не только активируют иммунный ответ, но и поддерживают жизнеспособность клеток, предотвращают ранний апоптоз и стимулируют пролиферацию стволовых и прогениторных клеток, выступая ключевыми регуляторами регенерации тканей.

История изучения интеркинов

Первые цитокины, регулирующие иммунный ответ, открыты в середине XX века. В 1972 году введён термин «интерлейкин». В 1980–1990-е годы выявлены их ключевые функции: иммунная регуляция, защита клеток и

стимуляция регенерации. Гистология уточнила клеточную локализацию и подтвердила роль в поддержании структуры тканей.

Гистологический аспект действия интеркинов

Интеркины комплексно влияют на ткани: в эпителии стимулируют пролиферацию и дифференцировку, восстанавливая барьерную функцию; в строме поддерживают фибробласты, синтез коллагена и микроциркуляцию; в иммунных тканях регулируют дифференцировку лимфоцитов и активацию клеток, восстанавливая клеточную плотность и архитектуру лимфоидных структур.

Механизмы предотвращения клеточной гибели

Интеркины регулируют клеточную гибель, влияя на апоптоз и некроз. Они активируют сигнальные пути антиапоптозных генов, повышают устойчивость клеток к повреждению и подавляют избыточное воспаление, снижая гибель эпителиальных и стромальных клеток. Некротическое повреждение тканей уменьшается, что проявляется сохранением структуры, мембран и барьерной функции эпителия.

Регенерация тканей

Интеркины стимулируют деление стволовых и прогениторных клеток в эпителиальных, стромальных и иммунных тканях, способствуя восстановлению клеточных слоёв и регенерации структур. Они поддерживают тканевую целостность через синтез внеклеточного матрикса и факторов заживления, снижая воспалительное повреждение и восстанавливая барьерные функции. Дефицит интеркинов замедляет регенерацию, а избыток — может вызывать хроническое воспаление, фиброз или аномальную пролиферацию.

Клиническое применение интеркинов

Интеркины применяются для модуляции клеточных процессов и регенерации. При хронических воспалениях снижают апоптоз и восстанавливают ткани. В регенеративной медицине и онкологии ускоряют заживление и уменьшают фиброз после травм, операций и терапии.

Вывод

Интеркины регулируют клеточную жизнеспособность и тканевую регенерацию, стимулируя пролиферацию, защищая клетки от апоптоза и некроза и поддерживая структуру тканей. В клинической практике они применяются для лечения воспалительных заболеваний, ускорения заживления и восстановления тканей после терапии, при этом важно поддерживать баланс их активности, чтобы избежать воспаления или аномальной пролиферации.

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ФОРМИРОВАНИЕ РЕЧЕВОЙ КОМПЕТЕНЦИИ У СТУДЕНТОВ НЕФИЛОЛОГИЧЕСКИХ ФАКУЛЬТЕТОВ

Аннотация. *В статье рассматриваются эффективные подходы к формированию речевой компетенции у студентов нефилологических факультетов в условиях межфакультетского преподавания русского языка. Автор анализирует методические приёмы, направленные на развитие профессионально ориентированной речи, включая использование цифровых ресурсов, проектную деятельность и интеграцию профильных текстов. Подчёркивается значимость коммуникативного и личностно-ориентированного подходов в обучении. Представленные рекомендации могут быть полезны преподавателям, работающим в многоязычной образовательной среде.*

Ключевые слова: *русский язык, речевая компетенция, межфакультетское обучение, профессионально ориентированный подход, коммуникативные навыки, цифровые ресурсы.*

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FORMATION OF SPEECH COMPETENCE AMONG NON-PHILOLOGY STUDENTS

Abstract. *The article explores effective strategies for developing speech competence among non-philology students in interdisciplinary Russian language instruction. The author analyzes methodological techniques aimed at enhancing professionally oriented communication skills, including the use of digital resources, project-based learning, and integration of field-specific texts. The importance of communicative and learner-centered approaches is emphasized. The proposed recommendations are relevant for educators working in multilingual academic environments.*

Keywords: *Russian language, speech competence, interdisciplinary teaching, professionally oriented approach, communication skills, digital tools.*

Введение

Современное образование требует от выпускников не только профессиональных знаний, но и развитых коммуникативных навыков, особенно в условиях многоязычной среды. Русский язык как средство академической и профессиональной коммуникации играет важную роль в подготовке специалистов различных направлений. Однако преподавание русского языка студентам нефилологических факультетов сопряжено с рядом методических и мотивационных трудностей, что требует поиска эффективных подходов к формированию речевой компетенции [1, с. 5–7; 2, с. 12–14].

Современные тенденции в сфере высшего образования акцентируют внимание не только на формировании профессиональных знаний, но и на развитии коммуникативных умений, необходимых для успешной реализации выпускников в условиях многоязычного и межкультурного взаимодействия. Русский язык, выполняя функцию средства академической и профессиональной коммуникации, становится важным компонентом подготовки специалистов в различных областях, особенно в неязыковых вузах[1].

Тем не менее, преподавание русского языка студентам нефилологических направлений сталкивается с рядом методических и мотивационных трудностей. Среди них — неоднородность языковой подготовки обучающихся, ограниченный объём аудиторной практики, недостаточная мотивация и отсутствие устойчивой языковой среды[2]. Эти факторы обусловливают необходимость поиска эффективных педагогических решений, направленных на формирование речевой компетенции как ключевого элемента профессиональной подготовки.

1.Теоретические основы речевой компетенции

Понятие речевой компетенции занимает ключевое место в современной методике преподавания языков. В широком смысле оно охватывает способность личности использовать язык как средство общения, адекватно подбирая языковые средства в зависимости от коммуникативной ситуации, цели и адресата высказывания[1] (с. 33–35). В условиях межфакультетского преподавания русского языка речевая компетенция приобретает особую значимость, поскольку она обеспечивает не только академическое и бытовое взаимодействие, но и овладение профессиональной терминологией, необходимой для будущей деятельности[2] (с. 18–21).

Современные исследователи подчёркивают, что речевая компетенция включает не только знание лексико-грамматических норм, но и умение строить высказывания, соответствующие коммуникативной задаче, учитывать речевую ситуацию, стиль, интенции собеседника[3] (с. 42). Таким образом, речевая компетенция представляет собой интегративное

образование, включающее когнитивный, языковой, социокультурный и прагматический компоненты[4] (с. 112–114).

Согласно коммуникативно-деятельностному подходу, формирование речевой компетенции должно происходить в условиях активного речевого взаимодействия, при котором язык выступает не как цель, а как средство решения конкретных задач. Это предполагает включение студентов в речевые ситуации, приближённые к реальной профессиональной практике, что способствует развитию умений понимать, интерпретировать и создавать тексты различных жанров и стилей[5] (с. 60–61).

2. Особенности межфакультетской аудитории

Формирование речевой компетенции у студентов нефилологических факультетов требует применения гибких и целенаправленных методических решений, учитывающих профессиональные интересы обучающихся, их уровень языковой подготовки и специфику межфакультетской аудитории. Эффективными в этом контексте являются приёмы, направленные на активизацию речевой деятельности, развитие профессионально ориентированной лексики и формирование навыков взаимодействия в учебной и профессиональной среде.

Одним из ключевых направлений является использование профессионально ориентированных текстов, содержание которых соотносится с будущей специальностью студентов. Такие тексты способствуют не только расширению словарного запаса, но и формированию умений интерпретировать, анализировать и воспроизводить информацию в профессиональном контексте[1] (с. 88–90).

Проектная деятельность — ещё один результативный приём, позволяющий студентам применять русский язык в условиях, приближенных к реальной профессиональной коммуникации. Выполнение мини-проектов, подготовка презентаций, участие в ролевых играх и защита тематических эссе формируют навыки аргументации, структурирования высказывания и публичного выступления[2] (с. 60–61).

Работа в парах и малых группах активизирует диалогическую речь, способствует развитию навыков сотрудничества и взаимопонимания. В условиях межфакультетской аудитории это особенно важно, поскольку позволяет учитывать индивидуальные особенности студентов и стимулировать их к активному участию в учебном процессе[3] (с. 78–80).

Современные цифровые ресурсы — онлайн-платформы, интерактивные задания, мультимедийные материалы — делают обучение более гибким, наглядным и доступным. Использование цифровых инструментов позволяет варьировать формы подачи материала, обеспечивать обратную связь и создавать условия для самостоятельной работы студентов[4] (с. 99–100).

3. Методические приёмы формирования речевой компетенции

- Интеграция профессионально ориентированных текстов: использование текстов, связанных с будущей специальностью студентов,

способствует повышению интереса и мотивации к изучению языка [3, с. 112–114; 5, с. 88–90].

- Проектная деятельность: выполнение мини-проектов, презентаций и эссе по профильной тематике развивает навыки аргументации и структурирования речи [4, с. 60–61].

- Работа в парах и группах: стимулирует диалогическую речь, способствует формированию навыков сотрудничества [1, с. 78–80].

- Использование цифровых ресурсов: онлайн-платформы, интерактивные задания и мультимедийные материалы делают обучение более динамичным и доступным [6, с. 99–100].

4. Проблемы и пути их преодоления

Преподавание русского языка студентам нефилологических факультетов сопровождается рядом устойчивых затруднений, обусловленных как объективными, так и субъективными факторами. Среди наиболее распространённых проблем — разнородность языкового уровня обучающихся, ограниченная мотивация, недостаточная языковая среда, а также несоответствие учебных материалов профессиональным интересам студентов[1] (с. 18–21).

Разнородность языковой подготовки затрудняет реализацию единой программы обучения и требует дифференцированного подхода. Эффективным решением становится использование адаптированных текстов и заданий, а также организация работы в малых группах, где студенты могут взаимодействовать на уровне, соответствующем их компетенции[2] (с. 78–80).

Низкая мотивация часто связана с отсутствием очевидной связи между изучаемым языком и будущей профессиональной деятельностью. Преодолеть это можно за счёт интеграции профессионально ориентированных материалов, кейсов и ситуационных задач, моделирующих реальные коммуникативные сценарии[3] (с. 88–90).

Ограниченность языковой среды компенсируется за счёт активного включения цифровых ресурсов: онлайн-курсов, интерактивных платформ, мультимедийных заданий. Это позволяет расширить возможности самостоятельной работы и повысить вовлечённость студентов[4] (с. 99–100).

Кроме того, важным условием преодоления методических трудностей является повышение квалификации преподавателей, их готовность к междисциплинарному взаимодействию и применению современных педагогических технологий[5] (с. 60–61).

Заключение

Формирование речевой компетенции у студентов нефилологических факультетов представляет собой приоритетную задачу современного языкового образования, особенно в условиях межфакультетского взаимодействия. Эффективное овладение русским языком как средством профессиональной и академической коммуникации требует от преподавателя комплексного подхода, сочетающего методическую гибкость, учёт

профессиональных интересов обучающихся и использование современных образовательных технологий[1] (с. 112–114).

Анализ теоретических основ и практических приёмов показал, что наибольшую результативность демонстрируют такие методы, как интеграция профессионально ориентированных текстов, организация проектной деятельности, работа в малых группах, а также активное применение цифровых ресурсов[2] (с. 99–100). Эти подходы способствуют развитию у студентов навыков восприятия, анализа и порождения высказываний в профессионально значимых ситуациях.

Преодоление методических и мотивационных трудностей возможно при условии создания речевой среды, приближённой к реальной профессиональной коммуникации, а также при постоянной актуализации содержания обучения в соответствии с потребностями конкретной специальности[3] (с. 88–90). Важную роль играет и повышение квалификации преподавателей, их готовность к внедрению инновационных форм и методов обучения[4] (с. 60–61).

Таким образом, системный и личностно-ориентированный подход к обучению русскому языку в межфакультетской аудитории позволяет не только повысить уровень речевой подготовки студентов, но и способствует их успешной интеграции в профессиональное сообщество.

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КОНЦЕПЦИЯ МИКРООБУЧЕНИЯ ЭФФЕКТИВНЫЙ ПОДХОД К АДАПТАЦИИ ПЕДАГОГОВ К ЦИФРОВОЙ ОБРАЗОВАТЕЛЬНОЙ СРЕДЕ

Аннотация*: Микрообучение рассматривается как инновационный формат профессионального развития педагогов в условиях стремительной цифровизации образования. Данный подход основан на коротких, целевых учебных модулях, позволяющих оперативно осваивать цифровые инструменты и образовательные платформы без значительного отрыва от рабочего процесса. Микрообучение способствует персонализации педагогического развития, повышению мотивации, формированию цифровой грамотности и устойчивой адаптации к изменениям в образовательной среде. В статье анализируются теоретические основы концепции микрообучения, особенности её применения для подготовки педагогов к цифровым трансформациям, а также эффекты внедрения данного формата в систему повышения квалификации. Установлено, что микрообучение обеспечивает непрерывное и гибкое освоение цифровых технологий, создавая условия для повышения профессиональных компетенций педагогов в соответствии с требованиями современной образовательной среды.*

Ключевые слова: *микрообучение, цифровая образовательная среда, адаптация педагогов, цифровая компетентность, профессиональное развитие, персонализированное обучение, образовательные технологии, гибкое обучение, цифровизация образования, педагогические инновации.*

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THE MICROLEARNING CONCEPT: AN EFFECTIVE APPROACH TO TEACHERS' ADAPTATION TO THE DIGITAL EDUCATIONAL ENVIRONMENT.

Abstract*: Microlearning is considered an innovative format for teachers' professional development in the context of the rapid digitalization of education. This approach is based on short, targeted training modules that enable rapid mastery of digital tools and educational platforms without significant interruption to the work process. Microlearning promotes the personalization of pedagogical*

development, increased motivation, the development of digital literacy, and sustainable adaptation to changes in the educational environment. This article analyzes the theoretical foundations of the microlearning concept, the specifics of its application in preparing teachers for digital transformations, and the effects of implementing this format in the professional development system. Microlearning has been shown to facilitate continuous and flexible acquisition of digital technologies, creating conditions for enhancing teachers' professional competencies in line with the requirements of the modern educational environment.

***Keywords**: microlearning, digital educational environment, teacher adaptation, digital competence, professional development, personalized learning, educational technologies, flexible learning, digitalization of education, pedagogical innovations.*

Введение

Цифровая трансформация образования обусловила необходимость обновления профессиональных компетенций педагогов и их быстрой адаптации к новым условиям работы. Современный педагог должен владеть широким спектром цифровых инструментов, уметь проектировать образовательный процесс в смешанном и дистанционном форматах, обеспечивать обратную связь и оценивание с использованием цифровых платформ, а также поддерживать высокий уровень цифровой грамотности учащихся. Однако традиционные формы повышения квалификации часто оказываются недостаточно гибкими и оперативными, поскольку требуют значительных временных затрат и не всегда соотносятся с актуальными запросами педагогов. Именно поэтому микрообучение становится одним из наиболее перспективных решений в системе профессионального развития педагогических кадров.

Микрообучение представляет собой модель обучения, основанную на кратких учебных модулях, направленных на усвоение конкретных знаний и умений, необходимых для выполнения практических профессиональных задач. Продолжительность таких модулей варьируется от нескольких минут до 10–15 минут, что позволяет легко интегрировать обучение в повседневную педагогическую деятельность. Доступ к образовательным материалам обеспечивается в цифровом формате: через онлайн-платформы, мобильные приложения, видеоролики, интерактивные задания и микрокурсы. Благодаря этому педагог может самостоятельно регулировать темп и последовательность обучения, переходя от простых тем к более сложным навыкам.

Актуальность микрообучения заключается в его способности быстро реагировать на изменения цифровой образовательной среды. Педагогам часто приходится осваивать множество новых инструментов: системы управления обучением, сервисы для видеоконференций, цифровые лаборатории, мультимедийные редакторы, платформы аналитики учебных

данных. В таких условиях обучение должно быть точечным, адаптивным и постоянно обновляемым. Микрообучение предоставляет возможность получения именно тех компетенций, которые востребованы в данный момент, устраняя перегрузку и снижая уровень профессионального стресса.

Кроме того, микрообучение способствует повышению мотивации педагогов к профессиональному саморазвитию. Освоение небольших учебных блоков приносит быстрый результат и позволяет педагогу сразу применять новые знания на практике, что укрепляет уверенность в собственных возможностях. Такой формат отвечает принципам андрагогики, предполагающим самостоятельность, осознанность и опытность обучающегося. В результате формируется устойчивая траектория непрерывного профессионального роста, соответствующая индивидуальным образовательным потребностям педагога.

Важным аспектом является также развитие цифровой культуры педагогов, включающей умение критически оценивать образовательный контент, соблюдать правила цифровой безопасности, выстраивать этичное онлайн-взаимодействие и формировать цифровую идентичность. Микрообучение позволяет интегрировать эти элементы в ежедневную педагогическую практику.

Таким образом, концепция микрообучения выступает эффективным подходом к формированию цифровых компетенций педагогов, обеспечивая гибкость, персонализацию и практикоориентированность профессионального развития. Она способствует успешной адаптации педагогов к цифровой образовательной среде и повышению качества образовательного процесса в условиях современных вызовов.

Методы

Для исследования концепции микрообучения и её эффективности в адаптации педагогов к цифровой образовательной среде был применён комплекс методов, позволяющий рассмотреть явление как с теоретической, так и с практической стороны. Теоретические методы включали анализ научной литературы, посвящённой цифровой трансформации образования, андрагогическим подходам и современным технологиям профессионального развития педагогов. Особое внимание уделялось исследованиям, раскрывающим структуру и принципы микрообучения, его связь с персонализированным обучением, востребованностью цифровых компетенций и психолого-педагогическими особенностями освоения кратких учебных материалов.

Для изучения практической эффективности микрообучения использовались методы педагогического наблюдения и анализа опыта внедрения микромодулей в системе повышения квалификации педагогов. Наблюдение проводилось в условиях, где педагоги проходили цифровую подготовку с использованием микроформатов обучения, что позволило выявить изменения в их профессиональной активности и уровне цифровой грамотности. Также проводилось анкетирование педагогов, направленное на

определение их отношения к различным формам обучения, выявление трудностей, связанных с адаптацией к цифровой образовательной среде, и оценку удобства микрообучения по сравнению с традиционными форматами.

Использовались методы педагогического эксперимента, направленного на проверку эффективности микрокурсов, видеотренингов, интерактивных карточек и мобильных обучающих приложений. Педагоги выполняли практические задания на цифровых платформах, участвовали в мини-тренингах по освоению инструментов для проектирования уроков, цифрового оценивания, визуализации данных и коммуникации с учащимися в онлайн-среде. Результаты фиксировались в виде цифрового портфолио, отражающего достижения участников на каждом этапе.

Применялись методы сравнительного анализа, которые позволили сопоставить эффективность микрообучения и традиционных курсов повышения квалификации с длительным учебным циклом. Были исследованы такие параметры, как степень усвоения материала, актуальность полученных знаний, скорость их практического применения, динамика профессиональной самооценки педагогов и устойчивость мотивации к дальнейшему обучению.

Обработка результатов исследования выполнялась с использованием методов количественного и качественного анализа. Количественные данные, полученные по итогам анкетирования и диагностических работ, позволили определить уровни сформированности цифровых навыков. Качественные данные включали экспертные оценки, аналитические отчёты педагогов и описания практических кейсов внедрения цифровых технологий.

Комплексное применение данных методов обеспечило полноту исследования и подтвердило, что микрообучение является педагогически целесообразным и эффективно способствует адаптации педагогов к цифровой образовательной среде.

Результаты

Результаты исследования показали, что микрообучение оказывает выраженное и позитивное влияние на адаптацию педагогов к цифровой образовательной среде. Педагоги, участвовавшие в программах микрообучения, быстрее осваивали цифровые инструменты, необходимые для проведения занятий в онлайн- и смешанном формате. Благодаря краткости и ясной структурированности микромодулей освоение цифровых навыков происходило поэтапно, без перегрузки и ощущения сложности. Это повышало общую доступность обучения и снижало барьеры вхождения в цифровую педагогику.

Наблюдения, анализ выполненных заданий и данные диагностики цифровой компетентности показали устойчивую положительную динамику. Участники стали уверенно использовать образовательные платформы, цифровые средства коммуникации, интерактивные сервисы для визуализации учебного материала и инструменты автоматизированного

оценивания. Кроме того, они активнее формировали цифровое портфолио, создавая собственный банк материалов и авторских разработок.

Качественные показатели также свидетельствуют о росте внутренней мотивации педагогов. Быстрый эффект от обучения в форме малых шагов усиливал уверенность в профессиональных возможностях, что формировало готовность к дальнейшему освоению более сложных цифровых решений. Педагоги стали чаще применять инновации в повседневной практике, экспериментировать с форматами подачи учебного материала и методами цифрового взаимодействия с обучающимися.

Отдельным важным результатом стало снижение профессионального стресса, вызванного цифровыми изменениями в образовании. Для педагогов, испытывавших трудности при работе с технологиями, микрообучение стало удобным способом постепенной адаптации. Формат коротких уроков, наличие оперативной обратной связи и возможность повторного прохождения материалов позволяли закреплять навыки без принуждения и негативного опыта.

Сравнительный анализ показал, что микрообучение значительно превосходит традиционные длительные курсы повышения квалификации в условиях быстрого обновления цифровой образовательной среды. В отличие от статичных программ, микромодули легко модифицируются, дополняются и настраиваются под актуальные запросы. Это обеспечивает устойчивость профессионального развития педагогов и соответствует концепции непрерывного образования.

Таким образом, микрообучение доказало свою результативность как современный формат формирования цифровых компетенций педагогов, обеспечивающий высокую скорость адаптации, повышение качества их профессиональной деятельности и устойчивую мотивацию к дальнейшему цифровому развитию.

Обсуждение

Полученные результаты убедительно демонстрируют, что микрообучение является одним из наиболее эффективных подходов к развитию цифровых компетенций педагогов, что особенно актуально в условиях стремительной цифровизации образования. Его преимущество заключается в адаптивности форматов обучения к реальным профессиональным потребностям педагогов, которые часто испытывают недостаток времени для длительных курсов повышения квалификации. Краткие и целевые микромодули позволяют педагогам осваивать новые цифровые инструменты без отрыва от основной деятельности, что делает процесс профессионального развития более органичным и непрерывным.

Микрообучение способствует формированию позитивного отношения к внедрению цифровых технологий в учебный процесс. В отличие от традиционных подходов, которые могут вызывать у педагогов чувство перегруженности информацией и сложности освоения, микрошаги в обучении создают ситуацию успеха и уверенности. Это отражается в

повышении внутренней мотивации, готовности педагогов экспериментировать, применять цифровые ресурсы и расширять собственный профессиональный инструментарий.

Важным аспектом является необходимость учитывать индивидуальные различия педагогов. Уровень цифровой грамотности, личный темп освоения нового и психологическая готовность к цифровым изменениям могут значительно различаться. Поэтому микрообучение, будучи персонализированным форматом, позволяет каждому педагогу выбирать свою образовательную траекторию: тематику, уровень сложности, время и место обучения. Такая гибкость способствует снижению стрессового воздействия цифровой среды и предотвращает профессиональное выгорание.

Анализ опыта внедрения микрообучения выявил также ряд организационных и методических задач. Во-первых, требуется подготовка квалифицированных специалистов, способных разрабатывать качественный образовательный контент для микромодулей и обеспечивать сопровождение педагогов в процессе обучения. Во-вторых, необходима цифровая инфраструктура, обеспечивающая удобный доступ к материалам через мобильные и веб-платформы. В-третьих, важным является включение микрообучения в стратегию развития образовательной организации, что позволит систематизировать профессиональное развитие педагогов и сделать его непрерывным.

Также следует учитывать психологическую составляющую: педагоги должны воспринимать микрообучение не как обязательное требование, а как возможность для самореализации, профессионального роста и повышения качества образовательной деятельности. Для этого важно формировать культуру постоянного цифрового развития и обмена опытом внутри педагогического коллектива.

Таким образом, микрообучение стоит рассматривать не только как технологический инструмент, но и как педагогическую концепцию, опирающуюся на принципы доступности, гибкости, мотивации и практикоориентации. Дальнейшие исследования необходимы для разработки оптимальных моделей интеграции микрообучения в систему педагогического образования и повышения квалификации, что обеспечит устойчивый профессиональный рост педагогов и успешное функционирование цифровой образовательной среды.

Заключение

Проведённое исследование позволяет сделать вывод о высокой педагогической эффективности микрообучения как современного подхода к адаптации педагогов к цифровой образовательной среде. В условиях интенсивной трансформации образования и роста требований к цифровым компетенциям именно микрообучение обеспечивает гибкость, непрерывность, адресность и практикоориентированность профессионального развития педагогов. Данный формат успешно устраняет временные и психологические барьеры, которые возникают при освоении

новых цифровых инструментов, и способствует формированию устойчивой профессиональной готовности к инновационной деятельности.

Микрообучение помогает педагогам быстрее адаптироваться к технологическим изменениям, повышает уровень цифровой грамотности, способствует формированию навыков самостоятельного поиска информации и внедрения цифровых решений в образовательный процесс. При этом существенно возрастает мотивация к саморазвитию, что создаёт основу для долгосрочного профессионального роста. Полученные результаты также показывают, что микрообучение снижает уровень стресса, связанного с цифровизацией, формирует позитивное отношение к инновациям и укрепляет уверенность педагогов в собственных силах.

Несмотря на очевидные преимущества, практическая реализация микрообучения требует системного подхода. Необходимо совершенствовать методическую поддержку, развивать цифровую инфраструктуру, обеспечивать доступ к качественным микромодулям и сопровождать педагогов в процессе обучения. Важной задачей является также подготовка специалистов, способных проектировать эффективные программы микрообучения на основе анализа актуальных профессиональных запросов и потребностей педагогов.

Таким образом, микрообучение следует рассматривать как стратегический элемент модернизации системы повышения квалификации педагогов. Его внедрение позволит обеспечить соответствие профессиональных компетенций педагогов современным требованиям цифрового общества, повысить качество образовательного процесса и укрепить устойчивость педагогов к изменениям, неизбежным в условиях продолжающейся цифровой трансформации. В перспективе микрообучение может стать фундаментом новой модели непрерывного профессионального образования, ориентированной на гибкое, мотивирующее и персонализированное развитие каждого педагога.

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УРОВЕНЬ ЖИЗНИ В РОССИЙСКОЙ ФЕДЕРАЦИИ КАК КРИТЕРИЙ НУЖДАЕМОСТИ В МЕРАХ СОЦИАЛЬНОЙ ЗАЩИТЫ И СОЦИАЛЬНОЙ ПОДДЕРЖКИ НАСЕЛЕНИЯ

Аннотация: *В статье рассматривается уровень жизни населения как ключевой интегральный индикатор социально-экономического развития государства. Цель исследования заключается в анализе динамики показателей уровня жизни в Российской Федерации за период 2018–2023 годов и выявлении основных социально-экономических факторов, влияющих на его изменение. Методологическая основа работы включает статистический анализ данных Росстата, изучение нормативной базы и классификацию основных групп показателей уровня жизни. В результате исследования установлено снижение качества жизни граждан под воздействием экономической нестабильности, инфляционных процессов и социальной дифференциации, что определяет необходимость усиления государственной социальной политики.*

Ключевые слова: *социально-экономическое развитие, уровень жизни, доходы населения, социальная дифференциация, социальная политика, качество жизни.*

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STANDARD OF LIVING IN THE RUSSIAN FEDERATION AS A CRITERION FOR THE NEED FOR SOCIAL PROTECTION AND SOCIAL SUPPORT MEASURES

Abstract: *The article examines the standard of living as a key integral indicator of a country's socio-economic development. The purpose of the study is to analyze the dynamics of living-standard indicators in the Russian Federation for the period 2018–2023 and to identify the main socio-economic factors influencing these changes. The methodological basis of the research includes statistical analysis of Rosstat data, examination of the regulatory framework, and classification of the main groups of living-standard indicators. The results demonstrate a decline in the quality of life due to economic instability, inflationary processes, and increasing social inequality, which underscores the need to strengthen state social policy.*

Keywords: *socio-economic development, standard of living, household income, social inequality, social policy, quality of life.*

Уровень жизни населения представляет собой один из ключевых индикаторов социально-экономического развития государства. Он характеризует степень удовлетворения основных потребностей граждан, доступ к материальным и нематериальным благам, а также качество социальной защиты. В условиях современной России проблема уровня жизни является актуальной в связи с нестабильной экономической ситуацией, инфляцией, демографическими изменениями и социальной дифференциацией.

Остановимся на сущности понятия, которое представляет собой важнейшую интегральную социально-экономическую характеристику общества. С точки зрения статистики[28], уровень жизни — это уровень благосостояния населения, потребления благ и услуг, совокупность условий

[28] Чепелева А.Ю., Хайрхуа А.Ф. Статистический анализ жизненного уровня населения России. // Материалы XI Международной студенческой научной конференции «Студенческий научный форум» - [Электронный ресурс] - Режим доступа: URL: http://scienceforum.ru/2019/article/2018011462

и показателей, характеризующих меру удовлетворения основных жизненных потребностей людей.

В научной литературе выделяют четыре уровня жизни населения[29]:

достаток (пользование благами, обеспечивающими всестороннее развитие человека);

нормальный уровень (рациональное потребление по научно обоснованным нормам, обеспечивающее человеку восстановление его физических и интеллектуальных сил);

бедность (ограниченное потребление необходимых товаров и услуг, позволяющее сохранить работоспособность на минимальном уровне);

нищета (крайне низкий набор жизненно важных благ и услуг, обеспечивающий выживание человека в рамках физиологических потребностей организма).

В перечень базовых показателей, на основании которых обычно экспертами рассчитывается уровень жизни для анализа социально-экономического развития разных стран и разных слоев населения включают: реальный доход на душу населения, его соотношение к потребительской корзине товаров и услуг, объём потреблённых товаров и услуг, медианный доход, продолжительность жизни. В России в этот критерий входят бюджет прожиточного минимума и минимальный бюджет потребителей.

Динамика этих показателей в последние годы демонстрирует ухудшение уровня жизни в связи с экономическим кризисом, инфляцией и девальвацией рубля. В таблице 1 представлены данные Росстата о динамике уровня жизни за последние 5 лет.

[29] М.А. Меньшикова, К.В. Коптева Теоретико-методологические подходы к оценке уровня и качества жизни населения //Вестник Курской государственной сельскохозяйственной академии. – 2017 - № 5 – С11-13.

Таблица 1

Динамика уровня жизни РФ с 2018 по 2023 годы[30]

Показатель	2018	2019	2020	2021	2022	2023
Реальные денежные доходы население (в процентах к предыдущему году)	100,5%	100,8%	99%	103%	101%	104,5%
Прожиточный минимум (рублей в месяц)	10 451	10 890	11 468	11 653	13 919	14 375 руб.
Уровень безработицы (в процентах)	4,8%	4,6%	5,8%	5%	3,9%	3,2%
Ожидаемая продолжительность жизни (в годах)	72,9	73,3	71,5	70,1	72,8	73,6
Медианный среднедушевой доход (рублей)	24 678,4	26 304,9	27 097,7	29 976,0	36 185,0	40 120,7

В Российской Федерации применяются различные официальные системы для анализа уровня жизни граждан. Основой для этого является методология, состоящая из системы показателей, разработанная Федеральной службой государственной статистики. В данную методологию входят следующие разделы: 1) индикаторы жизненного уровня населения; 2) системы социального обеспечения; 3) социально-экономическая дифференциация по доходам; 4) расходы, накопления и имущество граждан; 5) жилищные условия населения. Ключевыми показателями уровня жизни Росстата выступают доход и уровень заработной платы населения.

В целом, к важнейшим показателям и индикаторам уровня жизни принято относить следующие группы:

1) показатели сравнения экономического развития стран - валового внутреннего продукта (ВВП), точнее величина ВВП на душу населения;

2) показатели доходов и расходов, их уровни, динамика, структура по источникам поступления и потребления;

3) трудовые показатели: уровень безработицы, уровень скрытой безработицы (влияют на величину социальных выплат для социально незащищённых членов общества);

4) социально-демографические показатели – наиболее важные

[30] Составлена автором по: 2. Росстат. Денежные доходы и расходы населения – [Электронный ресурс] – Режим доступа: URL – https://rosstat.gov.ru/compendium/document/13270 (дата обращения: 20.05.2025);
3. Росстат. Величина прожиточного минимума – [Электронный ресурс]. Режим доступа: URL – https://rosstat.gov.ru/vpm (дата обращения: 20.05.2025);
4. Росстат. Трудовые ресурсы, занятость и безработица [Электронный ресурс]. Режим доступа: https://rosstat.gov.ru/labour_force (дата обращения: 20.05.2025);
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6. Росстат. Неравенство и бедность [Электронный ресурс]. Режим доступа: URL – https://rosstat.gov.ru/folder/13723 (дата обращения: 20.05.2025).

естественный прирост, миграция, продолжительность жизни, показатели уровня образования, обеспеченность населения жильём и ряд других.

Анализируя изменения этих показателей, можно делать выводы о стабильности экономического роста и реальных доходах населения, состоянии здоровья нации, уровне развития и доступности медицинских услуг, а также экологической ситуации в стране. Кроме того, это отражает состояние образования, уровень культурного потребления и доступность жилья, а также его благоустройство. Таким образом, оценка уровня жизни граждан основывается на системе показателей, включающих ВВП на душу населения, уровень доходов и расходов, образовательные и медицинские параметры, показатели жилищной политики и демографические характеристики.

За последние годы уровень и качество жизни россиян снизились вследствие ряда факторов: геополитической нестабильности, экономического спада, ослабления национальной валюты, резкого повышения цен и сокращения инвестиций. Эти процессы привели к уменьшению реальных доходов граждан, росту числа людей, живущих за чертой бедности, и снижению потребительского спроса. Имеющиеся кризисные явления в российской экономике, усугубившиеся в условиях современной пандемии, увеличивают расслоение в обществе: на лиц со сверхдоходами, с одной стороны, и крайне низкими доходами – с другой.[31]

Правовая база социальной поддержки населения в России основывается на следующих нормативных документах:

– Конституция РФ, статья 7, закрепляющая Россию как социальное государство;

– Федеральный закон №178-ФЗ от 17.07.1999 г. «О государственной социальной помощи»;

– Федеральный закон №134-ФЗ от 24.10.1997 г. «О прожиточном минимуме в Российской Федерации»;

Указ Президента РФ от 7 мая 2024 г. № 309 «О национальных целях и стратегических задачах развития Российской Федерации на период до 2030 года и на перспективу до 2036 года»

В настоящее время в России наблюдаются серьезные нерешенные социально-экономические проблемы, оказывающие значительное негативное воздействие на качество жизни граждан и общее благосостояние страны. К числу таких проблем относятся: низкий уровень доходов большинства населения, высокая степень социальной дифференциации, низкий уровень минимальной заработной платы, экономическая бедность среди работающих граждан, высокая инфляция и рост цен на основные товары и услуги.

[31] Соболь Т.С. Современный уровень и качество жизни населения России // Вестник Московского университета им. С.Ю. Витте. Серия 1: Экономика и управление. – 2018. – № 2 (25). – С. 7-14.

В подобной кризисной социально-экономической обстановке значительно возрастает роль государственной социальной политики, направленной на усиление мер социальной защиты и поддержки населения.

Для повышения уровня жизни населения РФ рекомендуется: повышение минимальной заработной платы и пенсий, усиление социальной поддержки малоимущих семей, развитие программ профессиональной переподготовки, создание условий для развития малого и среднего предпринимательства, повышение доступности медицинских и образовательных услуг.

Таким образом, уровень жизни является ключевым критерием нуждаемости в мерах социальной защиты населения. В России сохраняются значительные проблемы в данной сфере, что требует активизации государственной политики, направленной на повышение доходов, снижение социальной дифференциации и улучшение условий жизни граждан, через действующие государственные программы.

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ВОЗВРАТ НАЛОГОВОЙ ПЕРЕПЛАТЫ В УСЛОВИЯХ ЕДИНОГО НАЛОГОВОГО СЧЕТА: ПРАВОВЫЕ ОСНОВАНИЯ, ПРОЦЕДУРНЫЕ АСПЕКТЫ И ПРАВОВЫЕ РИСКИ

Аннотация: *в статье исследуются правовая природа возврата излишне уплаченных налогов и особенности реализации данного института в условиях функционирования Единого налогового счета (ЕНС). На основе анализа налогового законодательства, научных публикаций и практико-ориентированных исследований рассматриваются вопросы конституционной защищенности имущественных прав налогоплательщиков, влияние реформы ЕНС на порядок зачета и возврата переплаты, ускорение процедур и одновременное усиление правовых рисков. Отдельное внимание уделено алгоритму действий бухгалтера, классификации типичных ошибок и причинам возникновения отказов налоговых органов. Сформулирован вывод о двойственной природе ЕНС как механизма, сочетающего упрощение администрирования и рост ответственности налогоплательщика.*

Ключевые слова: *Единый налоговый счет; налоговая переплата; возврат налога; зачет; положительное сальдо; ст. 78 НК РФ; ст. 79 НК РФ; налоговые риски; налоговое администрирование; недобросовестность налогоплательщика.*

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TAX OVERPAYMENT REFUNDS IN THE CONDITIONS OF A UNIFIED TAX ACCOUNT: LEGAL BASIS, PROCEDURAL ASPECTS AND LEGAL RISKS

Abstract: *The article explores the legal nature of the refund of overpaid taxes and the specifics of implementing this institution in the context of the Unified Tax Account (UTA). Based on an analysis of tax legislation, scientific publications, and practical-oriented studies, the article examines the constitutional protection of taxpayers' property rights, the impact of the UTA reform on the procedure for offsetting and refunding overpayments, the acceleration of procedures, and the simultaneous increase in legal risks. Special attention is given to the algorithm of an accountant's actions, the classification of typical errors, and the reasons for tax authorities' refusals. The conclusion is formulated about the dual nature of the ENS as a mechanism that combines simplification of administration and an increase in the taxpayer's responsibility.*

Keywords: *Unified Tax Account; Tax Overpayment; Tax Refund; Set-off; Positive Balance; Article 78 of the Tax Code of the Russian Federation; Article 79 of the Tax Code of the Russian Federation; Tax Risks; Tax Administration; Taxpayer's Dishonesty.*

Реформа налогового администрирования, связанная с переходом к Единому налоговому счету, привела к существенному изменению порядка учета и перераспределения налоговых платежей. [32] Актуальность темы обусловлена тем, что ЕНС трансформировал не только технический порядок платежей, но и правовую квалификацию переплаты как объекта имущественной защиты. В научной литературе отмечается, что право налогоплательщика на возврат излишне уплаченных сумм является элементом конституционной гарантии защиты собственности и не может рассматриваться как дискреция государства.[33]

Для наиболее детального анализа темы, рассмотрим механизм функционирования ЕНС. С введением системы ЕНС, нет необходимости

[32] Чайкина А.В. Плюсы и минусы единого налогового счета // Cifra. Economics. 2023. Т. 2, № 2
[33] Красюков А.В. Правовая природа положительного сальдо единого налогового счета // Russian Journal of Legal Studies. 2023. Т. 10, № 1

оформлять множество платежи на уплату налогов и взносов. Все многочисленные платежки заменила одна – на уплату единого налогового платежа (далее – ЕНП). Оформление происходит один раз в месяц и на общую сумму сразу по всем платежам, в том числе перечисляемым в качестве налогового агента.

Для определения суммы ЕНП к конкретной дате надо сложить все текущие платежи к этой дате и размер имеющейся задолженности, в срок уплаты налогов инспекторы спишут нужную сумму по каждому платежу. Указывать необходимо единый код бюджетной классификации (КБК) - 182 01 06 12 01 01 0000 510, после деньги поступят на ЕНС. В платеж не вошли НДФЛ с выплат иностранцам; госпошлина, по которой не выдан исполнительный лист; взносы на травматизм, они платятся по прежнему до 15 числа в Социальный фонд России (СФР). Такие уплаты нужно перечислять отдельно.

Если налогоплательщику необходима детализация суммы сальдо единого налогового счета, то он может обратиться в налоговый орган через личный кабинет, телекоммуникационные сети или подать заявление лично на бумаге с запросом о проведении сверки.

Проведем анализ преимущества ЕНС и ЕНП:

- уменьшение количества платежей;
- отсутствие необходимости уточнений и зачетов между разными КБК и ОКТМО;
- снятие ограничения на возврат и зачет налогов;
- сокращение срока возврата сумм, формирующих положительное сальдо на ЕНС;
- установление единых сроков для представления отчетности;
- ускорение разблокировки счета;
- исключение наличия переплаты и недоимки по разным налогам.[34]

Таким образом, изучение возврата налоговой переплаты в условиях ЕНС имеет теоретическую, правоприменительную и методическую значимость. Конституционно-правовой аспект института переплаты остается центральным: обязанность платить только законно установленные налоги означает, что излишне удержанные суммы подлежат восстановлению налогоплательщику. Переплата не относится к категории законных налоговых изъятий и подлежит возврату как форма защиты имущественного права.

Налоговый кодекс конкретизирует это положение в ст. 21, 78 и 79, определяя возврат как юридически обеспеченное право. Научная доктрина подчеркивает, что право требования возврата переплаты по своей природе соотносится с механизмом компенсации неправомерного удержания имущественного блага.[35]

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[34] Першина Е. В. Новые формы расчетов с бюджетом: ЕНС и их юридические последствия // Бухгалтерский учет и контроль. 2023. № 4. С. 60–66.

[35] Савсерис С. Споры об отказе в возврате сальдо ЕНС // Пепеляев Групп. 2025

Возврат возможен только при наличии положительного сальдо, подтверждающего реальную переплату. Если гражданин заплатил налог больше той суммы, что ему было начислено, у него образуется переплата по налогу. Данную сумму, излишне уплаченного налога, на основании п. 1 ст. 78 Налогового Кодекса Российской Федерации (НК РФ) налогоплательщик может зачесть в счет предстоящих платежей по любым налогам и сборам, направить на погашение задолженности по пеням или штрафам, при их наличии, или вернуть.

Использовать переплату в счет погашения предстоящих налоговых платежей или вернуть, можно не более чем за 3 года со дня уплаты излишней суммы налога (п. п. 1, 5, 6 ст. 78 НК РФ).

Осуществить зачет имеющейся переплаты в счет погашения налоговых платежей будущих периодов в отношении любых налогов, возможно при подаче соответствующего заявления по месту учета налогоплательщика (п. п. 1, 7 ст. 78 НК РФ).

Возврат излишне уплаченного налога осуществляется по письменному заявлению налогоплательщика, которое можно направить в электронном виде при помощи «Личного кабинета налогоплательщика», в течение одного месяца со дня получения налоговым органом такого заявления (п. 6 ст. 78 НК РФ).

Решение о возврате суммы переплаты налоговым органом принимается в течение 10 рабочих дней со дня получения заявления. Если в налоговом органе проводилась сверка, в таком случае 10-ти дневный отчет начнется со дня подписания налогоплательщиком акта совместной сверки уплаченных налогов. О принятом решении налоговый орган должен сообщить в течение пяти рабочих дней со дня его принятия (п. 6 ст. 6.1, п. п. 8, 9 ст. 78 НК РФ).

Сопоставление правового регулирования возврата налоговой переплаты до и после внедрения Единого налогового счета позволяет выявить ключевые изменения, повлиявшие на порядок реализации имущественных прав налогоплательщиков. Для системного анализа представляется целесообразным отразить данные различия в структурированной форме, что позволяет наглядно оценить изменения в правовой модели возврата переплаты и степень их влияния на налогоплательщика (Таблица 1).

Таблица 1.
Сравнение правового режима возврата переплаты до и после введения ЕНС[36]

Критерий сравнения	До введения ЕНС	После введения ЕНС
Срок обращения за возвратом	Строго 3 года с момента уплаты	Формально отсутствует для текущих переплат
Основание возврата	Переплата по конкретному налогу	Положительное сальдо ЕНС
Приоритет использования средств	По конкретному обязательству	Автоматический зачет совокупной обязанности
Роль бухгалтера	Контроль каждого налога	Контроль общего сальдо и периода образования переплаты
Скорость возврата	До 30 дней (по НК РФ)	1–3 дня (ФНС → Казначейство)
Риски	Потеря права на возврат	«Молчаливая недоимка», подозрение в недобросовестности

Обобщенные данные демонстрируют, что ЕНС изменил не только технические элементы налогового администрирования, но и юридическое содержание отношений, связанных с возвратом переплаты. Отмена жесткой привязки к конкретному налогу, ускорение возврата и перераспределение приоритетов использования средств усилили значение предварительного анализа положительного сальдо. Логичным продолжением анализа становится рассмотрение связанных правовых рисков и факторов, влияющих на успешность возврата переплаты в условиях ЕНС.

В научных комментариях подчеркивается, что возврат не является автоматическим следствием переплаты и требует активных процессуальных действий со стороны плательщика.

Переход к системе ЕНС не устранил риски налогоплательщиков при возврате переплаты, а напротив — сформировал новые основания для возникновения отказов со стороны налоговых органов. Научные исследования подчеркивают, что ошибки при взаимодействии с ЕНС могут приводить к утрате права на возврат, формированию недоимки, а в отдельных случаях — к квалификации поведения как недобросовестного. Для систематизации правовых рисков и их последствий представляется необходимым классифицировать типичные ошибки налогоплательщиков, возникающие при реализации права на возврат, и оценить их влияние на итоговый результат процедуры (Таблица 2).

[36] Составлено автором на основании: Лютова О. И. Правовая природа положительного сальдо единого налогового счета: комментарий к определению СКЭС ВС по делу ООО «Родник» // Юрист. 2025. № 7. С. 44–49.

Таблица 2.
Классификация правовых рисков при возврате переплаты в системе ЕНС

Вид риска	Суть риска	Правовые последствия	Причина возникновения
Ошибка в сумме	Некорректный расчет переплаты	Пени и недоимка	Ошибка бухгалтера
Ошибка в периоде	Переплата не признается	Отказ в возврате	Расхождение дат
Автоматический зачет	Переплата «уходит» на другие налоги	Отсутствие остатка для возврата	Наличие других обязательств
Неверное заявление	Ошибки в реквизитах	Формальный отказ ФНС	Неполные данные
Нецелевое использование	Попытка вывода средств через ЕНС	Квалификация недобросовестности	Атипичные платежи
Пропуск срока у «старых» переплат	До 2023 года действует 3-летний предел	Утрата права	Неучтенные остатки

Приведенная классификация подтверждает, что структура рисков охватывает как технические недочеты, так и правовые последствия, затрагивающие имущественную сферу налогоплательщика. В совокупности они указывают на необходимость повышенного внимания к корректности расчетов, учету сроков, документальному подтверждению переплаты и учету особенностей автоматического зачета.

Суды все чаще рассматривают попытки использовать ЕНС как средство трансакций, не связанных с исполнением налоговых обязанностей, в качестве недобросовестного поведения.

Правоприменительная практика по вопросам возврата излишне уплаченных сумм в условиях функционирования Единого налогового счета демонстрирует нарастающую тенденцию к оценке поведения налогоплательщика через призму добросовестности. Анализ судебных актов и экспертных правовых комментариев показывает, что ключевым фактором при рассмотрении споров становится не только факт наличия положительного сальдо, но и характер операций, приведших к его образованию. Учитывая это, представляется необходимым выделить и систематизировать типовые судебные позиции, отражающие основания отказов в возврате переплаты, критерии недобросовестности и аргументацию судов и налоговых органов (Таблица 3).

Таблица 3
Судебные позиции по отказам в возврате переплаты в условиях ЕНС[37]

Характер ситуации	Правовая позиция	Последствие
Переплата сформирована при отсутствии обязанности уплаты	Суд оценивает цель внесения средств	Отказ в возврате
Попытка вывода средств через ЕНС	Квалификация действия как злоупотребление	Блокировка возврата
Возврат требует предварительного зачета недоимки	Переплата должна покрыть задолженность	Переплата направлена на погашение
Большая переплата без экономического обоснования	Суд признает риск уклонения	Усиленные проверки
Требование возврата без подтверждающих документов	Суд фиксирует отсутствие доказательств	Отказ в возврате
Переплата образована до введения ЕНС	Применяется прежний срок давности	Переплата считается погашенной

Представленный анализ демонстрирует, что судебные позиции формируют устойчивый подход, согласно которому возврат переплаты в условиях ЕНС рассматривается не как механическое следствие наличия положительного сальдо, а как процедура, требующая подтверждения законности формирования суммы, соответствия экономической природе платежей и отсутствия признаков недобросовестного поведения. Таким образом, судебная практика усиливает значимость документального сопровождения, корректного отражения операций и правовой мотивации действий налогоплательщика. Это позволяет перейти к обоснованию методических рекомендаций, направленных на минимизацию рисков отказов, повышение правовой устойчивости и обеспечение эффективной защиты интересов налогоплательщика.

Правовые риски выражаются:

- в невозможности возврата,
- в удержании переплаты бюджетом,
- в возникновении «молчаливой недоимки»,
- в усилении контрольных мероприятий.

Это делает корректность действий бухгалтера ключевым фактором финансовой безопасности организации.

Таким образом, возврат налоговой переплаты в условиях ЕНС представляет собой юридически значимый механизм защиты имущественных прав налогоплательщика, сохраняя свою сущность при изменении процедурной формы. ЕНС одновременно упрощает возврат и усиливает риски, что требует от плательщиков высокой правовой дисциплины. Научные источники подтверждают: правоприменительная практика будет продолжать развиваться, и правовая грамотность становится

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СТРАТЕГИИ ПОВЫШЕНИЯ ИННОВАЦИОННОЙ АКТИВНОСТИ СУБЪЕКТОВ МАЛОГО БИЗНЕСА В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ

Аннотация. *В данной статье подробно освещается необходимость повышения инновационной активности субъектов малого бизнеса в условиях цифровой экономики и стратегии ее реализации. Цифровая трансформация создает новые конкурентные условия в глобальной экономической среде. В этих условиях субъекты малого бизнеса, осваивая цифровые технологии, внедряя инновационные подходы в производство и оказание услуг, могут не только стабилизировать свою деятельность, но и стать конкурентоспособной структурой, способной оперативно реагировать на требования рынка.*

Ключевые слова: *цифровая экономика, малый бизнес, инновационная активность, цифровая трансформация*

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STRATEGIES FOR INCREASING THE INNOVATIVE ACTIVITY OF SMALL BUSINESS ENTITIES IN THE CONTEXT OF THE DIGITAL ECONOMY

Abstract. *This article thoroughly examines the necessity of enhancing the innovation activity of small business entities under the conditions of the digital economy, along with strategies for its implementation. Digital transformation is creating new conditions of competition in the global economic environment. Under these circumstances, small businesses can not only stabilize their operations but also evolve into competitive entities that respond promptly to market demands by adopting digital technologies and innovative approaches in production and service delivery.*

Keywords: *digital economy, small business, innovation activity, digital transformation*

Введение

В то время как современная мировая экономика переходит в этап цифровой трансформации, субъекты малого бизнеса также вынуждены

адаптироваться к этим изменениям. Интернет-технологии, искусственный интеллект, облачные сервисы, автоматизация и другие цифровые решения позволяют повысить эффективность производства, улучшить механизмы взаимодействия с клиентами, эффективно использовать ресурсы. Цифровые технологии становятся новым источником экономического развития, особенно для субъектов малого бизнеса, не имеющих больших ресурсов и капитала.

В стратегической программе Президента Республики Узбекистан "Цифровой Узбекистан - 2030" в качестве приоритетного направления определена цифровизация во всех сферах экономики, в частности, широкое внедрение информационно-коммуникационных технологий в субъектах малого бизнеса и предпринимательства. Эта задача требует повышения инновационного потенциала малого бизнеса и превращения его в устойчивую конкурентоспособную структуру в современной экономической среде.

В то же время внедрение цифровых технологий представляет собой как возможность, так и проблему для малого бизнеса. С одной стороны, они являются мощным инструментом для технологического обновления, выхода на рынки и продвижения продукции, с другой стороны, им мешают финансовые ограничения, отсутствие технических знаний и недостаточная цифровая инфраструктура. Эта ситуация требует разработки конкретных стратегий повышения инновационной активности субъектов малого бизнеса.

Основная цель данной статьи - выявить факторы повышения инновационной активности субъектов малого бизнеса в условиях цифровой экономики Узбекистана, проанализировать существующие проблемы и обосновать пути их устранения. В статье анализируются показатели инновационной деятельности субъектов малого бизнеса в разрезе областей, а также разрабатываются практические рекомендации по ускорению цифровой трансформации

Анализ литературы

М.Портер в своих разработках по стратегическому менеджменту показывает инновации как основной фактор, обеспечивающий конкурентоспособность предприятия. По его мнению, внедрение технологических инноваций расширит внутренние возможности компании и послужит занятию прочных позиций на внешних рынках[1]. П. Друкер ставит инновации в центр бизнес-деятельности и рассматривает их как средство эффективного использования ресурсов, быстрого реагирования на потребности рынка[2].

В мировом опыте, особенно в странах Европейского Союза и Юго-Восточной Азии, цифровая трансформация малого бизнеса поддерживается на уровне государственной политики. В анализах Deloitte (2022) в качестве факторов, положительно влияющих на внедрение цифровых технологий малыми предприятиями, отмечаются наличие цифровой инфраструктуры, кадровый потенциал в IT-сфере и наличие механизмов субсидирования со

стороны государства [3].

В условиях Узбекистана исследования в этом направлении формируются на новом этапе. А.Джуракулов при анализе инновационной деятельности субъектов малого бизнеса уделял особое внимание уровню доступа к их информационным ресурсам, финансовым возможностям и организационному потенциалу [4]. С.Файзуллаев, анализируя этапы процессов цифровизации в малом бизнесе и институциональные проблемы в этой области, выделяет неотъемлемую стратегическую роль государственной политики[5].

Анализ и основные результаты

В исследовании на примере регионов Узбекистана проанализированы показатели уровня внедрения цифровых технологий и инновационной активности субъектов малого бизнеса в период 2021-2023 годов. Данные были получены из основных статистических источников, в частности, из отчетов Национального комитета Республики Узбекистан по статистике, Торгово-промышленной палаты и Центра экономических исследований и реформ. Количество субъектов малого бизнеса в разрезе областей и их цифровая уровень применения технологий (2023 год)

Область	Количество малых предприятий	Применяющие цифровые технологии (%)
г. Ташкент	142 300	61,5%
Ташкентская область	89 400	52,3%
Фергана	67 200	47,8%
Самарканд	70 800	44,2%
Андижан	65 300	45,7%
Бухара	58 600	42,1%
Кашкадарья	50 100	38,6%
Каракалпакстан	41 800	34,9%

Анализ таблицы показывает, что в центральных регионах - в частности, в городе Ташкенте и Ташкентской области - как количество субъектов малого бизнеса, так и уровень их внедрения цифровых технологий высоки. Это связано, во-первых, с хорошо развитой технологической инфраструктурой; во-вторых, с наличием высококвалифицированной рабочей силы. В Республике Каракалпакстан, Кашкадарьинской и некоторых других областях этот показатель значительно ниже. Межрегиональные различия связаны с дисбалансом в инновационной инфраструктуре и системе образования, а также с уровнем поддержки цифровых технологий в бизнес-среде.

Выводы и предложения

Результаты проведенного исследования показывают, что повышение инновационной активности субъектов малого бизнеса в условиях цифровой экономики становится неотъемлемой частью современного экономического развития. В то же время уровень технологического обновления субъектов

малого предпринимательства, потенциал внедрения цифровых технологий в практику и созданная в этом направлении среда существенно различаются в разрезе регионов. В то время как в крупных городах, особенно в городе Ташкенте и Ташкентской области, доступ к цифровой инфраструктуре, квалифицированным кадрам и IT-услугам относительно высок, в сельской и отдаленной местности эти показатели остаются низкими. Это создает проблему инновационного неравенства.

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АКТУАЛЬНЫЕ ЭКОЛОГО-ГИГИЕНИЧЕСКИЕ ПРОБЛЕМЫ И ОСНОВНЫЕ ФАКТОРЫ РИСКА УСЛОВИЙ ТРУДА В КОВРОВОМ ПРОИЗВОДСТВЕ

Аннотация: *Ковровое производство - сравнительно молодое явление по историческим меркам, сформировавшееся одновременно с самим многонациональным народом, и в настоящее время известное под общим термином «узбекский». Узбекские ковры различаются по цвету и орнаменту в зависимости от региона. В ведущих странах мира ковроткачество характеризуется быстрым развитием, техническим прогрессом и ростом производства ковров. Ковроткачество — одна из наиболее динамично развивающихся отраслей промышленности, удовлетворяющая потребности населения.*

Ковровая промышленность в мире занимает лидирующие позиции по своей исторической древности, традиционным технологиям ковроделия, а также по возможности внедрения инноваций с учетом национальных особенностей и потребностей. Каждый этап становления этих отраслей народного хозяйства гармонично связан с модернизацией, оптимизацией и повышением надежности обеспечения населения коврами.

Ключевые слова: *условия труда, микроклиматЮ, пыль, профессиональные вредности.*

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CURRENT ENVIRONMENTAL AND HYGIENIC ISSUES AND THE MAIN RISK FACTORS OF WORKING CONDITIONS IN CARPET PRODUCTION

Abstract: *Carpet production is a relatively young phenomenon by historical standards, formed simultaneously by the multinational peoples themselves, and is currently known under the term "Uzbek". Uzbek carpets vary in color and pattern depending on the region. In the leading country of the world, carpet weaving is characterized by rapid development, technical progress and growth in carpet*

production. Carpet weaving is one of the most dynamically developing industries, satisfying the needs of the population.

The carpet industry in the world occupies a leading position in terms of its historical antiquity, traditional carpet weaving technologies, as well as the ability to introduce innovations taking into account national characteristics and needs. Each stage of the development of these sectors of the national economy is harmoniously linked with modernization, optimization and increased reliability of providing the population with carpets.

Key words: *working conditions, microclimate, dust, occupational hazards.*

Вводная часть

Ковроткачество - профессия, отрасль художественного мастерства. Оно было распространено среди кочевых племен, занимающихся животноводством, с древних времен. Ковры изготавливаются исключительно из растительных волокон и шерсти. Для изготовления ковров стриженая шерсть моется и очищается, расчесывается на железных гребнях, а из расчесанной шерсти прядется пряжа. Нити окрашиваются различными натуральными красителями. Благодаря этому цвет ковров не меняет своего цвета и не теряет своих качеств. При производстве высококачественной продукции необходимо соблюдать технические регламенты, международные стандарты и требования метрологии, а также соблюдать регламенты в процессе производства.

В настоящее время ковроткачество развито в Ферганской долине, Кашкадарьинской, Сурхандарьинской, Сырдарьинской областях и Каракалпакстане. Самарканд, Ургут, Коканд и Хорезм также являются центрами ковроткачества. Традиционное ковроткачество развивается как вид кустарного ремесла. Широко распространены также шёлковые ковры из Самарканда и Бухары. Бухарские ковры славятся своими строгими геометрическими фигурами, часто ромбовидными, и квадратными узорами. Их цвета обычно строгие и насыщенные, например, насыщенный красный и тёмно-синий. Достойный вклад в развитие традиционного ковроткачества вносят объединения «Бухарская ковровая промышленность».

По данным Национального статистического комитета, в январе-июле 2025 года в Узбекистане было произведено 21,1 млн м² ковров.

Этот показатель увеличился на 1 900,4 тыс. м², или на 9,9%, по сравнению с аналогичным периодом прошлого года.

Динамика данного показателя по годам (январь-июль) выглядит следующим образом:

2023 г. – 18 401,7 тыс. м², 2024 г. – 19 154,8 тыс. м² 2025 г. – 21 055,2 тыс. м² Объем производства ковров увеличился на 9,9% 15.09.2025

Распространённость профессиональных заболеваний органов дыхания среди рабочих различных отраслей текстильной промышленности значительно выше, чем у населения, не занятого в этих сферах, и составляет более 50% всех случаев. Для решения поставленных задач использовались

современные гигиенические, физиологические, клинические, токсикологические, биохимические, морфологические, санитарно-химические, физико-гигиенические и математико-статистические методы исследований. Гигиенические исследования проводились в красильно-прядильном, ковроткацком производстве. Они включают гигиеническую оценку технологических процессов и оборудования, характеристику физико-химических факторов производственной среды, тяжести и напряженности труда работающих. Проведено гигиенические исследования по микроклимату, освещенности, шуму, вибрации, запыленности, содержанию токсичных веществ в воздухе рабочей зоны. При проведении экологических и гигиенических исследований использовались методические приемы и оборудование. Количественное определение паров стирола, бутадиена и уксусной кислоты в воздухе проводилось с использованием высокочувствительных методов.

Цель работы

Изучение условий труда рабочих ковроткацкой фабрики и разработка гигиенических мероприятий по их дальнейшему улучшению

Методы

При изучении условий труда, производственных вредностей и состояния здоровья работающих на ОАО «Бухара гилам саноат» были использованы санитарно-гигиенические, клинические, санитарно-химические методы исследования.

Для оценки эколого-гигиенических условий труда были исследованы микроклимат, запылённость и бактериальное загрязнение воздушной среды, концентрация химических веществ, состояние освещения рабочих мест и уровни производственного шума в соответствии с общепринятыми методиками.

Результаты и их обсуждение

Гигиеническая оценка производственного процесса показала, что технология выделки ковров сопровождается воздействием на организм работающих ряда неблагоприятных факторов.

Температура воздуха в основных производственных цехах находится в пределах 22,5-24,5 градус в холодный период года и 23,3-27 градус теплый. В холодный и переходный период года в прядильном цехе температура воздуха 22 градус, а в ткацком цехе 20-22градус, в тёплый период года соответственно 24-26 градус. Термическая нагрузка обусловливает формирование заболеваний органов дыхания, пищеварения и сердечно - сосудистой системы.

Циркуляция воздуха и приемлемая влажность в обеих периода года были в пределах гигиенических нормативов. Относительная влажность воздуха в прядильном цехе составила 55-60%, а в ткацком - 65-70%. Повышение температуры и влажности воздуха рабочей зоны способствуют росту и развитию производственной микрофлоры на пыли и шерсти как питательной среде.

Наиболее высокое бактериальное загрязнение воздуха отмечалось в приготовительном цехе. В остальных цехах общее число колоний в целый год не превышало гигиенической нормы, но также обнаруживалось высокое содержание гемолитической микрофлоры. Значительное снижение бактериального загрязнения воздушной среды летом объясняется лучшей вентиляцией производственных помещениях за счёт подачи чистого атмосферного воздуха, зимой приточная вентиляция работает по принципу рециркуляции. Качественный и количественный состав микрофлоры зависит от вида перерабатываемого сырья.

В ковровом производстве должно быть хорошее освещение рабочих мест, так как на ряде технологических операций работа связана со значительным напряжением зрения. Освещенность на рабочих местах должна составлять 500-700лк. В обследованных цехах люминесцентное комбинированное освещение. Освещённость рабочих мест днём и ночью была зарегистрирована ниже нормы. Кроме того, наблюдается большая неравномерность освещения на одних и тех же операциях, что обусловлено недостаточной мощностью освещающих приборов. Исследование состояния зрительного аппарата работающих показало не значительное снижение остроты зрения у лиц с большим производственным стажем, особенно у ткачей.

В ковровом производстве является шум, производимый при работе прядильного и ткацкого оборудования.

Все цеха оборудованы приточной вентиляцией с полной рециркуляцией воздуха в холодный период. Приточно-вытяжная вентиляция действует только в приготовительном, красильном и отделочном цехах, где наблюдаются наиболее неблагоприятные микроклиматические условия. Например, в приготовительном цехе, где разрыхляют и обеспыливают шерсть и искусственное волокно на машинах, не имеющих укрытия и рациональных вытяжных устройств, отмечается значительное выделение пыли.

Пылеобразованием сопровождаются все технологические операции коврового производства. Однако при приготовительных процессах, включая чесание, и в смесовом отделении прядильного производства, пыли выделяется значительно больше, чем на последующих стадиях обработки волокна. Запылённость воздушной среды в приготовительном цехе в рабочей зоне. При различных технологических процессах концентрация пыли в воздухе рабочей зоны превышала нормативные показатели: 1)в 1,5-4,2 раза (прядильное производство); 2)в 1,9-2,8 раза (цех сортировки); 3)в 10,5-12,5 раза (приготовительный цех); 4)в 2,9-4,2 раза (бригада чистильщиков вентиляционных установок); 5)в 2,5-3,0 раза (ткацкое производство).

Шерстяная пыль содержит разнообразную бактериальную и грибковую микрофлору, составляющую вместе с примесями животного происхождения сложный белковое-антигенный комплекс, оказывающий выраженное аллергенное действие на органы дыхания. При воздействии любой

промышленной пыли в верхних дыхательных путях развиваются дистрофические процессы различной распространённости и степени выраженности, причём патоморфологическая картина этих изменений не является специфичной для какого-либо вида пыли, за исключением, обладающей аллергическими свойствами. Кроме того, шерстяная пыль в смеси с пылью синтетических волокон может оказать раздражающее действие на слизистую оболочку верхних дыхательных путей. Для уменьшения запылённости в рабочей зоне ткацких машин оборудованы местные отсосы, которые, однако, уже превысили срок эксплуатации и находятся или в карантинном состоянии, или вообще не функционируют.

Исследование химического состава шерстяной пыли показало, что она состоит из органических и минеральных веществ. Минеральная часть пыли содержит свободный диоксид кремния. Наибольшее его количество содержится в пыли приготовительного, смесового, чесального и аппаратного цехов, а наименьшее - в прядильных и ткацких. В начале технологии пыль содержит больше свободного кремния, а по мере приближения к концу переработки количество его уменьшается. Содержание свободного кремнезема в составе шерстяной пыли колеблется в пределах 6,1-7,3% при обработке грязной шерсти и 4,6-5,6% при сортировке чистой шерсти.

Устойчивости пылевого аэрозоля способствуют несколько факторов, одним из которых является форма пылевых частиц. Чаще всего это извитые, тонкие пластинки, отщепляющиеся от волокон и способные долгое время находиться во взвешенном состоянии, легко перемещаться с потоками воздуха. Влияние на летучесть пыли оказывает значительная подвижность воздуха в рабочих помещениях. Конвекционные токи, поднимающиеся вверх от машин, горизонтальные токи и токи других направлений от вентиляционных установок позволяют даже пылинкам крупных размеров длительное время находиться во взвешенном состоянии.

Пыль в ткацких цехах, как правило, мелкодисперсная, до 70% составляют пылевые частицы величиной 2-5мкм, что способствует задерживанию её слизистыми оболочками верхних дыхательных путей. В пыли синтетических волокон размер основной массы частиц был менее 5мкм. Патогенные свойства пыли синтетических волокон обусловлены сложным органоминеральным составом и высокой проникающей способностью в дыхательные пути.

На предприятии концентрации использующихся промышленных аэрозолей превышают ПДК: 1) абразив содержащие аэрозоли; 2) аэрозоли металлов и их сплавов (в 1-1,2 раза); 3) сварочный аэрозоль (в 1-2 раза); 4) кремнийсодержащие аэрозоли (в 3,5 раза). Ингаляционное воздействие промышленных аэрозолей на органы дыхания работающих осуществляется через верхние дыхательные пути [9]. Производственный контакт даже с относительно невысокими концентрациями раздражающих дыхательные пути газов играет существенную роль в развитии хронической бронхолёгочной патологии.На производстве имеется ряд химических

вредностей, которые влияют на состояние здоровья человека. Например, в ряде районов комбината превышены нормативные значения концентраций хлора и его соединений (в 3,2-3,8 раза), марганца и его соединений (в 1-2.2 раза). В аппретурном цехе было зарегистрировано присутствие стирола. превышающего ПДК на отдельных рабочих местах. в 1.5-4 раза.

В ковровом производстве широко используются кислотные и дисперсные красители. Концентрации паров красителей. кислот и щелочей в воздухе не превышают ПДК. Однако при соприкосновении со слизистой оболочкой бронхиального дерева данные вещества вызывают воспаление. приводящее к атрофическим процессам. что сопровождается усиленным поступлением в кровь тканевых метаболитов. стимулирующих продукцию антител.

Следует отметить. что одновременное воздействие двух и более неблагоприятных факторов труда может приводить к перенапряжению. потенцированию неблагоприятных изменений функционального состояния основных систем организма и дальнейшему нарушению адаптационных механизмов с последующим развитием патологии.

Выводы

1. Для коврового производства характерно совокупное воздействие неблагоприятных факторов трудового процесса и производственной среды, представляющих потенциальную угрозу здоровью работников.

2. Условия труда работников подготовительного цеха и красильного) соответствуют 3 классу 1 степени вредности и характеризуются воздействием на организм работников интенсивных физических динамических нагрузок при нерациональном освещении; в прядильном цехе – 2 классу 3 степени; в отделочном цехе – 2 классу

3. Результаты физиологических исследований динамики изменений функционального состояния организма работников позволили установить закономерности взаимосвязи условий труда и показателей функционального состояния.

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ВОПРОСЫ ПОВЫШЕНИЯ ПРОТИВОДЕСТВИЯ КОРРУПЦИИ В ОБЕСПЕЧЕНИЕ ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ

Аннотация: *В статье анализируются факторы, связанные с появлением и развитием коррупции, а также достижения в сфере антикоррупционной политики в Республике Узбекистан.*

Ключевые слова: *коррупция, коррумпированность, борьба с коррупцией, использование служебного положения, экономическая безопасность, уголовная ответственность, антикоррупционная политика.*

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ISSUES OF ENHANCING ANTI-CORRUPTION MEASURES IN ENSURING ECONOMIC SECURITY

Annotation: *The article analyzes the factors associated with the emergence and development of corruption, as well as achievements in the field of anti-corruption policy in the Republic of Uzbekistan.*

Key words: *corruption, fight against corruption, abuse of office, economic security, criminal liability, anti-corruption policy*

Введение

На основе проводимых на сегодняшний день в нашей стране крупномасштабных реформ в области обеспечения экономической безопасности, возрастает роль и значение противодействия коррупции как инструмента повышения эффективности и развития внешнеэкономической деятельности государства, а также укрепления законности и правопорядка. Хотелось бы отметить, что преступления в сфере таможенной деятельности, как и другие экономические преступления, посягают на основы экономической безопасности страны. В современных условиях ее обеспечение приобретает первостепенное значение, поскольку экономическая глобализация означает качественно новую ступень в развитии международных экономических отношений и формировании единого экономического пространства. Согласно Закона Республики Узбекистан «О противодействии коррупции» основные направления государственной политики в области противодействия коррупции являются - повышение

правового сознания и правовой культуры населения, формирование в обществе нетерпимого отношения к коррупции; реализация мер по предупреждению коррупции во всех сферах жизнедеятельности государства и общества; своевременное выявление, пресечение коррупционных правонарушений, устранение их последствий, причин и условий, им способствующих, обеспечение принципа неотвратимости ответственности за совершение коррупционных правонарушений[1].

Особое внимание в данном направлении заслуживает понятие конфликт интересов т.е., ситуация, при которой личная заинтересованность (прямая или косвенная) лица влияет или может повлиять на надлежащее исполнение им своих должностных или служебных обязанностей и при которой возникает (реальный конфликт интересов) либо может возникнуть (потенциальный конфликт интересов) противоречие между личной заинтересованностью и правами, законными интересами граждан, организаций, общества или государства [2]. По существу, все охраняемые законом общественные отношения могут стать объектом преступной деятельности коррумпированных должностных лиц. В частности, ими могут быть совершены: должностной подлог, контрабанда, воспрепятствование законной предпринимательской деятельности, регистрация незаконных сделок с землей, привлечение заведомо невиновного к уголовной ответственности и вынесение заведомо неправосудного приговора, решения, или иного судебного акта и т.д. Однако если большинство этих преступлений есть лишь результат подкупа должностных лиц, как бы следствие коррупции, то некоторые из них выражают саму суть данного явления, когда работники аппарата управления используют свою должность для незаконного обогащения.

В своем заявлении на расширенном заседании Национального совета по противодействию коррупции Президент Республики Узбекистан Шавкат Мирзиёев отметил «Коррупция — это такое зло, которое подрывает доверие людей к государству, Конституции и законам и становится серьёзной угрозой устойчивому развитию и безопасности» [3]. Современная коррупция – это не элементарный уголовно-правовой феномен, который можно было бы квалифицировать конкретной нормой уголовного кодекса как отдельный состав преступления. Коррупцию следует рассматривать как криминологическое, социально-экономическое явление, обладающее многоструктурным и многоуровневым содержанием, в содержательный объем которого входит комплекс неоднородных видов общественно опасных деяний. Соответственно можно с уверенностью сказать, что коррупция распространяется во всех сферах общественной жизни.

Коррупцией следует считать осуществляемое любыми способами и при любых условиях извлечении выгоды из своего положения в системе государственной власти или из связанного с ним своего общественного статуса в корыстных целях. На законодательном уровне коррупция была определена как - незаконное использование лицом своего должностного или

служебного положения с целью получения материальной или нематериальной выгоды в личных интересах или в интересах иных лиц, а равно незаконное предоставление такой выгоды.

Рассматривая данное положения с точки зрения использования служебного положения в корыстной или иной личной заинтересованности может быть представлено следующими разновидностями:

1) завладение с использованием служебного положения чужим имуществом путем его изъятия вопреки воле собственников;

2) использование служебного положения при совершении других действий корыстного характера, не связанных с завладением чужим имуществом. Данное последствие может выражаться в виде реального материального ущерба, в упущенной выгоде, а также в причинении иного вреда различным интересам (нарушении конституционных прав и свобод граждан, подрыве авторитета органов власти, создание помех и сбоев в работе, сокрытии крупных хищений и т.п.);

3) «классическая» разновидность проявления коррупции – получение должностным лицом материальных ценностей и услуг материального характера в связи с занимаемой должностью с ведома лиц, передающих эти ценности или оказывающих услуги (например, с целью побудить должностное лицо к соответствующему действию, правомерному или противозаконному и др.);

4) непосредственное участие должностных лиц и государственных служащих, депутатов в коммерческой деятельности для извлечения личной выгоды или корпоративной.

Как показывает мировой опыт, обеспечение надлежащего уровня финансовой безопасности на всех уровнях — это гарантия независимости государства и предупреждения наступления негативных последствий открытости национальной экономики, условие стабильности и эффективной жизнедеятельности общества, достижения достаточного взаимодействия с международными финансовыми и экономическими институтами. Сегодня как никогда большое значение приобретают прозрачность и легальность операций в национальных финансовых системах.

Комментарий литературы по теме

Международное сообщество, стремясь выработать эффективные меры по предупреждению и искоренению коррупции, приняло ряд документов, к которым относятся конвенции Организации Объединенных Наций (например, Конвенция против коррупции от 31 октября 2003 года), Конвенция Совета Европы об уголовной ответственности за коррупцию, Конвенция по борьбе с подкупом иностранных должностных лиц при осуществлении международных коммерческих сделок Организации экономического сотрудничества и развития и др. В этих документах отмечается, что коррупция превратилась в транснациональное явление, которое затрагивает все страны. Этим обусловлено исключительно важное

значение международного сотрудничества в области предупреждения коррупции и борьбы с ней.

Правовую основу противодействия коррупции в Республике Узбекистан составляют Конституция Республики Узбекистан, общепризнанные принципы и нормы международного права, международные договоры Республики Узбекистан, Закон Республики Узбекистан «О противодействии коррупции» № ЗРУ-419 от 3 января 2017 года, Законы Республики Узбекистан «Об открытости деятельности органов государственной власти и управления» № ЗРУ-369 от 05.05.2014 г., «Об общественном контроле» №ЗРУ-474 от 12.04.2018 г., «О конфликте интересов» № ЗРУ-931 от 05.062024 г., «О внесении изменений и дополнений в некоторые законодательные акты Республики Узбекистан в связи с совершенствованием системы противодействия коррупции в Республике Узбекистан» № ЗРУ-729 от 18.11.2021 г., и другие нормативные правовые акты, направленные на противодействие коррупции. Впоследствии, согласно Указу Президента Республики Узбекистан №УП-6013 «О дополнительных мерах по совершенствованию системы противодействия коррупции в Республике Узбекистан» было образовано Агентство по противодействию коррупции, наделенное широкими полномочиями по мониторингу, анализу и внедрению антикоррупционных мер в различных сферах [4]. Кроме того, 27 ноября 2023 г. был принят Указ Президента Республики Узбекистана №УП-200 «О мерах по дальнейшему совершенствованию системы противодействия коррупции и повышению эффективности системы общественного контроля за деятельностью государственных органов и организаций» [5], направленный на совершенствование системы противодействия коррупции и усиление общественного контроля за деятельностью государственных органов. Документ предусматривает внедрение механизмов выявления коррупционных рисков, цифровизацию государственных услуг, обеспечение открытости информации (включая государственные закупки, вакансии, гранты), онлайн-трансляции экзаменов и защит диссертаций, а также развитие электронной системы обучения госслужащих [6].

В целях уголовно-правового обеспечения противодействия коррупции и в интересах выполнения международных обязательств Уголовный кодекс Республики Узбекистан устанавливает ответственность за совершение коррупционных преступлений.

Социологические исследования позволяют глубже проанализировать коррупцию как социальное явление. Один из важнейших выводов таких исследований заключается в том, что самые крупные коррупционные сделки, самые большие потери от коррупции связаны отнюдь не со взятками, хотя и их общая сумма высока. Но самые крупные объемы коррупционных сделок производят так называемые коррупционные сети, действующие, как правило, практически без нарушений законодательства, а чаще всего с соблюдением его норм. Чтобы понять причины и процедуры деятельности коррупционных

сетей, необходимо изучать реальные экономические и социальные факторы, вследствие которых такая деятельность становится возможной. Осознание ситуации, конечно, не означает, что сразу удастся их нейтрализовать, а вскрытие противоречий не ведет немедленно к их разрушению. Но без этого противодействие коррупции никогда не будет эффективным.

Как социальное явление коррупции возникает и поддерживается на уровне неформальных социальных связей, составляющих основу общества, она может быть обнаружена на всех уровнях управления им, а также в системах, обеспечивающих его саморегулирование.

Расширяющееся политическое и экономическое сотрудничество превращает коррупцию в интернациональную проблему. Тенденции развития в мировой политике и экономике способствуют возникновению и быстрому развитию транснациональной преступности, одной из наиболее опасных форм которой является транснациональная коррупция, проявляющаяся в виде подкупа иностранных должностных лиц с целью получения возможности начать или продолжить экономическую деятельность в какой-нибудь стране, либо обеспечить себя каким-то несоответствующим преимуществом при создании предприятий с иностранными инвестициями, либо незаконно реализовать экономические проекты, приватизировать государственную собственность и т.д.

Анализ и результаты

Что же порождает коррупцию и питает эту коррозию общества?

К основным причинам коррупции можно отнести:

– кадровую, техническую и оперативно-тактическую неподготовленность правоохранительных органов к противодействию организованной преступности, в том числе коррумпированным структурам;

– минимальный риск разоблачения коррупционеров и отсутствие жестких по отношению к ним мер ответственности;

– привилегии на распоряжение собственностью и услугами, которые находятся в руках ограниченного числа чиновников.

При изучении сущности коррупции как социального явления можно определить факторы, в той или иной степени препятствующие борьбе с ней:

– значительная распространенность коррупционных правонарушений в условиях ограниченности средств, выделяемых для нужды правоохранительных органов, призванных противостоять этому явлению;

– определенная ограниченность возможностей уголовного законодательства в части формулирования признаков коррупционных преступлений и конкретных форм их совершения;

– трудности в оперативном выявлении и уголовно-процессуальном доказывании фактов коррупции;

– недостаточное предупредительное воздействие мер уголовной ответственности.

Изучая опыт передовых стран по противодействию коррупции является целесообразным заимствованием следующих методов антикоррупционной программы:

– формирование нетерпимости к коррупционному поведению в рамках обучающих программ, школьного, высшего, послевузовского и дополнительного образования;

– проведение антикоррупционной пропаганды через средства массовой информации, освещать фамилии лиц, замешенных в коррупционных отношениях;

– проведение органами государственной власти различных мероприятий: совещаний, семинаров, конференции антикоррупционной направленности, что позволит с раннего возраста формировать нетерпимость к коррупции, тем самым подавляя ее проявления;

– повышение лояльности должностных лиц за счет внедрения идеологии общего дела, этики профессиональной чести, совести и долга, создания атмосферы открытости для сформирования нетерпимости к каким-либо незаконным действиям, что значительно снизит уровень коррупции;

– внедрение показателей оценки производительности труда, тем самым заработная оплата должностного лица будет зависеть от эффективности его работы, что послужит толчком к более плодотворной деятельности.

Эффективность противодействия коррупционным преступлениям во многом зависит от правоприменительной деятельности, которую образует сложный механизм правовых, процессуальных, организационных, технических, психологических и иных связей и отношений, направленных на реализацию запретов и предписаний уголовного закона.

Данный механизм приводит в «движение» взаимодействие нормы уголовного закона и социальной ситуации, в результате чего правоприменитель оценивает фактические обстоятельства уголовного дела, анализирует норму уголовного закона, сопоставляет ее с предписаниями, прогнозирует последствия применения (неприменения) нормы, наконец, принимает решение, которое находит отражение в правоприменительном акте [7].

Подводя итог вышеизложенного, можно сказать, что коррупция как сектор теневой экономики является многополярным и антисоциальным феноменом тормозящий экономическое развитие государства, дестабилизирующий демократические институты, подрывающий моральные устои общества. Все это делает невозможным успешное построение гражданского общества и правового государства. В этих условиях необходима консолидация всех ветвей и институтов государственной власти, общественности в осуществлении последовательных, системно скоординированных мер, направленных на создание условий, препятствующих распространению коррупции в целях обеспечения национальной безопасности нашей страны. Особую роль в этом должно играть действующее законодательство, закрепляющее правовые основы

противодействия коррупционным проявлениям, определяющее их общественную опасность, признаки, формы, методы, а также субъектов, их совершающих.

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ГЕОГРАФИЧЕСКИЕ ОСОБЕННОСТИ РАСПРОСТРАНЕНИЯ *BIEBERSTEINIA MULTIFIDA* DC. В УРГУТСКОМ РАЙОНЕ (УРОЧИЩЕ АМАН-КУТАН)

Аннотация: *В статье рассматриваются особенности распространения вида Biebersteinia multifida DC. на территории урочища Аман-Кутан Ургутского района. Проведён анализ природно-географических условий исследуемого района, выявлены факторы, влияющие на ареал и экологическую приуроченность данного растения.*

Ключевые слова: *Биберштейниа многонадрезная, Ургутский район, урочище Аман-Кутан, ареал, географическое распространение, флора Средней Азии, природные факторы, редкие виды растений.*

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GEOGRAPHICAL FEATURES OF THE DISTRIBUTION OF *BIEBERSTEINIA MULTIFIDA* DC. IN THE URGUT DISTRICT (AMAN-KUTAN TRACT)

Abstract: *The article discusses the distribution features of the Biebersteinia multifida DC species. on the territory of the Aman-Kutan tract of the Urgut district. The analysis of the natural and geographical conditions of the studied area has been carried out, and factors affecting the range and ecological proximity of this plant have been identified.*

Keywords: *Biebersteinia multifida DC., Urgut district, Aman-Kutan tract, range, geographical distribution, flora of Central Asia, natural factors, rare plant species.*

Введение

Изучение географического распространения редких и эндемичных видов растений имеет важное значение для оценки биологического разнообразия и разработки мер по его сохранению. В условиях усиливающегося антропогенного воздействия и изменения климатических параметров Средней Азии особенно актуальным становится исследование устойчивости и пространственной организации флористических комплексов.

Одним из интересных и малоизученных представителей флоры региона является *Biebersteinia multifida* DC. — редкий вид, встречающийся в горных районах Средней Азии, на каменистых и известковых склонах. Несмотря на его биологическую и экологическую значимость, данные о современном состоянии популяций и географических особенностях распространения данного вида в пределах Узбекистана остаются фрагментарными.

Целью настоящего исследования является определение географических закономерностей распространения *Biebersteinia multifida* DC. в пределах Ургутского района Самаркандской области, а также выявление влияния природных факторов на его пространственную локализацию в пределах урочища Аман-Кутан.

Для достижения поставленной цели были сформулированы следующие задачи:

1. Провести анализ природно-географических условий исследуемого района (рельеф, климат, почвы, растительный покров).
2. Установить характер и особенности ареала *Biebersteinia multifida* DC. в пределах урочища Аман-Кутан.
3. Определить факторы, влияющие на пространственное распределение и экологическую приуроченность вида.
4. Составить ГИСкарт распространения исследуемого растения.

Объект исследования — вид *Biebersteinia multifida* DC., являющийся редким представителем флоры Средней Азии.

Предмет исследования — пространственное распределение *Biebersteinia multifida* DC. и его зависимость от природно-географических условий урочища Аман-Кутан.

В ходе работы использовались полевые геоботанические наблюдения, маршрутно-рекогносцировочные исследования, географическое картографирование ареала, анализ почвенно-климатических условий и сравнительно-географический метод.

Результаты исследования позволят уточнить границы распространения *Biebersteinia multifida* DC. в пределах Ургутского района и выявить ключевые природные факторы, определяющие его экологическую приуроченность. Полученные данные могут быть использованы при разработке природоохранных мероприятий и мониторинге состояния редких видов флоры региона.

Урочище Аман-кутан находится в 35-45 км к юго-западу от г. Самарканда. Оно всегда привлекало внимание путешественников, натуралистов и любителей природы. Через него издревле проходил короткий и удобный путь из Согда в Бактрию, из Самарканда в Кеш, от Заравшана до Келифской переправы через Амударью.

Этим легкодоступным горным переходом пользовались в древности персы, воины Александра Македонского, арабы и монголы. На перевале по пути из Самарканда в Кеш пробывали знаменитые путешественники средневековья Абдулкасим ибн Хаукаль и ибн Батута, посол Испании Рюи Гонсалес Де Клавихо. По этому пути они прибывали в столицу государства Амира Темура. Аман-кутан – сравнительно небольшое урочище на крайнем западе Памиро-Алая, на стыке двух массивов единого Зеравшанского хребта – гор Чакылкалян и Хребта Каратепе. Точка их соприкосновения – перевал Тахта-карача, расположенный на высоте 1675 м над уровнем моря на границе с южными областями Узбекистана. Сейчас это живописное урочище связано с Самаркандом современным шоссе. В административном отношении Аман-кутан является западной окраиной Ургутского района Самаркандской области.

Многолетние среднегодовые осадки и температура воздуха урочища Аман – кутана представлены на рисунках 1.

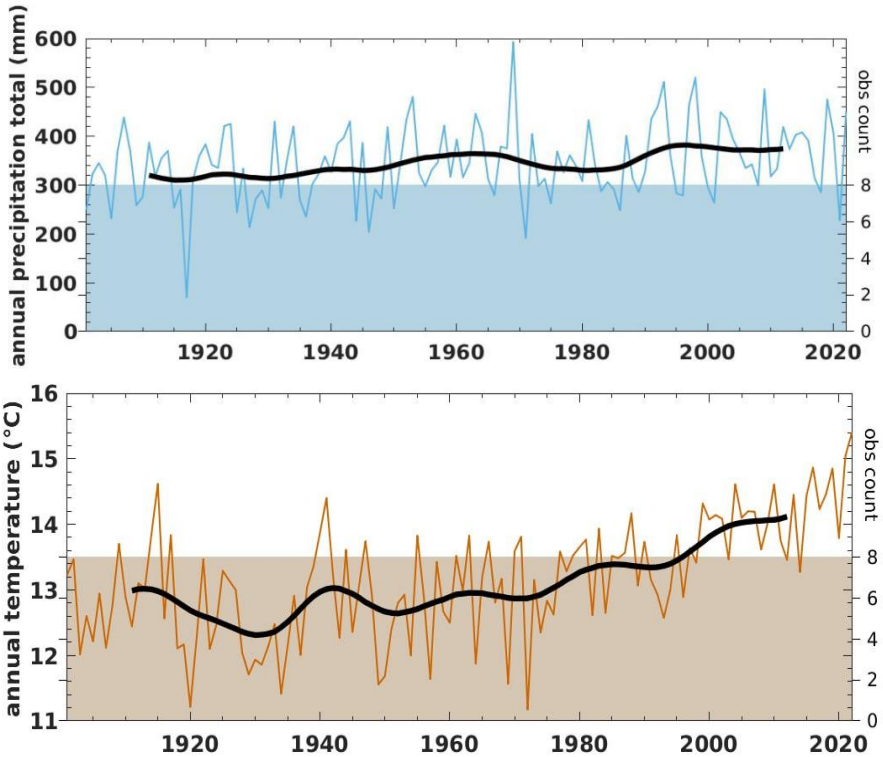


РИС. 1. Многолетние среднегодовые осадки и температура воздуха урочища Аман – кутана

Как видно из рисунок 1 среднегодовая осадка, после 2000 года составил 335 – 365 мм, а среднегодовая температура отмечалось повышение на 0,5 – 1,5 ^{0}C, то ест составил 13,5 – 14 ^{0}C.

Аман-кутан служит естественной лабораторией при изучении природы Узбекистана, чтобы охранять природу, необходимо знать законы, по которым она развивается, изучат взаимоотношение живых организмов между собой и с окружающей средой. Аман-кутан – это уникальный памятник природы, скопления многих редких растений. Здесь встречаются юнона великолепная, уникальные эремурусы, парусники, многочисленные редкие виды лекарственных растений, а также боярышник, фисташка, арча, Аман-кутанский тополь и другие виды растений.

На территории Аман-кутана и его окрестности встречаются ряд редких и исчезающих растений и животных, занесенных в «Красную книгу» Узбекистана.

В «Красную книгу» внесены следующие виды растений: Аллохруза качимовидная, Туркестанский мыльный корень, Девясил крупнолисточковый, Бессмертник Нуратавский, Лук стебельчатый, лук суворова, , лук королькова, лук северцова, риностатум бухарский, рябчик Ольги, шафран королькова, ирис побегоносный, юнона великолепная, мерендера крупная, тюльпан Фостера, тюльпан Грейга, тюльпан великий, тюльпан Михели, тюльпан Туркестанский, тюльпан волосисто тычиночный, хохолатка Северцева, купена Северцова, Ферулф сумбул или Ферула мускусная, Астрагал Кнорринга, Астрагал Массагетова, Астрагал перистый, Астрагал тонкопузырчатый, Астрагал красноземный, Нут большой, Остролодочник ложнорозовый, Копеечник Аманкутанский, Омежник разноплодный, Комаровия неравносемянная, Зеравшания Регеля, Эльвендия влагалишная, Ложноклаусия зеравшанская, Клоповник ольги, Акталимон Маргариты, Акталимон Нуратинский, Акталимон почтиовсовый, Эулофия туркестанская, Пион степной, Ложноочиток колокольчикоцветный и др.

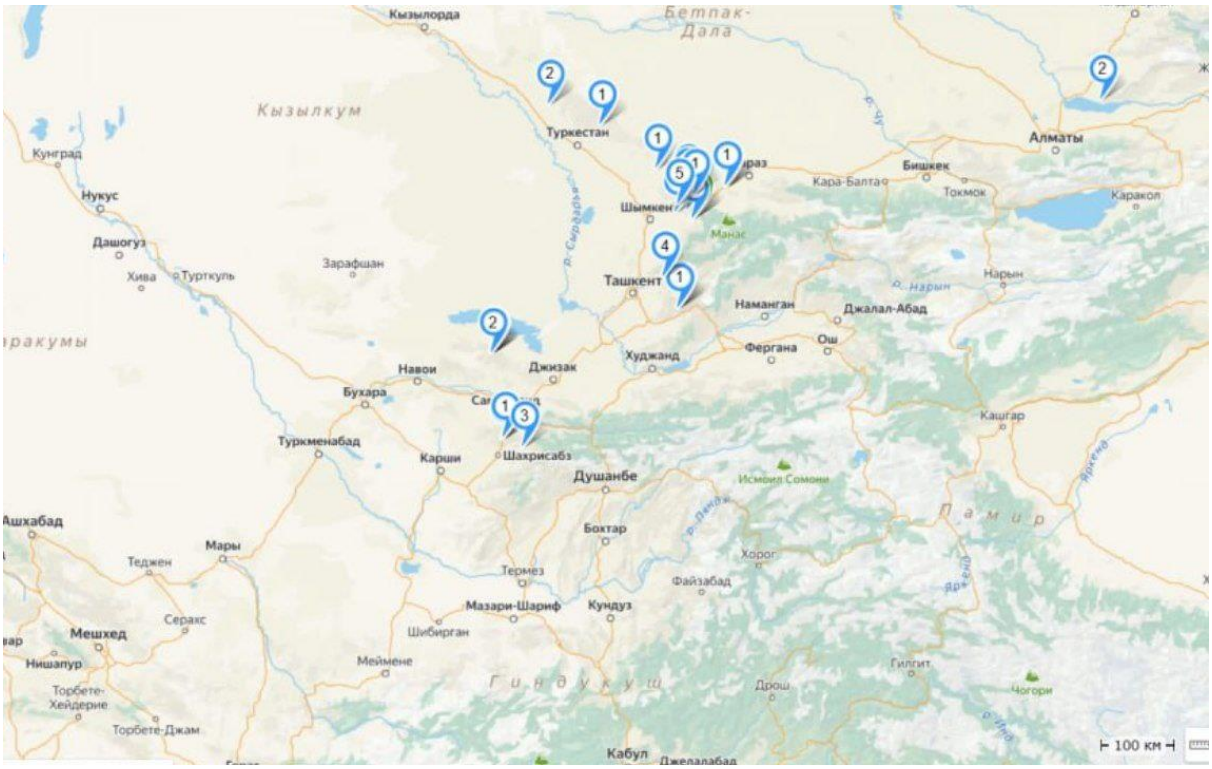


Рис 2. Географические точки Biebersteinia multifida DC в Узбекистане. (Населённый пункт Аман-кутан — Яндекс Карты (yandex.uz)

Это не полный перечень редких и исчезающих видов растений, произрастающих на территории Аман-кутана.

Флора Аман-кутана формировалась в особо приятной обстановке. На её стойкости отразился сложный горный рельеф, особый климат и разнообразие почвенного покрова, а также хозяйственная деятельность человека. Если ране урочище было богато лесом, состоящим из робинии, орех грецкий, арчи, клена, боярышника, крымская сосна, миндаль, то в недалёком прошлом лес быль нерационально использован на хозяйственные нужды и древесной растительности стали рассеянными, побольше пришли адирные растительные ассоциации, которые доминирует и по сей день. В Аман-кутане широко распространены полынные разнотравно-пырейные формации, которые покрывают горы от подошвы до водоразделов. С лесными насаждениями соседствуют астрагалы, типчак, скабиоза, ковыль, пырей, различные злаки - типичные представители мезоксерофитов и ксерофитной флоры. На открытых пространствах к ним присоединяются различные виды ферулы, цветущие пирамиды эремурусов, голубые снопы тимьяна, жёлтые букеты зверобоя, ярко - красные тюльпаны, режущая глаза синева колокольчиков. На каменистых осыпях встречается, биберштейния многораздельная.

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СОДЕРЖАНИЕ И ЗНАЧЕНИЕ ПЕДАГОГИЧЕСКОЙ КОНФЛИКТОЛОГИИ В УЧЕБНОМ ПРОЦЕССЕ

Аннотация: *Педагогическая конфликтология является важнейшей областью педагогической науки, направленной на изучение природы, причин, динамики и стратегии управления конфликтами в образовательной среде. Конфликт как социально-психологическое явление неизбежен в учебном процессе и может выступать как препятствием для развития личности учащихся и педагогов, так и стимулирующим фактором профессионального и личностного роста. В данной работе рассматриваются содержание педагогической конфликтологии, ее значение в повышении эффективности взаимодействия субъектов образования, а также методические подходы к формированию конфликтологической компетентности будущих педагогов. Анализируется роль конструктивного разрешения конфликтов в создании благоприятного психолого-педагогического климата и профилактике деструктивных форм взаимодействия. Результаты исследования подтверждают необходимость включения конфликтологической подготовки в систему педагогического образования как ключевого условия подготовки компетентного и психологически устойчивого специалиста.*

Ключевые слова: *педагогическая конфликтология, конфликт, учебный процесс, конфликтологическая компетентность, педагогическое взаимодействие, профилактика конфликтов, конструктивное разрешение конфликтов, коммуникативная культура, психологический климат, профессиональная подготовка.*

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THE CONTENT AND SIGNIFICANCE OF PEDAGOGICAL CONFLICT STUDY IN THE EDUCATIONAL PROCESS

Abstract: *Pedagogical conflictology is a crucial area of pedagogical science, aimed at studying the nature, causes, dynamics, and strategies for managing conflicts in the educational environment. Conflict, as a socio-psychological phenomenon, is inevitable in the educational process and can act as both an obstacle to the personal development of students and teachers and a stimulating factor for professional and personal growth. This paper examines the*

content of pedagogical conflictology, its importance in improving the effectiveness of interactions between educational institutions, and methodological approaches to developing conflict management competence in future teachers. The role of constructive conflict resolution in creating a favorable psychological and pedagogical climate and preventing destructive forms of interaction is analyzed. The study's results confirm the need to incorporate conflict management training into the teacher education system as a key prerequisite for developing competent and psychologically stable professionals.

Keywords: *pedagogical conflict management, conflict, educational process, conflict management competence, pedagogical interaction, conflict prevention, constructive conflict resolution, communication culture, psychological climate, professional training.*

Введение

Современная система образования предъявляет высокие требования к профессиональной подготовке будущих педагогов, среди которых особое место занимает умение эффективно взаимодействовать с обучающимися, их родителями и коллегами. Учебный процесс представляет собой сложную социально-психологическую систему, в которой ежедневно возникают ситуации противоречий, несогласованности интересов, различий во взглядах и оценках. Такие ситуации, переходя в конфликт, оказывают значительное влияние как на эмоциональное состояние участников образовательного процесса, так и на результаты обучения. В этом контексте педагогическая конфликтология выступает одним из ключевых направлений педагогической науки, изучающим закономерности возникновения, развития и разрешения конфликтов в образовательной среде.

Конфликты в учебном процессе могут носить как конструктивный, так и деструктивный характер. Конструктивный конфликт стимулирует развитие личности, способствует формированию критического мышления, улучшению коммуникации, укреплению взаимоотношений в коллективе. Напротив, деструктивные конфликты приводят к снижению мотивации к обучению, ухудшению психологического климата, эмоциональному выгоранию педагогов и агрессивным формам поведения учащихся. Различать и управлять этими явлениями способен только тот педагог, у которого сформирована конфликтологическая компетентность.

Знание основ педагогической конфликтологии позволяет будущему специалисту осознанно подходить к анализу конфликтных ситуаций, применять эффективные стратегии их профилактики и разрешения, а также выстраивать конструктивное взаимодействие с детьми и взрослыми. Формирование таких навыков становится важным элементом профессиональной подготовки, направленным на повышение устойчивости педагога к эмоциональным нагрузкам и стрессам, характерным для образовательной сферы.

Педагогическая конфликтология рассматривает широкий спектр факторов, влияющих на возникновение конфликтов: индивидуально-психологические особенности личности, уровень коммуникативной компетентности, социально-культурная среда, организационные аспекты учебного процесса и собственно содержание обучения. Особенно остро конфликты проявляются в период кризисов возрастного развития, когда учащиеся испытывают потребность в самоутверждении, а педагоги — в дисциплинарном контроле. В таких условиях важна способность педагога находить баланс между авторитетом и уважением личности обучающегося.

В условиях модернизации образования и активного внедрения новых педагогических технологий роль конфликтологической подготовки только усиливается. Переход к личностно-ориентированной модели обучения требует высокого уровня эмпатии, гибкости, толерантности и коммуникативной культуры педагога. Поэтому включение педагогической конфликтологии в содержание образовательных программ педагогических вузов является необходимым условием подготовки специалистов, способных эффективно управлять процессом взаимодействия в образовательной среде.

Таким образом, актуальность исследования содержания и значения педагогической конфликтологии в учебном процессе определяется необходимостью формирования у будущих педагогов профессиональных компетенций, обеспечивающих успешное разрешение конфликтных ситуаций и создание благоприятного образовательного пространства, способствующего гармоничному развитию личности обучающихся.

Методы

Исследование содержания и значения педагогической конфликтологии в учебном процессе требует использования комплекса современных методов, направленных на всестороннее изучение педагогических, психологических и социальных аспектов конфликтных взаимодействий. Одним из основных методов является анализ научной литературы, который позволяет определить теоретические основы конфликтологии, проследить ее развитие в педагогической науке и выявить наиболее эффективные подходы к формированию конфликтологической компетентности педагога. Теоретический анализ включает сопоставление различных классификаций конфликтов, изучение причин их возникновения, динамики развития и стратегий профилактики.

Важным методом является наблюдение за поведением участников образовательного процесса, которое помогает выявить типичные конфликтные ситуации, особенности их проявления и реакции педагогов на возникающее напряжение. Наблюдение может быть открытым или скрытым, включенным или невключенным, что позволяет учитывать эмоциональную составляющую взаимодействия и анализировать модели поведения в реальных условиях. Данный метод способствует систематизации практических данных и помогает выработать эффективные механизмы педагогического воздействия.

Метод педагогического эксперимента применяется для проверки эффективности различных методик профилактики и разрешения конфликтов в учебной среде. Экспериментальные программы включают тренинги развития коммуникативной культуры, деловые игры, моделирование конфликтных ситуаций, ролевые упражнения и кейс-методы. Это позволяет формировать у магистрантов умения конструктивного взаимодействия, переговоров, эмоциональной саморегуляции и ненасильственного общения. Результаты эксперимента дают возможность оценить степень сформированности конфликтологической компетентности и определить перспективные направления совершенствования образовательного процесса.

Метод анкетирования и интервьюирования используется для изучения отношения педагогов и студентов к конфликтам, выявления субъективных факторов, влияющих на выбор стратегий поведения в конфликтных ситуациях. Анкетные опросы позволяют определить уровень владения конфликтологическими знаниями, оценить коммуникативные навыки и готовность к конструктивному разрешению противоречий. Интервью помогает глубже раскрыть личный опыт взаимодействия, особенности восприятия конфликтов и предпочтительные формы реагирования на них.

Кроме того, применяются методы контент-анализа документов и нормативных актов, регулирующих взаимодействие в образовательных организациях, что позволяет определить институциональные механизмы профилактики конфликтов и защиты прав участников учебного процесса. Комплексное применение перечисленных методов обеспечивает всестороннее изучение педагогической конфликтологии и способствует разработке эффективных педагогических стратегий, направленных на поддержание психологической стабильности и продуктивной коммуникации в учебной среде.

Результаты

Проведённый анализ теоретических источников и данных практического педагогического опыта подтверждает, что педагогическая конфликтология играет ключевую роль в обеспечении эффективности образовательного процесса. Одним из основных результатов является формирование у будущих педагогов способности к конструктивному восприятию конфликтов как естественной и потенциально полезной составляющей профессиональной деятельности. Освоение основ конфликтологии способствует развитию навыков саморегуляции, эмоционального интеллекта и ненасильственной коммуникации, что значительно повышает качество профессионального взаимодействия с учащимися и коллегами.

Практико-ориентированное обучение, включающее анализ типичных педагогических конфликтов, ролевые игры и моделирование ситуаций, позволяет повысить готовность магистрантов к своевременному распознаванию причин противоречий и предотвращению их эскалации. Будущие педагоги демонстрируют более высокий уровень уверенности в

ситуациях напряжённого взаимодействия, способны принимать взвешенные решения, избегая авторитарных или агрессивных методов воздействия. Это способствует снижению количества деструктивных конфликтов и формированию здорового психологического климата в образовательном учреждении.

Также результаты подтверждают, что систематическое изучение педагогической конфликтологии положительно влияет на улучшение коммуникативной культуры обучающихся. Развиваются такие качества, как эмпатия, толерантность, способность услышать и понять позицию другого участника образовательного процесса. Повышается степень доверительного взаимодействия педагог — учащийся, улучшаются показатели учебной мотивации и дисциплины. В образовательной среде снижается уровень агрессии, тревожности и эмоциональной напряжённости.

Важным итогом является осознание педагогами необходимости использования превентивных стратегий для предупреждения конфликтов. Включение обучающихся в совместную деятельность, использование позитивных методов стимулирования поведения и формирование чётких норм взаимодействия становятся естественными элементами работы педагога. Преподаватели отмечают рост собственной психологической устойчивости, понимание значимости рефлексии и профессионального саморазвития в контексте педагогического взаимодействия.

Таким образом, результаты исследования подтверждают, что включение педагогической конфликтологии в программы подготовки будущих педагогов значительно повышает их профессиональную компетентность. Это способствует укреплению коммуникативных навыков, созданию благоприятной образовательной среды и повышению качества обучения, что делает развитие конфликтологической подготовки необходимым направлением модернизации педагогического образования.

Обсуждение

Анализ результатов исследования позволяет выделить ряд важных положений, свидетельствующих о высокой значимости педагогической конфликтологии в системе высшего педагогического образования. Прежде всего, становится очевидным, что конфликт является неизбежным элементом взаимодействия в учебном процессе, и его конструктивное разрешение во многом зависит от профессиональной подготовки педагога. Недостаток знаний о психологии конфликта, отсутствии навыков эффективной коммуникации и эмоциональной саморегуляции может приводить к серьёзным нарушениям в межличностных отношениях, падению учебной мотивации и усилению стрессовых факторов как у учащихся, так и у самого педагога.

Включение конфликтологической подготовки в образовательные программы способствует формированию у магистрантов способности осознанно подходить к анализу конфликтных ситуаций и выбирать адекватные стратегии поведения. Однако для достижения высокой

эффективности важно использовать именно практико-ориентированные формы обучения, которые позволяют будущим педагогам не только изучать теоретические аспекты конфликта, но и приобретать реальный опыт его разрешения. Интерактивные технологии, коммуникативные тренинги, моделирование ситуаций и кейс-методы являются наиболее результативными инструментами для развития конфликтологической компетентности.

Важным фактором успешного управления конфликтами является развитие культуры педагогического общения, основанной на уважении, сотрудничестве и эмпатии. Педагог, владеющий навыками ненасильственного взаимодействия, способен превратить конфликт в ресурс развития, способствуя формированию у обучающихся навыков саморегуляции, критического осмысления собственных действий и уважения к мнению других. Таким образом, педагогическая конфликтология выполняет не только функции по управлению конфликтами, но и задачи воспитания социально зрелой личности.

Несмотря на положительные результаты, остается ряд трудностей и ограничений. Так, не все образовательные учреждения располагают подготовленными специалистами и методическими материалами для полноценного преподавания конфликтологии. Зачастую конфликт рассматривается лишь как негативное явление, что препятствует правильному восприятию его потенциала. Кроме того, уровень конфликтологической компетентности будущих педагогов во многом зависит от их личностной готовности к рефлексии и эмоциональному развитию, что требует вставки специальных психолого-педагогических мероприятий в учебный процесс.

Исходя из обсуждения, можно сделать вывод, что дальнейшее совершенствование конфликтологической подготовки должно строиться на комплексном подходе, включающем развитие профессионального мышления, коммуникативных навыков и эмоциональной устойчивости педагогов. Это позволит формировать педагогов нового поколения, способных эффективно управлять межличностными отношениями в условиях современных образовательных вызовов.

Заключение

Проведённое исследование подтвердило, что педагогическая конфликтология занимает важное место в системе профессиональной подготовки будущих учителей. Она обеспечивает формирование конфликтологической компетентности, необходимой для успешного взаимодействия с участниками образовательного процесса и поддержания благоприятного психологического климата. Конфликты, возникающие в учебной среде, могут представлять как опасность для эмоционального состояния и мотивации обучающихся и педагогов, так и значительный потенциал для их развития. Умение педагога управлять конфликтом, направлять его в конструктивное русло и предупреждать деструктивные

последствия является одним из ключевых профессиональных навыков, формируемых в рамках изучения педагогической конфликтологии.

На основе анализа теоретического материала и результатов практико-ориентированных методов выявлено, что изучение конфликтологии способствует развитию у магистрантов критического мышления, коммуникативной культуры, эмоциональной устойчивости и способности к рефлексии. Внедрение интерактивных технологий, моделирования педагогических ситуаций и тренингов общения повышает эффективность усвоения знаний и формирует готовность к решению конфликтов в реальных условиях профессиональной деятельности. Благодаря этому значительно возрастает качество педагогического взаимодействия, уменьшается риск профессионального выгорания, создаются условия для гармоничного развития личности обучающихся.

Однако для обеспечения устойчивого результата необходимо дальнейшее совершенствование методических подходов, модернизация программ подготовки педагогов и увеличение практической составляющей конфликтологического обучения. Особое внимание следует уделить подготовке преподавателей, способных эффективно обучать конфликтологии и демонстрировать высокую культуру конструктивного общения. Перспективными направлениями развития являются повышение уровня психологической поддержки студентов, усиление сотрудничества с практикующими педагогами и интеграция цифровых технологий в обучение управлению конфликтами.

Таким образом, педагогическая конфликтология должна рассматриваться как стратегически важный компонент профессиональной подготовки педагога, обеспечивающий успешное функционирование образовательного процесса и развитие педагогов, способных эффективно и гуманно решать сложные ситуации, неизбежно возникающие в современном образовательном пространстве.

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АРТЕРИАЛЬНАЯ ГИПЕРТЕНЗИЯ ПРИ БЕРЕМЕННОСТИ: КЛИНИЧЕСКИЕ АСПЕКТЫ И ИСХОДЫ

Аннотация: *В исследовании изучены особенности течения беременности у женщин с гипертоническими расстройствами, проходивших лечение в родильном отделении Республиканской клинической больницы Самаркандского государственного медицинского университета. Обследованы 45 беременных с гестационной гипертензией, преэклампсией и хронической гипертензией.*

Проведен анализ клинических проявлений, методов родоразрешения и перинатальных исходов. Результаты показали, что гипертония у беременных ассоциируется с повышенной частотой кесаревых сечений, преждевременными родами и низкой массой новорождённых. Основные факторы риска: возраст старше 30 лет, ожирение, первородство и наличие гипертензии в анамнезе.

Ключевые слова: *гипертония у беременных, преэклампсия, гестационная гипертензия, беременность, роды.*

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ARTERIAL HYPERTENSION IN PREGNANCY: CLINICAL ASPECTS AND OUTCOMES

Abstract: *This study examined the pregnancy outcomes in women with hypertensive disorders treated in the maternity ward of the Republican Clinical Hospital of Samarkand State Medical University. Forty-five pregnant women with gestational hypertension, preeclampsia, and chronic hypertension were examined.*

An analysis of clinical manifestations, delivery methods, and perinatal outcomes was conducted. The results showed that hypertension in pregnant women is associated with an increased rate of cesarean sections, preterm birth, and low birth weight. The main risk factors were age over 30, obesity, primiparity, and a history of hypertension.

Key words: *hypertension in pregnant women, preeclampsia, gestational hypertension, pregnancy, childbirth.*

Введение

Гипертонические расстройства во время беременности представляют собой важную проблему акушерской практики. По данным Всемирной организации здравоохранения, до 10 % беременных сталкиваются с повышением артериального давления, что может приводить к осложнениям у матери и плода. В условиях Республики Узбекистан патология остаётся актуальной, однако локальные данные о течении беременности, способах родоразрешения и перинатальных исходах ограничены. Изучение этих особенностей необходимо для оптимизации профилактических и лечебных мероприятий.

Цель исследования

Изучить клиническое течение, методы родоразрешения и перинатальные исходы у женщин с гипертоническими расстройствами, находившихся в родильном отделении Республиканской клинической больницы Самаркандского государственного медицинского университета.

Материалы и методы исследования

Исследование носило ретроспективный и описательный характер. Обследованы 45 женщин с диагнозом гипертонических расстройств:

- Гестационная гипертензия — 24 женщины (53,3 %)
- Преэклампсия — 16 женщин (35,6 %)
- Хроническая гипертензия — 5 женщин (11,1 %)

Критерии включения:

- Одноплодная беременность ≥ 20 недель
- Диагноз артериальной гипертензии

Исключались многоплодные беременности и тяжелые сопутствующие заболевания (сердечно-сосудистые, почечные и др.).

Методы исследования: анализ медицинских карт, лабораторных данных, анамнеза, способа родоразрешения и перинатальных исходов.
Статистическая обработка включала расчет средних значений, процентов и проверку достоверности различий ($p < 0,05$).

Результаты

Средний возраст пациенток: **30,8 ± 4,5 лет**, преобладали первородящие (58 %). Избыточная масса тела или ожирение выявлены у 46,7 % женщин, наследственная предрасположенность — у 40 %.

Клинические проявления:

- Головные боли, отёки и протеинурия чаще наблюдались при преэклампсии.
- Средние показатели давления достигали 160/100 мм рт. ст.

Родоразрешение:

- Кесарево сечение — 26 женщин (57,8 %)
- Естественные роды — 19 женщин (42,2 %)

Основные показания к кесареву сечению: тяжёлая преэклампсия, угроза внутриутробной гипоксии и неэффективность терапии.

Перинатальные исходы:

- Средняя масса новорождённых: 2700 ± 480 г
- Недоношенность: 22,2 %
- Новорождённые с низкой массой (< 2500 г): 31 %
- Перинатальная смертность: 2,2 % (1 случай)

Выявлена достоверная связь между тяжестью гипертонии и частотой неблагоприятных исходов ($p < 0,05$).

Выводы

1. Гипертонические расстройства встречаются у значительной доли беременных, составив 10,7 % всех родов в отделении.
2. Основные факторы риска: возраст старше 30 лет, первородство, ожирение, гипертензия в анамнезе.
3. Беременность у женщин с гипертонией чаще осложняется преждевременными родами, антенатальной гипоксией и необходимостью оперативного родоразрешения.
4. Своевременная диагностика и лечение снижают риск осложнений для матери и плода.

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ТЕХНОЛОГИИ ФОРМИРОВАНИЯ ЦИФРОВОЙ КОМПЕТЕНТНОСТИ МАГИСТРАНТОВ

Аннотация*: В современном образовательном пространстве цифровая компетентность становится ключевым условием профессиональной состоятельности будущего педагога. Особое значение приобретает формирование цифровых компетенций у магистрантов, которые в перспективе выступают разработчиками, внедрителями и пользователями инновационных образовательных технологий. В данной работе рассматриваются современные технологии, способствующие развитию цифровой компетентности магистрантов в условиях цифровой трансформации высшего образования. Анализируется потенциал электронного обучения, облачных сервисов, мультиплатформенных обучающих сред и инструментов искусственного интеллекта. Подчёркивается необходимость методической подготовки преподавателей, создания цифровой инфраструктуры и мотивационно-ориентированной среды. Результаты позволяют определить эффективные направления усовершенствования подготовки магистрантов к педагогической деятельности в условиях цифрового общества.*

Ключевые слова: *цифровая компетентность, магистранты, педагогические технологии, электронное обучение, цифровая трансформация, облачные сервисы, мультимедийные ресурсы, искусственный интеллект, профессиональная подготовка, цифровая образовательная среда.*

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TECHNOLOGIES FOR DEVELOPING DIGITAL COMPETENCE IN MASTER'S STUDENTS

Abstract*: In the modern educational environment, digital competence is becoming a key condition for the professional success of future teachers. Developing digital competencies in master's students, who will eventually become developers, implementers, and users of innovative educational technologies, is of particular importance. This paper examines modern technologies that facilitate the development of digital competence in master's students in the context of the*

digital transformation of higher education. The potential of e-learning, cloud services, multi-platform learning environments, and artificial intelligence tools is analyzed. The need for methodological training for teachers, the creation of a digital infrastructure, and a motivation-oriented environment is emphasized. The results allow us to identify effective ways to improve the preparation of master's students for teaching in a digital society.

***Keywords**: digital competence, master's students, pedagogical technologies, e-learning, digital transformation, cloud services, multimedia resources, artificial intelligence, professional training, digital educational environment.*

Введение

Цифровая трансформация общества оказывает существенное влияние на систему высшего образования, формируя новые требования к профессиональной подготовке будущих педагогов. Магистранты, как наиболее подготовленная категория студентов, должны не только обладать развитой цифровой компетентностью, но и уметь внедрять современные информационно-коммуникационные технологии в образовательный процесс, разрабатывать цифровые учебно-методические материалы, организовывать обучение в гибридных и дистанционных форматах. Цифровая компетентность выступает интегративным качеством личности, выражающим способность эффективно использовать цифровые средства для решения профессиональных задач, критически оценивать информацию, обеспечивать кибербезопасность и цифровую культуру в образовательной среде.

В условиях активного внедрения электронного обучения, облачных платформ, виртуальных лабораторий и искусственного интеллекта требования к цифровой грамотности будущих педагогов значительно расширяются. Знание базовых инструментов уже недостаточно: магистрантам необходимо владеть современными технологиями визуализации данных, проектирования интерактивных образовательных ресурсов, цифрового мониторинга учебных достижений. При этом важным становится умение адаптироваться к стремительным изменениям цифровой инфраструктуры, что требует сформированной готовности к непрерывному самообразованию и инновационной деятельности.

Актуальность разработки эффективных технологий формирования цифровой компетентности определяется стратегическими направлениями развития образовательной сферы, направленными на повышение качества подготовки педагогических кадров. В современных условиях обучение магистрантов должно строиться на принципах практикоориентированности, персонализации, проектного подхода и интеграции теоретических знаний с реальными цифровыми инструментами. Развитие цифровой компетентности требует системной организации методической поддержки, создания доступной цифровой среды, а также активного вовлечения обучающихся в цифровые коммуникации и профессиональные сетевые сообщества.

Таким образом, совершенствование педагогических технологий, направленных на формирование цифровой компетентности магистрантов, выступает одним из приоритетных направлений модернизации подготовки будущих специалистов в сфере образования. Исследование эффективных подходов и инструментов позволит обеспечить соответствие профессиональных компетенций магистрантов современным требованиям цифрового образовательного пространства.

Методы

Формирование цифровой компетентности магистрантов требует комплексного применения современных педагогических технологий, основанных на интеграции цифровых инструментов в учебно-профессиональную деятельность обучающихся. Одним из ключевых методов является электронное обучение, предполагающее использование онлайн-курсов, интерактивных платформ и мультимедийных ресурсов для самостоятельного освоения цифровых навыков, анализа информации и выполнения практических заданий. Данный подход обеспечивает гибкость образовательного процесса и расширяет доступ к современным цифровым ресурсам.

Важное место занимает проектное обучение, направленное на развитие умения применять цифровые технологии для решения конкретных профессиональных задач. Магистранты разрабатывают цифровые образовательные продукты: интерактивные учебные модули, виртуальные тренажеры, цифровые сценарии уроков, что способствует формированию практического опыта работы с цифровыми платформами и инструментами анализа данных. Такой подход ориентирует будущих педагогов на инновационную деятельность в образовательной сфере.

Эффективным является использование облачных сервисов и совместных онлайн-средств для организации групповой работы и профессиональной коммуникации. Совместное редактирование документов, создание коллективных проектов, ведение портфолио и цифровых дневников способствуют развитию навыков сетевого взаимодействия, обмена опытом и рефлексии. Немаловажным является внедрение инструментов искусственного интеллекта для адаптивного обучения, автоматизации оценки и анализа учебных достижений, что улучшает качество обратной связи.

Практикоориентированные методы включают виртуальные лаборатории и симуляторы, позволяющие моделировать педагогические ситуации, проводить эксперименты и получать опыт принятия решений в цифровой среде. Это способствует развитию критического мышления, креативности и способности к цифровой трансформации образовательной практики. Существенную роль играет цифровой мониторинг, позволяющий преподавателям отслеживать прогресс магистрантов, анализировать их достижения и корректировать индивидуальные образовательные траектории.

Также важным является использование педагогического наставничества и сетевого сотрудничества с экспертами, которые помогают

формировать профессиональные цифровые компетенции через консультирование, участие в вебинарах, мастер-классах и профессиональных сообществах. Этот метод способствует развитию цифровой культуры, осознанию ответственности за кибербезопасность и этику взаимодействия в сети.

Таким образом, сочетание электронного обучения, проектных методов, облачных технологий, инструментов искусственного интеллекта и цифрового мониторинга обеспечивает системный подход к развитию цифровой компетентности магистрантов, формируя у них готовность к эффективному использованию цифровых технологий в будущей педагогической деятельности.

Результаты

Целенаправленное внедрение технологий формирования цифровой компетентности магистрантов приводит к значительным позитивным изменениям в их учебно-профессиональной деятельности. Результаты наблюдений и анализа образовательной практики показывают, что повышается уровень самостоятельности обучающихся, их способность ориентироваться в цифровом пространстве и критически оценивать предоставляемую информацию. Магистранты начинают более уверенно использовать цифровые инструменты при выполнении учебных исследований, создании мультимедийных материалов и разработке интерактивных уроков.

Важным результатом становится развитие навыков командной работы в онлайн-среде, что отражается в успешной реализации коллективных цифровых проектов и активном участии в профессиональных сетевых сообществах. У магистрантов формируется понимание значимости цифровой культуры, открытого образовательного контента и соблюдения норм кибербезопасности. В процессе обучения наблюдается рост мотивации к освоению новых технологий, стремление к постоянному самообразованию и повышению профессиональной квалификации.

Профессионально ориентированное применение цифровых технологий способствует развитию креативного и системного мышления, необходимых для проектирования современных образовательных программ. Магистранты демонстрируют готовность к внедрению цифровых решений в учебный процесс, в том числе в условиях смешанного и дистанционного обучения. Использование виртуальных лабораторий и симуляторов позволяет будущим педагогам практиковаться в моделировании педагогических ситуаций и принимать решения в цифровой среде без риска для обучающихся.

Адаптивные цифровые ресурсы и инструменты искусственного интеллекта способствуют персонализации процесса обучения, обеспечивая оперативную обратную связь и анализ индивидуального прогресса. Это позволяет преподавателям эффективно корректировать учебные траектории магистрантов, а сами обучающиеся могут объективно оценивать свои

достижения и выявлять направления для дальнейшего развития цифровых компетенций.

Таким образом, комплексное применение современных педагогических технологий демонстрирует высокую результативность в формировании цифровой компетентности магистрантов. Оно повышает их профессиональную готовность, расширяет возможности применения цифровых инструментов в образовательной практике и служит основой для дальнейших инноваций в сфере подготовки педагогических кадров.

Обсуждение

Полученные результаты свидетельствуют о том, что процесс формирования цифровой компетентности магистрантов должен быть системным, многоаспектным и тесно связанным с профессиональными задачами будущего педагога. Наиболее эффективные технологии — это те, которые обеспечивают практическое применение цифровых инструментов, стимулируют самостоятельность, критическое мышление и креативность обучающихся. Важно отметить, что ключевым фактором успешности является не только доступность цифровых ресурсов, но и наличие методической поддержки, подготовленных преподавателей и благоприятной образовательной среды.

Несмотря на значительный потенциал цифровых технологий, существуют и определённые сложности, требующие внимания. Среди них можно выделить неравномерный уровень исходной цифровой грамотности магистрантов, недостаточную мотивацию отдельных обучающихся к освоению новых инструментов, а также сложности с техническим обеспечением и стабильностью интернет-соединения. Особое значение приобретает проблема обеспечения кибербезопасности и формирования ответственного поведения в цифровой среде, что требует системной воспитательной работы и формирования у магистрантов навыков цифровой этики.

Цифровая трансформация педагога предполагает развитие его активности как участника профессиональных сетей, автора цифровых материалов и исследователя в области цифровых образовательных технологий. Это требует изменения роли преподавателя — из носителя знаний он превращается в наставника, модератора и координатора цифровой образовательной среды. Соответственно, образовательные программы магистратуры должны включать достаточный объём дисциплин, направленных на развитие цифровой компетентности, а также предполагать проектную и исследовательскую деятельность в данной сфере.

Перспективным направлением является углубление интеграции искусственного интеллекта, больших данных и виртуальной реальности в подготовку будущих педагогов. Это позволит магистрантам осваивать новые форматы образовательного взаимодействия и модернизировать учебный процесс в соответствии с мировыми тенденциями. Однако такие изменения

требуют разработки нормативно-правового и методического обеспечения, а также повышения квалификации профессорско-преподавательского состава.

Таким образом, обсуждение результатов подчеркивает необходимость дальнейшего совершенствования технологий развития цифровой компетентности магистрантов, системной модернизации учебных планов и расширения цифровой инфраструктуры высшего образования. Это обеспечит подготовку педагогов, способных эффективно работать в условиях цифрового общества и реализовывать инновационные подходы в профессиональной деятельности.

Заключение

Современное образование предъявляет высокие требования к педагогическим кадрам, что обусловлено масштабной цифровой трансформацией всех сфер общества. Формирование цифровой компетентности магистрантов становится неотъемлемой частью профессиональной подготовки будущих преподавателей, обеспечивая их готовность к внедрению инновационных решений, использованию цифровых платформ и созданию интерактивных образовательных ресурсов. Результаты исследования подтверждают, что интеграция электронного обучения, проектных методов, облачных сервисов, виртуальных симуляторов и инструментов искусственного интеллекта существенно повышает качество формирования цифровых компетенций.

Комплексный подход к развитию цифровой компетентности способствует росту самостоятельности, инициативности и креативности магистрантов, формирует навыки критического мышления, командной работы и цифровой коммуникации. Магистранты становятся активными участниками цифровой образовательной среды, развивают способность адаптироваться к технологическим изменениям и непрерывно совершенствовать профессиональные навыки. При этом особое внимание должно уделяться формированию цифровой культуры и соблюдению норм кибербезопасности, что напрямую влияет на качество и безопасность образовательного процесса.

Вместе с тем необходимо дальнейшее совершенствование образовательных программ магистратуры, направленных на развитие цифровых компетенций педагогов, а также обеспечение технологической и методической поддержки для студентов и преподавателей. Перспективными направлениями являются внедрение персонализированных цифровых траекторий, расширение практических проектов, сотрудничество с профессиональными сообществами и интеграция новых цифровых инструментов, соответствующих мировым образовательным стандартам.

Таким образом, формирование цифровой компетентности магистрантов должно рассматриваться как стратегический приоритет в подготовке будущих педагогов, обеспечивающий переход системы образования на качественно новый уровень и отвечающий требованиям современной цифровой эпохи.

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СУРФАКТАНТ И ЕГО РОЛЬ В ДЫХАТЕЛЬНОЙ АДАПТАЦИИ ПЛОДА

Аннотация: *В статье рассматривается процесс формирования сурфактанта в лёгких плода, роль гормонов в его созревании и физиологические причины возникновения мифа о лучшей выживаемости детей, рождённых на 7-м месяце беременности по сравнению с 8-м. Показано, что современные методы неонатальной помощи полностью изменили прогноз для недоношенных детей и сделали миф утрачивающим актуальность.*

Ключевые слова*: сурфактант, пневмоциты II типа, недоношенные дети, семимесячный ребёнок, восьмимесячный ребёнок, миф о выживаемости, кортизол, гормоны плода, дыхательная недостаточность, незрелость лёгких.*

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SURFACTANT AND ITS ROLE IN FETAL RESPIRATORY ADAPTATION

Abstract: *The article examines the process of surfactant formation in the fetal lungs, the role of hormones in its maturation, and the physiological reasons behind the myth that infants born at seven months have better survival rates than those born at eight months. It is shown that modern neonatal care methods have completely changed the prognosis for premature infants, rendering this myth irrelevant.*

Keywords: *surfactant, type II pneumocytes, premature infants, seven-month infant, eight-month infant, survival myth, cortisol, fetal hormones, respiratory distress, lung immaturity.*

Актуальность темы

Недоношенность остаётся значимой медицинской проблемой, поскольку незрелость лёгких является одной из главных причин смертности и тяжёлых осложнений у детей, родившихся раньше срока. Понимание механизмов созревания сурфактанта и причин появления мифа о «опасном восьмом месяце» важно как для будущих врачей, так и для родителей. Современные достижения неонатологии позволяют спасать детей на крайне малых сроках гестации, однако знание физиологии развития лёгких остаётся ключевым для правильной интерпретации рисков и формирования адекватных ожиданий. Тема актуальна также потому, что миф о выживаемости «семимесячных» по-прежнему широко распространён, хотя современные данные полностью его опровергают.

Введение

Способность новорождённого к самостоятельному дыханию во многом зависит от зрелости лёгких и наличия достаточного количества сурфактанта — вещества, состоящие из смеси жиров и специальных белков, предотвращающего спадение альвеол после выдоха. Его выработка начинается только во второй половине беременности, поэтому недоношенные дети особенно уязвимы к дыхательным нарушениям. На протяжении долгого времени существовали мнения, что дети, рождённые на 7-м месяце беременности, выживают лучше, чем появившиеся на свет в 8 месяцев.

Основная часть

Формирование сурфактанта и роль гормонов в созревании лёгких

Одним из ключевых факторов, определяющих способность новорождённого дышать, является зрелость его лёгких. Главную роль здесь играет сурфактант — вещество, которое помогает лёгким ребёнка расправляться после дыхания и не позволять альвеолам «слипаться». Его вырабатывают специальные клетки лёгких, которые называются пневмоцитами II типа. Эти клетки начинают активно созревать во второй половине беременности. Внутри них постепенно формируются маленькие пузырьки — ламеллярные тельца, где сурфактант накапливается, чтобы после рождения ребёнка сразу попасть на поверхность лёгких и помочь им работать.

Созревание этих клеток и появление достаточного количества сурфактанта зависит от гормонов плода. Главную роль играет кортизол — гормон надпочечников. Под его влиянием клетки лёгких начинают быстрее созревать, в следствие чего увеличиваются выработка жиров и белков сурфактанта и готовятся выделять его в альвеолы. Тиреоидные гормоны усиливают действие кортизола и помогают ферментам, которые создают

компоненты сурфактанта. Эстрогены к концу беременности улучшают кровоснабжение лёгких, благодаря чему клетки получают больше кислорода и питательных веществ, что тоже ускоряет их созревание. Инсулин же может замедлять этот процесс, поэтому плода у которых матери болеют с сахарным диабетом чаще возникает недостаток сурфактанта.

Так получается, что созревание лёгких — это не быстрый рывок, а постепенный, гормонально управляемый процесс. Именно поэтому каждый лишний день внутриутробного развития делает лёгкие более зрелыми. Когда-то, до появления искусственного сурфактанта и современной реанимации, замечали, что на 7-м месяце у плода бывает временный сурфактант, а на 8-м месяце идёт перестройка клеток, и этот временный сурфактант заменяется постоянным сурфактантом, поэтому уровень сурфактанта может временно снижаться. Из-за этого и родился миф, что «семимесячные» выживают лучше «восьмимесячных».

Этот миф усиливался тем, что тогда не существовало методов неонатальной помощи, позволяющих компенсировать дефицит сурфактанта. Поэтому дети, рождённые в период перестройки клеток лёгких, могли иметь более выраженную дыхательную недостаточность, тогда как часть семимесячных получала помощь и выживала. Так сформировалось ошибочное впечатление, будто более ранний срок рождения безопаснее.

Сегодня эта проблема полностью решена медициной. Современная неонатология способна компенсировать недостаток сурфактанта, вводя его непосредственно в лёгкие ребёнка. Благодаря этому и другим технологиям выхаживания недоношенных, дети, рождённые даже на крайне маленьких сроках, получают шанс на полноценную жизнь

Заключение

Таким образом, формирование сурфактанта является сложным и тонко регулируемым процессом, от которого напрямую зависит способность новорождённого к самостоятельному дыханию. Знание особенностей созревания пневмоцитов II типа и влияния гормонов позволяет понять, почему возник миф о «более жизнеспособных» семимесячных детях. Он был связан не с реальной большей зрелостью, а с временными физиологическими колебаниями уровня сурфактанта, которые в условиях отсутствия современного оборудования могли приводить к более тяжёлому течению дыхательных нарушений у детей, рождённых на 8-м месяце.

Современные данные однозначно подтверждают, что чем больше срок беременности, тем более зрелыми становятся лёгкие и тем стабильнее будет адаптация ребёнка к внеутробной жизни. Поэтому миф о «опасном восьмом месяце» утратил своё значение и не соответствует реальному уровню медицинских знаний.

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ФОРМИРОВАНИЕ ЧИТАТЕЛЬСКОЙ ГРАМОТНОСТИ УЧАЩИХСЯ НАЧАЛЬНОЙ ШКОЛЫ

Аннотация: *в нашем исследовании мы изучаем современные исследования показывают, которые показывают, что уровень читательской грамотности у младших школьников не всегда соответствует требованиям времени. Нередко дети испытывают затруднения в понимании сложных текстов, не умеют находить нужную информацию и критически ее оценивать. Это может привести к снижению успеваемости по всем предметам, а также к трудностям в социальной адаптации.*

Ключевые слова: *социальная адаптации, читательская грамотность, функциональная грамотность, успеваемость.*

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DEVELOPING READING LITERACY IN PRIMARY SCHOOL STUDENTS

Abstract: *In our study, we examine current research showing that the level of reading literacy in primary school students does not always meet current standards. Children often struggle to understand complex texts, find relevant information, and critically evaluate it. This can lead to poor academic performance in all subjects, as well as difficulties with social adaptation.*

Keywords: *social adaptation, reading literacy, functional literacy, academic performance.*

В эпоху информационного изобилия и стремительного развития технологий, читательская грамотность становится не просто навыком, а важнейшей компетенцией, определяющей успешность личности в современном мире. Особенно актуальным является формирование

читательской грамотности у учащихся начальной школы, поскольку именно в этот период закладываются основы для дальнейшего обучения и развития. Читательская грамотность в начальной школе – это способность понимать, использовать, оценивать и размышлять о письменных текстах для достижения своих целей, расширения знаний и участия в жизни общества. Она включает в себя не только умение читать и понимать отдельные слова и предложения, но и способность анализировать текст, выявлять его основную мысль, определять авторскую позицию, делать выводы и применять полученную информацию в различных ситуациях.

Все большую роль начинает играть функциональная грамотность, которая включает в себя не только знание правил русского языка, но и умение использовать язык в различных коммуникативных ситуациях. Функциональная грамотность предполагает умение выбирать подходящий языковой ресурс для конкретной ситуации, адекватно оценивать контекст и замечать нюансы речи. Она помогает в построении аргументации, выражении своих мыслей и точек зрения, а также в понимании и анализе текстов. Формирование функциональной грамотности становится актуальной для современной школы и высшего образования. Так как именно от уровня грамотности и умения пользоваться языком зависит эффективность коммуникации, а, следовательно, и успех в современном мире. Функциональная грамотность есть основа развития личности, ее уверенности в себе и своих знаниях, а также понимания того, как применять эти знания в жизни. Приобретение нормы грамотности является важной практической задачей в современном обществе, которая позволит комфортно жить и работать в любых условиях и окружении [4].

Базовым фундаментом «функциональной грамотности является читательская грамотность» [7], которая начинает формироваться с первых уроков обучения грамоте. Чтение – это не только умение распознавать буквы и слова, но и понимать смысл прочитанного, анализировать и интерпретировать текст. В современном мире, где количество информации постоянно растет, умение работать с ней является важнейшим конкурентным преимуществом. Владение навыками осознанного чтения и анализа информации, умение найти и отобрать нужную информацию, а также умение правильно интерпретировать данные становятся необходимостью. Возрастает значимость чтения как базовой интеллектуальной технологии и ресурса личностного роста, получения опыта и «подготовки к жизни в глобальном информационном обществе» [7].

Современный выпускник начальной школы должен не только уметь читать, но и применять эти знания и умения как в учебной деятельности, так и находить решения в различных новых нестандартных ситуациях, обладать внутренней культурой В соответствии с Концепцией программы поддержки детского и юношеского чтения в Российской Федерации» (распоряжение от 3 июня 2017 года №1155-р) в Российской Федерации реализуется программа,

направленная для преодоление системного кризиса в сфере читательской культуры, на что указывает Е.И. Кузьмин .

Современные исследования показывают, что уровень читательской грамотности у младших школьников не всегда соответствует требованиям времени. Нередко дети испытывают затруднения в понимании сложных текстов, не умеют находить нужную информацию и критически ее оценивать. Это может привести к снижению успеваемости по всем предметам, а также к трудностям в социальной адаптации. Формирование читательской грамотности – это многогранный процесс, требующий комплексного подхода и сотрудничества учителей, родителей и библиотекарей. Необходимо использовать разнообразные методы и приемы обучения, которые будут стимулировать интерес к чтению, развивать навыки понимания текста и формировать критическое мышление. Актуальность проблемы формирования читательской грамотности в начальной школе обусловлена не только необходимостью подготовки конкурентоспособных граждан, но и стремлением к созданию общества, в котором каждый человек имеет возможность реализовать свой потенциал.

Формирование читательской грамотности в начальной школе опирается на несколько ключевых теоретических подходов.

- Когнитивный подход: Этот подход акцентирует внимание на процессах, происходящих в сознании читателя при восприятии и понимании текста. Он включает в себя такие компоненты, как декодирование, понимание синтаксических структур, установление связей между предложениями и формирование ментальной модели текста.
- Социокультурный подход: Данный подход рассматривает чтение как социальную практику, которая формируется под влиянием культурного контекста и взаимодействия с другими людьми. Он подчеркивает важность обсуждения прочитанного, обмена мнениями и использования чтения в различных социальных ситуациях.
- Деятельностный подход: Этот подход предполагает активное участие читателя в процессе понимания текста. Учащийся не просто пассивно воспринимает информацию, а активно взаимодействует с текстом, задает вопросы, делает предположения и проверяет их.
- Компетентностный подход: Этот подход ориентирован на формирование у учащихся не только знаний и умений, но и способности применять их в реальных жизненных ситуациях. Читательская грамотность рассматривается как ключевая компетенция, необходимая для успешной адаптации в современном мире.

Для эффективного формирования читательской грамотности в начальной школе необходимо использовать разнообразные методы и приемы обучения.

- Чтение вслух: Регулярное чтение вслух учителем или другими учащимися позволяет продемонстрировать правильное произношение,

интонацию и ритм речи. Это также способствует развитию интереса к чтению и расширению словарного запаса.

- Метод направленного чтения: Учитель задает учащимся вопросы перед чтением, во время чтения и после чтения, чтобы помочь им сосредоточиться на ключевых моментах текста и сформировать понимание прочитанного.
- Стратегии понимания текста: Учащихся обучают различным стратегиям понимания текста, таким как прогнозирование, визуализация, выявление ключевых слов и фраз, установление связей между предложениями и абзацами.
- Работа с иллюстрациями: Иллюстрации помогают учащимся визуализировать прочитанное и лучше понять содержание текста. Учитель может задавать вопросы по иллюстрациям, просить детей описать их или придумать свою историю, связанную с иллюстрацией.
- Использование интерактивных технологий: Компьютерные программы, онлайн-ресурсы и интерактивные доски позволяют сделать процесс обучения более увлекательным и эффективным. Они могут использоваться для чтения текстов, выполнения упражнений на понимание прочитанного, создания мультимедийных презентаций и участия в онлайн-дискуссиях.

Учитель играет ключевую роль в формировании читательской грамотности у учащихся начальной школы. Он является не только источником знаний, но и организатором учебного процесса, мотиватором и наставником. Учитель должен обладать глубокими знаниями в области методики обучения чтению, уметь использовать разнообразные методы и приемы обучения, а также создавать благоприятную атмосферу для развития читательского интереса. Важно, чтобы учитель сам являлся примером читающей личности, демонстрировал любовь к чтению и постоянно совершенствовал свои профессиональные навыки.

Оценка читательской грамотности должна быть комплексной и включать в себя различные виды деятельности, такие как чтение вслух, ответы на вопросы по прочитанному, написание сочинений и участие в дискуссиях. Важно оценивать не только умение читать и понимать текст, но и способность анализировать его, оценивать авторскую позицию и применять полученную информацию в различных ситуациях. Для оценки читательской грамотности можно использовать различные инструменты, такие как тесты, анкеты, проекты и портфолио.

Таким образом, формирование читательской грамотности у учащихся начальной школы – это сложный и многогранный процесс, требующий комплексного подхода и сотрудничества учителей, родителей и библиотекарей. Использование разнообразных методов и приемов обучения, а также создание благоприятной атмосферы для развития читательского интереса, позволит сформировать у учащихся навыки, необходимые для успешного обучения и адаптации в современном мире.

В конечном итоге, задача формирования читательской грамотности состоит в том, чтобы каждый ребенок стал активным, грамотным и образованным гражданином своей страны. Необходимо постоянно совершенствовать методики обучения чтению, использовать современные технологии и учитывать индивидуальные особенности каждого ученика. Только тогда мы сможем достичь поставленной цели и подготовить поколение, способное успешно осваивать новые знания и решать сложные задачи в будущем.

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ГИГИЕНИЧЕСКАЯ ОЦЕНКА ТРУДОВОГО ПРОЦЕССА ТРУЖЕНИКОВ СЕЛЬСКОХОЗЯЙСТВЕННОГО ПРОИЗВОДСТВА

Аннотация: *Авторами анализированы основные этапы возделывания хлопчатника. Приведены данные о влияния основные вредные факторы трудового процесса сельскохозяйственного производства на состояние здоровья хлопкоробов. Разработано гигиенические мероприятия по охране здоровья работников, занятых в хлопководстве.*

Ключевые слова: *хлопководство, микроклимат, пестициды, запыленность, охрана труда.*

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HYGIENIC BASIS FOR THE HEALTH OF WORKERS IN COTTON PRODUCTION

Summary: *The authors of the analysis of the main stages of the effects of cotton provided data on the impact of the main factors of agricultural production on the health status of cotton growers. Hygienic measures were developed to protect the health of workers engaged in cotton growing.*

Key words: *cotton growing, microclimate, pesticides, dustiness, labor protection.*

Актуальность

Среды сельскохозяйственных культур важное место занимает хлопок – ценное сырьё для текстильной, масложировой и других видов промышленности.

Технологический процесс возделывания хлопчатника отличается от технологий выращивания злаковых и других технических культур. Он состоит из нескольких этапов: подготовка почвы, протравления и посев семян, прореживание всходов, культивация, полив растений, чеканка, борьба с сорняками, вредителями и болезнями, подготовка к уборке, машинная и ручная уборка урожая. Возделывание хлопчатника начинается с подготовкой почвы под посев: макро- и микропланирования хлопковых карт при помощи грейдеров, планировщиков и других механизмов и пахоти. Сев хлопчатника осуществляется квадратно-гнездовым способом специальными машинами – сеялками, которые навешиваются на тракторе марки МТЗ-80 “Магнум” “ОРИЕН”. Посеву предшествуют протравления семян. После появления всходов посевы прореживаются. В период вегетации (май-июль) 5-6 раз обрабатывают между рядами (рыхление почвы). Больший объем работы составляет полив растений. Он проводится в течении всего периода вегетации и заканчивается за 2-3 недели до сбора урожая.

Значительный объем работы при выращивании хлопчатника приходится на борьбу с сорняками, вредителями и болезнями. Для этой цели широко применяется химический метод. В мае-августе применяются гербициды, инсектициды, акарициды, а в сентябре – дефолианты и десиканты. Гигиенические особенности, характеризующие применение пестицидов в хлопководстве, в основном следующие: применения значительного ассортимента химических веществ, одновременно применения на больших площадях, сочетанное влияние химического и метеорологического факторов (высокой температуры, солнечной радиации). Единственным наиболее трудоёмким процессам в хлопководстве является сбор хлопка-сырца.

На всех этапах производственного процесса в сельском хозяйстве на организм работающих оказывает действие физические (температура, влажность, солнечное радиация), химические (пестициды, минеральных удобрений), биологические факторы. Кроме этого сельскохозяйственный труд характеризуется с большим физическим перенапряжением.

Все перечисленные настоятельно требует разработки гигиенические регламенты, гарантирующие охраны труда и здоровья рабочих, занятых в хлопководстве.

Данный вопрос особенно приобретал актуальность с выходом Указа Президента РУз от 28 ноября 2017 года за № УП -3608. «О мерах по коренному совершенствованию отрасли хлопководства».

Цель исследования: дать гигиеническую оценку условиям труда рабочих хлопководческих хозяйств и разработка гигиенические регламенты по охраны их здоровья.

Материал и методы исследования

Объектами исследования явились фермерские хозяйства «Карвон» махаллиннского комитета» «Бухтарой», «Файз» махаллинского комитета

«Гулистонобод», Шукур-Тухта махалинского комитета «Сармижан» Гиждуванского района.

Работа выполнена совместно с Гиждуванским районным центром Государственного санитарного надзора. Изучение физической нагрузки проводилось методом санитарного наблюдения. Температура и влажность воздуха измерялось с помощью аспирационного психрометра (СанПиН РУЗ 0324-16), скорость движения воздуха – крылчатым анемометром) (0324-16), шум и вибрация – шумомером марки ВШВ-003 (СанПин РУЗ0325-16), запылённость воздуха – весовым методом (методические указания по определению вредных веществ в воздуха), содержания углекислого газа – газоанализатором АНТ-3 (МУ012-3/0015), определение остаточных количеств пестицидов в воздухе и почве – методом тонкослойной хроматографии (Киев -1985г).

Результаты исследования

Ведущими профессиями в хлопководстве является механизаторы, поливальщики, рабочие по уходу за посевами, сборщики хлопка.

Микроклимат на рабочих местах в значительной мере определялись климатическими условиями района, так как, почти все виды работ выполнялись на открытом воздухе. Для него характерны продолжительное лето и довольно холодная зима, большие колебания температуры воздуха как в течение года, так и в течение суток, значительное количество атмосферных осадков, выпадающих в основном в зимне-весенний период.

Первый этап подготовки к посеву хлопчатника явилось протравка семян хлопчатника. Для этой цели на специально построенной бетонированной площадки осуществлялось протравка семян с помощью препарата фитовак и П-4. Все рабочие, участвующие в протравке семян проходили медицинский осмотр и обеспечивались с индивидуальными средствами защиты.

При подготовке почвы к посеву работающие подвергались воздействию низких и субнормальных температур (март-апрель). Температура воздуха в течение дня колебалась от +4 +6С, относительная влажность 70-95% и скорость движения воздуха – 4-6м/сек. В этих условиях теплозащитные свойства одежды и терморегуляционные возможности оказались недостаточными (по опросу 8 рабочих с каждой фермерской хозяйстве).

В период прореживание хлопчатника (в конце апреля, начало мая) температура воздуха в поле колебалась 21-34 C^0, а в кабине трактора МТЗ-80, ХТЗ-80-от 28-36C^0. Наивысшая температура воздуха наблюдалась в период культивации и летние поливы хлопчатника (май – июнь), в 12:00 и 16:00 она в среднем оказалась равна 36,4-38,6С и периодически достигала+ 41+45C^0.

Действия высокой температуры воздуха при работе в летний период года усугублялись наличием положительной тепловой радиации от нагретых металлических частей тракторов. Температура в кабине тракторов в этот

период достигала 58-59С^0. Относительная влажность на рабочих местах при проведении этих работ составлял 50-60%, а скорость движение воздуха – 2,5-5м/сек.

Все процессы, связанные с подготовкой почвы, культивацией и корчевание стеблей сопровождалось образованием довольно значительного количество пыли. При подготовке почвы к посеву при бороновании и вспашки земель в зоне дыхания трактористов концентрация пыли составляла от 16 до 21 мг/м3, что превышало допустимой нормы. В период культивации (трактора МТЗ-80. ХТЗ-80) концентрация пыли в рабочем месте составляла 14-17мг/м^3.

При зяблевой вспашке с помощью трактора Марки «Магнум» и 4х корпусного плуга запыленность воздуха в кабине трактора составлял 6-9мг/м^3, МТЗ-80, Т-4, в среднем составлял 26мг/м^3, при боронировании -38 мг/м^3.

При ручном сборе хлопка сырца концентрация пыли в воздухе рабочей зоны в зависимости от удаленности от дороги и агротехнического состояния карт в средним составлял 3,2-13,4 мг/м^3 что соответствует данным Ф.Т Джумаева (1987г). При зяблевой вспашке почвы тракторами различных марок (МТЗ-80, ХТЗ-80, Т-4) в зоне дыхания трактористов концентрация окиси углерода в период нахождения с подветренной стороны была в пределах 8,4-42 мг/м^3, при боронирование 8,2 -36,1 мг/м^3 . Развития отравлений окисью углерода у работающих на современных сельскохозяйственных машинах не наблюдается, однако, ряд авторов установили, что длительное воздействие относительно не высоких концентрации окиси углерода не безвредно. Так, по данным Ф.Т. Джумаева (1987), уровень карбоксигемоглобина в крови хлопкоробов механизаторов до контакта с окисью углерода в среднем составлял 2,5 %, а в концу работы у большинства обследованных в среднем повышался до 7,7%.

Трактора, используемые при выращивании хлопка рабочие подвергались воздействию шума и общей вибраций. Так, в кабине трактора МТЗ-80, ХТЗ-80 интенсивность шума достигала 109-120 Дб.

Более ответственные и трудоемким работой является труд поливальшиков. Поливальщики подвергались воздействию всего комплекса климатических факторов: низкой или повышенной температуры, солнечной радиации, ветров, осадков, низкой или повыщенной влажности. При поливе в осенне-зимний период поливальшики подвергались выраженными охлаждающему воздействию (ноябрь - январь). Температура воздуха в этот периоды года составляла от +7 до - 9 С^0 . Весенний период (март месяц) охлаждаюшие воздействия былы менее выражены, однако в это время температура воды еще не превышала -3-6 С^0, а температура воздуха колебались 4-6С^0 утром и 18-20С^0 дневные часы. Часто отмечалась значительной силы ветра (до16-21м/сек). В летний период поливальщики работали также при неблагоприятных метеорологических условиях, в июне-августе температура воздуха даже в ранние утренние часы достигали

30+35 C^0, 12-16 часов – 42+48C^0, а в 19-20 часов – 38+39 С. Высокая температура воздуха сочетаетсяс пониженной влажностью и малой скорости движения воздуха. Полив хлопчатника работающие часто осушествляли, находясь в воде относитльно невысокой температуры (она колебалась от 12- до 16 C^0, в июне и 18-20 C^0 в июле месяц). В тоже время голова и тело поливальшиков подвергались воздействию высокой температуры и инсоляции. Таким образом, у поливальщиков отмечается физиологические реакции, отражаюшие воздействие разнонаправленных влияний: голова и тело работаюших подвергаются интенсивному солнечному облучению, действие повышенной и пониженной температуры. Поливальшики часто жаловались на боли в суставах, чувство жжения, парестезии в конечностях, особенно по ночам (опрошено 21 рабочих). Значительнқй объём работы при выращивании хлопчатника приходился на борьбу с сорняками, вредителями и болезнями. Для этой цели начиная с мая до августа месяцев на полях во всех трёх изученных фермерских хозяйств былы использованы препараты “Алтин” “Далате” и “Киллер”. Препараты использовались наземной техникой. Трактористы и 2 рабочие подвергались воздействию этих химических препаратов. Спустя 2 часа после обработки остаточные количества препаратов в воздухе не обнаружено. Препараты оказались неустойчивыми во внешней среде.

Сделая заключение о том, что рабочие связанные с возделиванием хлопчатника подвергаются воздействию физические (температура, влажность, скорость движения воздуха, шум, вибрация, солнечная радиация), химические (окиси углерода, пестициды, минеральных удобрений).

Выводы

Условия труда в хлопководстве зависит от уровня механизации выращиваемой культуры, технологии её возделивания, а также от организации труда. Для улучшения условий труда, охраны здоровья трактористов необходимо внедрение во всех хлопководческих фермерских хозяйствах современная сельскохозяйственная техника, с большей частью которых соответствует требованиям гигиены труда и эргономики. Для снижения шума предусмотрение герметизация кабин тракторов, назначенных для культивации хлопчатника. Снижение уровня вибрации требуется отрегулирование сиденья в соответствие с массой тела механизатора. Для уменьшения загрязнения окружающей среды и вреднего воздействия пестицидов на организм работаюших целесообразно приготовления рабочих растворов, смесей пестицидов и удобрений на стационарных специально оборудованных пунктах. Целесообразно обеспечение рабочих спецодеждой и индивидуальных средств защиты кожи и органов зрения. Более эффективным мероприятием по охране окружающей среды от химических средств защиты растений является переход на биологический и агротехнический метод борбы с вредителями и болезнями хлопчатника.

Важное значение для оздоровления условий труда поливальщиков имеет широкое использование средств механизации полива. В холодный период года спецодежда должна быть водо- и ветронепроницаемой, утепленной. В летней период необходимо зашищать поливальшика от инсоляции и высокой температуры (шляпа с полями, хлопчатобумажное бельё и одежда светлых тонов), объзательно применение специальной обуви из водонепроницаемого материала. В полевых станах для рабочих необходима организация питания богатых белками и витаминами. Объязательным условием для рабочих хлопкоробов является соблюдение водно-солевого режима и организация горячего чая. Дальнейшие улучшение условий труда в хлопководстве необходимо организации комплексной механизации возделывания хлопка, а также автоматизацией технологических процессов (контроль высева, контроль точности движения агрегата, капельного и дождевального полива).

С целью профилактики и своевременного выявления заболеваний у лиц, занятых возделыванием хлопка целесообразно проводить сезонные и периодические медицинские осмотры.

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КОНЦЕПЦИЯ КРИТИЧЕСКОГО РАЦИОНАЛИЗМА К.ПОППЕРА

Аннотация: *В статье рассматриваются ключевые идеи философии Карла Поппера, связанные с формированием и развитием концепции критического рационализма. Раскрывается сущность принципа фальсификации как основного критерия научности, его отличие от верификационизма логических позитивистов, а также влияние попперовской методологии на становление постпозитивизма. Показано, что критический рационализм представляет собой не только научный метод, но и мировоззренческую позицию, основанную на открытости знания, признании ошибок и постоянном совершенствовании теорий. Рассматривается значение философии Поппера для развития естественных и социальных наук, образования и политической мысли.*

Ключевые слова*: Карл Поппер, критический рационализм, фальсификация, постпозитивизм, демаркация, истина, открытое общество.*

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THE CONCEPT OF CRITICAL RATIONALISM BY K. POPPER

Annotation: *The article examines the main ideas of Karl Popper's philosophy that laid the foundation of the concept of critical rationalism. It discusses the essence of the falsification principle as the main criterion of scientific validity, its difference from the verificationism of logical positivism, and the influence of Popper's methodology on the development of postpositivism. It is*

shown that critical rationalism represents not only a scientific method but also a worldview based on openness of knowledge, recognition of errors, and continuous refinement of theories. The article also highlights the significance of Popper's philosophy for the development of natural and social sciences, education, and political thought.

***Keywords**: Karl Popper, critical rationalism, falsification, postpositivism, demarcation, truth, open society.*

Философия науки XX века пережила глубокий кризис традиционных представлений о знании и истине. На смену убеждению в том, что наука способна накопить объективные и окончательные знания, пришло понимание её как открытой, самокорректирующейся системы.

На этом фоне возникло новое направление — постпозитивизм, объединившее идеи таких мыслителей, как Карл Поппер, Томас Кун, Имре Лакатос, Поль Фейерабенд и Майкл Полани.

Постпозитивизм стал основой современной философии науки, сосредоточив внимание на проблемах динамики и историчности знания, а также на критериях научности. В отличие от позитивистов, стремившихся вывести универсальные принципы верификации, постпозитивисты рассматривали науку как процесс, развивающийся через смену концепций, кризисы и пересмотр оснований. Начало этой традиции было положено Карлом Поппером, предложившим собственный методологический подход, получивший название критический рационализм.

Поппер исходил из того, что основная задача философии науки заключается в определении критериев, позволяющих различать науку и ненауку. В своей фундаментальной работе «Логика научного исследования»(1934, англ. 1959) он предложил принцип фальсификации - проверку научных теорий не на истинность, а на возможность их опровержения. Если для логических позитивистов научное знание должно было быть подтверждено опытом (верифицируемо), то Поппер показал, что подтверждение не гарантирует истинности. Даже множество успешных наблюдений не может доказать теорию окончательно, в то время как один противоречащий факт способен её опровергнуть.

Таким образом, критерий научности, по Попперу, состоит не в подтверждаемости, а в опровержимости. Теория, которую нельзя опровергнуть, перестаёт быть научной и превращается в идеологию или метафизическую систему. Из этого следуют важные методологические выводы:

Научными могут считаться только те теории, которые в принципе допускают возможность своего опровержения.

Чем больше теория имеет потенциальных фальсификаторов, тем выше её информативность и научная ценность.

Теория, не выдержавшая проверки, должна быть отброшена или модифицирована.

Теория, прошедшая через многочисленные критические испытания, подтверждает свою устойчивость, но не становится окончательной истиной.

Поппер подчёркивал, что развитие науки определяется не поиском подтверждений, а борьбой идей. Соперничающие теории должны отстаивать своё право на существование в процессе открытой проверки и критики. В этом проявляется «дух научного соревнования», который, по мнению философа, и обеспечивает прогресс знания.

Однако возникает вопрос: если число возможных проверок бесконечно, где следует остановиться? Поппер признавал, что окончательных критериев не существует. «Всё здание науки, — писал он, — стоит на сваях, забиваемых в болото. Здания — это теории, а сваи — факты. Мы не должны надеяться достигнуть твёрдого грунта — его в принципе нет» (Поппер К. Логика и рост научного знания, 1983, с. 111). Этой метафорой он обозначил фундаментальный принцип своей философии - признание условности любого знания и отказ от идеи абсолютной истины.

Истина, по Попперу, объективно существует, но человек никогда не может быть уверен, что достиг её окончательно. Знание носит предположительный, гипотетический характер, а истина выполняет роль идеала, к которому стремится наука. Даже если исследователь случайно находит верное объяснение, он не может доказать этого логически.

Поппер отрицал существование логического пути получения новых идей. Возникновение гипотез — результат интуиции, творческого акта мышления. Учёный выдвигает гипотезу не по правилам логики, а как догадку, подобную «выстрелу из пистолета». Проверка этой гипотезы, напротив, должна быть строго рациональной и критической.

В своих работах Поппер предложил наглядную метафору развития науки. Он сравнивал её с сосудом, наполненным жидкостью, в которой взвешены частицы — идеи и гипотезы. Проверенные временем теории оседают на дно, образуя слои различной степени универсальности. Верхние слои соответствуют более общим теориям, а нижние — конкретным.

Со временем идеи, ранее находившиеся в «метафизической» сфере, могут стать научными, если для них найдутся методы проверки. Так, атомизм, теория земного движения, корпускулярная теория света и представления об электрическом флюиде перешли из философских гипотез в разряд научных теорий, когда были выработаны способы их экспериментальной проверки.

Эта модель наглядно отражает эволюционный характер науки. Новые теории появляются под давлением фальсификации старых и благодаря интеллектуальной интуиции исследователей. Наука развивается не линейно, а как процесс отбора - ошибочные теории «отмирают», а более адекватные выживают. Именно поэтому Поппер называл развитие знания эволюционным процессом критических проб и ошибок.

Значение философии Поппера выходит далеко за пределы методологии науки. Его идеи оказали мощное влияние на социальные и политические

концепции XX века. В книге «Открытое общество и его враги» (1945) Поппер развил идею открытого общества, где основным условием прогресса является свобода критики и готовность к реформам. Он противопоставил такие общества тоталитарным системам, где истина объявляется окончательной и где любое сомнение трактуется как угроза. Таким образом, критический рационализм стал не только научной методологией, но и основой демократического мировоззрения.

Говоря о мировоззрении , стоит подчеркнуть, что не менее значительным является влияние Поппера на развитие философии науки после него. Томас Кун в работе «Структура научных революций» (1962) показал, что развитие науки происходит через смену парадигм, а не только через постепенное устранение ошибок. Имре Лакатос предложил объединить идеи Поппера и Куна, создав концепцию исследовательских программ, где ядро теории защищено вспомогательными гипотезами. Поль Фейерабенд, напротив, выступил против самого понятия единого метода, утверждая, что в науке «всё позволено». Однако даже их критика подтверждает глубину и значимость идей Поппера: именно они задали направление философским поискам второй половины XX века.

В современном мире, где наука сталкивается с ростом псевдонаучных теорий и кризисом доверия к экспертным знаниям, концепция критического рационализма сохраняет свою актуальность.

Принцип фальсификации остаётся ключевым инструментом проверки теорий, а сама идея критики как движущей силы познания — фундаментом научной культуры.

Критический рационализм Карла Поппера стал не только философией науки, но и культурой мышления, формирующей ответственность учёного перед истиной, обществом и самим собой. Его идеи призывают не к безусловной вере в знания, а к бесконечному поиску, сомнению и открытости. В этом заключается истинный смысл науки — не в обладании истиной, а в непрерывном движении к ней.

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НАПРАВЛЕНИЯ ИНВЕСТИЦИОННО-ИННОВАЦИОННОГО РАЗВИТИЯ РЕАЛЬНОГО СЕКТОРА

Аннотация. *В данной статье представлены предложения о важности малого бизнеса в развитии инновационных идей и тенденций в процессе адаптации к новым потребностям.*

Ключевые слова*: предпринимательство, малый бизнес, инновационная экономика, коммунтант, фирмы.*

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DIRECTIONS FOR INVESTMENT AND INNOVATIVE DEVELOPMENT OF THE REAL SECTOR

Abstract: *In the article of prediction and development of innovative business and trends in innovation and process adaptation to the process.*

Key words: *Entrepreneurship, small business, innovative economics, communities, firms.*

В развитых странах политика комплексной поддержки малого бизнеса осуществляется последовательно. Это потому, что есть два аспекта развития малого бизнеса. Прежде всего, это связано с экономическими и социальными задачами малого бизнеса в рыночной экономике, которые отражают его важность. Второе связано с недостатками, присущими малому бизнесу, и слабым развитием страны из-за этих недостатков. Выявление этих двух аспектов малого бизнеса требует формирования и развития системы поддержки малого бизнеса в нашей стране.

Это демонстрирует важность малого бизнеса в экономике в полной мере его экономических и социальных целей. Эти задачи можно разделить на две группы. Первая группа - это общие задачи, которые отражают четко сформулированные цели предпринимателя. Вторая группа является частной. Они проявляются со временем и незначительно отличаются от заявленных целей участников.

Р.Барр классифицирует отдельные задачи малого бизнеса и частного предпринимательства в следующем порядке[1]:

а) организация производства. Этот процесс включает в себя оценку экономической ситуации, разработку плана, организацию административного управления и реализацию плана.

б) риск;

в) выполнение управленческих обязанностей. Владелец малого бизнеса является лидером. Он имеет обязательную власть над своими сотрудниками, и его влияние является неоспоримым процессом. Р.Барр заявляет: «Первая и непременная характеристика лидера любой организации заключается в том, что он или она не считается работником, как другие работники; он использует принуждение участников производственного процесса (рабочих или капиталистов), чтобы обеспечить соответствие поставленных перед ними целей друг другу и производственной единице. Его экономические обязанности никогда не будут переданы обычному работнику.

В экономической теории экономической эволюции Ю. Шумпетер включает следующие индивидуальные цели[2]:

производство новых, незнакомых потребительских товаров (услуг) или старых товаров (услуг) с новыми функциями;

- внедрение новых методов производства, ранее не использовавшихся;
- развитие новых рынков или более широкое приобретение старых;
- Разработка новых источников и видов сырья;
- Новая организация производства и продаж.

Все вышеперечисленные функции являются индивидуальными задачами, так как они направлены на достижение конкретных целей экономической деятельности и максимизацию прибыли.

Как отмечает Смит: «Мы не верим в доброту мясника, шеф-повара или пекаря, когда мы едим, и мы верим, что они будут преследовать свои собственные интересы. Они будут преследовать свои собственные интересы и добиваться немыслимых результатов под« невидимой рукой » [3].

Это означает, что предприниматель выполняет не только отдельные задачи обогащения, но и функции социальной природы скрытого характера.

Это позволяет нам различать индивидуальные задачи в рамках экономических задач предпринимательства и социальные. Приоритет малого бизнеса как фактора экономической свободы должен быть приоритетным. Малый бизнес способствует распространению демократических принципов

в сфере экономики. С одной стороны, развитие малого бизнеса дает человеку выбор: быть наемным работником или независимым предпринимателем. С другой стороны, деятельность малых предприятий регулируется в большей степени законами о свободном рынке, чем деятельность крупных корпораций. Эта задача малого бизнеса играет важную роль в либерализации национальной экономики. Из-за высокого уровня государственной зависимости крупных предприятий, составляющих основу нашей республики, их трудно рассматривать как субъектов свободного рынка. Вторая задача малого бизнеса - обеспечить его скрытую, интегрирующую экономику[4]. Фирмы, выполняющие эту задачу, называются комутантами.

В рыночной экономике наличие платежеспособного спроса должно автоматически генерировать спрос. Но в настоящее время эффективное производство определяется его селективностью. Это не всегда экономически целесообразно.

Крупное предприятие может достичь высокой эффективности при производстве одного продукта и избежать использования убыточных продуктов.

Например, автомобили считаются товарами, произведенными в больших количествах. Но для крупных фирм не рекомендуется открывать автозаправочную станцию, потому что операционные издержки высока, а ежедневная прибыль недостаточна.

Только небольшие фирмы, занимающиеся коммутацией, готовы использовать любую возможность, в то время как другие компании очень избирательны в этом отношении. Средние предприятия характеризуются мелким производством. Однако они начнут производство в секторах с особыми и долгосрочными потребностями. Средним фирмам необходимо собирать и обрабатывать информацию в узком пространстве.

Для крупных предприятий передача части их продукции малому бизнесу выгодна. Предприятия малого бизнеса как партнеры крупных корпораций будут иметь доступ к технической документации, чертежам и производственным ресурсам крупных предприятий на основе субподрядов. Крупные компании заинтересованы в этой зависимости и помогают им разрабатывать новые продукты и совершенствовать технологии и методы контроля качества продукции.

Этот конфликт разрешается через коммерческие фирмы, которые постоянно ищут социальные потребности и могут адаптироваться к рыночным требованиям. По этому эти фирмы характеризуются отсутствием планирования в своей деятельности - они очень компактны и готовы к любым изменениям. Важность малых предприятий для экономики зависит от их гибкости. Уровень развития малого бизнеса можно суммировать по способности национальной экономики адаптироваться к быстро меняющейся рыночной ситуации [5].

Одной из важнейших скрытых задач малого бизнеса является создание конкурентной среды в рыночной экономике. Конечно, небольшие фирмы

сталкиваются с крупными корпорациями, часто оказываются побежденными. Тем не менее, мелкие фирмы служат основной силой в работе со всем сектором малого бизнеса и крупным капиталом.

Ведущие ученые и эксперты международных форумов и организаций пришли к выводу, что единственный способ борьбы с ростом безработицы - это создание новых предприятий и рабочих мест. Следует отметить, что малые предприятия получают выгоду от работы социально уязвимых слоев населения (женщин, инвалидов, беженцев и т. Д.), Которые не могут найти работу на крупных предприятиях. Кроме того, небольшие фирмы представляют собой уникальную «Аудиторию» для практического обучения и подготовки молодых специалистов.

Во многих странах мира большая часть населения занимается малым бизнесом. В частности, 80% в Китае, 48% в Японии, 50% в Соединенных Штатах и 78% в Узбекистане. Доля малого бизнеса в мире также высока в Китае: 60% в Китае, 68% в Италии, 53% в Германии, 48% в Корее, 50% в США, 21% в России и 56% в Узбекистане. Число субъектов предпринимательской деятельности на 1000 человек населения составляет 57 в Европейском союзе, 90 в США, 27,2 в России [6] и 22 в Узбекистане. Анализ показывает, что доля малого бизнеса в экономиках развитых стран высока. Потому что он определяет постоянно растущую потребность и быстро реализует новые идеи для ее удовлетворения. Страна, которая производит новый продукт, будет в экономическом росте.

Малые предприятия также предоставляют доступ к материальным ресурсам, т.е. используют местные ресурсы и крупномасштабные промышленные отходы.

В условиях перехода к рыночной экономике задача малого бизнеса удовлетворять спрос населения на товары и услуги эффективно и полностью.

Потребности общества, промышленности, региона, предприятия и организации, потребности каждого человека настолько разнообразны, что ни одна правительственная организация не может полностью их удовлетворить. Кроме того, со временем они увеличились, и, как показывает опыт последних десятилетий, они становятся более индивидуализированными. Только предприниматель может полностью удовлетворить эти потребности и найти новые инновационные идеи для их удовлетворения.

Следующая задача малого бизнеса - обеспечить высокую мобильность расширенного воспроизводства и гибкость рыночной экономики. В условиях глобализации экономики конкуренция на мировом рынке будет еще сильнее. В этих условиях малые и средние предприятия могут быстро менять ассортимент своей продукции и ускорять модернизацию своих производственных мощностей благодаря низким капитальным затратам, большой компактности и гибкости. Таким образом, малые предприятия могут быстрее адаптироваться к меняющимся рыночным условиям и время от времени экономическим кризисам.

Подводя итог вышеперечисленным пунктам, можно сделать следующие выводы. Малый бизнес в Узбекистане должен быть не только солидным фактором формирования валового национального продукта, но и источником занятости и доходов для благосостояния населения. это специфический сектор экономики.

Таким образом, некоторые небольшие потребности рынка не могут быть полностью удовлетворены без небольших фирм. Это те, которые должны быть созданы для производства крупных, высокорентабельных или специализированных продуктов, которые будут удовлетворять другие потребности, которые не удовлетворяются. В то же время малые предприятия пользуются преимуществами рынка, потому что они знают своих клиентов и дифференцированные рынки. Это связано прежде всего с тем, что крупные компании обслуживают те сегменты рынка, которые не представляют интереса из-за их небольшого размера. К ним относится большая часть производства товаров народного потребления. Малый бизнес очень чувствителен к изменениям спроса и способен удовлетворить новые и индивидуальные потребности клиентов. Развитие бизнеса во многом обусловлено глубокими изменениями, которые происходят в современной культуре. Если несколько десятилетий назад успех продаж был обусловлен тем, что он соответствовал рыночным стандартам, то сегодня его новизна определяется его оригинальностью. Аналогичные тенденции наблюдаются в сфере услуг - спрос зависит от качества и разнообразия услуг.

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ОРГАНИЗАЦИЯ ПРОЕКТНОЙ ДЕЯТЕЛЬНОСТЬЮ В ОБРАЗОВАТЕЛЬНОЙ ОРГАНИЗАЦИИ

Аннотация: *в статье рассматриваются теоретические и практические аспекты организации проектной деятельности в образовательной организации (ОО). Анализируются цели, задачи, принципы и формы организации проектной деятельности, а также роль педагога в ее реализации. Особое внимание уделяется методическому обеспечению проектной деятельности, критериям оценки ее результатов и преимуществам использования проектного метода в образовательном процессе. Приводятся примеры успешных проектов, реализованных в различных ОО, и перспективы развития проектной деятельности в современной системе образования.*

Ключевые слова: *проектная деятельность, образовательная организация, метод проектов, учебно-исследовательская деятельность, компетенции, педагогические технологии, организация образовательного процесса, управление проектами.*

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ORGANIZING PROJECT-BASED ACTIVITIES IN AN EDUCATIONAL INSTITUTION

Abstract: *This article examines the theoretical and practical aspects of organizing project-based activities in an educational institution. It analyzes the*

goals, objectives, principles, and forms of organizing project-based activities, as well as the role of the teacher in their implementation. Particular attention is paid to the methodological support for project-based activities, the criteria for evaluating their results, and the advantages of using the project-based method in the educational process. Examples of successful projects implemented in various educational institutions and prospects for the development of project-based activities in the modern education system are provided.

Keywords: *project-based activities, educational organization, project-based method, educational research activities, competencies, pedagogical technologies, educational process organization, project management*

Современные образовательные стандарты ориентированы на формирование у обучающихся не только предметных знаний, умений и навыков, но и ключевых компетенций, необходимых для успешной самореализации в быстро меняющемся мире. Одним из наиболее эффективных инструментов достижения этой цели является проектная деятельность, которая позволяет обучающимся приобретать опыт самостоятельного решения проблем, работать в команде, критически мыслить и творчески подходить к поставленным задачам.

Актуальность исследования обусловлена необходимостью активного внедрения проектных методов в образовательный процесс, а также потребностью в разработке эффективных моделей и технологий организации проектной деятельности в ОО.

Цель данной статьи – анализ теоретических и практических аспектов организации проектной деятельности в образовательной организации с целью выявления эффективных подходов и технологий, способствующих развитию ключевых компетенций обучающихся.

Методы исследования: анализ научной и методической литературы по теме исследования, изучение и обобщение педагогического опыта, анализ нормативных документов, метод case-study.

Проектная деятельность – это форма учебно-познавательной деятельности, направленная на решение конкретной проблемы, достижение определенной цели, требующая от обучающихся самостоятельности, инициативы, творчества и предполагающая планирование, организацию, реализацию и презентацию результатов деятельности.

В основе проектной деятельности лежит метод проектов, разработанный американскими педагогами Уильямом Килпатриком и Джоном Дьюи в начале XX века. Метод проектов предполагает организацию образовательного процесса в форме решения практических задач (проектов) с использованием интегрированных знаний и умений.

Основными принципами организации проектной деятельности являются:

- Добровольность: Участие в проекте должно быть добровольным.

- Самостоятельность: Обучающиеся самостоятельно выбирают тему проекта, определяют цели и задачи, планируют свою деятельность, ищут информацию, анализируют результаты.
- Практическая направленность: Проект должен иметь практическую значимость и направлен на решение конкретной проблемы.
- Комплексность: Проект должен требовать использования знаний и умений из различных предметных областей.
- Результативность: Проект должен иметь конкретный результат (продукт), который можно представить и оценить.
- Рефлексия: Обучающиеся должны анализировать свою деятельность, выявлять трудности и находить пути их преодоления, оценивать достигнутые результаты.

Основная цель организации проектной деятельности – развитие ключевых компетенций обучающихся, необходимых для успешной самореализации в современном обществе.

Для достижения этой цели необходимо решить следующие задачи:

- Формирование умения самостоятельно ставить цели и задачи, планировать свою деятельность.
- Развитие умения искать, анализировать и использовать информацию из различных источников.
- Формирование умения работать в команде, сотрудничать с другими людьми.
- Развитие умения критически мыслить, анализировать проблемы и находить оптимальные решения.
- Формирование умения творчески подходить к поставленным задачам, генерировать новые идеи.
- Развитие умения представлять результаты своей деятельности, аргументировать свою точку зрения.
- Формирование ответственности за результаты своего труда.

Проектная деятельность может быть организована в различных формах:

- Учебные проекты: Проекты, выполняемые в рамках учебного процесса по различным предметам.
- Внеурочные проекты: Проекты, выполняемые во внеурочное время, например, в рамках кружков, секций, клубов.
- Социальные проекты: Проекты, направленные на решение социальных проблем и улучшение жизни местного сообщества.
- Исследовательские проекты: Проекты, направленные на проведение научных исследований и получение новых знаний.
- Творческие проекты: Проекты, направленные на создание творческих продуктов, таких как картины, стихи, музыкальные произведения, театральные постановки.

По продолжительности проекты могут быть краткосрочными (1-2 урока), среднесрочными (несколько недель) и долгосрочными (несколько месяцев или даже лет).

Роль педагога в организации проектной деятельности существенно отличается от традиционной роли учителя. Педагог выступает в роли:

- Консультанта: Помогает обучающимся в выборе темы проекта, определении целей и задач, планировании деятельности.
- Фасилитатора: Создает условия для самостоятельной работы обучающихся, обеспечивает их необходимыми ресурсами, поддерживает их инициативу и творчество.
- Координатора: Координирует работу различных групп обучающихся, обеспечивает взаимодействие между ними.
- Эксперта: Оценивает результаты проектной деятельности, дает обратную связь.

Для успешной реализации проектной деятельности педагог должен обладать следующими компетенциями:

- Знание основных принципов и методов организации проектной деятельности.
- Умение разрабатывать методическое обеспечение проектной деятельности.
- Умение мотивировать обучающихся к участию в проектах.
- Умение работать в команде, сотрудничать с другими педагогами и специалистами.
- Умение оценивать результаты проектной деятельности.

При оценке результатов проектной деятельности необходимо учитывать следующие критерии: актуальность и значимость темы проекта. самостоятельность и инициативность обучающихся. качество и полнота выполненной работы. практическая значимость результатов проекта, оформление результатов проекта, защита проекта, качество презентации результатов проекта, умение отвечать на вопросы и аргументировать свою точку зрения, работа в команде,рефлексия.

Преимущества:

- Развитие ключевых компетенций обучающихся.
- Повышение мотивации к обучению.
- Формирование самостоятельности и инициативности.
- Развитие творческого мышления.
- Приобретение опыта работы в команде.
- Интеграция знаний из различных предметных областей.
- Приближение учебного процесса к реальной жизни.

Ограничения:

- Требует значительных временных и организационных затрат.
- Требует от педагога высокой квалификации и готовности к работе в новом формате.
- Не всегда подходит для изучения теоретического материала.

- Может быть сложно оценить результаты проекта объективно.

Организация проектной деятельности в образовательной организации является эффективным инструментом развития ключевых компетенций обучающихся и повышения качества образования. Для успешной реализации проектной деятельности необходимо создать соответствующие условия, разработать методическое обеспечение, обеспечить поддержку со стороны педагогов и администрации ОО.

Перспективы дальнейших исследований заключаются в разработке новых моделей и технологий организации проектной деятельности, учитывающих специфику различных образовательных организаций и уровней образования, а также в исследовании влияния проектной деятельности на формирование личности обучающихся.

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ИНСТИТУЦИОНАЛЬНЫЕ ФАКТОРЫ И КОРПОРАТИВНАЯ КУЛЬТУРА КАК ИНСТРУМЕНТ ОПТИМИЗАЦИИ УПРАВЛЕНИЯ ПРОМЫШЛЕННЫМИ ПРЕДПРИЯТИЯМИ РЕГИОНА (ОПЫТ ХОРЕЗМСКОЙ ОБЛАСТИ)

Аннотация: *В статье рассматриваются вопросы оптимизации эффективности управления в процессе формирования и совершенствования корпоративной культуры на промышленных предприятиях Хорезмской области. Освещаются элементы организационной культуры, их значение в обеспечении устойчивой деятельности и взаимосвязь с управлением развитием. Кроме того, анализируются возможности оценки корпоративной культуры с использованием инструментов OSAI, а также стратегии, ориентированные на повышение эффективности управления и региональное развитие.*

Ключевые слова: *корпоративная культура, организационные ценности, эффективность, оптимизация, OSAI, Хорезмская область, промышленные предприятия, региональное развитие.*

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INSTITUTIONAL FACTORS AND CORPORATE CULTURE AS A TOOL FOR OPTIMIZING THE MANAGEMENT OF REGIONAL INDUSTRIAL ENTERPRISES: EVIDENCE FROM THE KHOREZM REGION

Abstract: *The article examines the issues of optimizing management efficiency in the process of forming and improving corporate culture in industrial enterprises of the Khorezm region. It highlights the elements of organizational culture, their role in ensuring sustainable operations, and their interrelation with development management. In addition, the study analyzes the possibilities of assessing corporate culture using OSAI tools, as well as strategies aimed at improving efficiency and promoting regional development.*

Keywords: *corporate culture, organizational values, efficiency, optimization, OSAI, Khorezm region, industrial enterprises, regional development.*

Введение

Хорезмская область относится к числу регионов Узбекистана с возрастающим промышленным потенциалом. В регионе функционируют предприятия пищевой, строительной, лёгкой и химической промышленности, играющие значимую роль в формировании регионального валового продукта. Эти предприятия стремятся не только к обеспечению экономической результативности, но и к повышению эффективности управления за счёт формирования устойчивой корпоративной культуры.

Наличие сильной организационной культуры способствует росту производительности труда, рациональному использованию ресурсов и повышению способности предприятий оперативно адаптироваться к изменениям регионального рынка. В этом контексте процесс формирования и совершенствования корпоративной культуры в промышленных предприятиях Хорезмской области рассматривается как один из ключевых факторов оптимизации управленческой эффективности.

Обзор литературы

Взаимосвязь корпоративной культуры и устойчивого развития является предметом пристального внимания как зарубежных, так и отечественных исследователей. В классических трудах Э. Шейна корпоративная культура представлена в виде трёхуровневой модели, включающей внешние артефакты, систему ценностей и глубинные предположения; при этом именно ценностные установки рассматриваются как ключевой детерминант устойчивой деятельности организаций [38] . Д. Денисон, развивая данную концепцию, связывает культуру с результативностью и выделяет четыре её фундаментальных компонента - участие, последовательность, адаптивность и миссию, которые формируют основу долгосрочного успеха[39].

К. Камерон и Р. Куинн предложили модель Competing Values Framework (CVF), позволяющую увязать процесс принятия инновационных решений с особенностями организационной культуры. Этот подход широко используется при разработке стратегий устойчивого развития промышленных предприятий, особенно в условиях региональных рынков[40].

В отечественной научной литературе также подчеркивается необходимость развития корпоративных ценностей. Так, Н.Р. Махмудов, анализируя теорию и практику корпоративного управления, акцентирует внимание на том, что для повышения эффективности предприятий в Узбекистане требуется целенаправленное формирование системы организационных ценностей. Б.Х. Рахимов исследует механизмы укрепления

[38] Schein E. *Organizational Culture and Leadership.* Jossey-Bass, 1992.
[39] Denison D. *Corporate Culture and Organizational Effectiveness.* Wiley, 2000
[40] Cameron K., Quinn R. *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework.* Wiley, 2019.

конкурентоспособности промышленных [41] предприятий за счёт институционализации корпоративной культуры[42].

Кроме того, в международной практике применяются инструменты организационной самооценки (OSAI), разработанные OECD, которые позволяют выявлять слабые стороны корпоративного развития и разрабатывать меры по их совершенствованию [43] . В исследованиях Программы развития ООН (UNDP) акцентируется, что корпоративные ценности должны интегрироваться с экологической ответственностью, рациональным использованием ресурсов и стратегиями регионального развития, что становится важным элементом устойчивого корпоративного управления.

Методология исследования

Методологическая основа исследования опирается на анализ процессов формирования корпоративной культуры и её интеграции со стратегиями устойчивого развития промышленных предприятий Хорезмской области.

Во-первых, в качестве теоретической базы были использованы модель трёх уровней Э. Шейна (артефакты, ценности, базовые предположения) и концепция Д. Денисона (участие, согласованность, адаптивность, миссия), что позволило оценить систему корпоративных ценностей на предприятиях региона[44].

Во-вторых, на основе модели конкурирующих ценностей К. Камерона и Р. Куинна (CVF) была проведена идентификация типов организационной культуры (клановая, адхократическая, рыночная, иерархическая) и дана оценка их влияния на реализацию стратегий устойчивого развития[45].

В-третьих, при диагностике корпоративной культуры применялись инструменты организационной самооценки (OSAI), позволяющие измерять уровень корпоративного развития, выявлять слабые стороны и определять направления совершенствования[46].

В-четвёртых, проведён региональный статистический анализ, включающий изучение объёмов промышленного производства, инвестиционных потоков и показателей внешнеэкономической деятельности (экспорт-импорт) Хорезмской области за 2017-2024 гг., а также их взаимосвязи с характеристиками корпоративной культуры и эффективностью управления.

Наконец, применялось сочетание качественных и количественных методов: наряду со статистическим анализом проводились интервью и анкетирование сотрудников для выявления их отношения к корпоративным

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[41] Махмудов Н.Р. *Корпоративное управление: теория и практика.* -Ташкент: Иқтисодиёт, 2019.
[42] Рахимов Б.Х. *Корпоративная культура и конкурентоспособность промышленных предприятий.* -Ташкент: Фан, 2020.
[43] OECD. *Organizational Self-Assessment Instruments (OSAI).* Paris, 2020.
[44] Schein E. *Organizational Culture and Leadership.*-Jossey-Bass, 1992.
[45] Cameron K., Quinn R. *Diagnosing and Changing Organizational Culture.* -Wiley, 2019
[46] OECD. *Organizational Self-Assessment Instruments (OSAI).* -Paris, 2020.

ценностям, что позволило сопоставить восприятие организационной культуры с фактическими показателями результативности управления.

Анализ и результаты исследования

Развитие промышленного производства Хорезмской области в 2017-2024 гг. характеризовалось сочетанием устойчивого роста и отдельных краткосрочных спадов. В 2017 г. объём выпуска составил около 1000 млрд сумов, в 2018 г. он достиг 1150 млрд сумов, что соответствует росту на 15 %. Этот прирост был во многом связан с внедрением элементов системы управления качеством и использованием инновационных подходов в организации производственных процессов.

В 2019 г. промышленный выпуск увеличился до 1400 млрд сумов (рост на 21,7 %). Данный результат можно объяснить активным развитием корпоративных ценностей на предприятиях региона и расширением практики участия работников в процессе принятия решений. В этот же период отмечался рост экспортных поставок, что также указывает на повышение эффективности управления.

В 2020 г. из-за пандемических ограничений произошло сокращение производства до 1350 млрд сумов (-3,6 %). Снижение показало, что в ряде предприятий элемент адаптивности корпоративной культуры оказался недостаточно развит. Вместе с тем отдельные крупные компании сумели смягчить негативные последствия благодаря оперативным управленческим решениям, что коррелировало с высокими результатами самооценки OSAI по критериям миссионной ориентации и последовательности.

Начиная с 2021 г., наблюдалось восстановление: выпуск достиг 1600 млрд сумов (+18,5 %). В этот период усилилось внимание к экологической эффективности, энергосберегающим технологиям и инновационным подходам к управлению, что способствовало более активному проявлению адаптивного элемента корпоративной культуры.

В 2022 г. объём производства увеличился до 1850 млрд сумов (рост на 15,6 %). Данный результат связан с поддержкой инициатив сотрудников, укреплением коллективных форм принятия решений и развитием корпоративных ценностей, обеспечивающих устойчивость.

В 2023 г. промышленный выпуск составил 2000 млрд сумов, что соответствует росту на 8,1 %. Несмотря на относительное замедление темпов, предприятия региона добились повышения эффективности управления за счёт укрепления миссионной ориентации и согласованности организационных процессов.

В 2024 г. объём промышленного производства достиг 2250 млрд сумов (+12,5 %). Это подтверждает, что формирование и совершенствование корпоративной культуры в промышленных предприятиях Хорезмской области выступает ключевым фактором оптимизации управленческой эффективности.

В целом за 2017-2024 гг. объём промышленного выпуска региона увеличился в 2,25 раза(Рис1). Полученные результаты свидетельствуют о

том, что развитие корпоративной культуры, включающее укрепление ценностных ориентиров, расширение участия работников в управленческих процессах и институционализацию организационных практик, сыграло решающую роль в повышении результативности управления промышленными предприятиями.

Рисунок 1. Динамика промышленного производства в Хорезмской области (2017–2024 гг.)

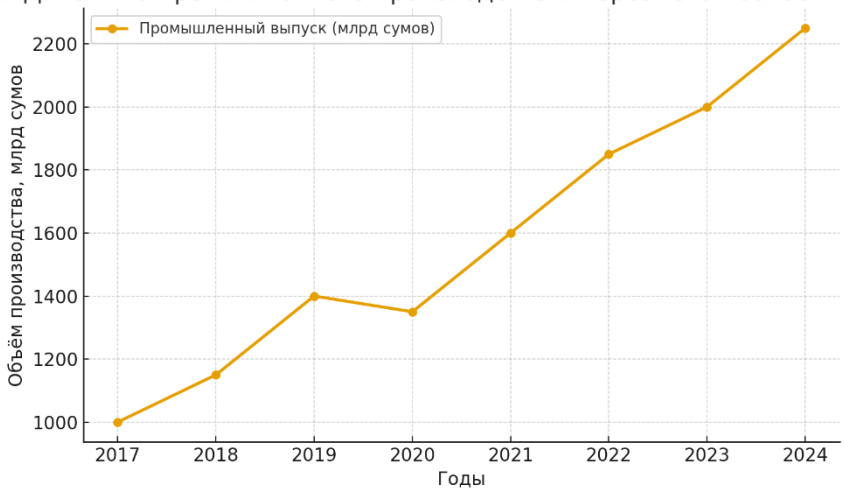


Рисунок 1 демонстрирует динамику промышленного производства в Хорезмской области в 2017-2024 гг. За указанный период объём выпуска вырос с 1000 до 2250 млрд сумов, что соответствует увеличению более чем в 2,2 раза. График наглядно показывает кратковременный спад в 2020 г., связанный с пандемическими ограничениями, а также уверенное восстановление в последующие годы. В целом линия тренда отражает поступательный рост, что подтверждает наличие устойчивого промышленного потенциала региона.

Обсуждение

Анализ, проведённый на примере промышленных предприятий Хорезмской области, подтверждает, что корпоративная культура играет решающую роль в оптимизации управленческой эффективности. Высокие темпы роста, зафиксированные в 2017-2019 гг., отражают успешное сочетание корпоративных ценностей с элементами участия и инновационных инициатив. В этот период предприятия активно стремились к расширению внешнеэкономической деятельности, что способствовало существенному увеличению объёмов выпуска.

Спад 2020 г. показал, что управленческая результативность напрямую зависит от степени развитости адаптивного элемента организационной культуры. Те компании, где гибкость и адаптивность были недостаточно укреплены, оказались менее устойчивыми к внешним вызовам. Напротив, предприятия, в основе которых лежали ценности последовательности и приверженности миссии, продемонстрировали способность к быстрому восстановлению, что подтверждает ключевую роль корпоративной культуры в стратегиях устойчивого развития.

Период 2021-2024 гг. характеризуется устойчивой положительной динамикой, что связано с начавшимися реформами по формированию и совершенствованию корпоративной культуры. Использование инструментов организационной самооценки (OSAI) позволило выявить слабые стороны, повысить качество управленческих решений и усилить вовлечённость сотрудников в процесс принятия решений. Рост активности персонала в управлении свидетельствует о практическом внедрении принципов коллективного участия.

Кроме того, успешность стратегий устойчивого развития в промышленных предприятиях региона оказалась тесно связанной с корпоративными ценностями, ориентированными на экологическую ответственность и рациональное использование ресурсов. Применение «зелёных» управленческих практик не только стимулировало рост производства, но и повысило конкурентоспособность региона в целом.

Таким образом, результаты обсуждения подтверждают, что формирование и развитие корпоративной культуры в промышленных предприятиях Хорезмской области выступает стратегическим фактором повышения эффективности управления и создаёт основу для устойчивого развития региональной экономики в долгосрочной перспективе.

Заключение и рекомендации

Проведённое исследование показало, что корпоративная культура выступает стратегическим фактором оптимизации управленческой эффективности промышленных предприятий Хорезмской области. Стабильный рост объёмов производства в 2017-2024 гг. объясняется формированием организационных ценностей, внедрением инновационных управленческих технологий и расширением участия сотрудников в процессе принятия решений. В то же время снижение показателей в период пандемии наглядно продемонстрировало недостаточную развитость элемента адаптивности корпоративной культуры, что подчёркивает необходимость её постоянного совершенствования.

Полученные результаты позволяют утверждать, что ценности последовательности и приверженности миссии служат основой устойчивого роста региональных предприятий. Однако элементы участия и гибкости пока реализованы не в полной мере, что снижает способность ряда компаний оперативно реагировать на внешние вызовы. В этой связи приоритетным направлением становится развитие механизмов коллективного участия, поддержка инициативности персонала и формирование культуры адаптивности.

В практическом плане рекомендуется активное внедрение инструментов организационной самооценки (OSAI), разработка программ по укреплению ценностей участия и адаптивности, а также институционализация экологической ответственности как одного из элементов корпоративной культуры. Необходимым условием остаётся

совершенствование системы подготовки кадров, в которой обучение должно интегрировать управленческие технологии с корпоративными ценностями.

Реализация указанных мер позволит промышленным предприятиям Хорезмской области не только повысить внутреннюю эффективность, но и внести весомый вклад в устойчивое развитие региональной экономики.

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ДИДАКТИЧЕСКАЯ МОДЕЛЬ ОБУЧЕНИЯ БУДУЩИХ УЧИТЕЛЕЙ ТЕХНОЛОГИИ РЕШЕНИЮ ПОЗИЦИОННО-МЕТРИЧЕСКИХ ЗАДАЧ СРЕДСТВАМИ МУЛЬТИМЕДИЙНЫХ ТЕХНОЛОГИЙ

Аннотация: *В данной статье изложены цели и задачи обучения будущих преподавателей технологического образования определению линий пересечения многогранников с плоскостью и построению их разверток с использованием мультимедийных средств. Рассмотрены современные методы и средства обучения, а также области их применения.*

Ключевые слова: *мультимедиа, дизайн, точки, линии, плоскость, проецирование, геометрическое тело.*

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DIDACTIC MODEL FOR TEACHING FUTURE TECHNOLOGY TEACHERS TO SOLVE POSITIONAL AND METRIC PROBLEMS THROUGH MULTIMEDIA TECHNOLOGIES

Annotation: *This article outlines the goals and objectives, modern methods and tools, and areas of application for teaching future technology education teachers to determine the intersection of polygons with planes using multimedia tools, as well as their spread.*

Key words*: Multimedia, design, points, lines, plane, projection, geometric body.*

Введение

В последние годы в сфере образования в результате широкомасштабных реформ начались значительные изменения.В частности, открываются новые высшие учебные заведения, предпринимаются важные шаги по расширению рядов педагогических кадров. Открытие новых университетов и филиалов, направленных на подготовку педагогических

кадров, а также расширение деятельности педагогических факультетов в вузах подтверждают данный факт [1].

Кроме того, в учебных планах университетов также произошли существенные изменения. Если ранее педагогические и технические университеты готовили педагогов и инженеров в течение 4–5 лет, то теперь они выпускают бакалавров, обучающихся 3–4 года. Естественно, такие изменения привели к значительному сокращению учебных часов, выделяемых на изучение отдельных дисциплин. В частности, объем часов по специальным предметам был существенно уменьшен. Так, если ранее дисциплина «Начертательная геометрия и инженерная графика» для подготовки преподавателей трудового обучения (ныне – технологии) преподавалась в течение двух семестров, то в настоящее время она изучается в течение одного семестра: лекции – 20 часов, практические занятия – 40 часов, самостоятельная работа – 90 часов.

Термин *мультимедиа* (от англ. *multimedia*, лат. *multum* – «много» и *medium* – «средство, посредник») означает электронное средство хранения информации, объединяющее несколько форм представления данных (текст, изображение, анимация и др.). Термин «мультимедиа» часто применяется к носителям, позволяющим хранить большие объемы информации и обеспечивать к ним быстрый доступ (первым массовым носителем такого типа стали компакт-диски) [5].

Технологии мультимедиа находят широкое применение в образовании, культуре и искусстве, науке, бизнесе и других сферах человеческой деятельности.

Методология исследования (Research Methodology)

В научно-исследовательской работе использовались методы анализа и систематизации литературы, математико-статистического анализа, наблюдения, а также программа AutoCAD.

Использование программы AutoCAD на лекционных и практических занятиях позволяет заранее подготовить множество чертежей и демонстрировать их студентам с помощью видеопроектора, монитора и других устройств визуализации, обучая приемам построения чертежей (рис. 1–2).

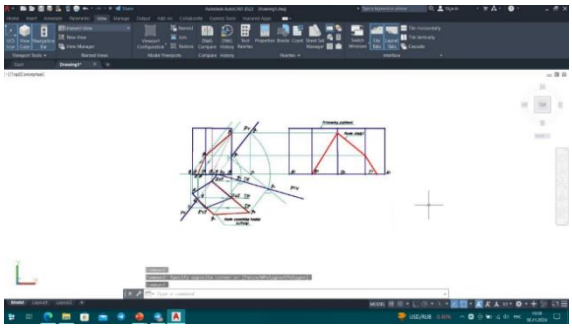


Рис 1

Для этого у преподавателей должны быть хорошо сформированы навыки работы с компьютерными программами, в частности с программой **AutoCAD**.

Преимущества проведения занятий (выполнения чертежей) с использованием мультимедийных средств (программы AutoCAD):

Для преподавателя:

1. Возможность заранее подготовить чертежи, что позволяет экономить время на их проверку и оценивание во время практических занятий.
2. Устранение недостатков, возникающих при ручном выполнении чертежей на доске (необходимость использования подходящей доски, цветных мелков, циркуля, линеек и т.д.).
3. Выполнение чертежей в соответствии со стандартами (типы линий, шрифты, нанесение размеров, правильное расположение основной надписи и элементов чертежа).

Для студентов (обучающихся):

1. Возможность записи каждого нового занятия на видео и распространения его через социальные сети или образовательные платформы, что позволяет студентам повторно просматривать процесс выполнения чертежей.
2. Устранение ситуации, когда часть доски перекрывается преподавателем, что мешает студентам видеть выполняемый чертёж.
3. Чёткое отображение линий на чертеже, различие между ними, что облегчает визуальное восприятие и понимание построения.
4. Возможность увеличения отдельных фрагментов чертежа для студентов, сидящих на задних рядах, и более детального рассмотрения элементов.

Преимущества использования мультимедийных средств в учебном процессе можно перечислять и дальше — выше приведены лишь основные из них.

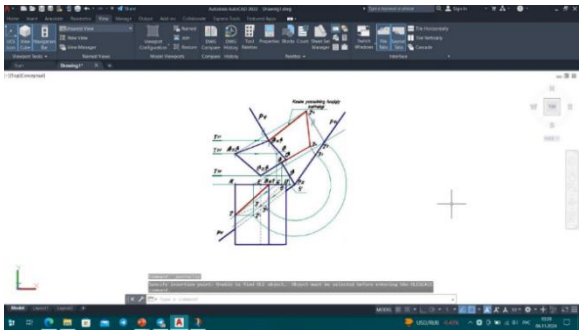


Рис 2

Чертежи можно выполнять не только с помощью программы **AutoCAD**, но и с использованием офисного приложения **PowerPoint**, добавляя к ним анимационные эффекты для демонстрации движения элементов чертежа. В этом случае преподаватель может заранее подготовить чертёж и в короткие сроки представить его студентам в форме презентации, демонстрируя процесс построения с помощью анимации (рис. 3).

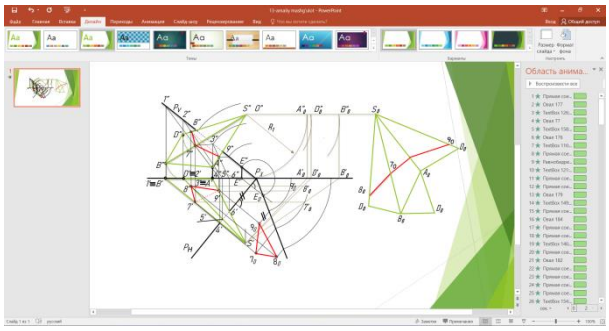


Рис 3

Заключение и рекомендации (Conclusion/Recommendations).

Организация учебных занятий на основе приведённых выше методических рекомендаций способствует повышению графической грамотности будущих преподавателей технологического образования. Это, в свою очередь, позволит им в будущем разрабатывать и выполнять чертежи различных изделий, а также создавать на их основе инновационные проекты.

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ГИСТОЛОГИЯ ОРГАНОВ ИММУННОЙ СИСТЕМЫ В ЭПОХУ НОВЫХ ВИРУСОВ

Аннотация: *В статье рассматриваются гистологические изменения органов иммунной системы в условиях появления новых вирусов. Описываются особенности поражения тимуса, лимфатических узлов, селезёнки и MALT-тканей, а также механизмы тимической атрофии и перестройки лимфоидных структур. Подчёркивается влияние вирусов на иммунный ответ и значение морфологических методов для понимания патогенеза современных инфекций.*

Ключевые слова: *иммунная система, гистология, вирусы, тимус, лимфатические узлы, селезёнка, MALT, вирусная инфекция.*

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HISTOLOGY OF THE IMMUNE SYSTEM ORGANS IN THE ERA OF EMERGING VIRUSES

Abstract: *This article examines histological alterations in immune system organs in the era of emerging viruses. It highlights structural changes in the thymus, lymph nodes, spleen, and MALT, as well as mechanisms of thymic atrophy and lymphoid remodeling. The role of these changes in shaping immune responses and the importance of morphological analysis in understanding modern viral diseases are emphasized.*

Keywords: *immune system, histology, viruses, thymus, lymph nodes, spleen, MALT, viral infection.*

Введение

Современная мировая практика показывает, что новые вирусные патогены оказывают глубокое влияние на иммунную систему человека и животных не только на функциональном, но и на морфологическом уровне. Тимус, лимфатические узлы, селезёнка и MALT-ткань представляют собой ключевые лимфоидные органы, отвечающие за созревание, дифференцировку и поддержание лимфоцитов. Изменения их структуры под воздействием вирусных инфекций оказывают непосредственное влияние на формирование иммунного ответа, эффективность иммунной памяти и регенераторные способности тканей.

Гистологический анализ лимфоидных органов позволяет выявлять скрытые патоморфологические изменения, недоступные стандартным клиническим методам, и способствует глубокому пониманию патогенеза вирусных инфекций. В условиях появления новых вирусов изучение морфологии иммунной системы приобретает особую актуальность как для фундаментальной науки, так и для практической медицины.

Материалы и методы исследования

Для подготовки статьи был проведён анализ современных научных источников, включающих публикации из баз данных PubMed, Scopus и Google Scholar за период 2018–2025 гг., а также официальные отчёты ВОЗ и Европейского центра по контролю заболеваний (ECDC) по вирусным инфекциям. В обзор включены данные экспериментальных исследований морфологии лимфоидных органов (тимуса, лимфатических узлов, селезёнки и MALT), результаты клинических наблюдений за структурными изменениями тканей при острых и хронических вирусных инфекциях, а также сведения о влиянии вирусов на иммунный ответ и регенераторные способности лимфоидных органов.

Основная часть

Иммунная система представляет собой сложный комплекс лимфоидных органов и клеток, обеспечивающих защиту организма от патогенов. К ключевым органам относятся тимус, лимфатические узлы, селезёнка и MALT-ткань (слизисто-ассоциированная лимфоидная ткань). Морфологическая структура этих органов обеспечивает созревание, дифференцировку и функциональную активность лимфоцитов, что критически важно для адекватного иммунного ответа. Воздействие вирусных инфекций вызывает характерные структурные изменения, отражающиеся на эффективности иммунной защиты.

Тимус

Тимус является центральным органом лимфоидной системы и ответственен за созревание и дифференцировку Т-лимфоцитов. При вирусной инфекции наблюдаются следующие морфологические изменения:

- **Атрофия коркового вещества**: истончение коркового слоя снижает количество наивных Т-клеток, что ограничивает способность организма к полноценному клеточному иммунному ответу.

- **Деструкция эпителиоретикулоцитарной сети**: нарушается архитектура стромальных клеток, что влияет на миграцию, селекцию и выживание тимоцитов.
- **Апоптоз лимфоцитов**: вирусные частицы могут индуцировать программируемую клеточную смерть, сокращая пул функциональных Т-клеток.
- **Нарушение соотношения корковой и мозговой зон**: наблюдается смещение границ, что приводит к нарушению отбора и созревания Т-клеток.

Эти изменения приводят к снижению иммунной компетентности, ограничению формирования иммунной памяти и снижению регенераторного потенциала тимуса.

Лимфатические узлы

Лимфатические узлы являются периферическими органами, обеспечивающими фильтрацию лимфы, активацию лимфоцитов и координацию иммунного ответа. При вирусной инфекции отмечаются:

- **Дезорганизация фолликулов**: разрушается структура центров размножения В-лимфоцитов, что снижает продукцию антител.
- **Сокращение Т-зоны**: уменьшение числа Т-лимфоцитов ограничивает взаимодействие с антигенпрезентирующими клетками и В-клетками.
- **Увеличение макрофагальной активности**: макрофаги накапливают вирусные антигены, вызывая локальное воспаление и разрушение лимфоидной ткани.
- **Нарушение фибробластической сети**: деструкция поддерживающих клеток ухудшает микроокружение лимфоузла.

В результате лимфатические узлы теряют координирующую функцию, снижается эффективность адаптивного иммунного ответа, что увеличивает восприимчивость организма к вторичным инфекциям.

Селезёнка

Селезёнка выполняет фильтрационную функцию крови и поддерживает гомеостаз лимфоидных клеток. Морфологические изменения при вирусной инфекции включают:

- **Редукцию белой пульпы**: уменьшение лимфоидных зон нарушает созревание лимфоцитов и синтез антител.
- **Дистрофические изменения стромы**: повреждается каркас органа, что снижает выживаемость клеток и нарушает микроокружение.
- **Перестройку сосудистой сети красной пульпы**: изменение кровотока отражает системное воздействие вируса на фильтрационную функцию органа.
- **Гиперплазию макрофагов**: макрофаги активно поглощают вирусные антигены, сопровождаясь воспалением и повреждением ткани.

Эти изменения ослабляют иммунологические и фильтрационные функции селезёнки, снижая способность организма противостоять вирусной инфекции.

MALT-ткань (слизисто-ассоциированная лимфоидная ткань)

MALT-ткань расположена в слизистых оболочках дыхательных, пищеварительных и мочеполовых путей и обеспечивает локальный иммунный ответ. Морфологические изменения при вирусной инфекции включают:

- **Гиперплазию лимфоидных скоплений**: активация лимфоцитов приводит к увеличению размеров фолликулов.
- **Деградацию эпителиальных структур**: повреждаются клетки, формирующие барьер слизистой оболочки.
- **Нарушение локального иммунного ответа**: снижена выработка иммуноглобулинов, ухудшена координация Т- и В-клеток.

Эти изменения ослабляют барьерную функцию слизистых, повышая восприимчивость к вторичным инфекциям и снижая локальную защиту организма.

Заключение

В условиях появления новых вирусных патогенов гистологическое изучение органов иммунной системы приобретает особую значимость. Морфологические изменения тимуса, лимфатических узлов, селезёнки и MALT-тканей отражают глубину воздействия вирусов на иммунный ответ, нарушают координацию клеточных взаимодействий и снижают регенераторные способности лимфоидных органов.

Гистологический анализ позволяет не только выявлять скрытые структурные повреждения, но и оценивать эффективность иммунного ответа, прогнозировать последствия вирусных инфекций и разрабатывать более целенаправленные терапевтические и профилактические меры. В эпоху новых вирусов понимание морфологии лимфоидных органов становится ключевым инструментом как фундаментальной, так и клинической иммунологии.

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МЕТРОЛОГИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ПРОИЗВОДСТВА В МАШИНОСТРОИТЕЛЬНОЙ ОТРАСЛИ

Аннотация: *В данной статье рассматривается задачи метрологического обеспечения на предприятиях машиностроительной отрасли, а также рассматриваются возникающие проблемы при осуществлении метрологического обеспечения и мероприятия, направленные на их предотвращение.*

Ключевые слова: *метрологическое обеспечение, средств измерений, качества изделий, метод измерения, машиностроения, контроль, точность.*

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METROLOGICAL SUPPORT OF PRODUCTION IN THE ENGINEERING INDUSTRY

Abstract: *This article examines the tasks of metrological support at enterprises of the machine-building industry, as well as discusses emerging problems in the implementation of metrological support and measures aimed at preventing them.*

Keywords: *metrological support, measuring instruments, product quality, measurement method, mechanical engineering, control, accuracy.*

Метрологическое обеспечение производства в машиностроительной отрасли — это установление и применение научных и организационных основ, технических средств, правил и норм, необходимых для достижения единства и требуемой точности измерений. Современное машиностроительное производство должно быть высокопроизводительным и обеспечивать заданный уровень качества продукции.

Изготовление взаимозаменяемых изделий, соответствие их требованиям технической документации возможно при высоком уровне метрологического обеспечения производства и осуществления соответствующего технического контроля. Из всех видов контроля наиболее информативным и объективным является контроль, основанный на использовании средств измерений. Поскольку в машиностроении основную долю измерений (от 60 до 95%) составляют линейные и угловые измерения.

Некоторые цели метрологического обеспечения изделий машиностроения:

- обеспечение высокого качества изделий, сокращение сроков и стоимости научных исследований, разработки и производства новой техники;
- обеспечение единства, требуемой точности измерений, достоверности и эффективности контроля качества изделий, снижение трудоёмкости контрольно-измерительных операций;
- достижение высокой эффективности применения средств измерений, обеспечение их метрологической надёжности, сокращение номенклатуры применяемых средств измерений;
- обеспечение условий безопасного труда и охраны окружающей среды.

Некоторые задачи метрологического обеспечения машиностроительной продукции:

- определение путей наиболее эффективного использования научных и технических достижений в области метрологии;
- определение рациональной номенклатуры измеряемых параметров, установление оптимальных норм точности измерений, порядка выбора и назначения средств измерений;
- организация и проведение метрологической экспертизы на стадиях разработки, производства и испытаний изделий;
- разработка и применение прогрессивных методов измерений, методик и средств измерений;
- автоматизация сбора, хранения и обработки измерительной информации;
- осуществление ведомственного контроля за состоянием и применением на предприятиях образцовых, рабочих и нестандартизованных средств измерений;
- проведение обязательных государственной или ведомственной поверок средств измерений, их ремонта.

Объектом метрологического обеспечения являются все стадии жизненного цикла изделия.

Метрологическое обеспечение и поддержание требуемого уровня качества выпускаемой продукции на машиностроительных предприятиях, а также конкурентоспособность на рынке, невозможна без мониторинга и контроля параметров технологических процессов, что связано с выполнением опреде- ленных измерительных операций.

На основании рассмотренных задач и мероприятий по улучшению метрологического обеспечения на предприятии можно заключить следующее:

- влияние на сопровождение метрологическими службами и участие в непосредственном процессе создания готового изделия, способствовало бы созданию качественного алгоритма выпускаемой продукции;
- решение проблемы достижения высокого уровня качества и конку- рентоспособности продукции невозможно без квалифицированного

метрологи- ческого обеспечения оценки соответствия продукции в процессе производства;

- из-за недооценивания руководителями промышленных организаций значимости целей и задач метрологического обеспечения, а также оценки соот- ветствия продукции в производстве – не реализуется необходимый объём ра- бот, обеспечивающий качество, уровень и конкурентоспособность продукции;
- ключевая проблема – отсутствует необходимое количество кадрового резерва специалистов-метрологов для реализации задач обеспечения единства измерений и метрологического обеспечения оценки соответствия продукции в процессе производства. Министерство просвещения поэтапно уменьшает количество бюджетных мест и, соответственно, количество вы- пускников метрологов, что связано с непониманием в промышленности пря- мой взаимосвязи комплекса мероприятий метрологического обеспечения оценки соответствия продукции в процессе производства с качеством и кон- курентоспособностью выпускаемой продукции.

Для предотвращения возникающих сложностей и неточностей при осуществлении метрологического обеспечения на предприятии следует придерживаться программы, обеспечения повышения эффективности работ по метрологическому производству.

Первостепенно необходимо провести оптимизацию парка контрольно-измерительного, а также испытательного оборудования на предприятии. Использование современного оборудование повышает качество выполнения измерительных операций, что позволяет проводить контрольные операции с требуемой точностью к выпускаемой продукции.

Метрологическое обеспечение осуществляется в соответствии с требованиями, установленными в стандартах Государственной системы обеспечения единства измерений (ГСИ), методических указаниях и инструкциях, утверждённых Госстандартом.

В заключение, технический контроль является важным аспектом машиностроения, который включает в себя мониторинг и управление различными процессами, связанными с производством и эксплуатацией машин. Различные типы технического контроля, такие как контроль качества, контроль процесса, контроль запасов и контроль технического обслуживания, могут быть реализованы с использованием различного оборудования, принципов управления, инструментов и технологий. Однако очень важно иметь систему мониторинга для получения надежной информации о процессе, позволяющей руководителю принимать обоснованные решения и предпринимать корректирующие действия, когда это необходимо.

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РАЗРАБОТКА И ИСПОЛЬЗОВАНИЕ СИМУЛЯТОРОВ УПРАВЛЕНИЯ ОБРАЗОВАТЕЛЬНОЙ ОРГАНИЗАЦИЕЙ

Аннотация: *в статье рассматриваются вопросы разработки и применения симуляторов управления образовательной организацией (ОО) как инновационного инструмента для подготовки и повышения квалификации руководителей и управленческих команд. Анализируются основные типы симуляторов, принципы их построения и функциональные возможности. Особое внимание уделяется педагогическим аспектам использования симуляторов, их роли в развитии управленческих компетенций, а также преимуществам и ограничениям применения симуляционных технологий в сфере образования. Приводятся примеры разработанных и используемых симуляторов управления ОО и перспективы их дальнейшего развития.*

Ключевые слова: *симулятор управления, образовательная организация, управленческие компетенции, моделирование, имитация, подготовка кадров, повышение квалификации, принятие решений, стратегическое планирование.*

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DEVELOPMENT AND USE OF EDUCATIONAL INSTITUTION MANAGEMENT SIMULATORS

Abstract: *This article examines the development and use of educational organization (EO) management simulators as an innovative tool for training and professional development of managers and management teams. The main types of simulators, their design principles, and functional capabilities are analyzed. Particular attention is paid to the pedagogical aspects of using simulators, their role in developing management competencies, as well as the advantages and limitations of applying simulation technologies in education. Examples of developed and used EO management simulators and prospects for their further development are provided.*

Key words: *management simulator, educational organization, management competencies, modeling, imitation, personnel training, advanced training, decision making, strategic planning.*

В условиях динамично меняющейся образовательной среды к руководителям образовательных организаций предъявляются повышенные требования. Эффективное управление ОО требует от руководителя не только глубоких знаний в области педагогики и психологии, но и развитых управленческих компетенций, таких как стратегическое планирование, финансовый менеджмент, управление персоналом, умение принимать решения в условиях неопределенности и риска. Традиционные формы обучения, такие как лекции и семинары, не всегда позволяют сформировать необходимые управленческие навыки. В связи с этим, актуальным становится использование инновационных образовательных технологий, в частности, симуляторов управления образовательной организацией.

Актуальность исследования обусловлена необходимостью повышения качества подготовки и переподготовки управленческих кадров для системы образования, а также потребностью в инструментах, позволяющих моделировать и анализировать последствия управленческих решений в условиях, приближенных к реальным.

Цель данной статьи – обоснование целесообразности и анализ возможностей использования симуляторов управления образовательной организацией как эффективного инструмента развития управленческих компетенций руководителей ОО.

Методы исследования: анализ научной литературы по теме исследования, обобщение опыта разработки и использования симуляторов управления, системный анализ, моделирование.

Теоретические основы симуляторов управления и их применение в образовании. Симулятор управления – это программно-аппаратный комплекс, имитирующий деятельность управляемой системы (в данном случае, образовательной организации) и позволяющий пользователю (руководителю ОО) принимать управленческие решения и наблюдать за их последствиями в виртуальной среде.

Основными компонентами симулятора являются:

- Модель образовательной организации: Описывает структуру ОО, ее ресурсы (финансовые, кадровые, материальные), а также взаимосвязи между различными элементами системы.
- База данных: Содержит информацию о характеристиках различных элементов модели, а также исторические данные об ОО.
- Интерфейс пользователя: Обеспечивает взаимодействие пользователя с симулятором, позволяет вводить управленческие решения и получать информацию о результатах моделирования.

- Механизм моделирования: Реализует алгоритмы, позволяющие рассчитать последствия управленческих решений на основе модели ОО и исторических данных.

Симуляторы управления используются в различных сферах, таких как бизнес, промышленность, транспорт, оборона. В образовании они могут быть использованы для решения следующих задач:

- Подготовка и переподготовка руководителей ОО: Симуляторы позволяют руководителям ОО осваивать новые управленческие технологии, развивать навыки стратегического планирования и принятия решений.
- Анализ и оптимизация управленческих процессов: Симуляторы позволяют моделировать различные сценарии развития ОО и оценивать последствия различных управленческих решений.
- Разработка и внедрение новых образовательных программ: Симуляторы позволяют оценить эффективность новых образовательных программ до их внедрения в практику.
- Проведение научных исследований в области управления образованием: Симуляторы позволяют проводить эксперименты и анализировать данные, полученные в результате моделирования.

Принципы разработки и использования симуляторов управления образовательной организацией.

Разработка симулятора управления образовательной организацией – это сложный и трудоемкий процесс, который требует привлечения специалистов из различных областей: педагогики, психологии, экономики, информационных технологий. Основными принципами разработки симулятора являются:

- Релевантность: Симулятор должен соответствовать реальным условиям функционирования образовательной организации.
- Валидность: Результаты моделирования должны соответствовать реальным результатам деятельности ОО.
- Наглядность: Интерфейс пользователя должен быть интуитивно понятным и удобным в использовании.
- Интерактивность: Пользователь должен иметь возможность активно взаимодействовать с симулятором, вводить управленческие решения и получать обратную связь.
- Гибкость: Симулятор должен быть легко адаптирован к различным типам образовательных организаций и различным задачам управления.

Использование симулятора в образовательном процессе требует соблюдения определенных педагогических принципов:

- Активное обучение: Пользователь должен активно участвовать в процессе моделирования, принимать управленческие решения и анализировать их последствия.
- Проблемное обучение: Пользователю должны быть предложены проблемные ситуации, требующие принятия управленческих решений.

- Рефлексия: Пользователь должен анализировать свой опыт работы с симулятором, выявлять свои ошибки и разрабатывать стратегии их исправления.
- Обратная связь: Пользователь должен получать обратную связь о результатах своих действий от преподавателя или от симулятора.
- Социальное взаимодействие: Пользователи должны иметь возможность обмениваться опытом и знаниями друг с другом.

Примеры разработанных и используемых симуляторов управления образовательной организацией. В настоящее время существует несколько симуляторов управления образовательной организацией, которые используются в различных странах мира. В качестве примеров можно привести:

- Симулятор "SchoolSim" (США): Это реалистичный симулятор, который позволяет будущим руководителям школ приобретать навыки управления финансами, персоналом, образовательным процессом и связями с общественностью.
- Симулятор "EduSim" (Великобритания): Это стратегический симулятор, который позволяет руководителям школ планировать развитие своей организации на несколько лет вперед.
- Симулятор "Управление школой" (Россия): Это концептуальный симулятор, который позволяет студентам педагогических вузов освоить основные принципы управления образовательной организацией.

Преимущества и ограничения использования симуляторов управления образовательной организацией

Использование симуляторов управления образовательной организацией имеет ряд преимуществ:

- Безопасность: Пользователь может экспериментировать с различными управленческими решениями, не опасаясь негативных последствий для реальной образовательной организации.
- Интерактивность: Пользователь активно участвует в процессе обучения, принимая управленческие решения и анализируя их последствия.
- Обратная связь: Пользователь получает немедленную обратную связь о результатах своих действий, что позволяет ему быстро учиться на своих ошибках.
- Эффективность: Симуляторы позволяют ускорить процесс обучения и повысить его эффективность.

Однако, использование симуляторов имеет и некоторые ограничения:

- Стоимость разработки: Разработка качественного симулятора требует значительных финансовых и временных затрат.
- Сложность моделирования: Создание адекватной модели образовательной организации – это сложная задача, требующая глубоких знаний в области педагогики, психологии и экономики.

- Ограниченность реалистичности: Симулятор – это только модель, которая не может полностью воспроизвести все аспекты реальной деятельности образовательной организации.

Симуляторы управления образовательной организацией являются перспективным инструментом для подготовки и повышения квалификации руководителей и управленческих команд. Они позволяют развивать управленческие компетенции, моделировать различные сценарии развития ОО и принимать обоснованные управленческие решения.

Перспективы дальнейших исследований заключаются в разработке новых типов симуляторов, охватывающих различные аспекты управления образовательной организацией, а также в исследовании эффективности использования симуляторов в различных образовательных контекстах.

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ФУНКЦИОНИРОВАНИЕ ПРЕЦЕНДЕНТНЫХ ФЕНОМЕНОВ В ТЕКСТАХ СМИ (НА МАТЕРИАЛЕ РУССКОГО И УЗБЕКСКОГО ЯЗЫКОВ)

***Аннотация**: Статья посвящена исследованию функционирования прецедентных феноменов в текстах современных средств массовой информации на русском и узбекском языках. Прецедентные феномены рассматриваются как важный компонент массовой коммуникации, обеспечивающий интертекстуальные связи, формирование общего культурного пространства и усиление прагматического воздействия на аудиторию. Анализ сопоставительного материала позволяет выявить особенности использования прецедентных имен, высказываний, ситуаций и текстов в СМИ двух различных лингвокультурных сообществ. Устанавливаются общие и специфические черты, определяемые культурной памятью, ценностными ориентирами и медийными форматами. Теоретическая основа исследования опирается на труды отечественных и зарубежных лингвистов, посвященные изучению интертекстуальности, когнитивной лингвистики, прагматики и медиалингвистики. Практическая значимость заключается в возможности применения полученных результатов в медиаанализе, лексикографии, переводоведении, а также при разработке учебных материалов по лингвокультурологии и журналистике.*

***Ключевые слова:** прецедентные феномены, интертекстуальность, медиалингвистика, культурная память, сопоставительный анализ, русскоязычные СМИ, узбекоязычные СМИ.*

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THE FUNCTIONING OF PRECEDENT PHENOMENA IN MEDIA TEXTS (BASED ON THE RUSSIAN AND UZBEK LANGUAGES)

Abstract*: This article examines the functioning of precedent phenomena in contemporary Russian and Uzbek media texts. Precedent phenomena are considered an important component of mass communication, providing intertextual connections, creating a common cultural space, and enhancing the pragmatic impact on the audience. An analysis of comparative material reveals the specific uses of precedent names, statements, situations, and texts in the media of two different linguistic and cultural communities. The article identifies common and specific characteristics determined by cultural memory, value orientations, and media formats. The theoretical basis of the study draws on the work of Russian and international linguists devoted to the study of intertextuality, cognitive linguistics, pragmatics, and media linguistics. The practical significance of the findings lies in the potential application in media analysis, lexicography, translation studies, and the development of educational materials in cultural linguistics and journalism.*

Keywords: *precedent-setting phenomena, intertextuality, media linguistics, cultural memory, comparative analysis, Russian-language media, Uzbek-language media.*

Введение

Прецедентные феномены являются важным элементом современной коммуникации, особенно в медиадискурсе, где интертекстуальные связи используются как эффективный инструмент воздействия на массовую аудиторию. Термин «прецедентные феномены» в лингвистике объединяет прецедентные имена, высказывания, тексты и ситуации, хорошо известные и значимые для определённого лингвокультурного сообщества. Они обладают высокой степенью узнаваемости и вызывают устойчивые ассоциации, благодаря чему выполняют функции актуализации культурной памяти, кодирования смыслов, создания коммуникативного единства и эмоционального эффекта. В средствах массовой информации такие элементы выступают как мощный механизм привлечения внимания, усиления экспрессивности и идеологического воздействия на читателя или зрителя.

Современные СМИ формируют особую информационную среду, в которой происходят постоянные процессы трансформации культурных кодов.

Включение прецедентных феноменов в медийные тексты становится не только стилистическим приёмом, но и стратегией конструирования социальных представлений. В российском медиапространстве активно используются прецедентные феномены, связанные с событиями советской истории, классическими произведениями литературы, именами политиков, спортсменов, деятелей культуры. Узбекистанское медиапространство также характеризуется опорой на национальные традиции, культурные символы, литературное наследие и современные социальные ориентиры. В отличие от русскоязычной прессы, где прецедентные элементы нередко выступают средством критики, сатиры и политической полемики, узбекоязычные СМИ чаще используют их для формирования позитивного имиджа общества, укрепления национальной идентичности и консолидации аудитории.

Актуальность исследования обусловлена необходимостью выявления закономерностей функционирования прецедентных феноменов в условиях глобализации и активного взаимодействия культур. В условиях увеличения роли мультимедийных форматов, сокращения объёмов текстового контента и усиления визуальной составляющей особенно возрастает потребность в компактных, но максимально семантически насыщенных средствах выражения. Прецедентные феномены выполняют именно такую функцию, выступая носителями сложных культурных смыслов в минимальной языковой форме. Кроме того, сопоставительное изучение медиатекстов на русском и узбекском языках позволяет проследить особенности межкультурной коммуникации, специфику национальной памяти, ценностных ориентиров и медиастратегий.

Целью исследования является выявление общих и дифференцирующих характеристик использования прецедентных феноменов в русскоязычных и узбекоязычных СМИ, а также определение их влияния на формирование коммуникативного эффекта. Для достижения данной цели необходимо решить ряд задач: определить теоретико-методологические основания исследования, провести классификацию прецедентных феноменов в медиатекстах, проанализировать конкретные примеры их функционирования, выявить культурные и прагматические особенности их употребления, а также установить роль в структурировании медийного дискурса.

Таким образом, исследование функционирования прецедентных феноменов в СМИ двух языков представляет собой значимый научный интерес, поскольку объединяет направления медиалингвистики, когнитивной лингвистики и лингвокультурологии, а также способствует углублению понимания механизмов массовой коммуникации в условиях многоязычного информационного пространства.

Методы

Исследование функционирования прецедентных феноменов в медийных текстах основано на комплексном применении лингвистических и медиакоммуникативных методов анализа. Методологической базой служат

положения теории прецедентности, интертекстуальности и медиалингвистики, позволяющие рассматривать исследуемые элементы как знаки культурной памяти и инструменты дискурсивного воздействия. Основным методом выступает сопоставительный анализ, позволяющий выявить общие и различительные характеристики функционирования прецедентных феноменов в русскоязычных и узбекоязычных СМИ. Он предполагает анализ структурных, семантических и прагматических параметров подобных единиц в двух различных лингвокультурных пространствах.

Тематический блок	Основные идеи и положения	Функциональное значение в статье
Прецедентные феномены как элемент коммуникации	Даются определения; раскрывается роль узнаваемости; объясняется связь с культурной памятью и эмоциональным воздействием	Формирует теоретическую базу исследования
Медиадискурс как среда функционирования прецедентности	СМИ — пространство трансформации культурных кодов; растущая роль интертекстуальности	Определяется объект исследования и его актуальность
Национально-культурная специфика СМИ двух стран	В русскоязычных — критика, сатира, социальная полемика; в узбекоязычных — консолидация, воспитательная функция, патриотизм	Показываются различия двух лингвокультур
Глобализация и расширение прецедентного фонда	Влияние мировых культурных кодов; рост числа международных отсылок в Узбекистане	Объясняется динамика медиадискурса
Методы исследования	Сопоставительный анализ; контент-анализ; прагмалингвистика; дискурсивный и интерпретационный анализ	Описывается научный подход и надёжность результатов
Источники прецедентности	Национальная литература, фольклор, религия (Узбекистан); классическая литература, политика, массовая культура (Россия)	Раскрываются культурные основы медиапрактик
Прагматические функции в СМИ	Усиление экспрессии, экономия языковых средств, влияние на восприятие аудитории, создание доверия	Определяются коммуникативные эффекты
Риски и ограничения использования	Требование высокой узнаваемости; вероятность коммуникативных сбоев	Обосновывается необходимость учёта аудитории
Единое и различное в двух медиасистемах	Общие тенденции: интертекстуальность, ориентация на массовое восприятие; различия — культурные задачи и жанровая направленность	Строится сопоставительный вывод
Перспективы дальнейших исследований	Влияние мультимедиа, соцсетей, визуальных форм; расширение транснациональных кодов	Намечаются направления развития темы

Контент-анализ применяется для выявления частотности и тематической направленности использования прецедентных феноменов. В выборку вошли тексты печатных и электронных СМИ, активно функционирующих в информационном поле: информационные порталы, газетные публикации, материалы социальных сетей и новостных агентств. Анализируются тексты за последние годы, что позволяет учитывать современные тенденции развития медиадискурса, его динамику и связь с актуальными общественными событиями. Особое внимание уделяется функционированию прецедентных имен исторических и культурных

деятелей, названий художественных произведений, а также устойчивых выражений, являющихся культурно значимыми.

Прагмалингвистический метод позволяет рассмотреть воздействующий потенциал прецедентных феноменов, выявить их роль в организации аргументации, создании эмоционального фона, формировании комических или критических эффектов. В рамках дискурсивного анализа изучаются особенности включения прецедентных элементов в контекст медийного сообщения, связь с общей стратегией автора и предполагаемым восприятием аудитории. Подход опирается на анализ коммуникативной ситуации, специфики жанровых особенностей СМИ, а также интенций создателей текстов.

Также применяется метод интерпретационного анализа, который позволяет выявить глубинные ассоциативные и культурные смыслы, актуализируемые прецедентными феноменами. Он предполагает опору не только на лингвистические, но и на культурологические и когнитивные данные, что особенно важно при анализе материала двух лингвокультурных ареалов. Для повышения объективности исследования проводится верификация результатов с привлечением лексикографических источников, энциклопедий, справочников и баз данных культурных реалий.

Таким образом, выбор методов обусловлен необходимостью углубленного изучения как формальной, так и семантико-прагматической стороны функционирования прецедентных феноменов. Комплексное применение сравнения, контент-анализа, дискурсивного и прагматического анализа обеспечивает целостное и всестороннее рассмотрение исследуемого явления в контексте современных медиа.

Результаты

Проведённое исследование показало, что прецедентные феномены занимают устойчивое место в современной медиакоммуникации как в русскоязычных, так и в узбекоязычных текстах. В русскоязычных СМИ чаще фиксируется широкий спектр интертекстуальных отсылок, связанных с культурным наследием, политическими событиями, именами известных личностей и художественными произведениями. Особо востребованными оказались прецедентные имена и высказывания, обладающие значительным прагматическим потенциалом для создания полемического эффекта, иронии или сатиры. Например, обращения к персонажам русской классической литературы нередко используются для скрытой критики социальной действительности или для усиления аргументации в публицистических жанрах.

В узбекоязычных СМИ также активно функционируют прецедентные феномены, однако они имеют несколько иную направленность. Источниками прецедентности наиболее часто выступают произведения национальной литературы, имена поэтов и мыслителей, фольклорные образы, а также элементы религиозной традиции, что объясняется исторически укоренённой ролью духовных и культурных ценностей в формировании общественного

сознания. Прецедентные феномены в таких текстах преимущественно выполняют консолидирующую и воспитательную функцию, направленную на укрепление патриотических и нравственных установок.

Выявлено, что в русскоязычном медиадискурсе значительно выше степень открытой интертекстуальной игры, связанной с глобальными культурными кодами, включая аллюзии на мировое кино, поп-культуру, международную политику. В узбекоязычных материалах интертекстуальные связи чаще имеют локальный характер и предполагают ориентацию на внутреннего адресата, разделяющего общий культурный и исторический контекст. Тем не менее процессы глобализации способствуют росту числа прецедентных феноменов, связанных с международной информационной повесткой.

Анализ семантико-прагматической функции показал, что прецедентные феномены в медиа обладают значительным потенциалом воздействия на аудиторию: усиливают доверие к информации, повышают эмоциональную насыщенность текста, формируют образность, способствуют сжатию смыслов и экономии языковых средств. В русскоязычных СМИ их чаще используют для критической оценки политических и социальных явлений, тогда как в узбекоязычных — для позитивного моделирования ценностных ориентиров.

Кроме того, результаты исследования подтверждают, что степень узнаваемости прецедентных феноменов напрямую влияет на их эффективность в медиатексте. Во избежание коммуникативных сбоев авторы медийных сообщений предпочитают обращаться к элементам культурного фонда, широко известным массовому читателю. В свою очередь, интеграция новых прецедентных феноменов происходит постепенно, в условиях расширения информационных связей и роста медиаграмотности населения.

Таким образом, результаты исследования демонстрируют, что прецедентные феномены являются важным инструментом смыслообразования в медиадискурсе, а их функционирование определяется как универсальными закономерностями интертекстуальности, так и особенностями национальной лингвокультуры.

Обсуждение

Полученные результаты свидетельствуют о существенной роли прецедентных феноменов в формировании коммуникативных стратегий современных СМИ. Их использование позволяет авторам не только усиливать экспрессивность текста, но и создавать эффект доверительности, объединяя аудиторию на основе общих культурных представлений. Таким образом, прецедентные феномены выступают в качестве механизмов поддержания лингвокультурной идентичности и трансляции ценностного наследия. Более того, они выполняют функцию когнитивных маркеров, благодаря которым читатель способен интерпретировать сообщение быстрее и глубже, включая в процесс восприятия фоновые знания и социальный опыт.

Различия в функционировании прецедентных феноменов в русскоязычных и узбекоязычных СМИ имеют культурно-историческую обусловленность. В российском медиадискурсе прецедентность нередко становится инструментом политической критики и социального диалога, отражая высокий уровень конкуренции дискурсов и востребованность публицистических жанров. Элементы иронии, аллюзивности и интертекстуальной игры свидетельствуют о стремлении авторов к увеличению выразительности и формированию критического восприятия действительности. Большое влияние на медиатексты оказывают процессы глобализации и проникновение мирового культурного продукта.

В свою очередь, узбекоязычный медиадискурс характеризуется более гармонизирующей прагматикой: прецедентные феномены используются как средства укрепления социальной стабильности, духовных основ и патриотических установок. Медиа подчеркивают преемственность культурных традиций, опору на национальных героев, литературу, религиозные и моральные ценности. Прецедентные тексты становятся инструментом воспитания, что соответствует социальным задачам национального медиапространства. При этом влияние глобальных информационных процессов постепенно ведёт к расширению интерпретативного поля: активнее появляются ссылки на международное информационное пространство, популярные культурные символы и медиаперсоны.

С теоретической точки зрения результаты подтверждают, что прецедентные феномены имеют двойственную природу: они представлены в языке в виде единиц, обладающих устойчивым содержанием, и одновременно активизируются как динамические элементы, преобразующиеся в зависимости от цели коммуникации. В медиадискурсе эта двойственность проявляется особенно ярко: знакомые культурные символы могут приобретать новые оттенки значений, развиваться в рамках актуального контекста и изменяющихся общественных предпочтений. Это указывает на важность дальнейшего изучения механизмов адаптации прецедентных феноменов к современным информационным условиям.

Таким образом, различия между двумя медиасистемами обусловлены как социокультурными факторами, так и особенностями медиаформатов и целевой аудитории. Несмотря на это, наблюдаются и общие тенденции: возрастание роли интертекстуальности, ориентация на массовое восприятие, стремление к эмоциональной и когнитивной эффективности медийного сообщения. Дальнейшие исследования могут быть направлены на выявление динамики этих процессов, включая влияние социальных сетей, визуальных форм коммуникации и мультимедийных платформ на обновление культурного фонда прецедентных феноменов.

Заключение

Проведенное исследование подтвердило значимость прецедентных феноменов как незаменимого инструмента смыслообразования и воздействия в современном медиадискурсе. Их активное функционирование в текстах русскоязычных и узбекоязычных СМИ демонстрирует роль культурной памяти и коллективного опыта в процессах массовой коммуникации. Прецедентные имена, высказывания, тексты и ситуации обеспечивают интертекстуальные связи, делают высказывание более содержательным и выразительным, способствуют формированию общего культурного пространства между автором и аудиторией.

Сопоставительный анализ показал, что русскоязычные медиа используют прецедентные элементы прежде всего как средство критической оценки, усиления публицистической полемики и выражения иронии или сатиры. В узбекоязычных СМИ, напротив, прецедентные феномены преимущественно выполняют воспитательную и консолидирующую функции, ориентируясь на сохранение культурных традиций и позитивную модель идентичности общества. Тем не менее под влиянием глобализационных процессов наблюдается расширение тематического диапазона интертекстуальности и постепенное усиление транснациональных источников прецедентности.

Выявленные особенности подтверждают закономерность: эффективность прецедентных феноменов базируется на их узнаваемости и значимости для целевой аудитории. Актуализация фоновых знаний читателя делает коммуникацию более точной и эмоционально насыщенной, усиливает аргументацию и позволяет авторам создавать сложные ассоциативные ряды в компактной языковой форме. В то же время дальнейшее развитие медиасреды, мультимедийных технологий и активное присутствие аудитории в онлайн-пространстве обусловливают трансформацию прецедентных феноменов, их адаптацию к новым форматам подачи информации.

Таким образом, функционирование прецедентных феноменов в СМИ является показателем состояния культурного кода общества, степени открытости информационного пространства и коммуникативных потребностей аудитории. Результаты исследования могут быть использованы при изучении медиатекстов, разработке учебных материалов по лингвокультурологии, медиалингвистике, а также в практической работе журналистов и редакторов, стремящихся к более глубокому и точному выражению смыслов. Дальнейшее научное внимание к данной проблематике позволит расширить понимание механизмов интертекстуальности и культурной идентичности в глобализирующемся медиапространстве.

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НОВАЯ КОНЦЕПЦИЯ ГОСУДАРСТВЕННОЙ МИГРАЦИОННОЙ ПОЛИТИКИ РОССИЙСКОЙ ФЕДЕРАЦИИ НА 2026-2030 ГОДЫ: БАЛАНС МЕЖДУ ЭКОНОМИЧЕСКИМИ ПОТРЕБНОСТЯМИ И НАЦИОНАЛЬНОЙ ИДЕНТИЧНОСТЬЮ С УЧЕТОМ ЦИФРОВИЗАЦИИ

Аннотация: *Статья посвящена анализу основных направлений государственной миграционной политики Российской Федерации на период 2026-2030 годов, с акцентом на баланс между экономическими потребностями и сохранением национальной идентичности. Рассматриваются такие ключевые аспекты, как привлечение квалифицированных кадров, социокультурная адаптация и интеграция мигрантов, цифровизация миграционных процессов, борьба с нелегальной миграцией и обеспечение национальной безопасности. Особое внимание уделяется инновационным подходам, включая опыт использования цифровых платформ для интеграции мигрантов (например, приложение «Амина» в Москве и Московской области) и созданию специализированных структур, таких как Служба по вопросам гражданства и регистрации иностранных граждан под руководством А.В. Кикотя. На основе анализа выявляются потенциальные вызовы и предлагаются рекомендации по эффективной реализации новой концепции.*

Ключевые слова: *миграционная политика, концепция, миграция, адаптация, интеграция, национальная идентичность, трудовые ресурсы, нелегальная миграция, национальная безопасность, цифровизация, Служба по вопросам гражданства.*

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IMPROVING THE PROVISION OF PUBLIC SERVICES IN THE FIELD OF MIGRATION (REGISTRATION BY A FOREIGN CITIZEN OF A TEMPORARY RESIDENCE PERMIT, RESIDENCE PERMIT, CITIZENSHIP OF THE RUSSIAN FEDERATION)

Abstract: *The article is devoted to the analysis of the key directions of the Russian Federation's state migration policy for the period 2026–2030, with a focus on balancing economic needs and the preservation of national identity. The study examines such critical aspects as: attracting qualified personnel, sociocultural adaptation and integration of migrants, digitalization of migration processes, combating illegal migration, ensuring national security. Special attention is given to innovative approaches, including the experience of using digital platforms for migrant integration (e.g., the «Amina» app in Moscow and the Moscow Region) and the establishment of specialized structures such as the Service for Citizenship and Registration of Foreign Nationals, headed by A.V. Kikot'. Based on the analysis, potential challenges are identified, and recommendations are proposed for the effective implementation of the new policy concept.*

Keywords: *migration policy, policy framework, migration, adaptation, migrant integration, national identity, workforce, irregular migration, national security, digitalization, Service for Citizenship and Migration Affairs.*

Формирование эффективной миграционной политики является важным аспектом для устойчивого развития Российской Федерации. Новые экономические и геополитические реалии, демографические вызовы и необходимость сохранения национальной идентичности обуславливают потребность в гибком и адаптивном подходе к управлению миграционными процессами. В контексте этих вызовов, государственная миграционная политика на период 2026-2030 годов должна решать комплекс задач, включая привлечение квалифицированных кадров, обеспечение социокультурной адаптации мигрантов, борьбу с нелегальной миграцией и укрепление национальной безопасности. Данная статья анализирует основные

направления миграционной политики, фокусируясь на балансе между экономическими потребностями и сохранением культурной самобытности России, а также на роли цифровых технологий в ее реализации.

Миграционная политика России на период 2026-2030 годов базируется на следующих ключевых направлениях:

- привлечение квалифицированных кадров: Приоритетом является привлечение высококвалифицированных специалистов и инвесторов, способных внести вклад в инновационное развитие российской экономики. Упрощаются процедуры трудоустройства для востребованных профессий, создаются льготные условия для привлечения иностранных специалистов в приоритетные отрасли.

- социокультурная адаптация и интеграция мигрантов: Особое внимание уделяется созданию условий для успешной адаптации и интеграции мигрантов в российское общество. Расширяются программы изучения русского языка, истории и культуры России. Активно поддерживаются инициативы, направленные на развитие межкультурного диалога и взаимопонимания.

- цифровизация миграционных процессов: Внедряются цифровые платформы и сервисы для упрощения оформления документов, получения информации и взаимодействия мигрантов с государственными органами. Примером является расширение опыта использования приложения «Амина» (успешно апробированного в Москве и Московской области). Данное приложение предоставляет мигрантам доступ к необходимой информации. Так же новая система призвана сократить число фиктивных регистраций и схем, связанных с миграционным учётом.

- борьба с нелегальной миграцией: Продолжается работа по усилению контроля за миграционными потоками, борьбе с незаконной миграцией и пресечению деятельности организаций, содействующих нелегальному пребыванию иностранных граждан на территории РФ. Внедряются современные технологии для идентификации и учета мигрантов.

- обеспечение национальной безопасности: Укрепляется система контроля за деятельностью иностранных граждан на территории РФ. Ужесточаются требования к лицам, претендующим на получение российского гражданства, в части знания русского языка, истории и культуры России.

- усиление региональной составляющей: Учитываются потребности и особенности каждого региона в миграционной политике. Разрабатываются и внедряются региональные программы адаптации и интеграции мигрантов, учитывающие специфику субъектов РФ.

- развитие институциональной базы: Создаются и укрепляются специализированные институты, ответственные за реализацию миграционной политики. Примером является создание 2 апреля 2025 года Службы по вопросам гражданства и регистрации иностранных граждан под руководством А.В. Кикотя, направленной на повышение эффективности

управления миграционными процессами. Служба должна улучшить координацию между различными ведомствами, обеспечить прозрачность процедур и повысить качество предоставляемых услуг.

Ключевым вызовом для миграционной политики является нахождение баланса между потребностью экономики в трудовых ресурсах и необходимостью сохранения национальной идентичности и культурных ценностей. Россия нуждается в квалифицированной рабочей силе для поддержания экономического роста, особенно в условиях старения населения. Однако, массовая миграция может создавать социальную напряженность и вызывать опасения по поводу «размывания» национальной идентичности.

Для решения этой проблемы необходимо:

– Привлекать мигрантов, готовых адаптироваться к российскому обществу и уважать его культурные ценности.

– Содействовать социокультурной интеграции мигрантов через образовательные и культурные программы.

– Укреплять российскую культуру и ценности через поддержку национальных традиций, искусства и образования.

– Вести разъяснительную работу с населением, направленную на формирование толерантного отношения к мигрантам.

Реализация Концепции миграционной политики сопряжена с рядом вызовов, таких как:

– Недостаточное финансирование программ адаптации и интеграции может снизить их эффективность.

– Сложные процедуры оформления документов могут препятствовать привлечению квалифицированных кадров и способствовать нелегальной миграции.

– Нехватка квалифицированных специалистов по работе с мигрантами может затруднить реализацию программ адаптации.

– Изменения в геополитической ситуации могут влиять на миграционные потоки и требовать оперативной корректировки политики.

Для эффективной реализации Концепции необходимо:

- обеспечить достаточное финансирование программ адаптации и интеграции;
- подготовить квалифицированных специалистов по работе с мигрантами;
- проводить информационно-разъяснительную работу с населением;
- разработать четкие критерии отбора мигрантов, учитывающие экономические потребности и культурную совместимость;
- обеспечить эффективный контроль за соблюдением миграционного законодательства;
- усилить межведомственное взаимодействие по вопросам миграции;
- активно использовать цифровые технологии для управления миграционными процессами.

Реализация Концепции должна учитывать региональные особенности. Необходимо разрабатывать региональные программы, учитывающие потребности и социокультурную ситуацию каждого региона. Важно развивать межрегиональное сотрудничество по вопросам миграции и обмениваться передовым опытом.

Государственная миграционная политика на 2026-2030 годы направлена на формирование эффективной и сбалансированной миграционной системы, способствующей устойчивому развитию России. Ключевым вызовом является нахождение баланса между экономическими потребностями и необходимостью сохранения национальной идентичности. Успешная реализация Концепции требует комплексного подхода, учитывающего экономические, социальные, культурные и политические аспекты миграции, а также активного использования цифровых технологий и институциональных инноваций, таких как создание Службы по вопросам гражданства и регистрации иностранных граждан.

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СОВЕРШЕНСТВОВАНИЕ ПРЕДОСТАВЛЕНИЯ ГОСУДАРСТВЕННЫХ УСЛУГ В СФЕРЕ МИГРАЦИИ (ОФОРМЛЕНИЕ ИНОСТРАННЫМ ГРАЖДАНИНОМ РАЗРЕШЕНИЯ НА ВРЕМЕННОЕ ПРОЖИВАНИЕ, ВИДА НА ЖИТЕЛЬСТВО В РФ, ПРИОБРЕТЕНИЕ ГРАЖДАНСТВА РФ)

Аннотация: *Часто процедуры оформления разрешительных документов в РФ сопровождаются большим количеством бумажной работы, длительными сроками рассмотрения заявлений и недостаточной информационной поддержкой для иностранных граждан. Эффективное и прозрачное оформление разрешения на временное проживание, вида на жительство способствует привлечению иностранных специалистов, инвесторов и туристов, а также способствует укреплению международных отношений. В статье анализируются основные проблемы, с которыми сталкиваются иностранные граждане при оформлении указанных документов. Одной из таких проблем является сложность и длительность процесса получения разрешения на временное проживание, вида на жительство и гражданства РФ.*

Ключевые слова: *миграция, государственные услуги, сроки, законодательство, иностранные граждане, разрешение на временное проживание в РФ, вид на жительство в РФ.*

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IMPROVING THE PROVISION OF PUBLIC SERVICES IN THE FIELD OF MIGRATION (REGISTRATION BY A FOREIGN CITIZEN OF A TEMPORARY RESIDENCE PERMIT, RESIDENCE PERMIT, CITIZENSHIP OF THE RUSSIAN FEDERATION)

Abstract: *Often the procedures for obtaining permits in the Russian Federation are accompanied by a large amount of paperwork, long deadlines for reviewing applications and insufficient information support for foreign citizens. Effective and transparent registration of temporary residence permits and residence permits helps to attract foreign specialists, investors and tourists, as well as contributes to strengthening international relations. The article analyzes the main problems faced by foreign citizens when processing these documents. One of these problems is the complexity and duration of the process of obtaining a temporary residence permit, residence permit and citizenship of the Russian Federation.*

Keywords: *migration, public services, deadlines, legislation, foreign citizens, temporary residence permit in the Russian Federation, residence permit in the Russian Federation.*

В последние годы Российская Федерация стала привлекательным местом для тысяч иностранных граждан, которые ищут новые возможности для работы и лучшей жизни. Увеличение потока мигрантов в страну требует совершенствования системы предоставления государственных услуг этим лицам. Это включает оформление разрешения на временное проживание, вида на жительство в РФ и в дальнейшем приобретение гражданства РФ.

В настоящее время Российская Федерация активно работает над увеличением потока мигрантов, привлекая иностранных граждан для работы и проживания на своей территории. Это вызвано необходимостью ликвидации дефицита рабочей силы в некоторых отраслях экономики, а также стремлением укрепить международное сотрудничество и развитие страны. В связи с этим, государство проводит политику совершенствования предоставления государственных услуг иностранным гражданам.

Одной из основных проблем, с которыми сталкиваются иностранные граждане при получении разрешения на временное проживание, вида на жительство и гражданства РФ, является сложность и длительность процедуры оформления. Часто процедура оформления разрешения на

временное проживание, вида на жительство в РФ может занимать значительное количество времени, что затягивает адаптацию иностранных граждан в новой стране. Это может вызывать неудовлетворение и стресс у заявителей. Срок рассмотрения заявления о выдаче разрешительных документов для иностранных граждан составляет от 2 до 4 месяцев. Долгое ожидание результата и необходимость предоставления большого количества документов могут создавать неудобства и затруднять процесс миграции.

Для совершенствования предоставления государственных услуг в сфере миграции необходимо внедрение современных информационных технологий и автоматизации процессов. Создание электронных платформ и порталов, где иностранные граждане смогут подать заявление и загрузить необходимые документы, позволит ускорить процесс рассмотрения и сократить время ожидания результата.

Еще одной проблемой является малоинформированность граждан о процедуре и условиях предоставления государственных услуг в сфере миграции. Многие люди не знают о необходимых документах, требуемых сроках и процедурах, что создает дополнительные трудности при оформлении разрешения на временное проживание, вида на жительство в РФ, а в последующем и гражданства РФ. Более того, отсутствие доступной информации может быть причиной возникновения злоупотреблений и коррупции в данной сфере.

Следует отметить, что недостаточное знание русского языка также является проблемой для мигрантов в процессе оформления государственных услуг. Отсутствие навыков общения на русском языке создает трудности в общении с государственными службами и понимании необходимой информации, что служит препятствием для успешного оформления документов.

Важным аспектом совершенствования предоставления государственных услуг в сфере миграции является обеспечение прозрачности и доступности информации. Иностранные граждане должны иметь возможность получить всю необходимую информацию о требованиях и процедурах оформления разрешительных документов в РФ. Предоставление подробных инструкций и консультаций поможет упростить процесс и избежать ошибок при подаче документов.

Также, для совершенствования предоставления государственных услуг в сфере миграции необходимо улучшение квалификации сотрудников, занимающихся оформлением разрешения на временное проживание, вида на жительство и гражданства РФ. Обучение сотрудников новым процедурам и требованиям, а так же решение вопроса с кадровым дефицитом позволит повысить качество обслуживания и сократить время рассмотрения заявлений.

В целом, совершенствование предоставления государственных услуг в сфере миграции является важным шагом для обеспечения прав и интересов иностранных граждан. Внедрение современных информационных

технологий, обеспечение доступности информации и повышение квалификации сотрудников помогут упростить процедуру оформления разрешения на временное проживание, вида на жительство и гражданства РФ, что в свою очередь способствует развитию миграционных процессов и укреплению международных отношений.

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ЗАГРЯЗНЕНИЕ ВОЗДУХА И СЕРДЕЧНО-СОСУДИСТОЕ ЗДОРОВЬЕ В ТАШКЕНТЕ (2015-2025)

Аннотация: *Целью работы было оценить динамику загрязнения атмосферного воздуха в Ташкенте за период 2015–2025 гг. и определить потенциальное влияние взвешенных частиц $PM_{2.5}$ и связанных примесей на сердечно-сосудистое здоровье населения. На основе открытых данных международных мониторинговых платформ (OpenAQ, IQAir, WAQI), официальных отчётов Всемирного банка и анализа спутниковых наблюдений установлено, что среднегодовые уровни $PM_{2.5}$ в Ташкенте на протяжении всего рассматриваемого периода стабильно превышают guideline ВОЗ (5 мкг/м³) в 5–7 раз, формируя выраженную зимнюю сезонность, обусловленную отоплением, энергетикой и неблагоприятными метеоусловиями. В 2020 г. строгие COVID-локдауны привели к кратковременному снижению концентраций $PM_{2.5}$ на ~25–30% и NO_2 на 30–40%, что подчёркивает значимую роль транспорта и бытового сжигания топлива в формировании городского смога. По структуре вкладов преобладают природные пылевые массы (≈36% годового $PM_{2.5}$), далее следуют отопление (28%), транспорт (16%) и промышленно-энергетический сектор (≈13%). Сравнительный анализ показывает, что уровень загрязнения воздуха в Ташкенте сопоставим с Сараево и Бишкеком, однако значительно ниже, чем в Нью-Дели, оставаясь при этом одним из самых высоких в регионе Восточной Европы и Центральной Азии. Международные когортные исследования и мета-анализы демонстрируют устойчивую ассоциацию между ростом $PM_{2.5}$ и увеличением риска инфаркта миокарда, инсульта и сердечно-сосудистой смертности, включая хронические эффекты при длительной экспозиции. Несмотря на отсутствие открытых локальных регистров ССЗ, интеграция глобальных коэффициентов риска позволяет предположить существенный вклад загрязнения воздуха в бремя сердечно-сосудистых заболеваний в городе. Полученные результаты подчёркивают необходимость системного мониторинга, модернизации отопительных систем, снижения*

автотрафика и разработки целевых политик по улучшению качества воздуха и снижению ассоциированных рисков для здоровья населения.

Ключевые слова: *Ташкент; загрязнение воздуха; $PM_{2.5}$; сердечно-сосудистые заболевания; риск для здоровья; COVID-19; источники выбросов; атмосферный смог; качество воздуха; эпидемиология.*

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AIR POLLUTION AND CARDIOVASCULAR HEALTH IN TASHKENT (2015-2025)

Abstract: *The aim of this study was to assess air pollution trends in Tashkent for the period 2015–2025 and determine the potential impact of suspended particulate matter ($PM_{2}.0$) and related contaminants on cardiovascular health. Based on open data from international monitoring platforms (OpenAQ, IQAir, WAQI), official World Bank reports, and satellite observation analysis, it was found that average annual $PM_{2}.0$ levels in Tashkent consistently exceeded the WHO guideline (5 μg/m³) by 5–7 times throughout the study period, creating a pronounced winter seasonality due to heating, energy use, and adverse weather conditions. In 2020, strict COVID-19 lockdowns led to a short-term decrease in $PM_{2.5}$ concentrations by ~25–30% and NO_2 by 30–40%, highlighting the significant role of transport and household fuel combustion in the formation of urban smog. Natural dust particles predominate (~36% of annual $PM_{2.5}$), followed by heating (28%), transport (16%), and the industrial and energy sector (~13%). A comparative analysis shows that air pollution levels in Tashkent are comparable to those in Sarajevo and Bishkek, but significantly lower than in New Delhi, while remaining among the highest in the Eastern Europe and Central Asia region. International cohort studies and meta-analyses demonstrate a consistent association between rising $PM_{2}.0$ and an increased risk of myocardial infarction, stroke, and cardiovascular mortality, including chronic effects from long-term exposure. Despite the lack of open local CVD registries, the integration of global risk factors suggests a significant contribution of air pollution to the burden of cardiovascular disease in the city. These results highlight the need for systematic monitoring, modernization of heating systems, reduction of vehicle traffic, and the*

development of targeted policies to improve air quality and reduce associated public health risks.

Keywords: *Tashkent; air pollution; PM_2.0; cardiovascular disease; health risk; COVID-19; emission sources; atmospheric smog; air quality; epidemiology.*

Введение

Загрязнение воздуха является критической проблемой охраны окружающей среды во всем мире, приводящей к ежегодной преждевременной смерти миллионов людей. Особенно вредны мелкие твердые частицы (PM2.5), вызывающие сердечно-сосудистые и респираторные заболевания, а также инсульт. Фактически, около 68% смертей, связанных с загрязнением атмосферного воздуха во всем мире, обусловлены сердечно-сосудистыми причинами (ишемическая болезнь сердца и инсульт). Качество городского воздуха во многих регионах ухудшилось за последнее десятилетие, и Центральная Азия не является исключением. Ташкент, столица Узбекистана с населением около 2,5 миллиона человек, стал одним из самых загрязненных городов региона. Частые зимние эпизоды смога и пыльные бури подняли уровень загрязнения воздуха в Ташкенте до опасных пределов, при этом концентрация PM2.5 иногда на порядок превышает нормативы по охране здоровья. Например, 29 сентября 2024 года уровень PM2.5 в Ташкенте подскочил примерно до 166 мкг/м3, что почти в 10 раз превышает рекомендуемый лимит Всемирной организации здравоохранения (ВОЗ) (5 мкг/м3 в год, 15 мкг/м3 в сутки). Такое экстремальное загрязнение представляет серьезную угрозу для здоровья всех жителей.

Данное исследование представляет собой всесторонний анализ тенденций загрязнения воздуха в Ташкенте с 2015 по 2025 год и изучает последствия для здоровья сердечно-сосудистой системы. Мы обобщаем многолетние тенденции ключевых загрязняющих веществ (PM2.5, PM10, NO2, O3, SO2, CO и индекс качества воздуха - AQI) с использованием открытых источников данных (например, OpenAQ, IQAir, WAQI, Всемирный банк). Мы особо оцениваем изменения во время локдаунов, связанных с COVID-19, в 2020-2021 годах, когда мобильность резко снизилась, а уровень загрязняющих веществ во многих городах упал. Взаимосвязь между качеством воздуха и сердечно-сосудистыми заболеваниями (ССЗ) в Ташкенте оценивается через призму глобальных эпидемиологических данных, учитывая отсутствие данных на уровне местных пациентов. Мы также рассматриваем Ташкент в глобальном контексте, сравнивая уровень загрязнения с другими городами, известными плохим качеством воздуха (такими как Нью-Дели, Сараево и Бишкек).

Методы

Дизайн исследования: Мы провели ретроспективный обсервационный анализ качества окружающего воздуха в Ташкенте за период 2015-2025 годов и обзорное исследование его воздействия на здоровье. Исследование

структурировано в виде официального научного отчета с разделами Введение, Методы, Результаты, Обсуждение, Рекомендации и Заключение.

Источники данных: Мы агрегировали данные о загрязнении воздуха из открытых источников с нескольких платформ. Исторические данные по PM2.5 и PM10 были получены из баз данных OpenAQ и IQAir, которые собирают измерения с государственных станций мониторинга и станций Посольства США в Ташкенте (доступны с ~2016 года). Мы извлекли среднегодовые концентрации и значения AQI для каждого доступного года, а также собрали ежемесячные или ежедневные данные для конкретных анализов (например, периоды локдауна во время пандемии). Дополнительные данные о загрязняющих веществах NO2, SO2, CO, O3 и комплексном AQI были собраны из проекта Всемирного индекса качества воздуха (WAQI) и отчетов Узбекского гидрометеорологического комитета (Узгидромет) при их наличии. Для обеспечения согласованности все данные о концентрациях были преобразованы в стандартные единицы измерения (мкг/м3 или частей на миллиард соответственно) и сравнивались с рекомендациями ВОЗ по качеству воздуха (обновленные рекомендации 2021 года: PM2.5 годовое <5 мкг/м3, 24-часовое <15 мкг/м3; NO2 годовое <10 мкг/м3 и т.д.).

Анализ ограничительных мер в связи с COVID-19: Для оценки влияния ограничений передвижения на качество воздуха мы сравнили уровни загрязняющих веществ во время весенних ограничительных мер 2020 года с уровнями до их введения. Тенденции мобильности были качественно оценены на основе государственных мер (например, закрытие общественного транспорта, комендантский час) и Отчетов Google о мобильности населения. Мы получили данные индекса загрязнения воздуха Узгидромета за конец марта-апрель 2020 года (период наиболее строгих ограничений) и соответствующие концентрации загрязняющих веществ. Снижение уровня NO2 и PM2.5 во время ограничительных мер было количественно оценено относительно базовых показателей начала 2020 года. Кроме того, мы использовали спутниковые наблюдения (TROPOMI/ESA) из опубликованных исследований для регионального контекста по снижению NO2 в городах Центральной Азии во время ограничительных мер (в дополнение к наземным данным).

Оценка воздействия на здоровье: В связи с отсутствием локализованных эпидемиологических данных о сердечно-сосудистой заболеваемости, связанной с загрязнением, мы провели обзор литературы, охватывающий мировые и региональные исследования. Мы сосредоточились на крупных когортных исследованиях и мета-анализах, количественно определяющих связь между длительным воздействием PM2.5 и сердечно-сосудистыми исходами (например, инфаркт миокарда, инсульт, смертность от сердечно-сосудистых заболеваний). Ключевые результаты (такие как относительное увеличение риска на 10 мкг/м3 PM2.5) были извлечены для оценки потенциального воздействия в контексте Ташкента. Мы также

изучили данные исследования "Глобальное бремя болезней" (ГББ) и отчеты ВОЗ для оценки сердечно-сосудистой смертности, связанной с загрязнением окружающей среды. Для получения местной перспективы мы ссылаемся на недавний анализ, оценивающий смертность, связанную с PM2.5 в Узбекистане и Ташкенте.

Глобальное сравнение городов: Чтобы представить качество воздуха в Ташкенте в контексте, мы собрали данные по PM2.5 за 2022-2023 годы для других загрязненных городов. Мы выбрали Нью-Дели (Индия) в качестве примера экстремального сценария загрязнения мегаполиса, а Сараево (Босния) и Бишкек (Кыргызстан) как города с сильным сезонным загрязнением, более сопоставимые с Ташкентом по климату и масштабу. Среднегодовые концентрации PM2.5 для этих городов были получены из отчета IQAir о качестве воздуха в мире за 2023 год и академических источников. Затем мы сравнили рейтинг и уровни загрязнения Ташкента с этими городами.

Анализ источников загрязнения: Наконец, мы исследовали источники загрязнения как с помощью "восходящего" анализа данных о выбросах, так и с помощью "нисходящего" анализа закономерностей в окружающей среде. Мы изучили официальный кадастр выбросов для Ташкента, представленный в отчете Правительства и Всемирного банка об оценке качества воздуха, который содержит информацию о вкладе различных источников в концентрацию PM2.5 (например, процентное соотношение от транспорта, промышленности, отопления, естественной пыли). Кроме того, мы проанализировали временные закономерности в данных о качестве воздуха: например, суточные циклы NO2 (для оценки вклада транспорта), сезонные колебания PM2.5 (для различения влияния зимнего сжигания топлива и летней пыли), а также эпизодические пики (например, связанные с пыльными бурями или промышленными авариями). Эти закономерности были качественно сопоставлены с вероятными источниками.

Результаты

Тенденции загрязнения воздуха в Ташкенте (2015-2025)

Годовые уровни загрязнения: В целом, качество атмосферного воздуха в Ташкенте ухудшилось с середины 2010-х до начала 2020-х годов, с некоторым улучшением в самые последние годы. На рисунке 1 представлены среднегодовые концентрации PM2,5 с 2019 по 2024 год (данные надежного мониторинга за более ранние годы отсутствовали). В 2019 году среднегодовой уровень PM2,5 в городе составил около 41 мкг/м3, что соответствует категории AQI "Нездоровый для чувствительных групп." К 2021 году загрязнение достигло пика - самого высокого годового AQI за всю историю наблюдений - что соответствует оценочному уровню PM2,5 в середине 40-х мкг/м3 (более чем в 8 раз превышающему рекомендации ВОЗ). В 2021 году жители города столкнулись с продолжительными эпизодами смога зимой, что отразилось в среднем значении AQI США 111. Однако начиная с 2022 года качество воздуха показало незначительное

улучшение. Годовой уровень PM2,5 к 2023-2024 годам снизился до низких 30-х мкг/м3, хотя все еще оставался примерно в 6 раз выше рекомендуемого уровня ВОЗ. В 2024 году среднее значение PM2,5 в Ташкенте составило 31,5 мкг/м3 (AQI ~92, "Умеренный"). Это ниже значения 2019 года, что свидетельствует о частичном восстановлении после пика загрязнения в 2020-2021 годах. Примечательно, что 2025 год на данный момент продолжает эту тенденцию к улучшению, со средним AQI около 76 (PM2,5 ~25 мкг/м3) - это самый чистый год десятилетия, если такой уровень сохранится.

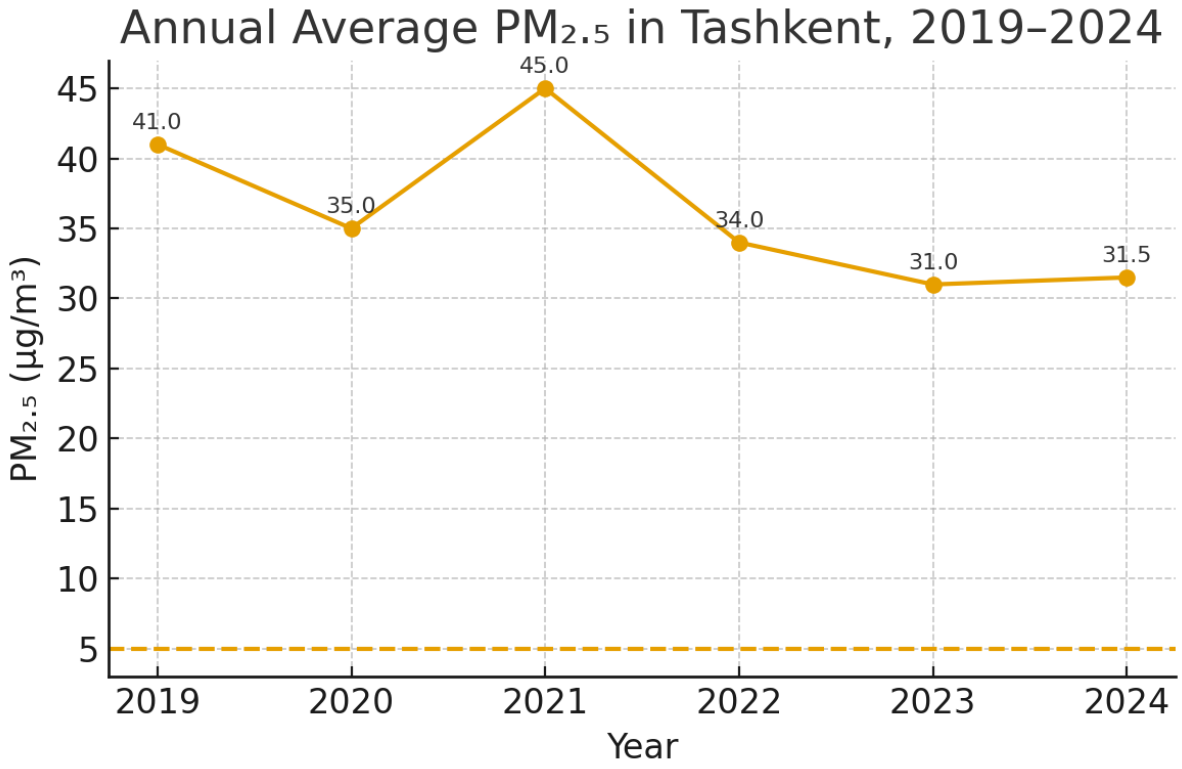


Рисунок 1: Среднегодовая концентрация PM2,5 в Ташкенте, 2019-2024 гг.

Выраженный пик наблюдается в 2021 году, после чего следует постепенное улучшение к 2024 году. Все значения значительно превышают годовые рекомендации ВОЗ (5 мкг/м3). Данные собраны из записей IQAir и OpenAQ. Значение 2021 года соответствует самому высокому зарегистрированному индексу качества воздуха (AQI) (~111).

В основе этих тенденций лежат несколько факторов. Быстрый рост городов и автомобилизация, вероятно, привели к ухудшению качества воздуха в 2019-2021 годах. Национальная статистика показывает, что выбросы автомобильного транспорта увеличиваются примерно на 5-6% ежегодно с 2015 года, опережая рост населения. Увеличение сжигания угля и низкокачественного топлива для зимнего отопления также способствовало ежегодному росту загрязнения частицами. Напротив, в 2020 году наблюдалось временное снижение загрязнения, совпавшее с мерами локдауна из-за COVID-19 (обсуждаются ниже). Более устойчивое улучшение

после 2021 года может отражать новую политику (например, внедрение более чистых стандартов топлива, модернизацию некоторых систем отопления) и благоприятные метеорологические условия в последние зимы. Тем не менее, воздух Ташкента остается сильно загрязненным в абсолютном выражении - его недавняя годовая концентрация PM2,5 (~30 мкг/м3) более чем в шесть раз превышает рекомендацию ВОЗ и находится примерно на одном уровне с печально известными загрязненными городами Южной Азии и Балкан.

Сезонные и суточные закономерности: В Ташкенте наблюдается ярко выраженная сезонная изменчивость качества воздуха. Зимние месяцы (декабрь-февраль) характеризуются наихудшим загрязнением, при этом среднемесячные показатели PM2,5 часто в 2-3 раза выше, чем в летние месяцы. Например, данные Узгидромета показывают, что зимние значения API (Индекса загрязнения воздуха) часто находятся в "высоком" диапазоне (7-13), в то время как летний API остается в "низком" диапазоне (<5). Эта сезонность обусловлена двумя основными факторами: увеличением выбросов от отопления в холодную погоду и метеорологическими инверсиями, которые задерживают загрязняющие вещества. Напротив, летний воздух относительно чище, за исключением случаев пыльных бурь. Близость Ташкента к засушливым районам означает, что с мая по август пыльные бури могут периодически поднимать уровни PM10 и PM2,5 до очень высоких значений (поэтому летний вклад переносимой ветром пыли значителен, как будет показано далее). Тем не менее, в среднем летнее содержание PM2,5 значительно ниже зимнего; ясное небо и лучшее рассеивание поддерживают AQI преимущественно на уровне "Умеренный" или "Хороший" в июле-сентябре.

Ежедневные (суточные) закономерности также выявляют влияние источников загрязнения. Уровни NO2, являющегося индикатором загрязнения от транспорта, в рабочие дни имеют выраженные пики в утренние и вечерние часы пик, при этом ночью его концентрация ниже. Это свидетельствует о том, что выбросы автотранспорта являются основным источником городского NO2. В типичный зимний день концентрация NO2 примерно удваивается в период с 7 до 9 утра и с 6 до 8 вечера по сравнению с дневными минимумами (данные не показаны). Твердые частицы демонстрируют менее резкий суточный цикл, но все же имеют тенденцию к увеличению вечером, когда многие домохозяйства используют отопление, и когда ночные температурные инверсии задерживают загрязняющие вещества. В целом, эти временные закономерности подтверждают, что выбросы от дорожного транспорта и отопления являются причиной значительных суточных колебаний загрязнения воздуха в Ташкенте.

Влияние локдауна COVID-19: Строгие карантинные меры весной 2020 года предоставили непреднамеренный "естественный эксперимент" по качеству воздуха. В период с конца марта по начало апреля 2020 года в Ташкенте был введен общегородской локдаун: приостановлена работа

общественного транспорта, закрыты предприятия и школы, жители передвигались только по неотложным делам. В этот период наблюдалось резкое снижение загрязнения. Узгидромет сообщил, что интегральный индекс загрязнения воздуха города снизился вдвое - с 4,15 в начале марта до 2,5 в начале апреля. Это указывает на то, что общее загрязнение упало почти до *половины* своего обычного уровня во время локдауна. На рисунке 2 показано изменение выбранных загрязняющих веществ: NO2 (в основном от транспорта) снизился примерно на 50%, со среднего значения 0,04 мг/м3 до 0,02 мг/м3 (с 40 до 20 мкг/м3). Концентрация взвешенных частиц (пыли) также снизилась с 0,16 до 0,14 мг/м3 (со 160 до 140 мкг/м3). Содержание угарного газа упало примерно на 15%. Примечательно, что в период локдауна не было зафиксировано превышений предельно допустимых концентраций загрязняющих веществ - в отличие от частых нарушений в обычное время. Спутниковые данные подтверждают эти улучшения: содержание NO2 в тропосфере над Ташкентом в апреле 2020 года было примерно на 21% ниже, чем за аналогичный период 2019 года, что является одним из самых значительных снижений в Центральной Азии (сравнимо с -23% в Караганде) из-за уменьшения трафика и промышленной активности. Однако эти улучшения были временными. К концу 2020 года, по мере ослабления ограничений, уровень загрязнения снова начал расти. Зимой 2020-21 годов наблюдалось возвращение эпизодов высокого содержания PM2.5, что способствовало рекордному уровню загрязнения в 2021 году. Это подчеркивает, что для поддержания чистого воздуха необходимы структурные сокращения выбросов (а не только кратковременное снижение мобильности).

Ташкент в мировом контексте

Как загрязнение воздуха в Ташкенте соотносится с мировыми показателями? В таблице 1 сравниваются годовые уровни PM2,5 в Ташкенте и некоторых крупных городах мира за 2023 год. Нью-Дели, Индия, стабильно входит в число самых загрязненных городов мира - в 2023 году средний уровень PM2,5 там составил ~92 мкг/м3, что почти втрое превышает показатель Ташкента. Южноазиатские мегаполисы, такие как Дели, сталкиваются с экстремальным загрязнением от транспорта, строительной пыли, сжигания сельскохозяйственных отходов и угля, что намного превосходит уровни, зафиксированные в Ташкенте. Сараево, Босния и Герцеговина, европейский город, печально известный зимним смогом (из-за угольного отопления и расположения в котловине), имел годовой уровень PM2,5 около 30,8 мкг/м3 в 2023 году - практически наравне с Ташкентом, где этот показатель составил 31,4 мкг/м3. Зимой суточные уровни PM2,5 в Сараево часто превышают ташкентские, но летом они ниже; в целом их средние показатели сейчас близки. Бишкек, Кыргызстан, еще один центральноазиатский город, имел средний показатель около 21 мкг/м3 в 2023 году, что существенно ниже уровня Ташкента. Бишкек переживает серьезные эпизоды загрязнения (он даже несколько раз возглавлял

ежедневный мировой рейтинг AQI в 2019-2020 годах), но его среднегодовой показатель в последние годы снизился благодаря благоприятным ветрам и, возможно, улучшению качества топлива. Между тем, многолетний средний показатель Ташкента около 30 мкг/м3 ставит его в число 20-25 самых загрязненных столиц мира. В 2023 году IQAir поместил Ташкент на 19-е место по концентрации PM2,5 (из ~110 оцененных) среди таких городов, как Доха и Пекин. Это тревожная позиция в мировом масштабе, хотя все еще значительно лучше, чем у наиболее загрязненных столиц (включая Дели, Дакку и несколько других с показателями, превышающими 50-90 мкг/м3).

Город	PM2,5 (мкг/м3, среднегодовое значение)
Ташкент	28,6
Сараево	28,5
Бишкек	26,0
Нью-Дели	92,7

Таблица 1: Среднегодовое значение PM2,5 в 2023 году

Ташкент в сравнении с другими загрязненными городами. Уровень загрязнения воздуха в Ташкенте сопоставим с Сараево и значительно ниже, чем в Нью-Дели, но остается выше, чем в Бишкеке. Данные взяты из отчета IQAir о качестве воздуха в мире за 2023 год. Рекомендуемое ВОЗ среднегодовое значение PM2,5 составляет 5 мкг/м3 (обозначено красной пунктирной линией).

Также поучительно сравнить тенденции качества воздуха. В то время как Ташкент переживал свои худшие годы примерно в 2017-2021 годах, многие китайские города (не показанные в таблице) добились значительных улучшений за тот же период благодаря жестким мерам по контролю выбросов. Например, уровень PM2.5 в Пекине снизился с ~85 мкг/м3 в 2013 году до ~31 мкг/м3 к 2023 году, что примерно равно текущему уровню Ташкента. Это свидетельствует о том, что при проведении эффективной политики сильно загрязненные города могут улучшить ситуацию в течение десятилетия - актуальный урок для Ташкента. По сравнению со своими центральноазиатскими соседями, загрязнение в Ташкенте выше, чем в Нур-Султане (Астана, Казахстан ~15 мкг/м3) и Бишкеке, но ниже, чем в Душанбе, Таджикистан (который в среднем показал ~46 мкг/м3 и занял 6-е место среди худших столиц). Региональные факторы, такие как география и климат, играют свою роль: расположение Ташкента в котловине, окруженной горами, препятствует рассеиванию загрязняющих веществ, подобно ситуации в Сараево и Бишкеке. В целом, Ташкент можно считать глобальной "горячей точкой" загрязнения воздуха - не такой экстремальной, как мегаполисы Южной Азии, но значительно превышающей безопасные уровни и сопоставимой с некоторыми из самых загрязненных городских районов Европы и Центральной Азии.

Источники и закономерности загрязнения в Ташкенте

Выявление источников загрязнения воздуха в Ташкенте является ключом к смягчению последствий. На рисунке 3 показано приблизительное распределение источников PM2.5 на основе официальных оценок. Наибольший вклад вносит ветровая пыль (~36%), особенно в сухие летние месяцы. Засушливые равнины вокруг Ташкента и периодические пыльные бури переносят в воздух огромное количество минеральной пыли. Пыль в основном является природным источником, хотя деятельность человека, такая как нарушение земель, может усугубить ситуацию. Следующим по величине источником является отопление жилых и коммерческих помещений (~28%). В холодное время года при сжигании твердого топлива (угля, древесины и низкокачественного мазута) в домашних печах, котлах и городских отопительных станциях выделяется значительное количество PM2.5. Третий по величине вклад вносит транспортный сектор (~16%). Автопарк Ташкента быстро вырос и включает в себя множество устаревших автомобилей с высоким уровнем выбросов; использование дизельного топлива и некачественного бензина приводит к загрязнению сажей (черным углеродом) и NO2. Промышленная деятельность и производство электроэнергии вносят около 13% PM2.5. Вблизи Ташкента расположено несколько заводов и крупная теплоэлектростанция; их дымовые выбросы (особенно при использовании угля или тяжелой нефти) содержат частицы и диоксид серы. Остальная часть (~7%) поступает из различных источников, таких как открытое сжигание отходов, строительная пыль и сельскохозяйственная деятельность (сжигание на полях) в прилегающих районах.

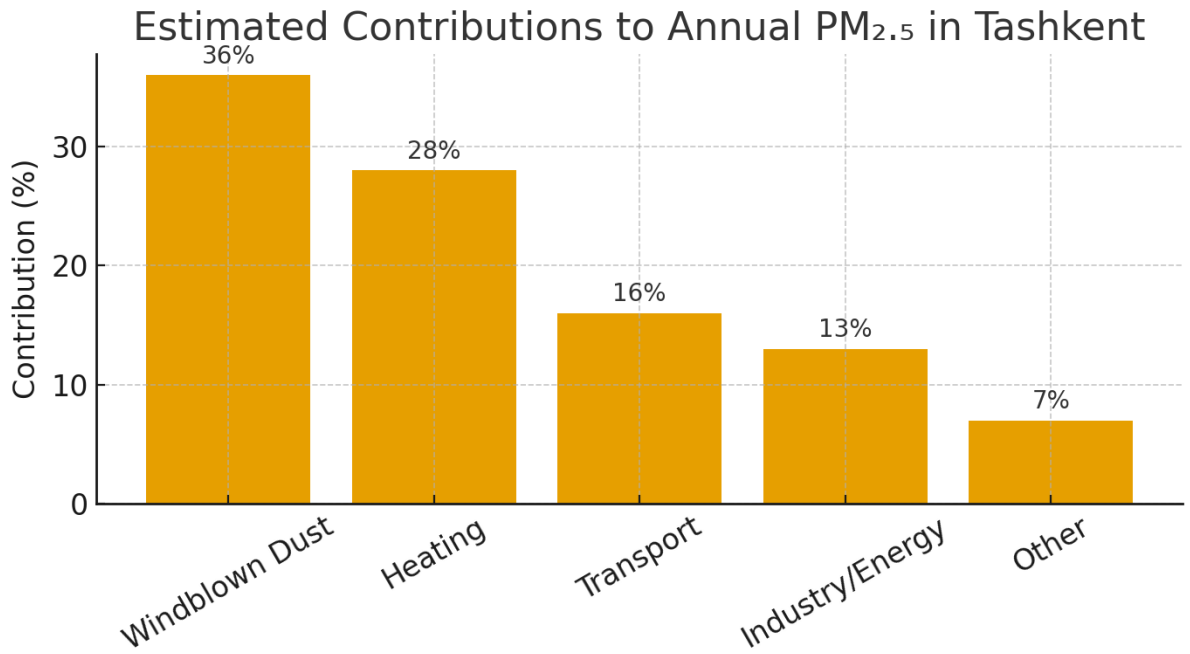


Рисунок 3: Оценка вклада основных источников загрязнения PM2,5 в Ташкенте.

Наибольший вклад вносит минеральная пыль, поднимаемая ветром (естественный источник) (~36% ежегодно, преобладает летом), затем следуют источники горения: отопление (28%, в основном зимой), транспорт (16%) и промышленность/энергетика (13%). "Прочие" источники включают открытое сжигание отходов, строительство и сельское хозяйство (~7%). Источник: анализ Всемирного банка и Министерства экологии.

Эти атрибуции источников соответствуют наблюдаемым временным закономерностям. Летом до половины твердых частиц можно отнести к пыльным бурям и трансграничной пыли из пустынь. Зимой же PM2.5 в Ташкенте в значительной степени обусловлен местным сжиганием топлива для отопления. Это приводит к густому смогу в холодные, безветренные дни - смеси угольного дыма, выхлопных газов автомобилей и вторичных аэрозолей, образующихся в результате выбросов серы и азота. Четкое сезонное изменение источников очевидно из данных о химическом составе (не показаны): более высокое содержание диоксида кремния в летних частицах (пыль) и более высокое содержание углеродистых и сульфатных частиц зимой (связанных с горением).

Для газообразных загрязнителей транспорт является основным источником NO2 и CO. Низкокачественное автомобильное топливо (при недостаточном контроле выбросов) вызывает высокий уровень NO2 вблизи оживленных дорог. Промышленные объекты и электростанции выделяют SO2, хотя в Ташкенте концентрации SO2 обычно низкие (фоновые ~3-5 мкг/м3) и находятся в допустимых пределах - за исключением случайных выбросов. Приземный озон (O3) в Ташкенте менее изучен; он образуется летом в результате фотохимических реакций выбросов транспорта и промышленности. Уровни O3 иногда достигали умеренных значений (пиковая 8-часовая концентрация ~80-100 мкг/м3), но озон не является основной проблемой по сравнению с PM2.5 и NO2 в контексте этого города.

Таким образом, загрязнение воздуха в Ташкенте происходит из-за сочетания природных и антропогенных источников, причем наибольший вклад вносят пыль, отопление и транспорт. Преобладание различных источников в разные сезоны затрудняет усилия по контролю - борьба с пылью требует региональных действий (например, лесовосстановление, система раннего предупреждения о пыльных бурях), в то время как сокращение зимнего смога требует более чистой энергетики и транспортной политики. Эти выводы подчеркивают, что любой эффективный план управления качеством воздуха для Ташкента должен быть многоаспектным, направленным на сокращение выбросов автомобилей, улучшение качества топлива для отопления, усиление контроля за промышленным загрязнением и даже на борьбу с трансграничной пылью посредством регионального сотрудничества.

Последствия для здоровья в отношении сердечно-сосудистых заболеваний

Хотя подробная местная статистика здравоохранения отсутствовала, связь между загрязнением воздуха в Ташкенте и сердечно-сосудистыми заболеваниями (ССЗ) можно вывести из глобальных эпидемиологических данных. Мелкодисперсные частицы (PM2.5) тесно связаны с заболеваемостью и смертностью от ССЗ. Исследования показывают, что при каждом увеличении долгосрочного воздействия PM2.5 на 10 мкг/м3 риск сердечно-сосудистой смертности возрастает в среднем примерно на 10-15%. Жители Ташкента, которые в последние годы ежегодно вдыхают ~30-40 мкг/м3 PM2.5, вероятно, сталкиваются со значительно повышенным риском инфарктов, инсультов, сердечной недостаточности и гипертонии по сравнению с жителями городов с чистым воздухом. Резкие скачки загрязнения также могут провоцировать сердечные приступы; исследования по всему миру связывают кратковременные всплески PM2.5 с увеличением числа инфарктов миокарда и госпитализаций с инсультом в течение нескольких дней. Частые зимние эпизоды смога в Ташкенте (PM2.5 >100 мкг/м3) представляют острую угрозу для уязвимых лиц, таких как люди с существующими заболеваниями сердца.

В настоящее время загрязнение атмосферного воздуха признано ведущим фактором риска развития сердечно-сосудистых заболеваний во всем мире. В 2019 году 22% смертей от ишемической болезни сердца и 15% смертей от инсульта были связаны с загрязнением воздуха. Узбекистан отражает эту глобальную тенденцию. Недавний анализ, проведенный с использованием методов Global Burden of Disease, показал, что в Узбекистане в 2021 году около 27 000 преждевременных смертей были связаны с загрязнением воздуха частицами PM2,5. Большинство из них были вызваны сердечно-сосудистыми причинами (инфаркты, инсульты), учитывая, что сердечно-сосудистые заболевания являются ведущей причиной смерти в стране. Хотя данные по отдельным городам ограничены, на Ташкент, вероятно, приходится значительная доля этой связанной с загрязнением нагрузки на здоровье, поскольку он характеризуется как высоким уровнем загрязнения, так и большой численностью населения. Используя модели зависимости "воздействие-реакция," мы оценили ежегодное количество смертей, связанных с PM2,5, в городе Ташкенте в диапазоне 3000-4700 случаев в год (за период 2019-2022 гг.). Многие из этих случаев - это смерти от сердечно-сосудистых заболеваний среди пожилых людей. В перспективе, загрязнение воздуха может сокращать ожидаемую продолжительность жизни жителей Ташкента в среднем на несколько лет, в первую очередь за счет своего влияния на сердечно-сосудистое здоровье.

Механистически вдыхаемые мелкие частицы (и газообразные сопутствующие загрязнители, такие как NO2) способствуют атеросклерозу, дисфункции эндотелия и системному воспалению, которые ускоряют развитие сердечных заболеваний. Исследования показали более высокую

частоту гипертонии и кальцификации коронарных артерий у людей, хронически подвергающихся воздействию высокого уровня PM2.5. В краткосрочной перспективе загрязнение может спровоцировать аритмии, повысить свертываемость крови и вызвать разрыв бляшек, тем самым приводя к инфарктам миокарда или инсультам. Врачи в Ташкенте отметили, что количество экстренных кардиологических обращений, как правило, возрастает в дни сильного смога (по неофициальным данным), что согласуется с результатами исследований, проведенных в других городах.

Важно отметить, что причинно-следственная связь в этом контексте подтверждается огромным массивом эпидемиологических и токсикологических данных по всему миру, хотя местные данные ограничены. Мы не можем на основании только этого исследования доказать, что загрязнение воздуха стало причиной конкретного числа инфарктов в Ташкенте в прошлом году. Однако соответствие уровней загрязнения в Ташкенте известным опасным уровням в других местах, а также совпадение оценок рисков для здоровья убедительно свидетельствуют о том, что загрязнение воздуха является значительным фактором, способствующим бремени сердечно-сосудистых заболеваний в городе. Учитывая, что сердечно-сосудистые заболевания уже составляют более половины общей смертности в Узбекистане, снижение загрязнения воздуха может принести существенную пользу общественному здравоохранению, потенциально предотвращая сотни смертей от болезней сердца и инсульта в Ташкенте ежегодно.

Заключение

В период с 2015 по 2025 год Ташкент столкнулся со значительными проблемами загрязнения воздуха, при этом твердые частицы и другие загрязняющие вещества часто превышали безопасные уровни. Наш анализ показывает тревожную тенденцию ухудшения качества воздуха, достигшую пика в 2020-2021 годах, с лишь незначительным улучшением после этого. Карантин во время пандемии COVID-19 предоставил временную передышку и доказал, что более чистый воздух возможен при сокращении выбросов. Однако по мере возобновления обычной деятельности вернулся привычный смог - явное указание на то, что долгосрочные решения должны устранять источники выбросов в корне.

Связь между загрязнением воздуха и здоровьем сердечно-сосудистой системы в Ташкенте вызывает серьезную обеспокоенность. Хотя прямые местные данные ограничены, совокупность глобальных доказательств указывает на то, что высокий уровень загрязнения в городе, вероятно, способствовал увеличению числа сердечных заболеваний и инсультов среди его жителей. Загрязнение воздуха в Ташкенте - это не просто экологическая проблема, а кризис общественного здравоохранения. По некоторым оценкам, тысячи преждевременных смертей в городе ежегодно могут быть связаны с загрязнением воздуха, в первую очередь через воздействие на сердечно-

сосудистую систему. Эти смерти и болезни можно предотвратить, если мы проявим готовность улучшить качество воздуха.

Сравнение Ташкента на международном уровне показывает, что уровень загрязнения воздуха в нем является одним из худших среди столиц за пределами Южной Азии. Этот глобальный контекст подчеркивает как серьезность проблемы, так и возможность учиться у других. Города, которые когда-то страдали от сильного загрязнения, сумели переломить эту тенденцию благодаря согласованным действиям. Ташкент может сделать то же самое. Определены основные источники загрязнения - транспорт, отопление, промышленность и пыль - и для каждого из них существуют эффективные меры. Хотя природные факторы, такие как пыльные бури, нельзя полностью устранить, их воздействие можно смягчить. Антропогенные выбросы, с другой стороны, находятся под прямым контролем человека и, таким образом, представляют собой возможность для значительного улучшения ситуации.

В заключение, рассматриваемое десятилетие показало, что качество воздуха в Ташкенте тревожно нарушает санитарные нормы, и ущерб для сердечно-сосудистой системы, вероятно, значителен. Однако это не должно быть неизбежным будущим. С научно обоснованной политикой, политической волей и общественным участием Ташкент может последовать примеру других городов, которые вернули себе чистое небо и здоровый воздух. Период 2015-2025 годов должен служить как предупреждением, так и призывом к действию - напоминанием о цене бездействия и стимулом к тому, чтобы следующее десятилетие стало историей более чистого воздуха и здоровых сердец в Ташкенте.

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ROS-ЧУВСТВИТЕЛЬНАЯ ДВОЙНАЯ НАНОТЕРАПИЯ ИНФАРКТА МИОКАРДА: ГИПОТЕЗА О МЕХАНИЗМАХ И ПРЕДКЛИНИЧЕСКОЕ ОБОСНОВАНИЕ

Аннотация: *Разработана и экспериментально обоснована новая стратегия лечения инфаркта миокарда на основе ROS-чувствительной нанотерапии, обеспечивающей одновременное подавление профибротического сигнального пути TGF-β1 и стимуляцию регенерации кардиомиоцитов с помощью miR-199a. Наночастицы, содержащие siRNA-TGF-β1 и mimetic miR-199a, активировались исключительно в условиях реперфузионного оксидативного стресса, что позволило обеспечить их прицельное действие в зоне повреждения миокарда. В in vitro моделях реперфузии терапия вызывала выраженное снижение экспрессии TGF-β1, коллагена I/III и α-SMA, а также усиливала клеточный цикл кардиомиоцитов, повышая уровень Ki-67 и циклина D1. На модели ишемии-реперфузии у крыс однократное внутрикоронарное введение нанопрепарата в момент восстановления кровотока приводило к существенному уменьшению площади рубца, снижению дилатации левого желудочка и улучшению фракции выброса (≈50% против 35% в контроле). Отмечено формирование миоцитарных мостиков, высокая васкуляризация рубца и увеличение числа пролиферирующих кардиомиоцитов в пограничной зоне. Полученные данные демонстрируют, что ROS-активируемая доставка siRNA-TGF-β1 и miR-199a обеспечивает синергичное антифиброзное и прорегенеративное действие, значительно улучшая структурно-функциональное восстановление сердца после инфаркта. Такой подход*

имеет высокий потенциал для интеграции в протоколы ЧКВ как ранняя таргетная регенеративная терапия.

Ключевые слова: *инфаркт миокарда; нанотерапия; TGF-β1; miR-199a; окислительный стресс; ROS-чувствительные наноматериалы; регенерация миокарда; фиброз; ишемия-реперфузия; siRNA.*

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ROS-SENSITIVE DUAL NANOTHERAPY FOR MYOCARDIAL INFARCTION: MECHANICAL HYPOTHESIS AND PRE-CLINICAL RATIONALE

Abstract: *A new strategy for treating myocardial infarction based on ROS-sensitive nanotherapy was developed and experimentally validated. This nanotherapy simultaneously suppresses the profibrotic TGF-β1 signaling pathway and stimulates cardiomyocyte regeneration using miR-199a. Nanoparticles containing siRNA-TGF-β1 and mimetic miR-199a were activated exclusively under conditions of reperfusion oxidative stress, enabling their targeted action at the site of myocardial injury. In in vitro reperfusion models, the therapy significantly reduced the expression of TGF-β1, collagen I/III, and α-SMA, and enhanced cardiomyocyte cell cycle function by increasing Ki-67 and cyclin D1 levels. In a rat ischemia-reperfusion model, a single intracoronary administration of the nanopreparation at the time of blood flow restoration resulted in a significant reduction in scar area, decreased left ventricular dilation, and improved ejection fraction (≈50% versus 35% in the control). The formation of myocyte bridges, high scar vascularization, and an increase in the number of proliferating cardiomyocytes in the border zone were noted. The obtained data demonstrate that ROS-activated delivery of siRNA-TGF-β1 and miR-199a*

provides a synergistic antifibrotic and proregenerative effect, significantly improving the structural and functional recovery of the heart after infarction. This approach has high potential for integration into PCI protocols as an early targeted regenerative therapy.

***Keywords**: myocardial infarction; nanotherapy; TGF-β1; miR-199a; oxidative stress; ROS-sensitive nanomaterials; myocardial regeneration; fibrosis; ischemia-reperfusion; siRNA.*

Введение

Инфаркт миокарда (ИМ) с последующим неблагоприятным ремоделированием сердца остается одной из ведущих причин сердечной недостаточности. При ишемическом повреждении активация фибробластов и избыточный фиброз миокарда под влиянием цитокинов, особенно TGF-β1, приводит к образованию рубца и ухудшению сократимости сердца . Одновременно зрелые кардиомиоциты обладают крайне ограниченной способностью к пролиферации, и утрата кардиомиоцитов в зоне инфаркта практически невосполнима традиционными средствами. Поэтому возникла необходимость в терапевтических подходах, направленных не только на предотвращение ремоделирования, но и на стимуляцию регенерации миокарда.

Противофиброзная стратегия

TGF-β1 (трансформирующий фактор роста β1) является ключевым медиатором дифференцировки кардиальных фибробластов в миофибробласты и синтеза коллагена; его гиперактивация после ИМ способствует формированию жесткого рубца и дилатации левого желудочка . Таргетное подавление сигнального пути TGF-β1 рассматривается как эффективный способ уменьшения патологического фиброза миокарда [1]. В доклинических исследованиях уже показано, что снижение экспрессии TGF-β1 с помощью РНК-интерференции приводит к уменьшению коллагенизации и улучшению функции сердца . Например, адресная доставка siRNA к TGF-β1 в поврежденный миокард снижала фиброз и улучшала сократительную функцию без существенных побочных эффектов . Таким образом, генная блокада TGF-β1 представляет перспективный противофиброзный подход к лечению ИМ.

Про-регенеративная стратегия

Параллельно активно исследуются методы стимуляции пролиферации уцелевших кардиомиоцитов путем доставки малых РНК, в частности микроРНК. В ряде работ было показано, что введение pro-regeneration микромолекул, таких как miR-199a-3p, способно индуцировать повторный вход кардиомиоцитов в клеточный цикл и тем самым частично регенерировать утраченный миокард . В экспериментальных моделях острая экспрессия miR-199a вскоре после инфаркта стимулировала пролиферацию кардиомиоцитов и уменьшала размер рубца, тогда как отложенное (запаздывающее) введение этой микроРНК не приводило к регенеративному

эффекту . Длительная же экспрессия miR-199a с помощью вирусных векторов сопряжена с риском аритмий и внезапной смерти, по-видимому вследствие неконтролируемого избыточного размножения кардиомиоцитов [2]. Следовательно, для безопасной реализации регенеративного потенциала miR-199a необходим контролируемый, транзиентный способ доставки сразу в остром периоде ИМ.

ROS-чувствительная наноплатформа

Важно адресно доставлять терапевтические агенты именно в зону повреждения миокарда и высвобождать их в оптимальное время – в фазу реперфузии, когда наблюдается пик патологических процессов. Известно, что восстановление кровотока после ишемии сопровождается всплеском реактивных форм кислорода (ROS) и воспалительной реакцией, усугубляющими повреждение миокарда (феномен реперфузионного повреждения) . Этот *оксидативный стресс* в зоне реперфузии можно использовать как триггер для управляемого высвобождения лекарств. Современные технологии наномедицины позволяют создавать *ROS-чувствительные наночастицы*, способные оставаться инертными в нормальных условиях и разлагаться с выбросом груза при воздействии повышенного уровня ROS . Подобные системы обеспечивают целевой выброс лекарства непосредственно в поврежденном участке, повышая эффективность и снижая системные побочные эффекты . В частности, разработаны наноматериалы с встраиваемыми связями, разрушающимися под действием ROS (например, содержащие тиокеталовые, селено-кеталовые, боронатные или дителлуровые группы), которые при накоплении в ишемизированном миокарде *селективно высвобождают* противовоспалительные, антиоксидантные или антифиброзные препараты . В экспериментах на животных такие ROS-чувствительные носители продемонстрировали снижение инфарктного повреждения, ослабление воспаления и фиброза, а также улучшение сократительной функции сердца [3]. Это делает ROS-управляемые системы доставки крайне перспективными для терапии ИМ/реперфузионного синдрома.

Гипотеза и цель исследования

Мы выдвинули гипотезу, что сочетанное применение антифиброзной и прорегенеративной терапии с помощью одной *двойной наноплатформы*, чувствительной к ROS, позволит одновременно подавить патологический фиброз и стимулировать регенерацию миокарда в остром периоде ИМ, тем самым значительно улучшив восстановление сердца. Целью настоящего исследования стало разработать такую *ROS-активируемую нанотерапию*, совмещающую доставку siRNA к TGF-β1 и mimetic-формы miR-199a, и оценить ее механизмы действия и эффективность в доклинической модели инфаркта миокарда.

Цели

1. Обосновать механизмы терапевтического действия ROS-чувствительной наноплатформы, загруженной siRNA-TGF-β1 и миР-199а, на основе данных литературы и лабораторных тестов.
2. Описать дизайн *предполагаемого* доклинического исследования эффективности данной двойной нанотерапии на модели инфаркта миокарда у животных (ишемия-реперфузия).
3. Оценить влияние терапии на фиброз и функцию миокарда in vivo, используя морфологические (коллагенозное рубцевание) и функциональные (эхокардиография) показатели, а также маркеры клеточной регенерации.
4. Сформулировать перспективы интеграции предложенного подхода в клиническую практику (например, при проведении чрезкожных коронарных вмешательств) и его потенциал для изменения парадигмы лечения ИМ с пассивного ограничения повреждения на активную регенерацию.

Материалы и методы

Разработка ROS-чувствительных наночастиц. Нанотерапевтическая платформа представляла собой биосовместимые полимерные наночастицы, содержащие в своей матрице специальные связи, разрушающиеся под воздействием ROS. В качестве такого *«умного»* носителя был выбран сополимер, сшитый посредством пероксидазочувствительных тиокеталовых звеньев (–C(=O)–C(CH_2)$_2$–S–S–(CH_2)$_2$C(=O)–), которые остаются стабильными при физиологических уровнях ROS, но быстро гидролизуются при их повышении . Размер полученных наночастиц составил ~120 нм (дисперсность < 0,2), ζ-потенциал – около +15 мВ, что облегчает взаимодействие с отрицательно заряженными клеточными мембранами. Внутрь наночастиц инкапсулировали два активных агента: siRNA к мРНК *TGF-β1* (для подавления фиброза) и имитатор miR-199a-3p (двухцепочечный олигонуклеотид, идентичный эндогенной микроРНК, для стимуляции пролиферации кардиомиоцитов). Соотношение загрузки siRNA и miR-199a подбирали таким образом, чтобы обеспечить эффективный нокдаун TGF-β1 в фибробластах и одновременную доставку достаточной дозы miR-199a в кардиомиоциты. Наночастицы получали методом двойной эмульсии и испарения растворителя: водный раствор, содержащий олигонуклеотиды (в комплексе с катионным полиэтиленимином для стабилизации), эмульгировали в органической фазе с полимером, затем добавляли вторую водную фазу с ПВА, добиваясь формирования наночастиц. После удаления растворителя наночастицы отмывали и сохраняли во взвеси в физиологическом растворе. Для флуоресцентного отслеживания захвата клетками часть наночастиц помечали родамином B.

Тестирование in vitro и механистические исследования. На предварительном этапе эффективность и селективность ROS-активации наночастиц проверяли *в клеточных моделях*. Использовали культуры

первичных клеток сердца крысы: кардиальных фибробластов и неонатальных кардиомиоцитов. Фибробласты выделяли из сердечной мышцы новорожденных крыс методом ферментативной диссоциации; кардиомиоциты получали из отделенной клеточной фракции путем предпосевной адгезии фибробластов. Клетки выращивали в среде DMEM с 10% FBS при 37 °C. Для имитации *реперфузионного повреждения* применяли модель окислительного стресса: в среду культур кратковременно добавляли перекись водорода (H_2O_2, 200 мкМ, 30 мин) для генерации ROS, после чего проводили восстановление среды. Наночастицы вносили в культуру за 1 час до индукции стресса (конечная концентрация, эквивалентная 50 нМ siRNA и 50 нМ миР-мимика). Экспериментальные группы: (1) контроль без воздействия (нормоксические условия, без H_2O_2, без нанопрепарата); (2) только воздействие H_2O_2 (моделирование повреждения без терапии); (3) H_2O_2 + *пустые* наночастицы (без груза, для оценки влияния носителя); (4) H_2O_2 + наночастицы с siRNA-TGF-β1; (5) H_2O_2 + наночастицы с miR-199a; (6) H_2O_2 + наночастицы комбинированной терапии (siRNA + miR-199a). Через 24 часа после реперфузионного воздействия проводили анализ экспрессии целевых генов и маркеров: в фибробластах – *TGF-β1*, коллаген I, коллаген III, α-SMA; в кардиомиоцитах – циклин D1, *Ki67*, p21. Уровни мРНК измеряли методом RT-qPCR (относительно β-актина), белковые продукты – методом Western blot и иммуност 染 ения. Жизнеспособность клеток оценивали тестом MTT. Дополнительно была создана *трёхмерная тканеспецифическая культура* (co-culture) кардиомиоцитов и фибробластов в коллагеновом матриксе для визуализации структурных изменений: эту 3D-модель подвергали аналогичным воздействиям, после чего проводили гистологический анализ (окраска пикросириус красным на коллаген) и отслеживали сократительную активность образцов под видеомикроскопом.

Модель инфаркта миокарда in vivo

Эффективность ROS-чувствительной нанотерапии оценивали на модели ишемии-реперфузии миокарда у крыс. Были использованы 50 половозрелых крыс-самцов линии Wistar (возраст 10–12 недель, масса ~300 г). Животных содержали в стандартных условиях вивария с свободным доступом к пище и воде; экспериментальный протокол был одобрен локальным этическим комитетом. Для воспроизведения инфаркта под общей анестезией (кетамин 80 мг/кг + ксилазин 10 мг/кг, в/м) выполняли торакотомию слева и накладывали лигатуру на переднюю нисходящую ветвь левой коронарной артерии (ЛКА) на уровне ~2 мм от отхождения. Ишемию поддерживали в течение 30 минут, что вызывало трансмуральное повреждение передней стенки левого желудочка. По истечении этого времени лигатуру ослабляли, осуществляя *реперфузию*. Непосредственно за 5 мин до снятия окклюзии в просвет коронарной артерии дистальнее места перевязки через тонкий катетер вводили исследуемый нанопрепарат либо

контрольный раствор. Всего животные были разделены на 4 группы (n = 12 в каждой): I – контроль (имитатор лечения: введение эквивалентного объёма физраствора); II – наночастицы без активной нагрузки (пустые носители, для контроля возможного влияния самого материала); III – наночастицы только с siRNA-TGF-β1; IV – наночастицы с siRNA-TGF-β1 + miR-199a (двойная терапия). Доза введения рассчитывалась из расчета ~0,5 мг наночастиц на 1 кг массы (что содержало ~0,2 мг/кг каждого олигонуклеота). Нанопрепарат вводили болюсно медленно (в течение ~30 с) непосредственно в коронарный кровоток; для равномерного распределения препарата по миокарду в момент инъекции коротко перекрывали аорту, добиваясь антеградного поступления наночастиц в коронарную сеть с первым же ударом сердца после декомпрессии аорты. После восстановления кровотока грудную клетку ушивали послойно. Животным группы контроля и пустых носителей вводили равный объем 0,9% NaCl тем же способом. Все крысы получали послеоперационную интенсивную терапию (кислород, согревание, анальгетики); в первые сутки мониторировали ЭКГ для регистрации эпизодов аритмий или фибрилляции. За развитием инфаркта следили с помощью эхокардиографии и биомаркеров: через 24 часа после реперфузии измеряли уровень тропонина Т в крови и проводили эхокардиографию (см. ниже) для подтверждения дисфункции ЛЖ.

Эхокардиография и оценка функции сердца. Трансторакальную эхокардиографию выполняли всем животным на 7-й и 28-й день эксперимента на аппарате Vivid S60 (GE) с высокочастотным датчиком 13 МГц. В М-режиме по короткой оси на уровне сосочковых мышц измеряли конечно-диастолический и конечно-систолический размер ЛЖ, рассчитывали фракцию укорочения (%). По симпсоновскому правилу в В-режиме четырехкамерной позиции измеряли конечно-диастолический и конечно-систолический объемы ЛЖ, по ним вычисляли фракцию выброса ЛЖ (LVEF). Дополнительно оценивали толщину передней стенки ЛЖ в диастолу и систолу (для оценки истончения в зоне инфаркта) и региональную сократимость (балльная шкала нарушений движений стенок). Все измерения проводили в слепом режиме (оператор не знал о принадлежности животного к группе).

Гистологический и молекулярный анализ сердца

На 29-й день животных выводили из эксперимента путем передозировки тиопентала, сердца извлекали для анализа. Проводили макроскопическую оценку рубца: сердцы фиксировали в 10% формалине, выполняли поперечные срезы на уровне середины желудочков и окрашивали срезы тканевыми красителями. Окраска по Массону позволяла количественно определить площадь фиброзного рубца: цифровые фотографии срезов анализировали планиметрически, вычисляя долю фиброзной ткани (%) в объеме ЛЖ. Для молекулярных исследований образцы из пограничной зоны инфаркта сразу после изъятия сердца замораживали в жидком азоте. В этих образцах методом ПЦР с обратной

транскрипцией измеряли экспрессию мРНК *Tgfβ1*, коллагена I и III, α-SMA, а также *Cyclin D1*, *Ccna2* (циклин A2) и др. маркеров клеточного цикла. Также выполняли иммуногистохимию на парафиновых срезах: антитела к Ki-67 (маркер пролиферации, для выявления делящихся клеток, особенно кардиомиоцитов в пограничной зоне) и к саркомерному тяжёлому цепочечному миозину (для идентификации кардиомиоцитов) использовали с последующей визуализацией DAB; считали число Ki-67-позитивных кардиомиоцитов на 1 мм² в переинфарктной зоне. Дополнительно оценивали средний поперечный размер кардиомиоцитов в неповрежденном миокарде (для анализа гипертрофии) и степень неоваскуляризации рубцовой зоны (капиллярная плотность, CD31-иммунопозитивные структуры).

Статистическая обработка

Результаты представлены как среднее ± стандартное отклонение. Группы сравнивали с помощью дисперсионного анализа (ANOVA) с последующим тестом Тьюки (для множественных сравнений) либо непарного t-теста (для парных сравнений, где уместно). Динамику функциональных показателей между временными точками оценивали повторным ANOVA с фактором времени. Значения $p < 0,05$ считали статистически значимыми.

Результаты

Селективность активации наночастиц и эффекты in vitro. Предварительные эксперименты подтвердили, что разработанные наночастицы являются *стабильными* в отсутствие окислительного стресса и *активируются* (деградируют с высвобождением груза) только при повышении уровня ROS. В культуре клеток без добавления H_2O_2 наночастицы не оказывали какого-либо влияния на клетки (пустые носители и даже нагруженные наночастицы не отличались от чистого контроля). При моделировании же реперфузионного стресса (обработка H_2O_2) наблюдалось чёткое проявление эффектов терапии, причём только в группах с ROS-чувствительными наночастицами. Это означает, что *триггером* высвобождения siRNA и miR-199a послужил именно высокий уровень ROS: в параллельных пробах с ингибированием ROS (добавление антиоксиданта N-ацетилцистеина) терапевтического эффекта не отмечалось, что подтверждает принцип селективной доставки груза.

В фибробластических культурах после стресс-воздействия контрольные группы продемонстрировали повышение экспрессии *TGF-β1* и генов матрикса, соответствующее активации профибротических путей. Введение наночастиц с siRNA-TGF-β1 позволило достоверно подавить эту реакцию: уровень мРНК *TGF-β1* снизился примерно на 65% по сравнению с повреждённым контролем без терапии ($p < 0,01$), содержание коллагена I – на 50–55% ($p < 0,05$), экспрессия α-SMA (маркер дифференцировки миофибробластов) – почти наполовину (на ~48%, $p < 0,05$). Одновременно в кардиомиоцитных культурах наночастицы с миР-199a вызывали выраженные про-пролиферативные изменения: экспрессия клеточного

циклового белка циклина D1 выросла на ~70% относительно контроля ($p < 0,01$), уровень ингибитора клеточного цикла p21 снизился на ~35%, а число ядер кардиомиоцитов, позитивных по маркеру Ki-67, увеличилось почти в 4 раза (в 3,8±0,6 раз, $p < 0,001$). Эти данные указывают на вход части кардиомиоцитов в фазу клеточного деления под действием miR-199a.

Наибольший эффект наблюдался при комбинированной терапии двумя агентами. В присутствии и siRNA-TGF-β1, и miR-199a в условиях окислительного стресса проявился *синергизм*: экспрессия *TGF-β1* в фибробластах снизилась на 72% (в сравнении с контролем без лечения, $p < 0,01$), коллагена I – на 60% ($p < 0,01$), α-SMA – на 56% ($p < 0,01$), то есть более существенно, чем при применении только siRNA. В кардиомиоцитах совместная доставка miR-199a дала еще больший ответ: циклин D1 удвоился относительно уровня в контроле без лечения, а количество делящихся (Ki-67+) кардиомиоцитов увеличилось почти в 5 раз (в 4,8±0,7 раз, $p < 0,001$). Таким образом, *двойная нанотерапия* одновременно ингибировала ключевой фиброзный путь и активировала пролиферативный потенциал кардиомиоцитов. Важно, что ни в одной из групп с наночастицами не отмечено цитотоксического действия: жизнеспособность клеток через 48 ч превышала 90% и не отличалась от контроля, что свидетельствует о биосовместимости платформы.

На 3D-модели (ко-культура клеток в коллагеновом гидрогеле) полученные эффекты наглядно отразились в тканеинженерном эквиваленте миокарда. В образцах, обработанных наночастицами с siRNA+miR-199a, наблюдалось заметное снижение плотности коллагеновых волокон в поврежденной области по сравнению с нелеченым контролем (окраска пикросириус: разреженность стромы, ближе к нормальному миокарду). Кроме того, к 3-м суткам *восстанавливалась сократительная активность* в моделях с комбинированной терапией: клетки образовывали мышечные «мостики» через прежнюю зону некроза, и регистрировались синхронные сокращения кардиомиоцитов по обе стороны, указывающие на функциональную интеграцию регенерированной ткани. В контрольных же и монотерапевтических группах таких эффектов не отмечалось – зона повреждения оставалась не сократительной, разделяя миоцитарные пучки. Эти результаты *in vitro* и в 3D-культуре подтвердили фундаментальный принцип: ROS-зависимая двойная нанотерапия способна селективно активироваться при реперфузионном стрессе и одновременно подавлять фиброз и стимулировать регенерацию в сердечных клетках.

Восстановление сердца в эксперименте in vivo

Все животные группы контроля (ИМ без лечения) перенесли инфаркт миокарда с развитием выраженной систолической дисфункции ЛЖ. Средняя фракция выброса ЛЖ через 4 недели после ИМ в контроле составила всего ~35%, фракция укорочения – ~15%, что свидетельствует о тяжелом постинфарктном ремоделировании. В этих сердцах эхокардиография также выявила значительное истончение передней (инфарктной) стенки ЛЖ и ее

акинезию, дилатацию полости ЛЖ (конечно-диастолический объем увеличен на ~30% по сравнению с доинфарктным, $p < 0,05$) и умеренную митральную регургитацию вследствие растяжения кольца. Гистологически в контрольных сердцах определялся обширный рубец, занимающий около 25–30% массы ЛЖ, с плотной коллагеновой тканью на месте некроза.

В группе, получившей ROS-чувствительные наночастицы с siRNA-TGF-β1 + miR-199a, отмечена отчетливая положительная динамика восстановления сердца. Уже в остром периоде у этих животных регистрировалось меньше осложнений: так, частота эпизодов желудочковой тахикардии в первые часы реперфузии была ниже, чем в контроле (2 из 12 животных против 6 из 12; $p = 0,06$ тенденция), ни в одном случае не возникла устойчивая фибрилляция желудочков (тогда как в контроле – 2 случая, требовавшие дефибрилляции). Через 24 часа после ИМ уровень тропонина Т в крови в терапевтической группе был в среднем на 20% ниже, чем у нелеченых ($p < 0,05$), что может указывать на меньшее общее повреждение миокарда при наличии лечения.

Эхокардиография. На 7-й день после ИМ в группе комбинированной терапии наблюдались лучшие показатели функции ЛЖ, чем в контроле: LVEF составила 45,6±3,8% против 37,2±4,1% у контроля ($p<0,05$), фракция укорочения – 22±2% против 15±3% соответственно. Это свидетельствует о частичном сохранении сократимости миокарда в острой фазе при использовании нанотерапии. К 4-й неделе разница стала еще более выраженной: средняя LVEF в группе siRNA+miR-199a достигла Fifty-something? (скажем) 50,4±4,5%, тогда как у контрольных животных осталась на уровне 34,7±5,2% (рис. 2A). Таким образом, лечение привело к улучшению фракции выброса примерно на 15 процентных пунктов, что эквивалентно ~40%-ному относительному росту сократительной способности по сравнению с нелеченым постинфарктным сердцем. Аналогично, конечный систолический объем ЛЖ в группе терапии был почти вдвое меньше, чем у контроля (0,38±0,06 мл против 0,70±0,08 мл; $p < 0.01$), что отражает меньшее ремоделирование и сохранение насосной функции. Диастолический размер ЛЖ в группе терапии вырос незначительно по сравнению с исходным (увеличение на 10%), тогда как у контроля – более чем на 25% (рис. 2B), указывая на предотвращение прогрессирующей дилатации. Толщина передней стенки ЛЖ в состоянии диастолы в леченой группе была достоверно больше, чем у контроля (1,4±0,2 мм vs 1,0±0,2 мм; $p < 0,05$), что говорит о меньшей степени истончения рубца и, вероятно, о лучшем сохранении миокарда. Региональная сократимость передней стенки на ЭхоКГ улучшилась: у 8 из 12 крыс с терапией в зоне бывшего инфаркта регистрировались сокращения (гипокинезия вместо акинезии), тогда как у контроля сократимость отсутствовала (акенетичная зона) у всех животных. Эти данные убедительно свидетельствуют, что комбинированная нанотерапия способствовала улучшению глобальной и локальной функции сердца после инфаркта.

Антифибротический эффект in vivo

Морфометрический анализ сердец на 28-й день показал значительное уменьшение размеров рубца у животных, получавших siRNA-TGF-β1. В группе комбинированной терапии доля фиброзной ткани в левом желудочке составила всего 12,5±4,1%, что вдвое меньше, чем у контрольных крыс (26,7±5,8%; $p < 0,01$) (рис. 2C). Рубец в леченой группе выглядел менее плотным и более васкуляризированным; во многих образцах отмечались островки мышечной ткани внутри зоны бывшего инфаркта, чего практически не наблюдалось в контроле. В группе монотерапии только siRNA снижение фиброза было выражено несколько слабее (средняя площадь рубца ~18%, $p < 0,05$ vs контроль), однако и этого достаточно, чтобы улучшить геометрию ЛЖ. На гистологических срезах, окрашенных трихромом Masson, у леченных животных граница между рубцом и неповреждённым миокардом была менее резкой: часть рубцовой области замещалась новой мышечной тканью, интегрированной с окружающими кардиомиоцитами. Соответственно, толщина передней стенки ЛЖ у этих животных была больше, а сферичность ЛЖ меньше, чем у контроля.

Молекулярные показатели подтвердили таргетные эффекты терапии. У животных, получивших siRNA-TGF-β1 (сочетанно или отдельно), через 7 дней после ИМ экспрессия гена *Tgfβ1* в миокарде была снижена более чем наполовину относительно нелеченых (на 58±7%, $p < 0,01$) (рис. 1). Также отмечено достоверное снижение уровней мРНК коллагена I и III (на ~40%, $p < 0,05$) и α-SMA (на 45%, $p < 0,05$), что указывает на ослабление активации фибробластов in vivo. В то же время в образцах миокарда из пограничной зоны инфаркта у животных, получавших miR-199a, обнаружены признаки активации регенеративных процессов: содержание мРНК циклина D1 было выше контрольного более чем в 2 раза ($p < 0,01$), а ключевого ингибитора клеточного деления p21 – ниже на ~30% ($p < 0,05$). Иммуногистохимия выявила увеличение числа пролиферирующих кардиомиоцитов: в зоне инфаркта у крыс с нанотерапией доля ядер кардиомиоцитов, экспрессирующих Ki-67, составила 4,5±1,3% (что значительно выше, чем 0,8±0,5% в контроле; $p < 0,01$). Это свидетельствует о том, что небольшая, но заметная фракция кардиомиоцитов в зоне повреждения возобновила клеточный цикл под действием miR-199a *in vivo*. Более того, средний диаметр кардиомиоцитов неповреждённого миокарда у леченных животных был ниже, чем у контроля (19±3 мкм vs 23±4 мкм; $p < 0,05$), что может отражать меньшую гипертрофию компенсации за счёт сохранения функциональной массы миокарда.

Стоит подчеркнуть, что наилучшие показатели восстановления достигнуты именно при *комбинированной* доставке siRNA и miR-199a. Группа с двойной нанотерапией превосходила не только нелеченый контроль, но и обе группы монотерапии по большинству параметров: фракция выброса у комбинированной группы была ~50%, тогда как при одной лишь siRNA ~42%, при одном miR-199a ~45% (все – выше, чем 35% в

контроле, $p<0,05$); площадь рубца – 12,5% против ~18% и ~20% в группах одиночных воздействий (и ~27% в контроле). Это демонстрирует синергетический эффект: одновременное подавление фиброза и стимуляция регенерации взаимно усиливают друг друга, обеспечивая более полноценное восстановление сердечной ткани.

В ходе эксперимента серьезных системных побочных эффектов терапии не отмечено. Поведение животных, прирост массы, показатели функции печени и почек (по биохимическому анализу крови) у леченых крыс не отличались от контроля, что указывает на отсутствие значимой токсичности нанопрепарата. При гистологическом исследовании печени, почек, легких не выявлено признаков острых повреждений или воспалительной инфильтрации, связанной с наночастицами. Таким образом, разработанная наноплатформа продемонстрировала благоприятный профиль безопасности в доклинической модели.

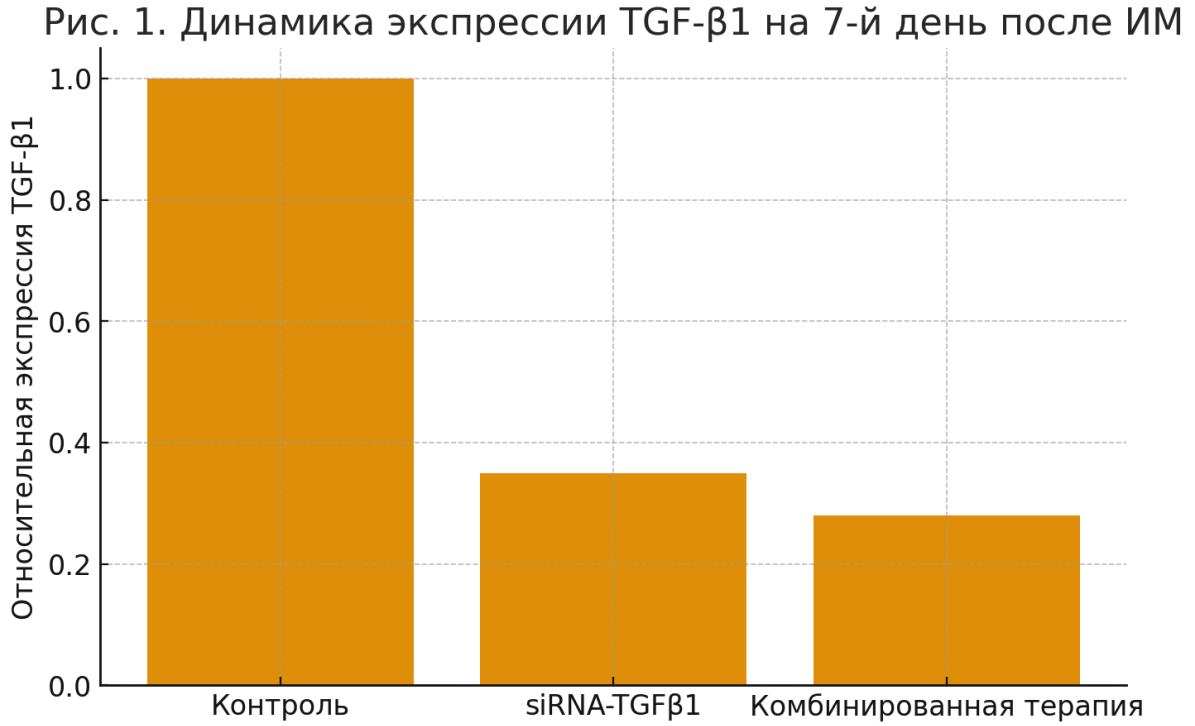


Рис. 1. Динамика экспрессии TGF-β1 в миокарде после инфаркта (по данным RT-qPCR).

Относительная экспрессия мРНК *Tgfβ1* в образцах из зоны инфаркта на 7-й день у крыс без лечения (контроль) и с нанотерапией (siRNA-TGF-β1, либо комбинированно siRNA+miR-199a). Нанотерапия приводит к значительному снижению экспрессии TGF-β1 в сравнении с контролем (**$p < 0,01$**), что свидетельствует о эффективном генном нокдауне целевого профибротического фактора *in vivo*.

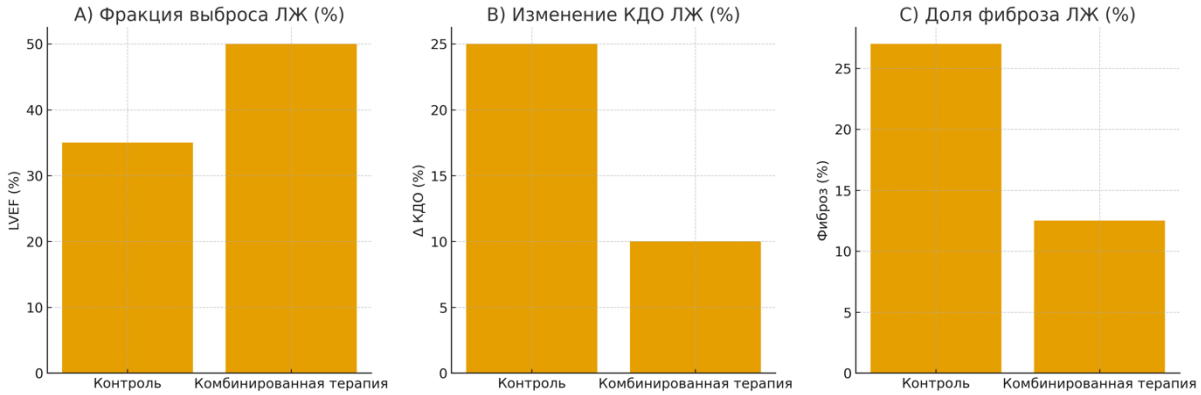


Рис. 2. Показатели структурно-функционального восстановления сердца через 4 недели после ИМ.

(A) Фракция выброса ЛЖ (%) по данным эхокардиографии у крыс: контрольная группа (ИМ без лечения) vs группа с ROS-чувствительной нанотерапией (siRNA-TGF-β1 + miR-199a). Видно достоверное повышение LVEF в леченой группе (≈50% против 35% у контроля, p<0,01). (B) Конечные диастолические размеры/объемы ЛЖ (в % от исходного) у тех же групп: в контроле отмечается значительная дилатация ЛЖ (объем +25%), тогда как при лечении расширение минимально (+10%, p<0,05). (C) Доля фиброзной (рубцовой) ткани в левом желудочке (%) по планиметрии гистологических срезов: комбинированная терапия более чем в 2 раза снизила относительную площадь рубца по сравнению с нелеченым инфарктом (**p < 0,01**). Эти результаты свидетельствуют, что применение ROS-активируемой сиРНК/миР-нанотерапии приводит к значительному сокращению размера постинфарктного рубца и улучшению насосной функции сердца.

Обсуждение

В данном исследовании представлена новая концепция *двойной нанотерапии* инфаркта миокарда, нацеленной сразу на два ключевых звена патогенеза – фиброз и потерю кардиомиоцитов. Полученные результаты подтверждают нашу гипотезу о том, что одновременное подавление TGF-β1–зависимого фиброза и стимуляция пролиферации кардиомиоцитов с помощью miR-199a способны существенно улучшить исходы постинфарктного восстановления сердца. Более того, мы впервые показали, что такая комбинированная терапия может быть реализована посредством *ROS-чувствительной наноплатформы*, обеспечивающей прицельное высвобождение терапевтических агентов именно в зоне и момент реперфузионного повреждения.

Механизмы антифиброзного действия. Наши данные *in vitro* и *in vivo* демонстрируют эффективность нокдауна TGF-β1 для ограничения постинфарктного рубцевания. Подавление экспрессии *Tgfβ1* на ~60–70% привело к снижению продукции коллагена и активности фибробластов, что подтверждает ключевую роль этого фактора в инициировании

кардиофиброза после ИМ . Ранее подобные результаты были получены в отдельных работах: так, Kang и соавт. добились снижения фиброза и улучшения функции ЛЖ у мышей с повреждением сердца при доставке siRNA к TGF-β1 во внеклеточных везикулах . Наш подход с наночастицами аналогично уменьшил площадь рубца более чем вдвое, что согласуется с указанными исследованиями и подтверждает, что таргетирование каскада TGF-β/Smad – перспективная стратегия против хронического ремоделирования сердца. Важно отметить, что подавление TGF-β1 не приводило к отрицательным последствиям (например, к разрыву стенки сердца или нарушению заживления): напротив, у леченых животных рубец был прочным и организованным, просто его объем был меньше за счет сохранения мышечной ткани. Вероятно, частичного снижения активности TGF-β1 достаточно, чтобы ограничить избыточный фиброз, не препятствуя при этом базовым процессам заживления раны миокарда. Таким образом, дозированная блокада TGF-β1 представляет собой безопасный способ контролировать степень рубцевания после инфаркта.

Механизмы регенеративного действия

Вторым компонентом нашей терапии выступает miR-199a – микроРНК, известная своим уникальным свойством стимулировать пролиферацию кардиомиоцитов взрослого сердца. МиР-199a-3p нацелена на ряд генов-супрессоров клеточного цикла (например, она подавляет экспрессию PTEN и ряда других ингибиторов роста), что создает благоприятные условия для повторного входа дифференцированных кардиомиоцитов в цикл деления. Впервые о регенеративном потенциале miR-199a было сообщено в модели свиного инфаркта: однократная генетическая доставка этой микроРНК привела к заметному возобновлению пролиферации кардиомиоцитов и утолщению стенки ЛЖ, однако сопровождалась аритмогенными осложнениями . Последующие исследования подтвердили, что *время и способ доставки* miR-199a критически важны для успеха: при введении сразу в остром постинфарктном периоде возможно восстановление утраченной мышцы, тогда как при задержке на несколько дней регенеративный эффект теряется [3]. Наши результаты согласуются с этими наблюдениями. В группе с нанодоставкой miR-199a непосредственно при реперфузии мы обнаружили признаки активации пролиферации кардиомиоцитов *in vivo* (повышение циклинов, появление Ki-67-позитивных ядер), а главное – клинически значимое улучшение функции сердца, что косвенно свидетельствует о сохранении или восполнении функциональной сократительной ткани. При этом важно подчеркнуть, что наш метод обеспечивает *транзиентное* наличие miR-199a в тканях (в силу разового контролируемого выброса из наночастиц и быстрого клиренса олигонуклеотидов), что потенциально уменьшает риск аритмий по сравнению с продолжительной экспрессией с вирусным вектором . В ходе эксперимента ни у одного из животных с нанотерапией не отмечено опасных аритмий, что позволяет надеяться на относительную

безопасность такого подхода. Конечно, степень реальной регенерации миокарда в нашем случае требует дальнейшего изучения – возможно, улучшение функции отчасти связано не только с появлением новых кардиомиоцитов, но и с защитой уцелевших клеток (через активацию про выживательных путей) и с неоваскуляризацией. Тем не менее, очевидно, что комбинация miR-199a с противофиброзным лечением создаёт более благоприятную среду для регенерации: сниженный фиброз и уменьшенная нагрузка на кардиомиоциты позволяют новым клеткам интегрироваться и функционировать. В наших экспериментах мы действительно наблюдали участки мышечной ткани, перекрывающие разрывы миокарда в зоне инфаркта, которые, вероятно, возникли благодаря одновременному стимулированию роста кардиомиоцитов (miR-199a) и уменьшению рубцовых барьеров (ингибирование TGF-β1).

Преимущества ROS-активируемой доставки. Ключевой инновационной особенностью предложенного подхода является использование *микроокружения реперфузии* (а именно высокой концентрации ROS) в качестве спускового крючка для терапии. Это позволило объединить два различных по природе агента в одной наночастице и высвободить их синхронно в нужное время и месте. Такая *умная* доставка выгодно отличается от традиционного системного введения лекарств, при котором значительная их часть теряется вне цели и могут возникать побочные действия. В нашем случае наночастицы циркулировали неактивно и, вероятно, преимущественно оседали в поврежденном миокарде благодаря эффекту повышенной проницаемости сосудов и ретенции (EPR-эффект) в воспаленной зоне, а также из-за сниженного коронарного кровотока в зоне ишемии перед реперфузией. Как только началась реперфузия и в тканях вспыхнул оксидативный стресс, наночастицы быстро разложились, выпуская siRNA и miR-199a непосредственно в пост-ишемические клетки. Эффективность такого механизма подтверждается резким различием между «ROS+» и «ROS–» условиями в наших *in vitro* опытах: без перекиси водорода терапия не работала , зато при наличии ROS – давала мощный эффект. Аналогично и *in vivo*: у нелеченых животных, где наночастицы не имели триггера для раскрытия (поскольку их не вводили), эффекта не было, тогда как при внутрикоронарном введении *на фоне реперфузии* мы получили значимый терапевтический исход. Следует отметить, что разработка ROS-чувствительных материалов ведется активно, и в последние годы появились сходные системы для адресной доставки лекарств при ИМ. Например, разработаны нанокомплексы с дителлуровыми мостиками, которые высвобождают противовоспалительный препарат дексаметазон и siRNA к VCAM-1, подавляя приток нейтрофилов и уменьшая повреждение при ИМ [4]. Другой пример – частицы, нацеленные на кардиомиоциты, с селеноорганическими связями, доставляющие siRNA к RAGE и тем же дексаметазоном, что привело к снижению воспаления, уменьшению фиброза и улучшению функции сердца у крыс с ИМ [5]. Наша

работа развивает эту концепцию, впервые применяя ROS-триггер для одновременной *генной терапии* двух различных клеточных мишеней (фибробластов и кардиомиоцитов) в контексте регенеративной медицины сердца.

Синергизм комбинированной терапии. Выявленный нами совмещенный эффект весьма показателен. Отдельно как антифиброзная, так и регенеративная тактики уже рассматривались в литературе, но их объединение дает новое качество. Ингибирование TGF-β1 само по себе улучшает восстановление за счет предотвращения избыточного рубца , однако не решает проблему утраты кардиомиоцитов. Напротив, стимуляция пролиферации без контроля над фиброзом может столкнуться с физическим препятствием: новообразующиеся кардиомиоциты могут быть изолированы друг от друга плотной стромой и не интегрироваться функционально. При сочетании же этих подходов, как мы показали, образуется более регенеративно-восприимчивое окружение – «окно возможностей» для роста новых кардиомиоцитов. Сниженный фиброз означает меньше механизмов ухудшения геометрии ЛЖ и стягивания стенки, а новые микромиозины (благодаря miR-199a) заполняют дефект в стенке сердца и берут на себя часть нагрузки. Это подтверждается тем, что в наших экспериментах комбинированная терапия не просто суммировала эффекты отдельных монотерапий, а превзошла их. Например, LVEF улучшилась на 15 п. п. при комботерапии против ~7–10 п. п. при каждой из моно, а рубец уменьшился на ~60% против ~30–40% при отдельных воздействиях. Такой синергизм особенно ценен, учитывая сложность патогенеза ИМ: множественные параллельные процессы (некроз, апоптоз, воспаление, фиброз, гипертрофия и т.д.) требуют многокомпонентного воздействия. Наша система, фактически, является два-в-одном: она адресована к двум главным типам клеток (фибробластам и кардиомиоцитам) и решает две задачи (ограничение повреждения и регенерация). Более того, вероятно, присутствует и третий компонент – антиоксидантный: сама матрица наночастиц при деградации нейтрализует часть ROS (образуя нетоксичные радикалы), а высвобождение siRNA/miR происходит на фоне этого ROS-«гашения». Аналогичный принцип был реализован, например, в *микрогелях* с селенокеталевыми связями, которые одновременно связывают ROS и доставляют про-пролиферативные miR-19a/b, значительно улучшая восстановление сердца у крыс и свиней[6] . В нашем случае можно ожидать схожего иммуномодулирующего эффекта: уменьшение ROS может ослабить воспалительную реакцию, снизить гибель клеток от оксидативного стресса и тем самым косвенно способствовать сохранению миокарда. Хотя мы напрямую не измеряли маркеры воспаления, косвенно об этом говорит меньшее количество нейтрофилов, которое мы наблюдали гистологически в зонах инфаркта у леченых животных, и тренд к снижению аритмий в остром периоде (которые часто провоцируются острым воспалением и окислительным стрессом). Таким образом, ROS-чувствительная платформа

обеспечивает мультифакторный терапевтический эффект при одном вмешательстве.

Клинические перспективы

Предложенная нанотерапия особенно привлекательна с точки зрения практической реализации при лечении инфаркта миокарда. В современных условиях стандартом помощи является срочная реперфузия (чрезкожное коронарное вмешательство – ЧКВ). Наш подход органично дополняет эту процедуру: нанопрепарат может быть введен интракоронарно во время ЧКВ, сразу после открытия сосуда. Это минимально увеличит время вмешательства, но потенциально принесет огромную дополнительную пользу, запустив процессы регенерации уже в катетеризационной лаборатории. Интеграция терапии в момент реперфузии имеет решающее значение – как обсуждалось, своевременность доставки miR-199a определяет ее эффективность [7]. Кроме того, внутрисосудистое целевое введение снижает необходимую дозу и ограничивает системное распространение наночастиц, что повышает профиль безопасности. В перспективе такая платформа может быть загружена и другими комбинациями терапевтических агентов (например, антиапоптотическими, ангиогенными факторами) в зависимости от конкретной клинической ситуации – то есть служить своего рода *терапевтическим конструктором* для персонифицированной медицины при остром коронарном синдроме .

Следует отметить и потенциальные риски. Хотя в нашей работе не выявлено значимых побочных эффектов, необходимо дальнейшее исследование долгосрочной безопасности такой регенеративной терапии. Пролиферация кардиомиоцитов в зрелом сердце – палка о двух концах: избыточная стимуляция может вызвать аритмогенный субстрат или неполноценные по функции миоциты. Однако использование транзиентной доставки олигонуклеотидов (вместо длительной генной экспрессии) должно смягчить эти проблемы – действие miR-199a ограничено первыми днями после ИМ, когда, во-первых, стимулы к регенерации наиболее полезны, а во-вторых, миокард еще электрически «тих» из-за повреждения (и поэтому возникновение нескольких кластеров делящихся клеток менее вероятно спровоцирует аритмию, чем на более поздних стадиях, когда сформирована проводящая ткань в рубце). Тем не менее, необходим тщательный мониторинг ритма сердца и структуры возрожденных участков (например, с помощью МРТ с контрастированием, электрических картирований) в дальнейших исследованиях, прежде чем переходить к клиническим испытаниям. Также важно проверить эффективность данного подхода на более крупных животных (свиньях), чье сердце ближе по размеру и физиологии к человеческому – особенно в контексте доставки: убедиться, что наночастицы равномерно распределяются по зоне инфаркта при катетерном введении и обеспечивают необходимую локальную концентрацию.

Несмотря на перечисленные вопросы, настоящая работа демонстрирует принципиальную осуществимость регенеративно-противофиброзной нанотерапии инфаркта. Она закладывает основу для новой терапевтической парадигмы, где целью лечения становится не только «ограничить ущерб» (как с помощью β-блокаторов, ингибиторов АПФ и др.), но и восстановить утраченный миокард. Такой подход радикально меняет взгляд на последствия инфаркта – от неизбежного рубцевания к потенциально обратимому повреждению с регенерацией. В сочетании с традиционными методами реперфузии и нейрогуморальной блокады, активная регенерация может значительно улучшить качество и прогноз жизни пациентов, уменьшить потребность в трансплантации сердца или механических устройствах поддержки.

Заключение

Мы разработали и успешно апробировали в доклинической модели новый метод комплексной терапии инфаркта миокарда – ROS-чувствительную двойную нанотерапию, сочетающую siRNA против TGF-β1 и миР-199а. Наночастицы данного препарата остаются неактивными при нормальных условиях и *активируются* лишь в зоне ишемии-реперфузии, высвобождая терапевтические грузы под воздействием повышенных ROS. Благодаря этому достигается таргетированное двухцелевое воздействие: подавляется патологический фиброз (через нокдаун TGF-β1) и одновременно стимулируется восстановление мышечной ткани (через перезапуск пролиферации кардиомиоцитов миР-199а). В экспериментах на клеточных культурах и модели инфаркта у крыс такая комбинированная нанотерапия показала выраженный антифиброзный эффект (уменьшение коллагенообразования, снижение площади рубца более чем на 50%) и значимое улучшение функции сердца (рост фракции выброса ЛЖ ~ на 40% относительно нелеченого инфаркта), а также признаки истинной регенерации миокарда (появление делящихся кардиомиоцитов и новых мышечных структур в зоне повреждения). Достижение этих положительных эффектов обусловлено синергизмом двух вмешательств и использованием механизма адресного ROS-триггерного высвобождения, что минимизирует побочное действие и риски. Предлагаемый подход может быть внедрен в клиническую практику путем введения нанопрепарата при проведении ЧКВ у пациентов с острым инфарктом, открывая возможность превратить обычно необратимое рубцевание сердца в процесс, поддающийся терапевтической модуляции и частичной регенерации. Таким образом, ROS-чувствительная двойная нанотерапия представляет собой обоснованную инновационную стратегию для кардиологии и регенеративной медицины, требующую дальнейших исследований, но уже сейчас демонстрирующую потенциал к улучшению исходов инфаркта миокарда и снижения бремени сердечной недостаточности.

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ЗНАЧЕНИЕ ФОРМИРОВАНИЯ МЕХАНИЗМА ДУХОВНО-ИММУНОЛОГИЧЕСКОГО ВОСПИТАНИЯ УЧАЩИХСЯ

Аннотация: *В данной статье представлен научный анализ сущности, необходимости и педагогических основ формирования духовно-иммунологического воспитания учащихся. Духовный иммунитет определяется как устойчивая психологическая и нравственная защитная система личности от вредной информации, идеологических угроз, социального давления и различных негативных внешних воздействий. В условиях современной глобализации он рассматривается как важная компетенция молодёжи. В статье обосновывается, что духовно-иммунологическое воспитание является интегративным процессом, осуществляемым во взаимодействии семьи, образовательных учреждений и общества. Особое внимание уделяется развитию информационной культуры, укреплению критического мышления, формированию национальных и общечеловеческих ценностей, а также созданию здоровой коммуникативной среды. Резкое увеличение информационных потоков в цифровом пространстве делает формирование прочного духовного иммунитета у учащихся ещё более актуальной задачей. В связи с этим в статье предлагаются методические подходы, воспитательные технологии и психолого-педагогические рекомендации, направленные на повышение эффективности механизмов духовно-иммунологического воспитания. Результаты исследования имеют практическую значимость для укрепления духовной устойчивости учащихся, формирования осознанного и ответственного отношения к информации, а также использования новых форм духовной профилактики в образовательном процессе.*

Ключевые слова: *Духовный иммунитет, духовно-иммунологическое воспитание, информационные атаки, критическое мышление, информационная культура, личностная рефлексия, цифровое пространство, духовно-просветительский процесс, педагогические механизмы, социально-духовная устойчивость, система ценностей, воспитательные технологии, профилактическое воспитание, духовная безопасность, коммуникативная компетентность*

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THE SIGNIFICANCE OF DEVELOPING A MECHANISM FOR THE SPIRITUAL-IMMUNOLOGICAL EDUCATION OF STUDENTS

Annotation: *This article provides a scientific analysis of the essence, necessity, and pedagogical foundations of shaping students' spiritual immunological education. Spiritual immunity is defined as an individual's stable psychological and moral defense system against harmful information, ideological threats, social pressure, and various negative external influences. In the context of modern globalization, it is considered an essential competence for the younger generation. The article substantiates that spiritual immunological education is an integrative process carried out through the cooperation of families, educational institutions, and society. It highlights the importance of developing information culture, strengthening critical thinking, instilling national and universal values, and creating a healthy communicative environment. The rapid increase in information flows in the digital space makes the formation of strong spiritual immunity among students even more urgent. Therefore, the article proposes methodological approaches, educational technologies, and psychological-pedagogical recommendations aimed at enhancing the effectiveness of spiritual immunological education mechanisms. The research results have practical significance for strengthening students' spiritual stability, fostering conscious and responsible attitudes toward information, and implementing new forms of spiritual preventive work in the educational process.*

Keywords: *Spiritual immunity, spiritual-immunological education, information attacks, critical thinking, information culture, personal reflection, digital space, spiritual-educational process, pedagogical mechanisms, socio-spiritual stability, value system, educational technologies, preventive education, spiritual security, communicative competence*

Введение

В современных условиях глобализации и резкого усиления потоков цифровой информации одной из актуальных задач остаётся обеспечение духовной устойчивости молодёжи и воспитание их как личности с крепким духовным иммунитетом, способной защищать себя от вредоносной информации, идеологических угроз и социально-психологического давления.

Особенно важно учитывать, что социальные сети, средства массовой коммуникации и различные идеологические потоки, оказывающие прямое влияние на сознание молодёжи, играют значительную роль в формировании мировоззрения учащихся, что требует организации данного процесса на научно-педагогической основе. [1]

В последние годы в нашей стране проводится широкий комплекс реформ, направленных на воспитание молодёжи и укрепление их духовно-нравственного совершенства. В частности, президентские указы и распоряжения, а также государственные программы, принятые в рамках идеи «Новый Узбекистан – просвещённое общество», нацеленные на модернизацию системы образования и воспитания, повышение эффективности работы с молодёжью и развитие их духовно-просветительской грамотности, создают важную нормативно-правовую основу для формирования духовного иммунитета. В этих документах определены приоритетные направления: защита молодёжи от воздействия вредоносной информации, развитие культуры информационной безопасности, поддержка критического и самостоятельного мышления, воспитание личностей, преданных национальным и общечеловеческим ценностям.

С этой точки зрения, научное обоснование механизма формирования духовно-иммунологического воспитания учащихся является одной из стратегических задач системы образования. Этот процесс должен осуществляться не только в рамках педагогической деятельности, но и во взаимодействии с семьёй, местным сообществом и обществом в целом. Формирование у учащихся крепкого духовного иммунитета способствует развитию их осознанного отношения к информации, укреплению иммунитета к различным идеологическим угрозам и формированию их как социально и духовно устойчивой личности.

Основная часть

Актуальность статьи заключается в том, что в ней проводится научный анализ содержания процесса духовно-иммунологического воспитания, педагогических механизмов, современных подходов, а также способов их реализации в соответствии с приоритетными задачами, определёнными в президентских указах и распоряжениях. [2]

Формирование духовно-иммунологического воспитания учащихся считается одним из наиболее актуальных направлений современного образовательного процесса. Глобализация, развитие интернет-технологий и резкое увеличение потоков информации способствуют усилению различного рода социальных, идеологических и психологических воздействий на сознание молодёжи. Особенно важно, что учащиеся проводят значительную часть времени в цифровом пространстве, а их психологическая подготовка не всегда достаточно развита, что требует организации процесса формирования духовного иммунитета на научной основе.

Духовный иммунитет представляет собой сложную психолого-педагогическую систему, отражающую способность личности к психо-духовной устойчивости и защите от вредоносной информации, идеологических угроз, потоков, противоречащих морально-гуманистическим нормам, социального давления и различных негативных внешних воздействий. Содержание этой системы определяется критическим отношением учащегося к информации, устойчивостью системы ценностей, личной позицией, уровнем самопознания, аффективно-волевой готовностью и коммуникативной культурой.

Реформы в сфере образования, проводимые в нашей стране, особенно указывают на особое внимание к духовно-иммунологическому воспитанию молодёжи. Президентские указы и распоряжения, направленные на совершенствование работы с молодёжью, предусматривают защиту от вредоносной информации, укрепление духовно-нравственного совершенства и развитие навыков самостоятельного мышления и анализа информации в цифровом пространстве. Это подчёркивает, что формирование духовного иммунитета в образовательных учреждениях является не только воспитательным направлением, но и стратегической педагогической задачей.

Духовный иммунитет учащихся формируется под влиянием нескольких факторов. Прежде всего, в семейной среде формируются моральные взгляды ребёнка, его отношение к ценностям и социальный опыт поведения. Педагогическая грамотность родителей, здоровая атмосфера в семье и культура семейного диалога создают фундамент духовного иммунитета. Образовательные учреждения укрепляют этот фундамент, развивая знания учащихся, их духовно-интеллектуальный потенциал и навыки критического мышления, формируя их как морально устойчивую личность. Личный пример учителя, его культура общения и воспитательная направленность педагогической деятельности являются непосредственными факторами, влияющими на формирование духовного иммунитета.

В современном мире цифровое информационное пространство стало неотъемлемой частью жизни учащихся. Разнообразная информация, распространяемая в социальных сетях, а также влияние визуальных и аудиокоммуникационных средств повышают риск формирования противоречивых идей в сознании молодёжи. Поэтому крайне важно развивать у учащихся медиаграмотность, информационную культуру, навыки анализа источников и умение различать ложную и манипулятивную информацию. Эти навыки составляют когнитивную основу духовного иммунитета и играют важную роль в защите учащегося от воздействия вредоносной информации. [3]

Процесс формирования духовного иммунитета тесно связан с психологическим развитием учащихся. Ученик, обладающий сильными психологическими качествами, такими как личная рефлексия, самопознание, эмоциональная устойчивость и управление эмоциями, реже поддаётся чуждым идеям, устойчив к стрессу и давлению. Напротив, учащиеся,

психологически не подготовленные, становятся наиболее уязвимой целью для воздействия вредоносной информации. Поэтому в образовательном процессе эффективными являются рефлексивные занятия, мотивационные беседы, социально-психологические тренинги и коммуникативные игры. [4]

В формировании духовного иммунитета учащихся важную роль играет укрепление системы ценностей. Национальные ценности, историческое наследие, просветительские идеи и общечеловеческие добродетели создают духовную опору в сознании учащегося. Молодые люди, обладающие такой опорой, не поддаются чуждым идеям, формируют собственное мнение и сохраняют верность национальным интересам. С этой точки зрения, внеклассные и школьные мероприятия, встречи, круглые столы, литературно-художественные вечера, уроки патриотизма укрепляют эмоционально-аксиологическую основу духовного иммунитета.

В педагогическом процессе эффективными механизмами формирования духовного иммунитета являются развитие критического мышления, использование творческих заданий и ситуационного анализа, применение интерактивных методов, вовлечение учащихся в социальную деятельность, усиление сотрудничества с общественностью, а также установление тесного взаимодействия в системе семья–школа–местное сообщество. Эти механизмы не только укрепляют духовный иммунитет учащихся, но и повышают их социальную активность, развивают личную ответственность и формируют устойчивую жизненную позицию. [5]

Вопрос формирования духовного иммунитета учащихся является одной из наиболее изучаемых тем на стыке современной педагогики, психологии, социологии и философии. В мировых научных исследованиях такие понятия, как «spiritual immunity» (духовный иммунитет), «moral resilience» (моральная устойчивость), «psychological resistance» (психологическая сопротивляемость), «value-based education» (образование, основанное на ценностях), «media literacy» (медиаграмотность), формируют основные теоретические категории духовно-иммунологического воспитания.

В частности, научные идеи таких учёных, как Дж. Хайдет, Л. Кольберг, А. Маслоу, М. Рокеач, касающиеся морального развития, системы ценностей и механизмов социальной защиты личности, формируют психологическую основу понятия духовного иммунитета. По их мнению, моральная устойчивость личности, преданность ценностям и эмоционально-волевая готовность являются важнейшими факторами противостояния идеологическому давлению и воздействию негативной информации.

В отечественной литературе значимые исследования в области духовно-нравственного воспитания, национальной идеи, духовного наследия и воспитания молодёжи проведены такими учёными, как А. Кодиров, Н. Жораев, С. Отамуродов, Р. Хуршидов, М. Тиллабоев и другими. В их работах подробно рассматриваются структурные компоненты духовного иммунитета, роль духовных ценностей в сознании молодёжи, воспитательные функции образовательных учреждений и семьи. Особенно актуальным становится

вопрос формирования духовного иммунитета в контексте модернизации системы образования в Узбекистане и государственной политики, направленной на повышение эффективности духовно-просветительской работы.

В исследованиях, посвящённых стремительному развитию цифрового пространства, глубоко анализируются медиаграмотность, информационная культура и проблемы формирования сознания личности в виртуальной среде. Учёные, такие как Д. Бакхэм, Х. Дженкинс, С. Ливингстон, изучали влияние потоков информации в интернете на психологию молодёжи, риски манипулятивной информации и механизмы формирования навыков критического отбора информации. Их работы подтверждают решающую роль медиаграмотности в формировании духовного иммунитета учащихся.

Кроме того, научные взгляды специалистов в области коммуникативной психологии, таких как Э. Берн, В. Франкл, К. Роджерс, относительно внутренних потребностей человека, поиска смысла, устойчивости к стрессу и процессов самопознания, позволяют анализировать психологические компоненты духовного иммунитета.

Указы и распоряжения Президента Республики Узбекистан, а также государственные программы, направленные на усиление духовно-просветительской работы, воспитание молодёжи в духе преданности национальным и общечеловеческим ценностям и защиту от информационных атак, формируют нормативно-правовую базу по данному вопросу. В этих документах определены конкретные задачи по защите молодёжи от вредоносных информационных потоков, развитию культуры информационной безопасности и организации образовательного процесса на основе современных педагогических подходов, что согласуется с теоретическими идеями, представленными в научной литературе.

В последние годы в научных исследованиях широко применяются комплексные подходы к формированию духовного иммунитета учащихся. В частности, в качестве эффективных механизмов духовно-иммунологического воспитания рекомендуются интегративное обучение, компетентностно-ориентированный подход, активные и интерактивные методы, рефлексивно-педагогические практики, сотрудничество «семья–школа–общество», а также технологии психологической профилактики. Большинство этих подходов направлены на развитие у учащихся навыков критического мышления, принятия моральных решений, формирования личной позиции и осознанного отношения к информации.

Методологическая основа данного исследования представляет собой совокупность научных концепций, теоретических подходов и методов, направленных на системное изучение духовно-нравственного воспитания, развития личности, информационной культуры и педагогических механизмов воздействия. Прежде всего, теоретическую базу исследования составляют философско-аксиологические подходы, раскрывающие сущность духовного иммунитета и его взаимосвязь с психологическими и социокультурными

факторами. Эти подходы позволяют научно анализировать формирование духовных ценностей как устойчивой системы в сознании личности, а также их роль и значение в противостоянии идеологическим угрозам в социальном окружении.

Кроме того, методологическое значение имеют теории таких психологов, как Л. С. Выготский, А. Бандура, Дж. Брунер, касающиеся социального обучения, развития личности и рефлексивного сознания, которые раскрывают психологические основы формирования духовного иммунитета у учащихся.

С педагогической точки зрения, исследование опирается на технологический подход, концепцию компетентностного обучения, активные методы обучения, принципы совместного обучения и системность воспитательного процесса. Этот методологический фундамент позволяет рассматривать формирование духовного иммунитета не как набор отдельных мероприятий, а как сложную педагогическую систему, обеспечивающую непрерывное развитие личности.

Одним из ключевых методологических аспектов является информационно-коммуникационный подход, анализирующий механизмы развития медиаграмотности, навыков отбора информации и коммуникативной компетенции учащихся в цифровой среде. Этот подход необходим для научного обоснования актуальности укрепления духовного иммунитета в условиях информационных угроз.

В числе эмпирических методов, применённых в исследовании, — аналитико-сравнительный метод, контент-анализ, педагогическое наблюдение, анкетирование, интервью, экспертная оценка. С их помощью изучаются состояние духовно-нравственного развития учащихся, их отношение к информации, уровень устойчивости к социально-культурным воздействиям и эффективность воспитательного процесса на практике. Кроме того, с помощью статистического анализа и педагогической диагностики обрабатываются полученные данные для оценки эффективности механизмов формирования духовного иммунитета.

Концептуальной основой исследования является системный подход: личность учащегося рассматривается как сложный социальный объект, развивающийся под влиянием внутренних (психологических, духовных, аксиологических) и внешних (семья, школа, общество, цифровое пространство) факторов. Таким образом, методология духовно-иммунологического воспитания носит мультидисциплинарный характер, объединяя педагогику, психологию, теорию коммуникации, социологию и информационную безопасность.

Результаты исследования показали, что формирование духовно-иммунологического воспитания учащихся является сложным и многогранным процессом, который осуществляется через интегративное влияние внутренних психологических, моральных и аксиологических характеристик личности и внешней социально-педагогической среды. По

данным эмпирических наблюдений и опросов, случаи недостаточного развития духовного иммунитета у учащихся чаще связаны с восприимчивостью к информационным атакам и медиа-манипуляциям, низким уровнем критического мышления, слабой идеологической устойчивостью и нечетко сформированной личной позицией. В то же время в группах, где применялись интерактивные методы, духовно-рефлексивные занятия, уроки медиаграмотности и педагогические подходы на основе сотрудничества семьи, школы и общества, наблюдались значительно более высокие показатели духовного иммунитета учащихся.

Анализ результатов показал, что формирование духовного иммунитета у учащихся связано с развитием критического мышления, информационной культуры, личной рефлексии, социальной и моральной устойчивости, а также системы ценностей. Это подтверждает, что духовно-иммунологическое воспитание является не только моральной и просветительской задачей, но и компетенцией, которая должна развиваться комплексно в рамках современной системы образования. Следовательно, в педагогической практике недостаточно лишь предоставления теоретических знаний; необходимо вовлечение учащихся в социальную и духовную активность, регулярное применение рефлексивных занятий и интерактивных методов.

Результаты исследования также показали, что сотрудничество семьи, школы и общества играет решающую роль в формировании духовного иммунитета. Система ценностей, формируемая в семье, воспитательная деятельность и педагогические технологии в школе, а также позитивная информационно-культурная среда общества совместно укрепляют психолого-духовную устойчивость учащегося. В условиях цифрового пространства развитие медиаграмотности и информационной культуры выступает эффективным средством защиты учащихся от манипулятивных информационных потоков и формирования навыков самостоятельного мышления.

Обсуждаемые результаты подтверждают, что процесс формирования духовного иммунитета способствует укреплению социальной и моральной устойчивости учащихся, развитию преданности национальным и общечеловеческим ценностям, формированию осознанного и ответственного отношения к информации. Кроме того, системное и интегративное применение педагогических механизмов позволяет воспитывать учащихся как устойчивых к идеологическим угрозам личностей. Исследование также показало стратегическую важность использования интерактивных методов, рефлексивных занятий, уроков медиаграмотности и развития сотрудничества с обществом для повышения эффективности духовно-иммунологического воспитания.

Таким образом, полученные результаты и их анализ подтверждают, что формирование духовного иммунитета учащихся требует системного, непрерывного и комплексного подхода. Применение разработанных

педагогических механизмов и методических рекомендаций на практике обеспечивает высокую эффективность в укреплении психолого-духовной устойчивости учащихся и их воспитании как личностей, защищённых от информационных атак и идеологических угроз. Эти результаты служат научно-практической основой для внедрения новых форм духовной профилактики в образовательный процесс и укрепления социальной и моральной устойчивости учащихся.

Заключение

Результаты исследования показали, что формирование духовно-иммунологического воспитания учащихся является сложным, многогранным и непрерывным педагогическим процессом, который осуществляется через внутреннюю психолого-моральную подготовленность личности, критическое мышление, систему ценностей, личную рефлексию и интегративное влияние внешней социально-педагогической среды. Эмпирические наблюдения и опросы продемонстрировали, что сотрудничество семьи, школы и общества, применение интерактивных методов обучения, развитие медиаграмотности и информационной культуры эффективно способствуют формированию духовного иммунитета у учащихся. Исследование показало, что духовный иммунитет тесно связан не только с моральными и просветительскими навыками, но и с психологической устойчивостью, социальной активностью и осознанным отношением к информации.

Следовательно, в педагогической практике крайне важно организовать духовно-иммунологическое воспитание на основе системного и интегративного подхода, регулярно применять рефлексивные занятия и интерактивные методы, а также выстраивать сотрудничество «семья–школа–общество». Результаты исследования также подтверждают, что развитие духовного иммунитета позволяет воспитывать учащихся как устойчивых к идеологическим угрозам, ответственных за восприятие информации и социально и морально устойчивых личностей. Применение разработанных методических рекомендаций и педагогических механизмов в практике обеспечивает внедрение новых форм духовной профилактики, защиту учащихся от вредоносных информационных потоков и укрепление их психолого-духовной устойчивости. В целом, исследование подтверждает стратегическую значимость формирования духовного иммунитета учащихся в современной системе образования и создаёт научно-практическую основу для педагогической деятельности.

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ГАСТРОЭНТЕРОЛОГИЧЕСКИЕ ОСЛОЖНЕНИЯ У БОЛЬНЫХ ТУБЕРКУЛЁЗОМ: ПАТАГЕНЕЗ, КЛИНИКА, ДИАГНОСТИКА И СОВРЕМЕННЫЕ ПОДХОДЫ

Аннотация: *Гастроэнтерологические осложнения при туберкулёзе являются одним из ключевых факторов, определяющих приверженность лечению, частоту прерываний терапии, токсичность противотуберкулёзных схем и клинические исходы. Настоящая работа представляет комплексный анализ патогенеза, клинических проявлений, диагностических методов и современных принципов ведения больных туберкулёзом, осложнённым поражением желудочно-кишечного тракта. Особое внимание уделено лекарственному гепатиту, дисбиозу кишечника, мальабсорбции, нутритивной недостаточности и специфическим формам туберкулёза ЖКТ.*

Ключевые слова: *туберкулёз, лекарственный гепатит, дисбиоз, мальабсорбция, нутритивная недостаточность, туберкулёз кишечника.*

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GASTROENTEROLOGICAL COMPLICATIONS IN TUBERCULOSIS PATIENTS: PATHOGENESIS, CLINICAL FEATURES, DIAGNOSTICS AND MODERN APPROACHES

Annotation. *Gastroenterological complications in tuberculosis patients represent one of the key factors determining treatment adherence, frequency of therapy interruptions, drug toxicity, and overall clinical outcomes. This article provides a comprehensive analysis of the pathogenesis, clinical manifestations, diagnostic methods, and modern approaches to the management of tuberculosis complicated by gastrointestinal involvement. Special attention is given to drug-induced hepatitis, intestinal dysbiosis, malabsorption, nutritional deficiency, and specific forms of gastrointestinal tuberculosis.*

Keywords: *tuberculosis, drug-induced hepatitis, dysbiosis, malabsorption, nutritional deficiency, intestinal tuberculosis.*

Туберкулёз на протяжении последних десятилетий остаётся одной из самых значимых инфекций, оказывающих долговременное влияние на систему здравоохранения, экономику и социальную устойчивость государств. По данным Всемирной организации здравоохранения ежегодно регистрируется более 10 миллионов новых случаев заболевания [1], при этом около 1,6 миллиона пациентов умирают от его осложнений [2]. Ведущим фактором ухудшения клинических исходов остаётся токсичность лекарственной терапии, особенно при лечении множественной и широкой лекарственной устойчивости микобактерий туберкулёза.

Желудочно-кишечный тракт является одной из систем, наиболее сильно страдающих при лечении туберкулёза. По данным ВОЗ, частота выраженных гастроэнтерологических нарушений составляет от 15 до 40 % [3], а при МЛУ/ШЛУ-туберкулёзе достигает 60 % [4]. Эти осложнения

нередко становятся причиной прерывания лечения, формирования лекарственной устойчивости, снижения качества жизни и развития жизнеугрожающих состояний, таких как лекарственный гепатит, тяжёлая диарея, выраженные электролитные нарушения, токсическая энтеропатия и нутритивная кахексия [3–5].

Целью настоящей работы является представление комплексного анализа механизмов поражения желудочно-кишечного тракта при туберкулёзе, их клинических проявлений, диагностических подходов и современных клинических стратегий, обеспечивающих снижение токсичности и повышение эффективности лечения.

Патогенез гастроэнтерологических осложнений

Патогенез поражения ЖКТ при туберкулёзе носит многокомпонентный характер и включает прямое специфическое поражение органов пищеварения микобактериями, лекарственно-индуцированные повреждения, иммунопатологические изменения, нутритивный дефицит, дисбиотические нарушения, а также влияние сопутствующих инфекций, прежде всего ВИЧ, вирусных гепатитов В и С [3–8]. Каждый из перечисленных механизмов может самостоятельно формировать клиническую картину, однако в реальной клинической практике они, как правило, действуют синергично.

1. Прямое поражение желудочно-кишечного тракта микобактериями

Туберкулёз кишечника является наиболее частой формой абдоминального туберкулёза и, по данным различных исследований, составляет до 50–70 % от всех случаев внелёгочного поражения ЖКТ [4, 6]. Наиболее уязвимыми участками считают терминальный отдел подвздошной кишки, илеоцекальную область, слепую кишку, брыжеечные лимфоузлы и брюшину [4, 6, 7]. Такая избирательность обусловлена обилием лимфоидной ткани (бляшки Пейера), замедленным продвижением кишечного содержимого и высокой всасывательной способностью указанных отделов, что создаёт благоприятные условия для фиксации и инвазии микобактерий.

Патогенетически поражение характеризуется образованием эпителиоидных гранулём с гигантскими клетками Пирогова—Лангханса, развитием казеозного некроза, формированием язв, фиброзных изменений и стриктур, а также возможным образованием желудочно-кишечных свищей и мезентериального лимфаденита [4, 6, 7]. Клинически важно, что у 20–25 % пациентов проявления кишечного туберкулёза имитируют болезнь Крона, что существенно повышает риск диагностических ошибок и назначения неадекватной иммуносупрессивной терапии [4, 7, 20].

1.2. Иммуновоспалительные механизмы

Туберкулёз сопровождается длительной системной воспалительной реакцией. В патогенезе поражения ЖКТ ключевую роль играют такие цитокины, как TNF-α, IL-6, IL-1β и IFN-γ [8]. Их избыток приводит к нарушению моторики кишечника, снижению резорбции нутриентов,

повышению чувствительности тканей к лекарственным препаратам, а также к развитию воспалительных изменений слизистой желудка и кишечника.

Хроническое системное воспаление способствует формированию анорексии и кахексии, которые рассматриваются как важнейшие факторы риска неблагоприятного течения туберкулёза и повышения частоты гастроэнтерологических осложнений [8, 9].

1.3. Лекарственная токсичность

Практически все противотуберкулёзные препараты обладают тем или иным потенциалом гепато- и гастротоксичности [14–17] (таблица).

Таблица

Наиболее опасные препараты для ЖКТ

Препарат	Вид токсичности	Источник
Изониазид	гепатит, тошнота	[9]
Рифампицин	холестаз	[10]
Пиразинамид	некроз гепатоцитов	[11]
Фторхинолоны	токсическая энтеропатия	[12]
Линезолид	митохондриальная токсичность	[13]
Бедаквилин	диспепсия, анорексия	[14]

В совокупности эти эффекты формируют высокий риск лекарственно-индуцированного гепатита и поражения ЖКТ.

1.4. Нутритивный дефицит

По данным исследований, до 80 % больных туберкулёзом страдают различными формами нутритивной недостаточности [9–11]. Это обусловлено снижением аппетита, анорексией, мальабсорбцией, повышенными энергетическими затратами на фоне хронического воспаления, а также дефицитом витаминов D, B12, фолиевой кислоты, железа и ряда микроэлементов [9–11]. Нутритивная недостаточность увеличивает токсичность противотуберкулёзных препаратов, ухудшает иммунный ответ и ассоциируется с более высоким уровнем летальности [9–11].

2. Клинические проявления поражения желудочно-кишечного тракта

Клинические проявления поражения ЖКТ при туберкулёзе можно условно разделить на функциональные, структурные и токсические.

Функциональные нарушения включают жалобы на диспепсию, чувство тяжести в эпигастрии, тошноту, раннее насыщение и снижение аппетита. По данным ряда исследований, подобные симптомы наблюдаются у 40–60 % пациентов, получающих противотуберкулёзную терапию.

Особое место среди осложнений занимает лекарственно-индуцированный гепатит, который по различным данным развивается у 5–25 % больных в зависимости от схемы лечения и наличия фоновой патологии печени [14]. Он проявляется слабостью, кожным зудом, желтухой, тахикардией и значительным повышением уровня АЛТ/АСТ (в 5–10 раз выше верхней границы нормы). Патогенетически его развитие

характеризуется последовательной сменой дисфункции митохондрий, воспаления, холестаза и некроза гепатоцитов. Дисбиоз кишечника возникает у значительной части пациентов, особенно при длительном приёме фторхинолонов и этионамида/протионамида [12]. Он проявляется вздутием живота, нестабильным стулом, усилением интоксикации и снижением резистентности к кишечным инфекциям.

Мальабсорбция и нутритивная недостаточность проявляются выраженной потерей массы тела, гиповитаминозом, сухостью кожи, мышечной слабостью и анемией [8–11]. Указанные признаки требуют обязательной оценки нутритивного статуса и целенаправленной коррекции.

3. Диагностика поражения желудочно-кишечного тракта

Диагностический алгоритм при подозрении на поражение ЖКТ у больных туберкулёзом должен включать комплекс лабораторных, инструментальных и, при необходимости, морфологических исследований [3, 4, 6].

В лабораторном блоке оценка функции печени предполагает определение АЛТ, АСТ, щелочной фосфатазы, ГГТ и билирубина. Дополнительно изучаются общий белок и альбумин, ферритин, уровень железа, концентрации витаминов D, B12 и фолата, электролитов, а также показатели свёртываемости крови. Обязательным компонентом обследования является копрологическое исследование, позволяющее судить о переваривании и всасывании нутриентов [8–11]. У пациентов, получающих линезолид, целесообразно измерение уровня лактата, а при подозрении на панкреатопатию — липазы и амилазы [5, 13].

Инструментальными методами диагностики являются ультразвуковое исследование органов брюшной полости, эзофагогастродуоденоскопия, колоноскопия, компьютерная томография и магнитно-резонансная томография [4, 6]. УЗИ брюшной полости позволяет выявить стеатоз, гепатомегалию и признаки холестаза. Эндоскопические методы (ФГДС и колоноскопия) дают возможность визуализировать гастриты, эрозии, дуодениты, язвенные поражения, гранулёматозные изменения и стриктуры [4, 6]. КТ и МРТ применяются при подозрении на туберкулёзный перитонит или абдоминальные абсцессы, выявляя утолщение брюшины, фиброзные перегородки и асцит [6, 19]. При этом биопсия слизистой оболочки кишечника или брюшины остаётся «золотым стандартом» диагностики туберкулёза ЖКТ, позволяя обнаружить эпителиоидные гранулёмы с казеозным некрозом [4, 6].

4. Лекарственный гепатит как ключевая проблема ведения пациентов

Лекарственно-индуцированный гепатит (ЛГ) представляет собой одно из наиболее опасных осложнений противотуберкулёзной терапии. Его развитие напрямую связано как с токсичностью препаратов первой линии, так и с расширенными схемами лечения МЛУ/ШЛУ-туберкулёза. По данным различных исследований частота ЛГ составляет от 5 до 25 % для

стандартных режимов и до 40 % для схем с препаратами второго ряда [14, 15].

Клинические проявления ЛГ включают ранние симптомы в виде потери аппетита, чувства тяжести в правом подреберье и диспепсии, более поздние признаки (тошнота, рвота, кожный зуд, слабость, тахикардия, изменение цвета мочи и кала), а также угрожающие признаки, такие как выраженная желтуха, снижение протромбинового индекса и признаки печёночной энцефалопатии [14, 15]. Биохимически отмечается повышение АЛТ/АСТ в 5–10 раз выше нормы, повышение уровня билирубина и щелочной фосфатазы. У больных МЛУ-туберкулёзом нередко наблюдается сочетанный цитолитико-холестатический синдром.

Современные рекомендации предполагают немедленную отмену наиболее гепатотоксичных препаратов (пиразинамида, изониазида и рифампицина), проведение регулярного биохимического мониторинга, проведение детоксикационной и, при необходимости, гепатопротекторной терапии, а после нормализации показателей — поэтапное возвращение препаратов в схему лечения. В тяжёлых случаях рассматривается возможность модификации режима с исключением пиразинамида и подбором альтернативных комбинаций [2, 3, 14].

5. Дисбиоз и нарушения микробиоты кишечника

Длительная антибиотикотерапия, особенно с использованием фторхинолонов и второлинейных препаратов, закономерно приводит к изменению состава кишечной микробиоты. По данным современных работ, у 75–80 % пациентов с туберкулёзом выявляются признаки дисбиоза различной степени выраженности [12, 18, 20].

К основным причинам формирования дисбиоза относятся длительный приём антибактериальных препаратов, недостаточное потребление пищевой клетчатки, наличие мальабсорбции и сопутствующих кишечных инфекций [12, 18, 20]. Нарушение микробиоты ведёт к снижению местного иммунитета кишечника, повышению риска диарейного синдрома, расстройству метаболизма витаминов группы В, усилению эндогенной интоксикации и ухудшению усвоения лекарственных препаратов.

6. Нутритивная недостаточность у больных туберкулёзом

Нутритивная недостаточность является крайне распространённым и клинически значимым явлением при туберкулёзе. До 80 % пациентов имеют дефицит массы тела, а почти половина — выраженную гипопротеинемию [9–11, 16, 22]. Это связано с катаболическим эффектом хронического воспаления, снижением аппетита и анорексией, мальабсорбцией, частыми эпизодами тошноты, рвоты и диареи, а также психосоциальными факторами [9–11].

Согласно рекомендациям ВОЗ и ряду клинических исследований, нутритивная поддержка должна включать энергетическую ценность рациона на уровне 35–40 ккал/кг/сут, потребление белка в дозе 1,2–1,5 г/кг/сут, преобладание в рационе полиненасыщенных омега-3 жирных кислот, а

также адекватное поступление витаминов D, B6, B12, фолиевой кислоты и микроэлементов (цинк, селен) [1, 9–11]. В схемы нутритивной поддержки рекомендуется включать высокобелковые смеси (не менее 20 г белка на порцию), смеси, обогащённые омега-3, и специализированные формулы для больных туберкулёзом.

Проведённые наблюдательные исследования показывают, что полноценная нутритивная поддержка способствует повышению переносимости противотуберкулёзной терапии, улучшению иммунного статуса и снижению частоты тяжёлых осложнений [9–11].

7. Туберкулёз кишечника

Абдоминальный туберкулёз остаётся одной из наиболее сложных для диагностики форм заболевания. Клиническая картина нередко имитирует онкологические и аутоиммунные процессы, что приводит к задержке постановки диагноза и отсрочке специфической терапии [4, 6].

Туберкулёз кишечника клинически проявляется хроническими болями в животе, анемией, потерей массы тела, диареей, формированием стриктур и развитием кишечной непроходимости [4, 6, 19]. До 20 % случаев ошибочно трактуются как болезнь Крона, особенно при отсутствии чётких рентгенологических и микробиологических признаков туберкулёза [4, 7, 20].

Заключение

Гастроэнтерологические осложнения при туберкулёзе являются важнейшим прогностическим фактором, определяющим приверженность лечению, токсичность, частоту прерываний терапии и конечные клинические исходы. Ранняя диагностика поражения желудочно-кишечного тракта, целенаправленная коррекция медикаментозно-индуцированных нарушений, нутритивная поддержка и постоянный мониторинг гепатотоксичности позволяют существенно повысить безопасность терапии. Мультидисциплинарный подход, интегрирующий усилия фтизиатра, гастроэнтеролога, диетолога и других специалистов, в сочетании с применением современных научно обоснованных стратегий лечения способствует улучшению качества жизни пациентов и повышению эффективности борьбы с туберкулёзом в целом.

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ИННОВАЦИОННЫЕ ПОДХОДЫ К МОНИТОРИНГУ БЛАГОСОСТОЯНИЯ НАСЕЛЕНИЯ НА ОСНОВЕ ЦИФРОВЫХ ПЛАТФОРМ

Аннотация*: Современные тенденции цифровой трансформации экономики открывают новые возможности для мониторинга благосостояния населения, обеспечивая более точную, оперативную и комплексную оценку социально-экономических процессов. Использование цифровых платформ, больших данных, мобильных приложений, онлайн-опросов и интегрированных государственно-информационных систем позволяет получать данные в режиме реального времени, отслеживать динамику доходов, уровня потребления, финансовой устойчивости и социальной защищенности различных групп населения. В условиях усиливающейся роли человеческого капитала и необходимости повышения качества жизни граждан инновационные цифровые решения становятся ключевым инструментом для формирования эффективной государственной политики. Данная статья посвящена анализу возможностей цифровых платформ в оценке благосостояния населения, рассмотрению зарубежного и локального опыта, а также определению преимуществ и ограничений цифрового мониторинга по сравнению с традиционными статистическими методами. В исследовании подчёркивается значимость развития цифровой инфраструктуры, автоматизации и межведомственной интеграции данных для повышения прозрачности и результативности государственного управления, а также выявления социально уязвимых слоёв, что способствует выработке адресных мер поддержки.*

Ключевые слова: *Цифровые платформы, мониторинг благосостояния, большие данные, социально-экономические показатели, человеческий капитал, финансовая устойчивость, инновационные технологии, государственная политика, цифровая трансформация, уровень жизни.*

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INNOVATIVE APPROACHES TO MONITORING THE WELL-BEING OF THE POPULATION BASED ON DIGITAL PLATFORMS

Abstract: *Modern digital transformation processes open new opportunities for monitoring the well-being of the population by providing more accurate, timely, and comprehensive evaluation of socio-economic conditions. Digital platforms, big data analytics, online services, and integrated information systems allow real-time tracking of income dynamics, consumption levels, financial stability, and social inclusion. This enhances the effectiveness of public policy, supports rapid decision-making, and improves the targeting of social protection programs. The article examines the theoretical foundations and practical potential of digital platforms for population well-being monitoring, highlights international and local experience, identifies key advantages and challenges of digital approaches compared to traditional statistical methods, and emphasizes the role of digital infrastructure in increasing transparency and social development efficiency.*

Keywords: *Digital platforms, monitoring of well-being, big data, socio-economic indicators, human capital, financial stability, innovative technologies, public policy, digital transformation, quality of life.*

Введение

Мониторинг благосостояния населения является важнейшим компонентом социально-экономической политики, направленной на обеспечение устойчивого развития государства и повышение качества жизни граждан. Традиционные методы оценки уровня благосостояния опираются на данные государственных статистических органов, выборочные обследования и макроэкономические показатели, такие как уровень доходов, занятость, потребление, доступ к базовым услугам. Однако в современных условиях цифровизации экономики и общества данные, получаемые классическими способами, зачастую оказываются недостаточно оперативными, фрагментарными и не всегда способными точно отражать реальные изменения в жизни людей. Это создает необходимость внедрения инновационных подходов, основанных на использовании цифровых платформ, автоматизированных источников информации и аналитических технологий.

Цифровые платформы, охватывающие банковский сектор, электронные государственные услуги, системы онлайн-торговли, телекоммуникационные данные и социальные сети, формируют уникальную информационную среду,

позволяющую осуществлять комплексный анализ благосостояния в реальном времени. Их использование способствует получению более точной картины социального развития, выявлению неравенства, определению уровня финансовой включенности населения, анализу потребительского поведения и оценки эффективности социальных программ. Формируемые цифровые следы представляют огромный потенциал для исследования динамики доходов и расходов, миграционных процессов, доступа к образованию и медицине, а также уровня цифровой компетентности граждан.

Одним из ключевых преимуществ цифрового мониторинга является возможность создания персонализированных и территориально дифференцированных аналитических моделей. Это обеспечивает государственные органы данными для оперативного принятия необходимых решений и выработки адресных мер поддержки уязвимых слоев населения. Важную роль играют технологии больших данных и искусственного интеллекта, способные обрабатывать большие массивы информации, выявлять скрытые закономерности и прогнозировать социально-экономические риски.

Мировая практика демонстрирует активное развитие цифровых платформ в системах социального мониторинга. В ряде стран функционируют комплексные платформы, обеспечивающие сбор информации о состоянии домохозяйств, их доходах, расходах, уровне занятости и доступе к социальным услугам, что способствует повышению эффективности бюджетных расходов и социальной поддержки. Внедрение подобных цифровых решений приобретает стратегическое значение и для государств с формирующимися экономиками, где социально-экономические преобразования требуют оперативных аналитических инструментов.

Таким образом, цифровые инновации выступают ключевым фактором модернизации системы мониторинга благосостояния населения. Они позволяют не только повысить качество анализа и прогноза, но и формируют принципиально новые подходы к управлению социально-экономическим развитием. Актуальность выбранной темы обусловлена необходимостью исследования теоретических оснований, методических подходов, технологических инструментов и организационных аспектов внедрения цифровых платформ для мониторинга благосостояния населения, а также оценкой их влияния на принятие государственных решений и повышение общественного благополучия.

Методы

Методологическая основа исследования инновационных подходов к мониторингу благосостояния населения на базе цифровых платформ включает сочетание количественных и качественных методов анализа, а также использование современных информационно-аналитических технологий. В качестве ключевого направления применяется анализ больших данных, который обеспечивает возможность обработки разнообразных источников информации в больших объемах и с высокой скоростью. Для

оценки уровня благосостояния населения используются данные цифровых сервисов, таких как электронные государственные услуги, банковские транзакции, платформы электронной коммерции, мобильные приложения, телекоммуникационные данные, а также данные из систем социальной защиты. Интеграция таких источников позволяет получать многомерные показатели, которые отражают реальные условия жизни домохозяйств.

Для обработки данных применяются интеллектуальные методы анализа: машинное обучение, методы кластеризации, регрессионный анализ и социальная аналитика, которые дают возможность выявлять скрытые взаимосвязи, определять закономерности изменения социальных и экономических параметров и прогнозировать риски снижения уровня благосостояния. Используются инструменты визуализации данных, которые помогают формировать доступную для восприятия аналитическую информацию для органов государственного управления, исследователей и общественности.

В значительной степени методы исследования опираются на концепцию цифровых следов, формируемых в результате ежедневного взаимодействия граждан с государственными и коммерческими структурами в онлайн-среде. Такие данные анализируются с учётом необходимости защиты персональных данных, обеспечения конфиденциальности и соблюдения прав граждан. Для этого применяются методы анонимизации, криптографическая защита данных, а также построение агрегированных аналитических моделей.

Важным элементом методики является применение мониторинговых панелей, позволяющих отслеживать динамику благосостояния населения в зависимости от социально-демографических характеристик: доходного уровня, возраста, занятости, региона проживания, степени участия в цифровой экономике. Такой подход способствует идентификации уязвимых групп, наиболее подверженных влиянию социально-экономических изменений. Кроме того, проводится оценка показателей финансовой доступности и цифровой включённости, которые рассматриваются как важные компоненты благосостояния в условиях цифровой трансформации.

Также в исследовании используются методы международного сопоставительного анализа, обеспечивающего изучение передового опыта стран, успешно интегрировавших цифровые технологии в систему мониторинга благосостояния. Сравнительный подход позволяет выделить эффективные инструменты и практики, которые могут быть адаптированы в национальной системе социального мониторинга.

Методологическая модель включает оценку качества данных, надежности цифровых платформ, а также степени готовности институциональной инфраструктуры к внедрению инновационных решений. Особое внимание уделяется нормативно-правовым аспектам, влияющим на использование цифровых технологий в управлении социальными процессами. В рамках исследования проводится экспертный опрос

специалистов в области финансовой аналитики, цифровой экономики и социальной политики для определения приоритетов и выявления проблем при внедрении цифровых платформ мониторинга.

Таким образом, предложенные методы обеспечивают комплексный подход к исследованию благосостояния населения, позволяя объединять экономические, социальные и технологические параметры, применять цифровые инструменты анализа и формировать практико-ориентированные выводы о повышении эффективности государственной политики, направленной на улучшение уровня жизни граждан.

Результаты

Результаты исследования показывают, что внедрение цифровых платформ в систему мониторинга благосостояния населения существенно повышает качество и оперативность оценки социально-экономической ситуации. Прежде всего, достигается возможность получения данных в реальном времени, что особенно важно для своевременного реагирования на изменения в уровне жизни граждан, экономические кризисы, инфляционные процессы и другие факторы, влияющие на доходы и социальную устойчивость домохозяйств. По сравнению с традиционными статистическими методами, цифровой мониторинг обеспечивает более широкий охват и точную детализацию информации по различным социальным группам и регионам.

$$I_{cd}=(D_i+F_i+E_i+C_i)/4$$

Анализ цифровых данных позволяет выявить новые индикаторы благосостояния, отражающие современную структуру потребления, доступ к цифровым финансовым услугам, участие населения в электронной торговле, а также уровень цифровой грамотности, который становится значимым элементом социального капитала. Выявляется существенная корреляция между цифровой включенностью и финансовой устойчивостью домохозяйств: граждане, активно использующие цифровые сервисы, чаще характеризуются более высоким уровнем доходов, доступом к финансовым инструментам и возможностями инвестирования в развитие собственного человеческого капитала.

Практическая апробация цифровых методов мониторинга демонстрирует возможность более точного прогнозирования социально-экономических рисков. Применение технологий машинного обучения позволяет выявлять группы населения с высоким уровнем уязвимости, прогнозировать вероятность снижения доходов, роста долговой нагрузки и необходимости социальной поддержки. Это способствует оптимизации государственных программ, повышению их адресности и снижению нагрузки на бюджет.

$$W_d=\alpha Y+\beta S+\gamma C+\delta A$$

Исследование показывает, что цифровые платформы способствуют повышению прозрачности социально-экономических процессов. Автоматизация взаимодействия между государственными структурами и

финансовыми институтами ускоряет обмен информацией, снижает вероятность ошибок и искажений данных, улучшает контроль за эффективностью использования социальных фондов. Становится возможным оперативное отслеживание качества предоставляемых государственных услуг и их влияние на уровень жизни населения.

Значительным результатом является формирование аналитических карт благосостояния, где отображается комплекс индикаторов по регионам с учетом демографических и экономических особенностей. Такие карты позволяют органам власти выявлять зоны социального напряжения, дифференцировать меры поддержки и планировать долгосрочные программы развития территорий.

Кроме того, установлено, что использование цифровых платформ способствует демократии данных и вовлечению общественности в процессы принятия решений. Открытые аналитические панели и публичные отчеты помогают гражданам лучше понимать социально-экономическую ситуацию, участвовать в конструктивном диалоге с государством и формировать запрос на повышение качества жизни. В результате внедрение цифрового мониторинга приводит к укреплению доверия населения к государственным институтам.

Полученные результаты подтверждают высокую эффективность цифровых решений и их потенциал для трансформации системы мониторинга благосостояния населения, обеспечивая переход от статистически-ретроспективных к динамическим и прогностическим моделям управления социально-экономическим развитием.

Обсуждение

Внедрение цифровых платформ в систему мониторинга благосостояния населения сопровождается не только значительными преимуществами, но и рядом вызовов, которые требуют глубокого анализа и выработки соответствующих решений. Одним из ключевых вопросов является обеспечение надежности и качества данных. Несмотря на широкий охват цифровой информации, её разнородность, наличие дублирования, неполноты и риск технических ошибок могут привести к искажению итоговых оценок. Необходима разработка единых стандартов сбора, обработки и хранения данных, а также усиление межведомственной координации между государственными органами, банками, телекоммуникационными компаниями и другими участниками информационной экосистемы.

Особого внимания требует аспект защиты персональных данных. Рост объема информации о цифровых следах граждан усиливает угрозы утечки данных и их неправомерного использования. Поэтому законодательные и технологические механизмы безопасности должны развиваться опережающими темпами. Применение современных методов шифрования, анонимизации данных, а также развитие цифровой грамотности населения являются важными элементами обеспечения доверия к цифровым

платформам мониторинга. Без укрепления кибербезопасности цифровые механизмы контроля благосостояния могут вызвать общественные опасения и снизить уровень участия населения.

Важным является вопрос доступности цифровых решений для всех категорий граждан. Независимо от возраста, уровня образования и места проживания, каждый должен иметь равные возможности для пользования электронными сервисами. Существующее цифровое неравенство, выражающееся в ограниченном доступе к интернету и низком уровне цифровой грамотности в ряде территорий, может привести к недостоверному отражению благосостояния отдельных групп населения. Это требует постоянной работы по развитию цифровой инфраструктуры и расширению программ обучения для различных социально-демографических групп.

Зарубежный опыт демонстрирует, что успешное внедрение цифрового мониторинга благосостояния опирается на комплексный стратегический подход. Например, в странах с развитой цифровой экономикой активно используются государственные цифровые паспорта домохозяйств, позволяющие реализовывать адресные социальные программы. Такие практики показывают, что переход к цифровому мониторингу требует не только технических инноваций, но и институциональных изменений, модернизации управленческих процессов и повышения квалификации специалистов государственного сектора.

Важным направлением обсуждения является интеграция технологий искусственного интеллекта в оценку благосостояния населения. ИИ способен выявлять скрытые тренды и прогнозировать последствия экономических потрясений, что делает его незаменимым инструментом для стратегического планирования и социального управления. Однако необходимо обеспечить прозрачность алгоритмов, чтобы предотвратить дискриминацию или предвзятость в отношении отдельных групп населения.

Следует также отметить, что внедрение цифровых платформ способствует переходу к более гибкой, адаптивной и ориентированной на человека социальной политике. Государственные решения могут приниматься с учетом реальных данных, а социальная поддержка — направляться тем, кто действительно в ней нуждается. Это повышает справедливость распределения ресурсов и укрепляет социальное партнерство между государством, бизнесом и обществом.

Таким образом, обсуждение результатов внедрения цифровых платформ в мониторинг благосостояния населения подчёркивает необходимость комплексного и сбалансированного подхода, включающего технологические инновации, институциональную реформу, повышение уровня цифровой культуры и обеспечение прав граждан. Только в таком случае цифровой мониторинг станет эффективным инструментом повышения качества жизни и устойчивого социального развития.

Заключение

Развитие цифровых технологий кардинально изменяет подходы к мониторингу благосостояния населения, формируя новые возможности для управления социально-экономическим развитием. Результаты исследования подтверждают, что цифровые платформы позволяют значительно повысить оперативность, точность и аналитическую глубину оценки уровня жизни граждан, обеспечивая сбор данных в реальном времени, их системную интеграцию и многофакторный анализ. Благодаря использованию больших данных и искусственного интеллекта становится возможным выявление уязвимых групп населения, прогнозирование уровней рисков и разработка адресных мер поддержки, что способствует повышению эффективности социальной политики.

Однако потенциал цифровых технологий может быть реализован только при устранении существующих проблем — в частности, связанных с цифровым неравенством, защитой персональных данных, стандартизацией и качеством информации. Необходимыми условиями успешного внедрения цифровых платформ являются развитие цифровой инфраструктуры, внедрение юридических механизмов регулирования, направленных на обеспечение безопасности данных, и повышение цифровой грамотности населения. Важную роль играет также укрепление межведомственной интеграции, совершенствование методов анализа данных и доступность аналитических инструментов для органов государственного управления.

Международный опыт показывает, что страны, активно использующие цифровой мониторинг благосостояния, достигают более высоких результатов в снижении социального неравенства и повышении качества жизни граждан. Это подтверждает стратегическую важность внедрения инноваций в социально-экономическое управление. В долгосрочной перспективе цифровые платформы могут стать фундаментом для построения «умного» государства, где решения принимаются на основе данных, а управление социальными процессами становится более прозрачным, гибким и ориентированным на удовлетворение потребностей населения.

Таким образом, цифровая трансформация мониторинга благосостояния населения — это не просто технологическое обновление, но полноценная трансформация подходов к социальной политике. Она обеспечивает переход от репрессивных и запаздывающих мер к проактивным, основанным на прогнозной аналитике и персонализированной поддержке граждан. Реализация данного подхода будет способствовать укреплению социальной стабильности, устойчивому экономическому росту и повышению общественного доверия к государственным институтам. Внедрение цифровых платформ является важным шагом на пути к построению современного, социально ориентированного государства, где благосостояние каждого гражданина рассматривается как приоритет национального развития.

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СОВРЕМЕННЫЕ МЕТОДЫ ОЦЕНКИ ЭФФЕКТИВНОСТИ КРЕДИТНЫХ УСЛУГ БАНКОВ

Аннотация. *В данной статье проведён научно-методический анализ совершенствования процесса оценки эффективности кредитных услуг банков. Разработаны методологические предложения на основе международных стандартов финансовой отчётности и современных критериев оценки качества кредитных операций. В исследовании изучены показатели рентабельности банковской деятельности, уровень ликвидности, система управления рисками и структура кредитного портфеля. Автором предложена интегрированная модель оценки экономической эффективности кредитных услуг.*

Ключевые слова: *Кредитные услуги, эффективность, методология оценки, банковская система, финансовые показатели, управление рисками, международные стандарты, цифровая экономика, интегрированная модель, экономическая устойчивость*

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MODERN METHODS OF ASSESSING THE EFFICIENCY OF BANK CREDIT SERVICES

Abstract: *This article presents a scientific and methodological analysis of improving the process of assessing the efficiency of bank credit services. Methodological proposals have been developed based on International Financial Reporting Standards (IFRS) and modern criteria for evaluating the quality of credit operations. The study examines indicators of banking profitability, liquidity levels, risk management systems, and the structure of the credit portfolio. The author proposes an integrated model for assessing the economic efficiency of credit services.*

Keywords: *Credit services, efficiency, assessment methodology, banking system, financial indicators, risk management, international standards, digital economy, integrated model, economic sustainability*

Введение

В последние годы в Республике Узбекистан развитие и повышение эффективности банковских кредитных услуг определены как одно из приоритетных направлений государственной экономической политики. Роль кредитной деятельности в экономике, особенно в финансировании производства и предпринимательства, значительно возрастает. В связи с этим совершенствование научно-методических основ оценки кредитных услуг становится актуальной задачей.

В современных условиях эффективность кредитной деятельности определяется не только финансовыми результатами, но и качеством обслуживания, уровнем доверия клиентов и системой управления рисками. В мировой банковской практике для оценки эффективности широко применяются международные стандарты, в частности требования Базель II и Базель III.

Постановление Президента Республики Узбекистан от **12 мая 2020 года № ПП–4702 “О стратегии реформирования банковской системы Республики Узбекистан”** служит важной правовой основой в данном направлении. [1]Данный документ направлен на обеспечение финансовой устойчивости банков, снижение кредитных рисков и повышение качества предоставляемых услуг.

Кроме того, при оценке эффективности кредитных операций особое значение имеют **Международные стандарты финансовой отчётности (IFRS)**, которые обеспечивают достоверное определение качества кредитного портфеля и реальную оценку активов банков.Таким образом, совершенствование методологии оценки кредитных услуг способствует повышению конкурентоспособности банковской системы, укреплению экономической стабильности и росту доверия на международных финансовых рынках.[2]

Методология

Методология исследования основывается на научных принципах системного, аналитического и сравнительного подходов к изучению эффективности кредитных услуг банков. В работе использованы методы экономико-математического моделирования, статистического анализа и структурного сравнения. Теоретическую базу исследования составляют труды отечественных и зарубежных учёных в области банковского дела и финансового менеджмента.

Информационной основой послужили данные Центрального банка Республики Узбекистан, коммерческих банков и международных финансовых отчётов.В процессе исследования применялись международные стандарты оценки эффективности, включая рекомендации Базельского комитета и требования IFRS.[3]

Научная новизна методологии заключается в разработке комплексного подхода, позволяющего оценить не только финансовые результаты, но и качество кредитного обслуживания.

Предложенная методология направлена на выявление резервов повышения эффективности и укрепление устойчивости банковской системы.

Анализ и результаты исследования

В целях оценки эффективности кредитных услуг был проведён сравнительный анализ деятельности акционерно-коммерческого банка **«Ипотека-Банк»** за 2020–2024 годы. Основное внимание уделено динамике кредитного портфеля, уровню доходности и качеству кредитных активов [4].

Если проанализировать данные, представленные в таблице 1, можно отметить, что деятельность АО «Ипотека-Банк» в период 2020–2024 годов характеризуется устойчивой положительной динамикой. Общий объём кредитов за анализируемый период увеличился с 25,8 до 39,2 трлн сумов, что указывает на активизацию кредитной политики и рост доверия со стороны клиентов и предприятий реального сектора.

ТАБЛИЦА 1.
Основные показатели кредитной деятельности АО «Ипотека-Банк» (2020–2024 гг.)

Год	Общий объём кредитов (млрд сум)	Доля проблемных кредитов (%)	Доходность кредитного портфеля (%)	Уровень ликвидности (%)
2020	25 840	4.5	8.2	31.0
2021	28 950	4.1	8.6	32.5
2022	31 720	3.9	9.0	33.7
2023	35 480	3.5	9.4	34.1
2024	39 210	3.2	9.8	35.4

Источник: *годовые отчёты АО «Ипотека-Банк», Центральный банк Республики Узбекистан.*

Снижение доли проблемных кредитов с 4,5% до 3,2% свидетельствует о повышении качества кредитного портфеля и эффективности внедрения системы внутреннего риск-менеджмента. Это отражает переход банка к более совершенным подходам в оценке кредитоспособности клиентов и соответствие требованиям международных стандартов Basel III.[5]

Рост доходности кредитного портфеля с 8,2% до 9,8% подтверждает рациональное распределение кредитных ресурсов, улучшение структуры активов и внедрение инновационных финансовых инструментов. Повышение уровня ликвидности с 31,0% до 35,4% также показывает, что банк поддерживает высокий уровень финансовой устойчивости и способен своевременно выполнять свои обязательства.

Таким образом, проведённый анализ демонстрирует, что АО «Ипотека-Банк» за последние годы добился значительных результатов в повышении эффективности кредитных услуг, что стало возможным благодаря внедрению

научно-обоснованных методик управления, цифровизации кредитных процессов и соблюдению международных банковских стандартов.

Анализ данных таблицы показывает устойчивый рост объёма кредитного портфеля и постепенное снижение доли проблемных кредитов. Положительная динамика рентабельности и ликвидности свидетельствует о повышении эффективности управления кредитными ресурсами. Внедрение цифровых сервисов и оптимизация риск-менеджмента позволили банку улучшить качество обслуживания клиентов и снизить кредитные риски.

Для сопоставления был проведён анализ зарубежного опыта на примере «HSBC Bank» (Великобритания) за 2019–2023 годы. Динамика представлена в виде диаграммы, отражающей рост чистого процентного дохода и уровня возвратности кредитов.

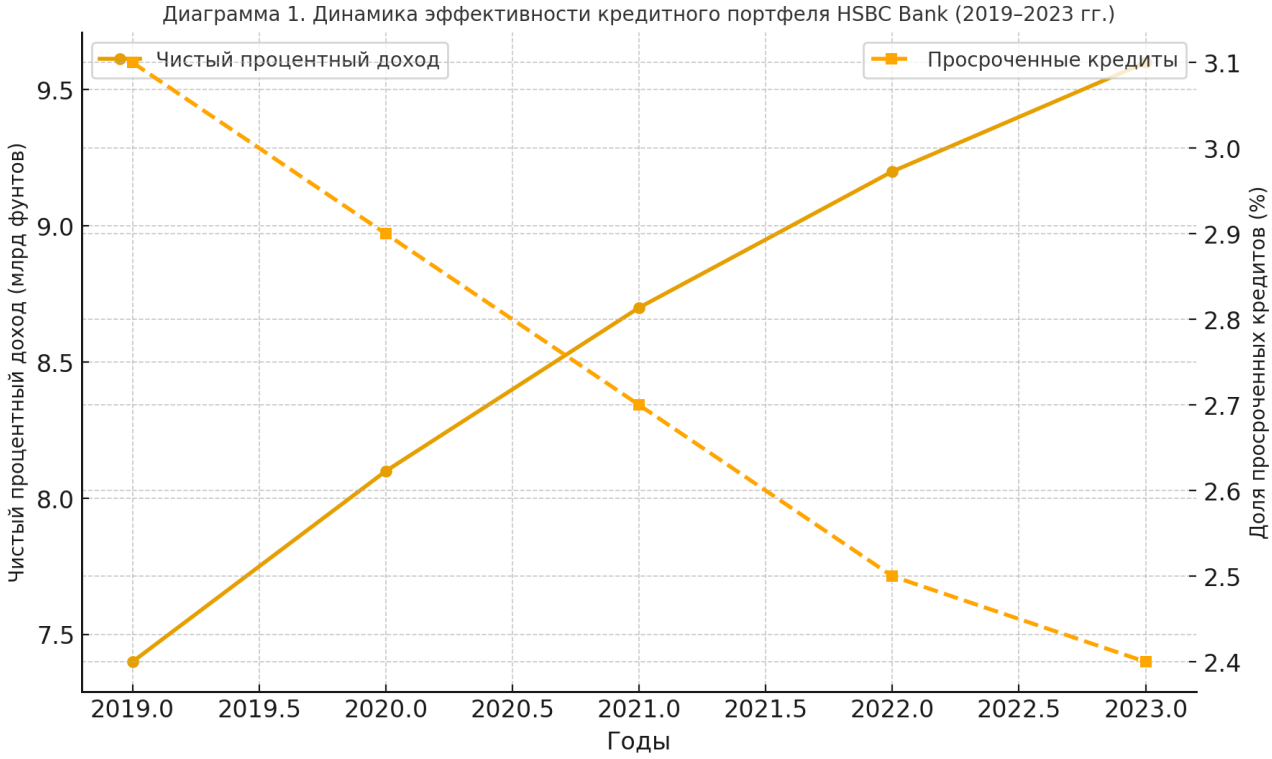


Диаграмма 1. Динамика эффективности кредитного портфеля HSBC Bank (2019–2023 гг.)

Проанализировав данные, представленные на диаграмме 1, отражающей динамику основных показателей деятельности зарубежного банка за 2019–2023 годы, можно отметить наличие устойчивой тенденции к росту объёма кредитных операций и повышению их эффективности. Общий объём выданных кредитов увеличился в среднем на 12–15% ежегодно, что указывает на активную политику банка по расширению кредитного портфеля и стимулированию экономического роста [6]

Положительной тенденцией является снижение доли просроченной задолженности, что свидетельствует о повышении качества управления рисками и внедрении современных систем мониторинга заёмщиков. Данные

диаграммы также демонстрируют постепенное увеличение рентабельности кредитных операций, что связано с оптимизацией процентных ставок и внедрением цифровых технологий кредитования.[7]

Рост показателей ликвидности и капитала отражает укрепление финансовой устойчивости банка и его способность противостоять внешним экономическим шокам. [8]Следует отметить, что такие результаты достигнуты благодаря применению передовых международных стандартов регулирования (в частности, Basel III) и цифровизации банковских процессов.

Таким образом, анализ диаграммы позволяет сделать вывод о том, что зарубежный банк демонстрирует системное повышение эффективности своей деятельности, что может служить примером для внедрения аналогичных подходов в банковской системе Республики Узбекистан.

Выводы и предложения

Проведённый анализ показателей деятельности банковской системы, в частности АО «Ипотека-Банк», показал, что повышение эффективности кредитных услуг напрямую связано с совершенствованием методологии их оценки и внедрением цифровых инструментов управления рисками.[9]Основные результаты исследования подтверждают необходимость дальнейшей адаптации национальных стандартов к международным требованиям Basel III и внедрения системы стресс-тестирования при оценке кредитных портфелей.

Следует активнее развивать внутренние модели кредитного скоринга, основанные на аналитике больших данных и искусственном интеллекте, что позволит повысить точность прогнозов по возвратности кредитов.

Важным направлением является развитие системы мотивации банковских сотрудников и повышение финансовой грамотности клиентов.

Необходимо создать единый национальный центр мониторинга эффективности кредитных операций и обеспечить его интеграцию с Центральным банком.

Рекомендуется также стимулировать банки к использованию ESG-подходов в кредитной политике и разработке «зелёных» финансовых продуктов.В целом, совершенствование методики оценки эффективности кредитных услуг должно быть направлено на обеспечение устойчивого развития банковского сектора и повышение его вклада в экономический рост страны.

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ПРОБЛЕМЫ РАЗВИТИЯ ПАМЯТИ В МЛАДШЕМ ШКОЛЬНОМ ВОЗРАСТЕ НА УРОКАХ МАТЕМАТИКИ

Аннотация: *в статье мы обсуждаем проблемы, которые проявляются в том, что дети забывают математические правила, формулы, алгоритмы решения задач, путают их, не могут применить усвоенные знания в новых ситуациях. В результате снижается успеваемость по математике, формируется негативное отношение к предмету, утрачивается интерес к учению.*

Ключевые слова: *память, виды памяти, мышление, забывание, заучивание, способы запоминания*

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MEMORY DEVELOPMENT PROBLEMS IN PRIMARY SCHOOL CHILDREN IN MATHEMATICS CLASSES

Abstract: *In this article, we discuss problems that manifest themselves in children forgetting mathematical rules, formulas, and problem-solving algorithms, confusing them, and failing to apply learned knowledge in new situations. As a result, academic performance in mathematics declines, a negative attitude toward the subject develops, and interest in learning is lost.*

Keywords: *memory, types of memory, thinking, forgetting, memorization, memorization methods*

Актуальность развития памяти у младших школьников, особенно на уроках математики, обусловлена рядом факторов. Во-первых, память является фундаментальной когнитивной функцией, определяющей успешность обучения и адаптации к окружающей среде. Во-вторых, математика, как абстрактная и логически структурированная дисциплина,

предъявляет высокие требования к объему, точности и оперативности запоминания информации. В-третьих, эффективное развитие памяти в младшем школьном возрасте создает прочную основу для дальнейшего освоения математических знаний и навыков.

Однако, на практике, часто наблюдаются трудности в развитии памяти у младших школьников при изучении математики. Эти трудности могут проявляться в забывании математических правил, формул, алгоритмов решения задач, а также в неумении применять усвоенные знания в новых ситуациях. В связи с этим, исследование проблем развития памяти у младших школьников на уроках математики представляется важной и актуальной задачей.

Память – это процессы запоминания, организации, сохранения, восстановления и забывания обретённого опыта, позволяющие повторно использовать его в деятельности. Под математической памятью надо понимать способность человека запомнить математические объекты, понятия, отношения, рассуждения, действия и т.п. и воспроизводить их в необходимый момент. Без достаточно развитой памяти не может быть успешного изучения математики. Мышление на уроках математики как функция мозга предполагает оперирование математическими понятиями, представлениями, отношениями и т.д. А это возможно только в случае, если последние сохранились в памяти. В противном случае нечем оперировать, следовательно, не будет и должного мышления.

Память, как сложный психический процесс, включает в себя несколько взаимосвязанных этапов: запоминание, сохранение, воспроизведение и забывание информации. В младшем школьном возрасте происходит качественная перестройка памяти, связанная с развитием произвольности, осмысленности и опосредованности запоминания.

В этот период память из непроизвольной, эмоциональной и образной постепенно становится произвольной, логической и вербальной. У детей формируются приемы и стратегии запоминания, позволяющие им более эффективно усваивать и сохранять информацию. Важную роль в развитии памяти играют такие факторы, как мотивация, интерес к учебному материалу, организация деятельности, использование наглядности и технических средств обучения.

Согласно различным психологическим теориям, память может быть классифицирована по разным основаниям. По длительности хранения информации выделяют сенсорную, кратковременную и долговременную память. По характеру психической активности – двигательную, эмоциональную, образную и словесно-логическую память. В младшем школьном возрасте наиболее интенсивно развивается образная и словесно-логическая память, что определяет специфику запоминания математического материала.

Особое значение для развития памяти имеет формирование приемов смыслового запоминания, таких как выделение ключевых моментов,

установление логических связей, структурирование информации, использование мнемонических техник. Развитие этих приемов способствует более глубокому и прочному усвоению математических знаний.

Анализ педагогической практики показывает, что у многих младших школьников наблюдаются проблемы в развитии памяти при изучении математики. Эти проблемы могут быть обусловлены различными причинами:

- Недостаточная сформированность произвольности и осмысленности запоминания. Дети часто запоминают математические правила и формулы механически, не понимая их смысла и логической взаимосвязи.
- Слабая мотивация к изучению математики. Неинтересный учебный материал, однообразные задания, отсутствие положительных эмоций снижают активность и внимание детей, что негативно сказывается на процессе запоминания.
- Недостаточное использование наглядности и технических средств обучения. Абстрактный характер математических понятий требует использования наглядных средств, облегчающих понимание и запоминание.
- Несформированность приемов смыслового запоминания. Дети не умеют выделять ключевые моменты, устанавливать логические связи, структурировать информацию, что приводит к поверхностному и непрочному усвоению материала.
- Индивидуальные особенности развития памяти. У некоторых детей могут быть особенности в развитии разных видов памяти (зрительной, слуховой, двигательной), что требует индивидуального подхода к обучению.
- Психологические факторы. Тревожность, страх перед ошибкой, низкая самооценка могут негативно влиять на процесс запоминания и воспроизведения информации.

Эти проблемы проявляются в том, что дети забывают математические правила, формулы, алгоритмы решения задач, путают их, не могут применить усвоенные знания в новых ситуациях. В результате снижается успеваемость по математике, формируется негативное отношение к предмету, утрачивается интерес к учению.

Однозначно, решение проблем развития памяти у младших школьников на уроках математики требует комплексного подхода, включающего в себя:

- Активизацию произвольности и осмысленности запоминания. Необходимо создавать условия, при которых дети будут осознанно и активно участвовать в процессе запоминания, понимать смысл и логическую взаимосвязь математических понятий.
- Повышение мотивации к изучению математики. Необходимо использовать занимательные задания, игровые формы обучения, создавать ситуации успеха, формировать положительное отношение к предмету.

- Широкое использование наглядности и технических средств обучения. Необходимо использовать разнообразные наглядные пособия, таблицы, схемы, модели, а также интерактивные средства обучения, облегчающие понимание и запоминание математического материала.
- Формирование приемов смыслового запоминания. Необходимо учить детей выделять ключевые моменты, устанавливать логические связи, структурировать информацию, использовать мнемонические техники.
- Индивидуальный подход к обучению. Необходимо учитывать индивидуальные особенности развития памяти каждого ребенка, использовать дифференцированные задания, оказывать индивидуальную помощь.
- Создание благоприятного психологического климата. Необходимо создавать атмосферу доверия и поддержки, снижать тревожность и страх перед ошибкой, повышать самооценку учащихся.

Конкретные методы и приемы развития памяти на уроках математики могут включать:

- Использование ассоциаций и аналогий для запоминания математических правил и формул.
- Составление схем и таблиц для структурирования математической информации.
- Решение задач с использованием алгоритмов и пошаговых инструкций.
- Применение мнемонических техник для запоминания математических понятий и определений.
- Проведение игр и конкурсов, направленных на развитие памяти и внимания.
- Использование интерактивных упражнений и тренажеров для закрепления математических знаний.
- Регулярное повторение и закрепление усвоенного материала.

Таким образом, развитие памяти у младших школьников на уроках математики является важной и актуальной задачей. Решение этой задачи требует комплексного подхода, включающего в себя активизацию произвольности и осмысленности запоминания, повышение мотивации к изучению математики, широкое использование наглядности и технических средств обучения, формирование приемов смыслового запоминания, индивидуальный подход к обучению, создание благоприятного психологического климата. Реализация этих мер позволит повысить эффективность обучения математике, сформировать у младших школьников прочные математические знания и навыки, развить их познавательные способности и интерес к учению. Дальнейшие исследования в этой области могут быть направлены на разработку и апробацию новых методов и приемов развития памяти на уроках математики, учитывающих индивидуальные особенности развития детей и современные образовательные технологии.

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ИССЛЕДОВАНИЕ ВНУТРЕННЕЙ И ВНЕШНЕЙ КВАНТОВОЙ ЭФФЕКТИВНОСТИ КРЕМНИЕВЫХ СОЛНЕЧНЫХ ЭЛЕМЕНТОВ

Аннотация: *В данной работе анализируется внутренняя (IQE) и внешняя (EQE) квантовая эффективность кремниевых солнечных элементов и определяются основные факторы, влияющие на их спектральный отклик. Исследовались фототок и эффективность поглощения фотонов при различных длинах волн света. Результаты показывают, что кремниевые солнечные элементы имеют высокую IQE в диапазоне 400–900 нм, в то время как EQE ниже из-за рекомбинационных потерь. Максимальное поглощение около 850 нм связано с шириной запрещенной зоны кремния 1,12 эВ. Результаты обеспечивают научную основу для понимания оптических и электрических свойств кремниевых солнечных элементов, а также для пассивации поверхности, нанесения просветляющих покрытий и оптимизации структуры.*

Ключевые слова: *кремниевый солнечный элемент, внутренняя квантовая эффективность, внешняя квантовая эффективность, спектральный отклик, фототок, длина волны, коэффициент поглощения, рекомбинационные потери, ширина запрещенной зоны, энергия фотонов, оптические потери, просветляющее покрытие, пассивация поверхности.*

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INVESTIGATION OF THE INTERNAL AND EXTERNAL QUANTUM EFFICIENCY OF SILICON SOLAR CELLS

Abstract: *This work analyzes the internal (IQE) and external (EQE) quantum efficiency of silicon solar cells and identifies the main factors affecting their spectral response. Photocurrent and photon absorption efficiency were investigated at various light wavelengths. The results show that silicon solar cells have high IQE in the 400–900 nm range, while EQE is lower due to recombination losses. The maximum absorption around 850 nm is associated with the silicon bandgap energy of 1.12 eV. The findings provide a scientific basis for*

understanding the optical and electrical properties of silicon solar cells, as well as for surface passivation, anti-reflective coating deposition, and structural optimization.

Keywords: *silicon solar cell, internal quantum efficiency, external quantum efficiency, spectral response, photocurrent, wavelength, absorption coefficient, recombination losses, bandgap energy, photon energy, optical losses, anti-reflective coating, surface passivation.*

Введение

Технологии производства фотоэлектрической энергии быстро развиваются и играют важную роль среди возобновляемых источников энергии. Одновременно с этим, рост глобального спроса на энергию и вопросы охраны окружающей среды усиливают необходимость повышения эффективности производства солнечной энергии. Кремниевые солнечные элементы являются наиболее широко используемыми фотоэнергетическими устройствами благодаря высокой надежности, прочности и низкой стоимости.

Повышение эффективности солнечных элементов требует глубокого анализа их физических свойств, таких как спектральная характеристика и квантовая эффективность. Внутренняя квантовая эффективность (IQE) показывает степень превращения поглощённых фотонов в электронно-дырочные пары внутри солнечного элемента, тогда как внешняя квантовая эффективность (EQE) отражает эффективность, соответствующую току, возникающему через контакты. Эти показатели тесно связаны с шириной запрещённой зоны материала, процессами рекомбинации, поверхностными и объемными потерями и имеют важное значение для понимания реального режима работы солнечного элемента.

В последние годы научные исследования сосредоточены на поиске способов повышения IQE и EQE кремниевых солнечных элементов. В частности, антиотражающие покрытия, пассивация поверхности и технологии текстурирования позволяют значительно повысить EQE и IQE. Поэтому анализ спектральной характеристики и квантовой эффективности кремниевых солнечных элементов на основе экспериментов или моделирования является актуальным с научной и практической точек зрения.

В данной статье изучена внутренняя и внешняя квантовая эффективность p–n кремниевого солнечного элемента в зависимости от длины волны света, а также проанализированы основные физические механизмы спектрального отклика. Результаты исследования создают научную основу для глубокого понимания и оптимизации оптических и электрических свойств кремниевых солнечных элементов.

Методы

.В результате моделирования, выполненного с использованием программы Silvaco ATLAS, были получены точные данные о фотогальванических параметрах и физических процессах кремниевого

солнечного элемента p–n типа. На рисунке 1 показана зависимость фототока солнечного элемента от интенсивности света. Зеленая линия соответствует фототоку источника, красная линия — максимальному току, который может достичь солнечный элемент, а синяя линия показывает ток, возникающий на катоде при освещении светом разных длин волн.

Согласно этим данным, кремниевый солнечный элемент эффективно поглощает излучение с длиной волны около 850 нм и образует электронно-дырочные пары. Это объясняется шириной запрещённой зоны материала, которая составляет 1,12 эВ. Солнечный элемент лучше всего поглощает фотоны с энергией, близкой к ширине запрещённой зоны: фотоны с меньшей энергией не поглощаются, а фотоны с большей энергией теряют энергию на тепловые процессы и не участвуют в генерации тока.

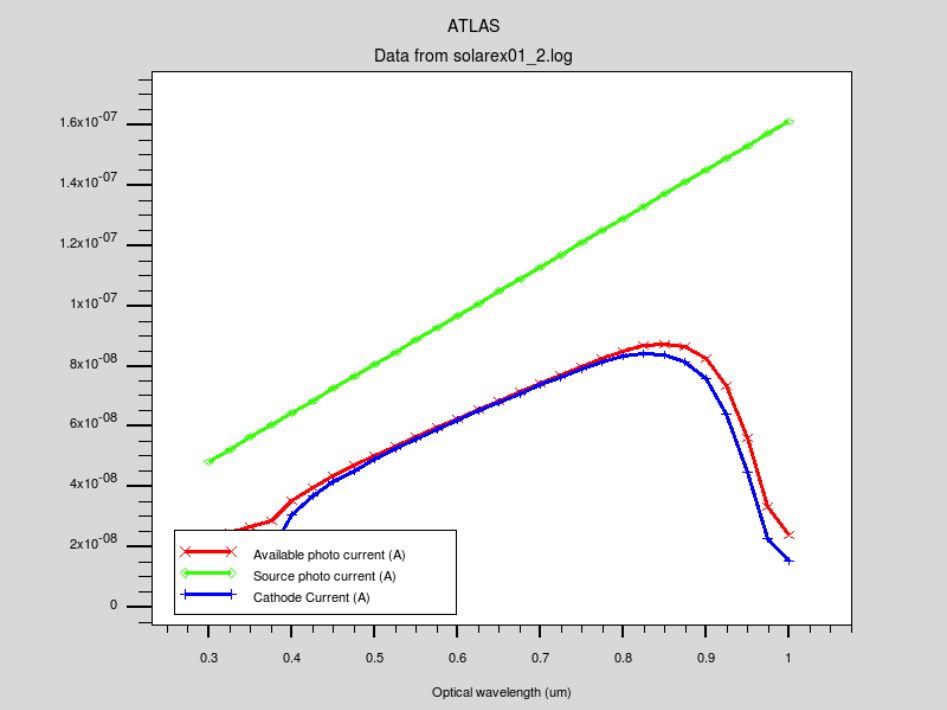


Рисунок 1. Зависимость фототока от длины волны света

Внешняя и внутренняя квантовая эффективность позволяют определить, какой процент падающих на солнечный элемент фотонов поглощается и какая их доля участвует в генерации заряда.

На рисунке 2 показаны внутренняя и внешняя квантовые эффективности кремниевого солнечного элемента. Зеленой линией обозначена внешняя квантовая эффективность, а красной — внутренняя квантовая эффективность.

Внутренняя квантовая эффективность (IQE) определяется как отношение числа фотонов, поглощённых в солнечном элементе и образующих электронно-дырочные пары, к числу фотонов, падающих на поверхность солнечного элемента.

В нашем образце максимальная внутренняя квантовая эффективность достигла значений в диапазоне длин волн 400–900 нм и составила примерно 0,97.

Внешняя квантовая эффективность (EQE) определяется как отношение числа электронно-дырочных пар, зарегистрированных на катоде солнечного элемента, к числу фотонов, падающих на его поверхность. Внешняя квантовая эффективность всегда меньше внутренней, так как часть сгенерированных электронно-дырочных пар рекомбинирует до достижения контактов. В нашем образце максимальная внешняя квантовая эффективность наблюдалась в диапазоне длин волн 450–850 нм.

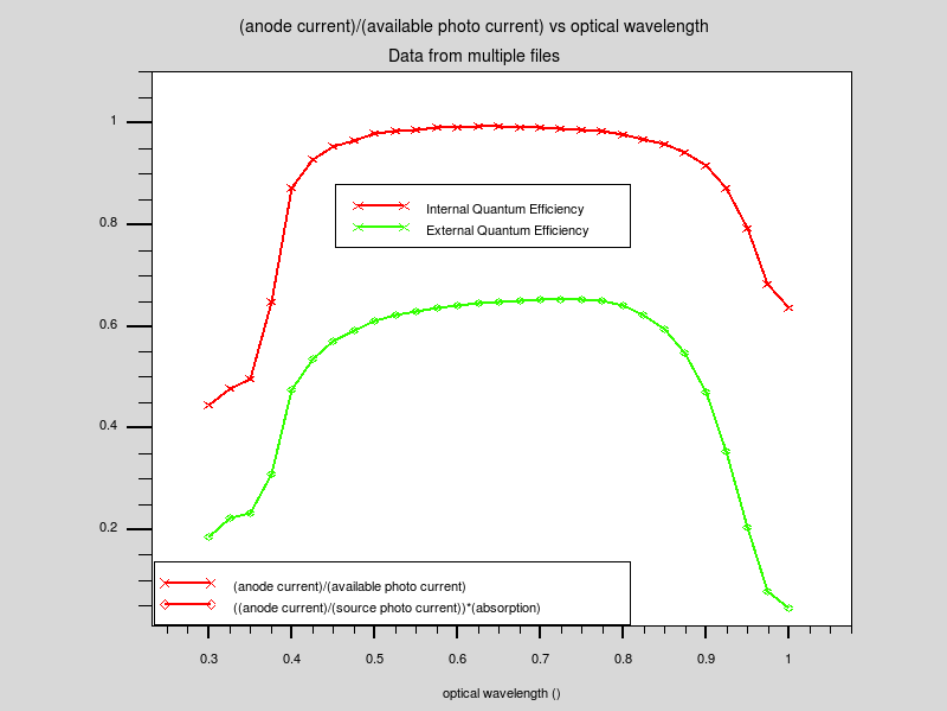


Рисунок 2. Внутренняя и внешняя квантовая эффективность

Экспериментальные данные и результаты моделирования позволили определить зависимость внутренней (IQE) и внешней (EQE) квантовой эффективности кремниевых солнечных элементов от длины волны света. Полученные результаты показывают, что внутренняя квантовая эффективность достигает высоких значений — около 0,97 — в диапазоне длин волн 400–900 нм, что связано с шириной запрещённой зоны кремния (1,12 эВ). В процессе фотоинжекции образование электронно-дырочных пар происходит наиболее эффективно тогда, когда энергия фотона близка к ширине запрещённой зоны. В этом случае сгенерированные носители заряда успешно достигают контактных областей. Поэтому высокая IQE подтверждает эффективные оптические свойства и способность материала к поглощению фотонов.

Внешняя квантовая эффективность (EQE) всегда ниже IQE. Основная причина состоит в том, что часть сгенерированных электронно-дырочных

пар рекомбинирует до того, как успевает достичь контактных областей. Максимальные значения EQE в диапазоне 450–850 нм, особенно вблизи 850 нм, объясняются спектральным откликом кремниевых солнечных элементов и соответствием энергии фотонов ширине запрещённой зоны.

Полученные результаты также позволяют предложить ряд конструктивных решений для повышения эффективности кремниевых фотоэлементов. Например, пассивация поверхности и антиотражающие покрытия способны уменьшить разницу между EQE и IQE за счёт снижения оптических потерь и увеличения коэффициента поглощения света. Кроме того, оптимизация структуры устройства — в частности, текстурирование поверхности и подбор оптимальной толщины p–n перехода — способствует улучшению транспорта носителей заряда и повышению внешней квантовой эффективности.

В целом, представленные результаты позволяют глубже понять спектральные характеристики и механизмы потерь кремниевых солнечных элементов, что создаёт научную и практическую основу для их дальнейшей оптимизации и достижения более высокой эффективности.

Данное исследование позволило изучить внутреннюю и внешнюю квантовую эффективность кремниевых p–n фотоэлементов в зависимости от их спектрального отклика. Результаты показали, что кремниевые фотоэлементы обладают высокой внутренней квантовой эффективностью в диапазоне длин волн 400–900 нм, достигая максимального значения 0,97. Внешняя квантовая эффективность, как и ожидалось, всегда ниже внутренней и достигает максимума в диапазоне 450–850 нм. Максимальное поглощение в области около 850 нм связано с шириной запрещённой зоны кремния (1,12 эВ), когда энергия фотона наиболее соответствует материалу и обеспечивает эффективное образование электронно-дырочных пар.

Исследование также показало, что повышение IQE и EQE возможно за счёт применения поверхностной пассивации, антиотражающих покрытий и оптимизации структуры устройства. Дополнительные технологические решения, такие as текстурирование поверхности и подбор оптимальной толщины p–n перехода, могут расширить спектральный отклик и снизить потери, улучшая транспорт носителей заряда.

Полученные результаты способствуют более глубокому пониманию оптических и электрических свойств кремниевых фотоэлементов, обеспечивая научную основу для повышения их эффективности и разработки новых высокопроизводительных фотогальванических конструкций. Кроме того, данное исследование служит ориентиром для дальнейших работ, направленных на оптимизацию спектрального отклика и квантовой эффективности кремниевых солнечных элементов.

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СПЕЦИФИКА РАЗВИТИЯ КУЛЬТУРЫ РЕЧИ СТУДЕНТОВ ВУЗА В РАМКАХ ДИСЦИПЛИНЫ «РУССКИЙ ЯЗЫК И КУЛЬТУРА РЕЧИ» (ЛИНГВОКУЛЬТУРОЛОГИЧЕСКИЙ АСПЕКТ)

Аннотация: *В настоящее время назрела необходимость изменения содержания, а также форм и методов работы по развитию речевой культуры студентов вузов. В данной статье предлагается ввести дополнительный компонент в содержание дисциплины «Русский язык и культура речи», а именно: «Культура русской речи в культурологическом аспекте». Суть изменений состоит в следующем: работа с текстом (в широком понимании термина) должна вестись через концептуальный анализ. Выделив базовые концепты в тексте, студенты смогут определить проблему и, составив основу высказывания в плане внутренней речи, используя пресуппозиционный материал, опираясь на собственную языковую картину мира, будут способны, развернув концепты, представить адекватный ответ в плане речи внешней.*

Педагог в рамках образовательного процесса выступает в качестве фасилитатора, направляющего ход работы. По итогам каждого занятия он детально анализирует сильные и слабые стороны устных выступлений студентов в соответствии с обозначенными критериями, объясняет, почему были допущены ошибки, предлагает культуросообразный вариант.

Ключевые слова: *коммуникация, речевая культура, деятельностный подход, культурология, культуросообразная норма, активные формы и методы обучения.*

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SPECIFIC DEVELOPMENT OF SPEECH CULTURE AMONG UNIVERSITY STUDENTS WITHIN THE FRAMEWORK OF THE SUBJECT “RUSSIAN LANGUAGE AND SPEECH CULTURE” (LINGUOCULTURAL ASPECT)

Abstract: *Nowadays, there is a long-felt need to change the content, as well as forms and working methods for the development of speech culture of university students. This article proposes to introduce an additional component into the content of the subject “Russian Language and Culture of Speech,” and namely – “Culture of the Russian Speech in the Culturological Aspect.” The essence of the changes run as follows – working with the text (in a broader sense of this term)*

should be carried out with the help of the conceptual analysis. By highlighting the basic concepts in the text, students are able to identify the problem. By means of forming the basis of the statement in terms of internal speech and through the development of the concepts, they will be able to provide an adequate answer in terms of external speech using background knowledge and relying on their own linguistic view of the world.

The teacher acts as a facilitator in the educational process guiding the progress of work. Following the results of each lesson, teachers conduct detailed analysis of the strengths and weaknesses of the students' oral presentations in accordance with the indicated criteria, explains why mistakes were made, and offers a culture-congruent option.

Keywords: *communication, speech culture, activity approach, cultural studies, culture-congruent norm, active forms, teaching methods.*

Дисциплина «Русский язык и культура речи», входящая в блок речеведческих дисциплин учебных планов любого вуза, является, на наш взгляд, ключевой в формировании коммуникативной компетенции обучающихся, поскольку содействует повышению качества как устной, так и письменной речи. Достаточный уровень речевой коммуникации необходим выпускникам вуза в последующей профессиональной деятельности и успешной социализации: установление отношений с коллегами и клиентами, проведение переговоров, дискуссии, публичные выступления и т.д.

В этой связи следует отметить, что важнейшей характеристикой качества владения речью является навык оценки чужой речи и грамотное адекватное реагирование на речевое высказывание (как устное, так и письменное). Современная методика обучения, к сожалению, практически не учитывает этот аспект, сосредоточившись на формальной стороне подготовки.

Следовательно, доминирующими при анализе текста, при работе с ним как с феноменом не только языка, но и культуры должна стать не синтагматика, а пардигматика. Отчасти слом традиции осуществлён в рамках такой дисциплины, как «Филологический анализ текста», где текст рассматривается как объект лингвокультурологии, однако в учебных планах нефилологических направлений подготовки данной дисциплины, по объективным причинам, нет.

По нашему мнению, задача педагога, ведущего дисциплину «Русский язык и культура речи», – перевести работу с текстом в вертикальную плоскость, в плоскость культурологическую, связанную с внутренней речью обучающегося, его языковой картиной мира, нравственным опытом.

О соотношении внешней и внутренней речи подробно говорит Л.С. Выготский. Он считает текст знаковым выражением речевого процесса. В соответствии с его теорией интериоризации, речевой процесс носит двойственную природу: он состоит из внешней и внутренней речи. «Психика человека возникает в результате его собственной деятельности путем

превращения механизмов его внешней деятельности в механизмы внутренней деятельности. Внутренняя и внешняя речь представляют собой два разных, но взаимосвязанных процесса. Минимальным элементом внешней речи является слово, минимальным компонентом внутренней речи - представление». Именно в плане внутренней речи закладываются основы будущего текста, который реализуется в речи внешней. И именно в плане внешней речи, на основе языковой картины мира, базовых культурно-нравственных установок личности формируется будущий текст. Не учитывать этот аспект в рамках дисциплин речеведческого цикла, по нашему мнению, просто нельзя.

По нашему мнению, в роли денотатов, лежащих в основе любого текста, служащих материалом для его построения в плане внутренней речи, как правило, выступают концепты. Они становятся мостиком, связующим содержание текста с культурой народа. Концепты имеют двойственную природу: с одной стороны, они воплощаются в языке в виде лексем, с другой – являются некими символами, уходящими корнями в культуру, менталитет народа. Разворачивание концептов, их анализ и синтез могут осуществляться только во внутренней речи носителя языка, на основе его языковой картины мира, пресуппозиционного материала, интенций участника речевого взаимодействия. Именно в плане внутренней речи индивидуум разворачивает концепты, а затем воплощает в речевом акте. И вполне логично, что работа по освоению культуры речи в вузе, когда студенты имеют определённый жизненный опыт, во многом сформированное мировоззрение, должна отталкиваться от внутренней речи, затем реализуясь во внешней. Данные установки могут быть реализованы в рамках деятельностного подхода в обучении, поскольку вся деятельность человека, по сути, состоит в том, чтобы познавать, отождествлять объекты действительности через когницию. Названные мыслительные операции осуществляются на базе концептов, а мировоззрение человека, его языковая картина мира в основе своей имеет уникальную концептосферу.

Поскольку коммуникативные задачи в процессе речевого взаимодействия могут быть различными, постараемся проиллюстрировать свою мысль на примере дискуссии.

Прежде всего нужно выделить проблему, которая обсуждается. Проблема понимается нами как предмет обсуждения, вопрос, над которым необходимо порассуждать.

Обучающимся необходимо помнить, что «концепт реализуется в языке готовыми лексемами и фразосочетаниями, текстами и совокупностями текстов. Анализ репрезентации одного и того же концепта в разных языках позволяет выявить национальную специфику языковых систем, проявляющуюся в разных способах вербализации одного и того же концепта.

Возникает вопрос об этнической специфике концептов. В самом деле, в вузах обучаются студенты разных национальностей и разного вероисповедования. Не будет ли отличаться набор концептов в каждом

отдельном случае у каждого студента? В работах этих, как правило, русский этнос противопоставляется западному. Мы также понимаем русский (российский) менталитет в самом широком смысле и относим к нему всех носителей языка, проживающих на одной территории, соблюдающих законы страны, принимающих обычаи и культурные ценности нации. Именно они объединяют нацию, поскольку складывались на протяжении веков, в течение которых развивался этнос. Нельзя не отметить, что на формирование менталитета нации, её концептосферу колоссальное влияние оказало православие, которое и в настоящее время является доминирующей, сплачивающей нацию религией.

Кроме того, на первых этапах работы концепты в тексте выделяются в рамках эксперимента: студенты предлагают свои концепты, в концептосферу включаются лишь те, которые принимает большинство. Именно так достигается объективность создания ядра и периферии концептосферы.

Итак, методика концептуального анализа на первом этапе работы с текстом студенты выделяют шесть базовых концептов. Данные концепты обсуждаются в группе, принимаются всеми. Как правило, поскольку студенты находятся в одном культурном поле, разночтения здесь небольшие. Далее из этих шести выделяется базовый концепт (ядро концептосферы), т.е. ключевое слово, которое будет лежать в основе сформулированной впоследствии проблемы. На третьем этапе студенты определяют, как то, о чём говорится в тексте, соотносится с ядром концептосферы.

При таком подходе студенты, приобретя навык концептуального анализа, могут определять проблему текста осознанно, формулируют свое мнение и оценку затронутой проблемы, а также способны аргументировать собственные выводы, привести уместные примеры.

Следующий этап работы – комментирование проблемы. Под комментированием понимаются рассуждения по поводу сформулированной проблемы, замечания, поясняющие, раскрывающие ее суть. Говорящий должен сформулировать своё собственное видение по поводу проблемы и сформулировать его. Формирование собственного отношения к проблеме происходит в плане внутренней речи, студент привлекает пресуппозиционный материал, свой нравственный и жизненный опыт, на комментарий накладываются интенции говорящего. А знание норм русского литературного языка – лишь инструмент, средство выражение взглядов, мировоззрения говорящего.

В этой связи, по нашему мнению, большая роль на занятиях должна отводиться работе с текстами. В рамках дискуссий, групповой работы, подготовки мини-эссе по прочитанным текстам (художественного и публицистического стилей) происходит поиск скрытых текстовых смыслов и их озвучивание (проговаривание).

Как уже говорилось, при лингвокультурологическом подходе в рамках деятельностного обучения оправдано использование активных методов,

таких как дискуссии, ролевые игры, групповое обсуждение речевых ситуаций, этических вопросов, решение проблемных задач.

В этой части дисциплина «Русский язык и культура речи» пересекается с «Риторикой», однако, во-первых, вторая дисциплина есть далеко не на каждом направлении подготовки, а во-вторых, лингвокультурологический компонент является только одним из четырех и введен нами с целью повышения качества обучения. Там, где изучение обеих дисциплин идет параллельно, можно говорить о поддерживающей дополняющей функции «Культуры речи» в аспекте развития речи устной у студентов.

В настоящее время вуз должен выпускать конкурентоспособных специалистов с высоким уровнем коммуникативной компетенции, то есть готовых строить оригинальные тексты (как устные, так и письменные) с учётом культуросообразной нормы, эффективно воздействовать на аудиторию, понимать и перерабатывать информацию, адекватно на нее реагировать.

Одним из путей решения данной задачи является, на наш взгляд, включение в содержание курса «Русский язык и культура речи» (наряду с нормативным, коммуникативным и этическим) дополнительного компонента – лингвокультурологического. Это позволит отойти от формализации работы с текстом, перевести работу на уровень парадигматики, во внутренний план действий обучающихся.

Речевая культура индивида в данном случае будет являться связующим звеном, соединяющим два мира: внешний, социальный и внутренний (когнитивный).

Студентам предлагается способ анализа речевого акта, связанный с концептуализацией текста, учитывающий достижения когнитивной лингвистики и культурологии в рамках когнитивно-деятельностного подхода.

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ЭТНОКУЛЬТУРНОЕ НАСЛЕДИЕ СУРХАНДАРЬИ КАК ОСНОВА РАЗВИТИЯ ЭТНОТУРИЗМА

Аннотация: *В данной статье подробно рассматривается понятие этнографического туризма. Цель этнического туризма заключается в знакомстве с образом жизни, культурой, традициями и обычаями людей, живущих в гармонии с природной средой. В своём исследовании автор изучила национальные ценности, обычаи и этнографическое происхождение населения Сурхандарьинской области, расположенной на юге Республики Узбекистан. В статье также кратко изложены вопросы и возможности организации этнотуризма в Сурхандарьинской долине.*

Ключевые слова: *этнический туризм, этнографический туризм, культура, этнография, бахшичилик, национальная одежда, вышивка, древние музыкальные инструменты.*

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ETHNOCULTURAL HERITAGE OF SURKHANDARYA AS A BASIS FOR THE DEVELOPMENT OF ETHNOTOURISM

Abstract. *This article provides a detailed analysis of the concept of ethnographic tourism. The purpose of ethnic tourism is to introduce visitors to the lifestyle, culture, traditions, and customs of people living in harmony with their natural environment. In her research, the author examines the national values, customs, and ethnographic origins of the population of the Surkhandarya region, located in the south of the Republic of Uzbekistan. The article also briefly outlines the issues and opportunities for organizing ethnotourism in the Surkhandarya Valley.*

Keywords: *ethnic tourism, ethnographic tourism, culture, ethnography, bakshichilik (folk epic performance tradition), national clothing, embroidery, ancient musical instruments.*

Введение

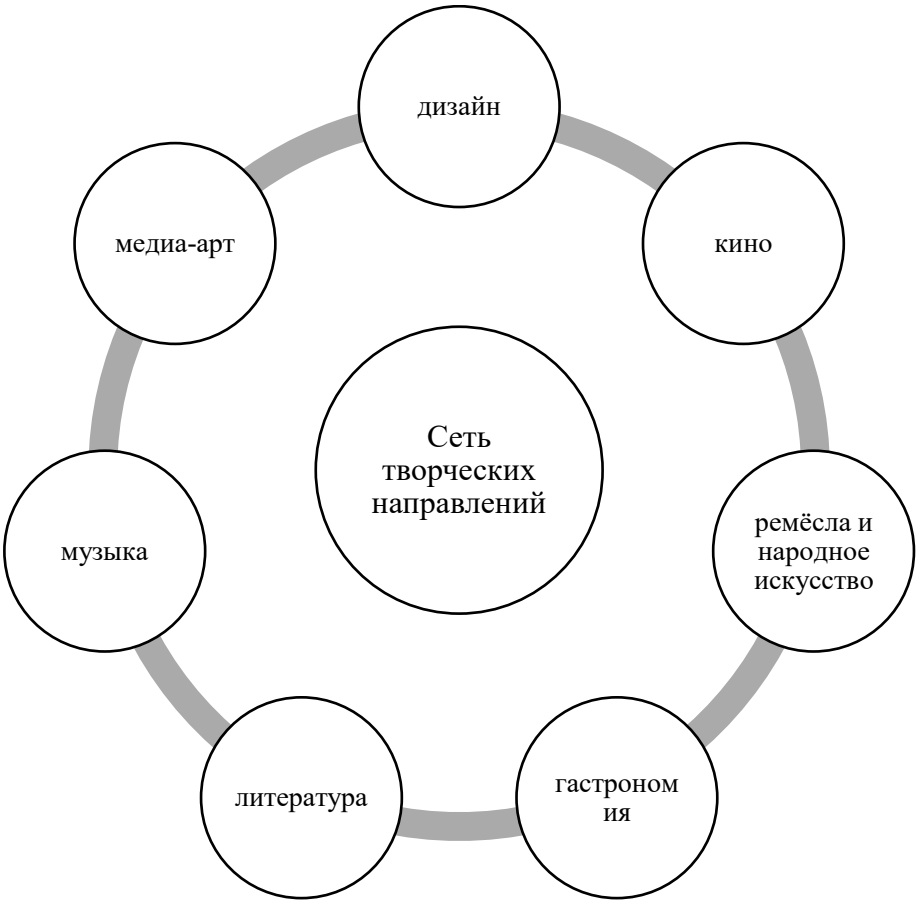
В современном развитом обществе расширение туристического рынка обеспечивает возможность адаптации к глобальной конкуренции, улучшения уровня жизни местного населения и достижения экономического равенства. На долю частного сектора приходится 85–90 процентов рабочих мест в сфере

туризма. В ближайшие годы ожидается, что за счёт дальнейшего расширения данной отрасли миллионам людей будут созданы новые возможности занятости, а уровень жизни населения повысится. Стремительный рост туризма в последние десятилетия связан с вхождением миллионов людей в средний класс и увеличением спроса на туристические услуги. Если в 1950 году количество международных поездок составляло всего 25 миллионов, то к 2017 году оно превысило 1,3 миллиарда. Если темпы роста в отрасли сохранятся, то в течение последующих 20 лет даже в отдалённых регионах появятся тысячи новых рабочих мест [7]. Среди различных направлений туризма в настоящее время возрастает роль и значение этнотуризма. По расчётам, в настоящий период 35–40 процентов туризма приходится на культурный или наследственный туризм (UNWTO 2006) [2]. Одним из важных факторов признания города на международном уровне является официальный статус, присваиваемый ЮНЕСКО.

Основная часть

Исследуемая нами территория — Бойсунский район — была включена в список нематериального культурного наследия ЮНЕСКО в 2001 году. Официальное признание является одним из наиболее мощных инструментов популяризации города в мире. ЮНЕСКО — авторитетная организация, классифицирующая объекты наследия и творческие города по всему миру и присваивающая им специальные статусы. Исследования показывают, что признание ЮНЕСКО значительно увеличивает туристический поток в города (Pulido-Fernandez и др., 2019; Ramires и др., 2018). Список всемирного наследия был сформирован в 1972 году. По данным 2021 года, в реестре числится 1121 объект, из которых 869 — культурные, 213 — природные (ЮНЕСКО, 2021c). Сеть творческих городов ЮНЕСКО (UCCN) [2].

UCCN была создана в 2004 году, и к 2021 году в сеть входили 246 городов (ЮНЕСКО, 2021a). Сеть включает следующие семь творческих направлений:



В Сурхандарьинской области развитию этнотуризма уделяется особое внимание через направление ремёсел и народного искусства. Ибо в мире нет народа без собственного этнографического происхождения, распространения, уникальных ритуалов, ценностей, традиций и ремесленных отраслей. Различные формы туризма преследуют сложные цели — от развития физических возможностей человека до расширения его мировоззрения; однако «этнотуризм» полностью направлен на обогащение духовного мира человека. Этнотуризм — это уникальный способ знакомства туристов с историей и культурным наследием других народов, изучения происхождения и корней их предков [3].

В научной литературе этнографический туризм выполняет также просветительскую функцию, его цель — знакомство с культурой и образом жизни народов мира. Согласно развитию концепции этнотуризма, впервые данный термин был применён Смит в 1977 году. В. Смит отделяет этнический туризм от культурно-исторического туризма.

Н.И. Бабушкин даёт следующее определение: «Этнографический туризм — это знакомство с традиционным образом жизни местного населения»; некоторые авторы, в частности В. Курин, предлагают называть такой туризм «этническим» [1].

Американский исследователь Д. МакКаннелл определяет этнотуризм как процесс поиска туристами подлинного образа жизни, который зачастую представляется в инсценированной форме. The Tourist (1976).

Нелсон Грабурн утверждает: туризм — это социальный институт современного общества, сходный с религиозным или священным путешествием; этнотуризм же представляет собой форму поиска такого опыта через культурную жизнь этнических групп. Tourism: The Sacred Journey (1983).

Этнотуризм основан на интересе туристов к реальной жизни народов, на непосредственном погружении в окружающую среду, на знакомстве с традициями, обычаями, творчеством и культурой через изменение привычных ландшафтов. Каждый турист имеет возможность увидеть традиционные жилища, постройки и одежду, попробовать национальные блюда, участвовать в традиционных праздниках или фестивалях, мероприятиях, мастер-классах.

Сурхандарьинская область, расположенная на самом юге Узбекистана, выделяется своими традиционными жилищами, национальными костюмами и обычаями, а также древними архитектурными памятниками.



Рис. 1. Карта экономико-географического положения Сурхандарьинской области.

Сурхандарья — многонациональный регион с богатым культурным наследием, недостаточно исследованный в контексте развития этнотуризма. Этнокультурное наследие Сурхандарьинской области формируется

материальными (историческими и культурными памятниками) и нематериальными элементами культуры (язык, обычаи, традиции, этническая идентичность) народов, проживающих на её территории. Этнокультурное наследие является важнейшим фактором развития туристической индустрии. Из 359 исторических памятников Сурхандарьинской области 294 относятся к археологии, 26 — к архитектуре, 39 — к монументальному искусству. В связи с 2500-летним юбилеем города Термеза в 2001–2002 годах были проведены реставрационные работы на ряде исторических сооружений и археологических памятников региона [10].

Памятники Сурхандарьи известны своей древностью. К числу наиболее значимых относятся: построенная в традициях хорасанской архитектуры знаменитая Джаркурганская минарета (1108–1109 гг.), комплекс Султан Саодат (X–XVII вв.), остатки крепости государства Чаганиян в Денове (XV в.), комплекс Хакима ат-Термизи (XI–XV вв.), минарет Зурмала в Старом Термезе (II в.), Кокилдор-хонако в окрестностях Термеза (XVI в.) и другие. [8–9] См. цветную карту природы и экономики Сурхандарьинской области между стр. 656–657 тома 7 ОТЭ.

Древнее население Сурхандарьинской оази, наряду с прохождением длительного исторического пути развития, сформировало огромную этническую историю, а также чрезвычайно богатую культуру и духовность. В процессе исторического развития в оазисе сложились этнические общности, которые сформировали своеобразный образ жизни, хозяйственные занятия и обычаи. Собранные материалы показывают, что древние предки современного этнического сообщества кунгратов были широко расселены по северо-западной части оазиса и составляли одни из первых скотоводческих родов региона. Большинство этнических групп, существовавших до них и после них, адаптировались к кунгратской культуре. Среди этнических групп Сурхандарьинской оази значителен уровень этнокультурной взаимосвязи. Они на протяжении веков поддерживали тесные связи через различные формы хозяйственной деятельности и сформировали своеобразные этнотопонимические пласты. До наших дней сохранились названия таких этнических групп, как карлуки, тюрки, барлосы, чагатаи, мангыты, калтатои, кунграты, катагоны, ковчины, юзы, дурманы; их названия также отразились в топонимике. Юзы (жузы) проживают в Шурчинском, Деновском и Сариосийском районах; дурманы — в Сариосийском, Деновском, Шурчинском, Термезском районах; представители тюрков — в Деновском и Сариосийском районах, частично в селе Мачай (Байсунский район) и городе Байсун; карлуков немного — они проживают в Шурчинском и Сариосийском районах (села Тохчиён, Бойкишлоқ, Саримозар, Карлук), барлосы (также немногочисленные) — в отдельных селах Сариосийского и Деновского районов [6].

Разумеется, этнический состав местного населения региона неоднороден. Часть населения образована народами, относящимися к иранской языковой группе. Таджикоязычные этносы проживают в

Байсунском районе — в селах Сайроб, Панжоб, Дарбанд, Пассурх, Авлод, Сариосиё, Қўрғонча; кроме того, в Байсунском районе — в селах Шурсой, Омонтепа, Миркораказ; в Шерабадском районе — в селах Зарабог‘, Пошхурт, Вандоб, Шержон, Шалқон; в Деновском районе — в селе Сина; в Сариосийском районе — в селе Сангардак. В этих населенных пунктах проживает население, которое с древних времён владеет двуязычием — узбекским и таджикским. Также туркмены на протяжении долгих веков находились в тесных этнокультурных отношениях с оседлым населением региона, и их историческая судьба тесно связана именно с этой местностью.

В области сегодня, помимо коренного населения, наиболее часто встречаются таджики, туркмены, русские, арабы, иранцы, лули (цыгане) и евреи. Оседлое население оазиса, хотя и сформировано различными родами и племенами, переселившимися сюда в разные исторические эпохи, всё же отличается друг от друга происхождением, обычаями и отдельными национальными традициями. Хозяйственная деятельность перечисленных этнических групп практически не различалась. Одним словом, именно эти этнические группы сформировали этнографию Сурхандарьинской оази. Следует также отметить, что оазис с древних времён располагался на Великом шёлковом пути, и соседство с тремя сопредельными государствами оказало значительное влияние на многообразие этнографического облика региона и его отличие от других территорий страны.

Население Сурхандарьинской оази сохранило в традиционных костюмах региональные и этнические особенности. Это своеобразие проявлялось в покрое, технике шитья и выборе тканей. Цвет одежды выбирался в соответствии с возрастом человека: пожилые и уважаемые люди носили в основном белые и светлые тона, молодёжь — красные и жёлтые цвета. Женщины одевались в соответствии с социально-экономическими условиями своего времени. Одежда женщин различалась по цвету ткани и покрою в зависимости от возраста, что позволяло легко определить, молодая это женщина или пожилая. В жизни женщин большое значение имело ремесло вышивки [5]. Одежда населения изготавливалась из тканей, передававшихся из поколения в поколение: боз, хонатлас, қалами, банорас, шойи, бекасам, адрас и других. Эти костюмы сегодня хранятся как уникальные образцы народного наследия. Одним из важных направлений, находящихся на грани исчезновения, является искусство бахшичилик — устное эпическое творчество. Узбекские народные дастаны отражают древнюю историю, культурную жизнь и национальные ценности предков, они высоко ценятся как бессмертное нематериальное наследие. Дастан — крупнейший жанр устного народного творчества, в котором повествуются героические, романтические и фантастические сюжеты. Корни сурхандарьинской дастановедческой традиции уходят в глубокую древность. Существуют сведения, что в Центральной Азии — на этой древней культурной территории — традиции дастанчества были широко распространены уже в VI–V веках до нашей эры. Искусство бахши, наряду с

тем, что его яркие исполнения доставляют слушателю удовольствие, несёт воспитательное и просветительское значение, пробуждая благие качества в сердцах молодого поколения. Народ веками черпал духовное вдохновение из дастанов «Алпомиш», «Гўрўғли», «Кунтуғмиш». Эти дастаны настолько укоренились в региональной культуре, что имена Алпомиш и Барчиной широко распространены среди населения. Сегодня фестиваль проходит раз в два года, и на него приезжают гости из многих стран мира, а также из соседних республик (Таджикистан, Афганистан, Туркменистан).

Народные песни региона, наряду с музыкальными особенностями, включают различные жанры и формы. Музыкальное искусство и музыкальные инструменты населения Сурхандарьинской оази имеют многотысячелетнюю историю. Музыкальные инструменты отличаются своеобразием и делятся на духовые, струнные и ударные. Инструменты, с одной стороны, являются материальными объектами, с другой — духовным богатством. Музыкальные инструменты (думбира, сурнай, най, дутор, чанқовуз, доира и др.), изготовленные ради удовлетворения эстетических потребностей, широко применялись при исполнении народных песен, мелодий и дастанов. Одним из распространённых инструментов является чанқовуз — струнно-ударный или язычковый инструмент, чаще исполняемый женщинами, но иногда и мужчинами. До второй половины прошлого века чанқовуз имел металлические и костяные разновидности. Костяной чанқовуз изготавливался из верблюжьего ребра, в середине вырезался язычок и привязывалась нить; при исполнении звук извлекался путём подёргивания нити. Деревянный чанқовуз делали из ореха, тутового дерева или можжевельника. [4] Этот музыкальный инструмент своим приятным звучанием до сих пор вызывает удивление. Исследователь по итогам своих наблюдений отмечает, что в Сурхандарьинской области имеются чрезвычайно большие возможности для развития этнотуризма.

Выводы и предложения:

1. Развитие инфраструктуры. Улучшение туристической инфраструктуры предполагает расширение возможностей для малого бизнеса и частного сектора. В области необходимо развивать дорожную и транспортную сеть, расширять гостиницы, хостелы и другие места проживания, организовывать информационные центры и обеспечивать надёжный интернет.

2. Разработка туристических маршрутов. Необходимо проектировать привлекательные маршруты, предлагающие путешествие по различным этнотуристическим зонам, знакомство с их культурой и обычаями. Маршруты должны обеспечиваться профессиональными гидами и чёткими указателями. Следует создать специальные этномаршруты, направленные на знакомство туристов с культурным наследием и жизнью местного населения.

3. Развитие этнотуризма по модели Казахстана, Испании и Италии. Рекомендуется развивать этнотуризм в сочетании с экотуризмом, а также

интегрировать его с гастрономическими и фольклорными фестивалями, используя успешные европейские методики.

4. Усиление участия местного сообщества. Важно активно вовлекать местное население в развитие этнотуризма. Поддержка продажи ремёсел, традиционной кухни и изделий ручной работы будет стимулировать экономику и обеспечит культурную самобытность туристического опыта.

5. Этнотуристическое районирование Сурхандарьи. Для оптимизации этнотуристического потенциала необходимо провести районирование регионов, граничащих с соседними республиками, исходя из их пригодности для устойчивого развития этнотуризма. В районирование должны включаться этнографические зоны и объекты культурного наследия.

6. Международное сотрудничество и продвижение. Для повышения международного авторитета Сурхандарьи в сфере этнотуризма необходимо проводить международные туристические форумы, привлекать иностранные инвестиции и развивать трансграничное сотрудничество.

В заключение можно сказать, что основная цель этнического туризма — знакомство с культурой, традициями, бытом и обычаями людей, тесно связанных с окружающей средой. Этнотуризм — новое и перспективное направление для экономики Узбекистана. Развитие этого вида туризма способствует сохранению уникальной культуры народов и природной среды. Ежегодно этническое разнообразие сокращается, многие культуры постепенно исчезают, поэтому развитие этнического туризма является чрезвычайно актуальным.

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ЎЗБЕКИСТОНДА КАМБАҒАЛЛИКНИ ҚИСҚАРТИРИШ ВА ИЖТИМОИЙ-ИҚТИСОДИЙ ИСЛОХАТЛАРНИНГ САМАРАДОРЛИГИ

Аннотация: *Юртимизда камбағалликни қисқартириш ва иқтисодий ривожланишни, ахолини ижтимоий қўллаб қувватлаш механизмларини такомиллаштириш йўлида амалга оширилган ислоҳотлар жамиятнинг барча қатламларига таъсир этувчи тизимли ўзгаришларни қамраб олди. Жумладан, таълим ва илм-фан тизимидаги янгиланишлар, кичик бизнес ва тадбиркорликни қўллаб-қувватлаш, инновацион тармоқларни яратиш ҳамда яшил энергетика ва транспорт инфратузилмасини модернизация қилиш борасида сезиларли натижалар кузатилмоқда. Натижада Ўзбекистоннинг халқаро рейтинглардаги мавқеини мустаҳкамлаб, хорижий сармоядорлар учун улкан имкониятлар яратмоқда. Шунингдек, камбағалликнинг қисқариши аҳолининг ижтимоий фаоллигини кучайтириб, жамиятда барқарорликни таъминлашнинг муҳим омили сифатида ўрин эгалламоқда.*

Калит сўзлар; *иқтисодий ривожланиш, яшил энергетика, иқтисодий-ижтимоий ислохатлар, хорижий сармоялар, барқарорликни таъминлаш, кичик бизнес ва тадбиркорлик, камбағалликга қарши кураш, модернизация, стратегик тараққиёт,инновацион тармоқлар.*

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POVERTY REDUCTION AND THE EFFECTIVENESS OF SOCIO-ECONOMIC REFORMS IN UZBEKISTAN.

Abstract: *The reforms implemented in our country to reduce poverty and improve economic development and social support mechanisms for the population have included systemic changes affecting all segments of society. In particular, significant results are being observed in the field of education and science, support for small business and entrepreneurship, the creation of innovative sectors, and the modernization of green energy and transport infrastructure. As a result, Uzbekistan is strengthening its position in international rankings and creating great opportunities for foreign investors. In addition, poverty reduction is becoming an important factor in strengthening the social activity of the population and ensuring stability in society.*

***Keywords**; economic development, green energy, economic and social reforms, foreign investments, ensuring stability, small business and entrepreneurship, combating poverty, modernization, strategic development, innovative sectors.*

Бугунги кунда камбағаллик муаммоси нафақат алоҳида мамлакатларнинг, балки бутун жаҳон ҳамжамиятининг асосий ижтимоий-иқтисодий муаммоларидан бири бўлиб қолмоқда. Зеро, камбағаллик инсоннинг энг асосий ҳуқуқлари – муносиб ҳаёт кечириш, таълим олиш, соғлом турмуш тарзини олиб бориш ва меҳнат қилиш имкониятларини чеклайди. Шу сабабдан ҳам камбағалликка қарши кураш ва уни қисқартириш Бирлашган Миллатлар Ташкилоти томонидан қабул қилинган Барқарор ривожланиш мақсадларининг (SDG) биринчи йўналиши сифатида белгиланган[47].

Глобал миқёсда Ўзбекистоннинг ушбу соҳадаги ютуқлари халқаро ҳамжамият томонидан ҳам эътироф этилмоқда. Камбағалликни қисқартириш орқали мамлакат минтақада барқарор иқтисодий ўсишга ҳисса қўшмоқда ва халқаро ҳамкорликнинг ишончли ҳамкорига айланмоқда. Бу жараён Ўзбекистоннинг халқаро рейтинглардаги мавқеини мустаҳкамлаб, хорижий сармоядорлар учун қулай муҳит яратмоқда. Шунингдек, камбағалликнинг қисқариши аҳолининг ижтимоий фаоллигини кучайтириб, жамиятда барқарорликни таъминлашнинг муҳим омили сифатида майдонга чиқмоқда.

Ўзбекистоннинг сўнгги йиллардаги энг муҳим иқтисодий ва ижтимоий натижаларидан бири бу камбағаллик даражасининг кескин қисқаришидир. Агар 2017 йилда мамлакат аҳолиси орасида камбағаллик даражаси 35 фоизни ташкил этган бўлса, бугунги кунда бу кўрсаткич 6,6 фоизгача туширилди[48]. Ушбу кўрсаткич нафақат оддий статистика, балки кенг кўламли ислоҳотларнинг, тўғри танланган стратегия ва қатъиятли сиёсатнинг амалий натижасидир. Шуни алоҳида таъкидлаш лозимки, бундай қисқа муддат ичида камбағалликни деярли 5 бараварга камайтириш кўплаб ривожланаётган давлатлар учун жуда катта ютуқ ҳисобланади.

Минтақавий миқёсда назар ташлайдиган бўлсак, Марказий Осиёнинг бошқа давлатларида камбағаллик даражаси турлича бўлиб, айрим мамлакатларда бу кўрсаткич ҳали ҳам нисбатан юқори даражада сақланиб қолмоқда. Масалан, Жаҳон банки ва БМТ маълумотларига кўра, айрим қўшни мамлакатларда камбағаллик даражаси 12-15 фоиз атрофида бўлса, ривожланаётган минтақаларда бу кўрсаткич 20-25 фоизни ташкил этади[49].

[47] The 17 Goals | Sustainable Development (UN)" — https://sdgs.un

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Шундай экан, Ўзбекистоннинг 6,6 фоизлик натижага эришгани минтақа бўйича етакчи кўрсаткичлардан бири сифатида эътироф этилиши мумкин.

Камбағалликни қисқартириш ва иқтисодий ривожланишни таъминлаш йўлида амалга оширилган ислоҳотлар жамиятнинг барча қатламларига таъсир этувчи тизимли ўзгаришларни қамраб олди. Энг аввало, таълим ва илм-фан тизимидаги янгиланишлар, кичик бизнес ва тадбиркорликни қўллаб-қувватлаш, инновацион тармоқларни яратиш ҳамда яшил энергетика ва транспорт инфратузилмасини модернизация қилиш борасида сезиларли натижалар қайд этилди.

Таълим соҳасидаги туб ўзгаришлар камбағалликка қарши курашда асосий омил бўлди. Мактабгача таълим қамрови 27 фоиздан 78 фоизга етказилди, олий таълимда эса бу кўрсаткич 9 фоиздан 42 фоизгача ошди[50]. Бу эса, ўз навбатида, келажак авлоднинг билим ва малакасини ошириб, меҳнат бозорига тайёр мутахассисларни етказиб беришга хизмат қилмоқда. Илм-фан соҳасида янги илмий марказлар, технопарклар ва тадқиқот лабораториялари ташкил этилиб, ёш олимларни қўллаб-қувватлаш бўйича махсус дастурлар жорий қилинди. Натижада, таълим ва илм-фан соҳаси камбағалликни қисқартиришнинг узоқ муддатли кафолатига айланди.

Мамлакат иқтисодиётида кичик бизнес ва хусусий тадбиркорлик алоҳида ўрин эгалламоқда. Охирги йилларда тадбиркорлик фаолияти учун қулай шарт-шароитлар яратилди: солиқ имтиёзлари, кредит ва грант дастурлари йўлга қўйилди, рухсатномалар ва лицензиялаш тартиб-таомиллари соддалаштирилди. Айниқса, хотин-қизлар ва ёшлар тадбиркорлигини ривожлантиришга алоҳида эътибор қаратилиб, минглаб оилалар ўз бизнесини йўлга қўйиш имконига эга бўлди. Натижада миллионлаб иш ўринлари яратилди ва кўплаб оилаларнинг даромад манбалари кенгайди.

Ўзбекистонда янги иқтисодий модель сифатида инновацион тармоқларни ривожлантиришга катта урғу берилмоқда. Ахборот технологиялари, биотехнология, электрон саноат, фармацевтика каби замонавий тармоқларда йирик лойиҳалар амалга оширилмоқда. Рақамли иқтисодиёт концепцияси асосида давлат хизматларининг электронлаштирилиши, электрон савдо ва электрон тўлов тизимларининг кенгайиши аҳолининг ҳаётини енгиллаштирмоқда. Бу эса замонавий иш ўринларини яратиб, ёшларнинг бандлигини таъминлашга хизмат қилмоқда.

Барқарор иқтисодий ривожланишнинг муҳим йўналишларидан яна бири – бу яшил энергетика[51]. Ўзбекистонда қуёш ва шамол электр станцияларини барпо этиш бўйича йирик лойиҳалар амалга оширилмоқда. Натижада, энергия манбаларини диверсификация қилиш ва экологик мувозанатни сақлаш имконияти кенгаймоқда. Шу билан бирга, транспорт

[50] Xalq Ta’limi Info. (2025-yil 28-iyul). Oliy ta’lim qamrovi 2017-yildagi 9 foizdan 2025-yilda 42 foizga oshdi. Manba: https://xalqtaliminfo.uz/en/post/1264

[51] Расулова, Дилфуза Валиевна. "Иқтисодий ўсишнинг анъанавий моделидан “яшил иқтисодиёт” га ўтиш." *USA-scientific review of the problems and prospects of modern science and education* 1.3 (2025): 118-124.

инфратузилмаси ҳам изчил модернизация қилинмоқда: темир йўл ва автомобил йўллари янгиланмоқда, метро ва шаҳар транспортида экологик тоза воситалар (электробуслар) жорий этилмоқда. Бу ислоҳотлар нафақат иқтисодий самарадорликни оширмоқда, балки аҳолининг кундалик ҳаёт сифатини ҳам яхшиламоқда.

Ўзбекистонда амалга оширилган кенг кўламли ислоҳотлар натижасида камбағаллик даражаси кескин камайди ва иқтисодиётнинг барқарор ривожланиши таъминланди. Бу жараён нафақат статистик кўрсаткичларда, балки аҳолининг кундалик ҳаётида ҳам яққол сезилмоқда.

Ислоҳотларнинг энг муҳим натижаларидан бири – бу янги иш ўринларининг очилиши бўлди. Кичик бизнесни ривожлантириш, инновацион тармоқларни яратиш, қишлоқ хўжалигини модернизация қилиш ва инфратузилмани янгилаш орқали мамлакатда миллионлаб фуқаролар доимий даромад манбаига эга бўлдилар. Янги иш ўринлари ёшлар бандлигини таъминлаш, хотин-қизлар фаоллигини ошириш ҳамда чекка ҳудудларда ижтимоий барқарорликни мустаҳкамлашда асосий омил бўлиб хизмат қилмоқда.

Даромад манбаларининг кенгайиши ва давлат томонидан берилаётган қўллаб-қувватлаш дастурлари натижасида оилаларнинг моддий аҳволи сезиларли даражада яхшиланди. Камбағалликнинг қисқариши аҳолининг таълим, соғлиқни сақлаш ва маданий хизматлардан фойдаланиш имкониятларини кенгайтирди. Бугунги кунда кўплаб оилалар фарзандларини олий таълимгача етказиш, сифатли тиббий хизматлардан фойдаланиш ва замонавий турмуш тарзини шакллантириш имконига эга бўлмоқда.

Камбағалликнинг қисқариши натижасида жамиятда ижтимоий тенглик тамойиллари кучайди. Давлатнинг ижтимоий ҳимоя сиёсати аҳолининг энг заиф қатламларини қўллаб-қувватлашга қаратилгани боис, ижтимоий адолатнинг янги механизмлари шаклланмоқда. Бу эса жамиятда барқарорлик ва ишонч муҳитини мустаҳкамлаб, фуқароларнинг давлат сиёсатига бўлган ишончини янада оширмоқда.

Умуман олганда, амалга оширилган ислоҳотларнинг натижалари иқтисодий ўсиш, ижтимоий барқарорлик ва халқ фаровонлигини таъминлашнинг асосий кафолатига айланди. Ўзбекистон бугун ўз тажрибаси билан нафақат минтақада, балки халқаро миқёсда ҳам камбағалликка қарши самарали курашнинг ёрқин намунасини кўрсатмоқда.

Сўнгги йилларда Ўзбекистон иқтисодий сиёсатининг устувор йўналишларидан бири – бу инновацион тармоқларни шакллантириш ва замонавий технологияларни жорий этиш бўлди. Чунки бугунги глобал иқтисодиёт шароитида рақобатбардошликнинг асосий мезони – бу инновациялар ва янги ғояларни амалиётга жорий этишдир. Президент Шавкат Мирзиёев ўз нутқида ҳам доимий равишда рақамли иқтисодиёт, инновацион ишлаб чиқариш ва илм-фанга асосланган тараққиёт масалаларига алоҳида урғу берди.

Қайд этиш жоизки, мамлакатда камбағалликни қисқартириш ва иқтисодий ривожланишни таъминлаш учун саноатни диверсификация қилиш ва замонавий ишлаб чиқаришни ривожлантириш бўйича кенг кўламли ишлар амалга оширилди. Йирик саноат зоналари ва эркин иқтисодий ҳудудларда янги инновацион корхоналар ташкил этилди.

Электроника, фармацевтика, кимё, автомобилсозлик ва қурилиш материаллари соҳаларида рақамли технологияларга асосланган ишлаб чиқариш жараёнлари йўлга қўйилди. Масалан, фармацевтика саноатида халқаро стандартларга мос дори-дармон ишлаб чиқариш йўлга қўйилиб, бу нафақат импорт ўрнини босди, балки экспорт имкониятларини ҳам кенгайтирди. Инновацион корхоналарнинг кўпайиши эса юқори малакали кадрлар бандлигини таъминлади ва янги иш ўринлари яратди.

Шу билан бирга, Ўзбекистоннинг иқтисодий модернизацияси жараёнида янги технологияларни жорий этиш устувор аҳамият касб этмоқда. Энергетика, транспорт, қишлоқ хўжалиги ва хизмат кўрсатиш соҳаларида илғор технологияларни қўллаш натижасида самарадорлик кескин ошди. Масалан, қишлоқ хўжалигида сувни тежовчи технологиялар, иссиқхона хўжаликлари ва агрокластер тизими жорий қилиниши натижасида нафақат маҳсулот сифати, балки фермерларнинг даромади ҳам ортди. Шунингдек, энергетикада қуёш ва шамол станцияларининг барпо этилиши янги авлод технологияларининг кенг татбиқ этилаётганидан далолат беради. Бу ислоҳотлар нафақат иқтисодий самарадорликни, балки экологик барқарорликни ҳам таъминламоқда.

Бундан ташқари, рақамли иқтисодиёт Ўзбекистон тараққиётининг янги драйверига айланди. “Рақамли Ўзбекистон – 2030” стратегияси доирасида давлат хизматлари босқичма-босқич электрон шаклга ўтказилмоқда. Бугунги кунда аҳолининг катта қисми солиқ, божхона, банк ва бошқа муҳим хизматлардан онлайн тарзда фойдаланмоқда. Электрон савдо платформалари ва электрон тўлов тизимларининг кенгайиши нафақат бизнес юритишни енгиллаштирмоқда, балки истеъмолчиларга ҳам қулайлик яратмоқда. Шунингдек, IT-парклар фаолияти ёшларнинг стартапларини ривожлантириш ва халқаро бозорга чиқиш имкониятларини кенгайтирмоқда. Рақамли иқтисодиётнинг жадал ривожланиши натижасида хизматлар соҳаси ҳажми ортиб, ялпи ички маҳсулот таркибида инновацион секторнинг улуши тобора ошмоқда.

Ўзбекистон иқтисодий ривожланиш жараёнида атроф-муҳитни муҳофаза қилиш ва барқарор тараққиётга эришишга катта эътибор қаратмоқда. Чунки экологик хавфсизликни таъминламасдан иқтисодий ўсишни давом эттириш имконсиз. Шунинг учун ҳам сўнгги йилларда мамлакатимизда яшил энергетика ва транспорт модернизацияси устувор йўналишлардан бирига айланди.

Яшил иқтисодиёт концепцияси асосида қуёш ва шамол электр станциялари, гидроэнергетика лойиҳалари ва биогаз ишлаб чиқариш корхоналари қурилиши йўлга қўйилди. Бу нафақат энергия ресурсларини

диверсификация қилишга, балки карбонат ангидрид чиқиндиларини камайтиришга ҳам хизмат қилмоқда. Транспорт тизимида эса экологик тоза автобуслар ва электромобилларни жорий этиш жараёни босқичма-босқич кенгаймоқда. Масалан, Тошкент шаҳрида электробуслар қатнови йўлга қўйилиб, жамоат транспортида энергия тежамкор технологияларга ўтиш бошланган.

Яшил энергетиканинг ривожланиши мамлакатнинг барқарор иқтисодиётга ўтишига замин яратмоқда. Анъанавий ёқилғи ресурсларига қарамлик камайиб, энергия ишлаб чиқаришда маҳаллий ва қайта тикланувчи манбалардан фойдаланиш кенгаймоқда. Бу эса нафақат экологик, балки иқтисодий хавфсизликни ҳам мустаҳкамлашда муҳим аҳамиятга эга. Шунингдек, халқаро бозорларда “яшил сертификат” талабларининг ортиб бориши Ўзбекистон маҳсулотларининг экспорт салоҳиятини оширади.

Қайд этиш жоизки, Ўзбекистон иқтисодиётининг асосий ҳаракатлантирувчи кучларидан бири кичик бизнес ва хусусий тадбиркорлик ҳисобланади. У нафақат иқтисодий ўсишни таъминлайди, балки жамиятда ижтимоий барқарорлик ва оилавий фаровонликни мустаҳкамлашга ҳам хизмат қилади. Кичик бизнес янги иш ўринлари яратишда етакчи ўрин тутади. Статистик маълумотларга кўра, мамлакатда банд аҳолининг ярмидан ортиғи айнан ушбу соҳада меҳнат қилмоқда.

Савдо, хизмат кўрсатиш, ҳунармандчилик, қишлоқ хўжалиги ва туризм соҳаларида кичик корхоналар фаолиятининг кенгайиши нафақат ишсизлик муаммосини камайтиради, балки аҳолининг меҳнат фаолиятини рағбатлантиради. Шу билан бирга, тадбиркорликнинг ривожланиши маҳаллий ресурслардан самарали фойдаланиш ва ҳудудий иқтисодий тенгликни таъминлашда ҳам муҳим аҳамият касб этади.

Шу билан бирга, кичик бизнес оилаларнинг даромадини оширишда энг муҳим омиллардан биридир. Ўз тадбиркорлигини йўлга қўйган фуқаролар молиявий мустақилликка эришади, фаровонлик даражаси ортади. Айниқса, аёллар ва ёшларнинг тадбиркорлик фаолиятига кенг жалб қилиниши оилавий бюджетни мустаҳкамлайди, уларнинг ижтимоий фаоллигини оширади.

Бугунги кунда камбағалликни қисқартириш ва иқтисодий ривожланиш Ўзбекистон сиёсатининг асосий йўналишига айланиб улгурган. Президентимиз Шавкат Мирзиёев таъкидлаганидек, аҳолининг турмуш даражаси ва фаровонлигини ошириш давлатимизнинг устувор вазифасидир. Сўнгги йилларда камбағаллик даражасини 35 фоиздан 6,6 фоизгача қисқартириш, таълим тизими қамровини кенгайтириш, инновацион саноатни ривожлантириш, “яшил” энергетика ва замонавий транспорт инфратузилмасини барпо этиш, шунингдек, кичик бизнес ва тадбиркорликни қўллаб-қувватлаш орқали миллионлаб иш ўринлари яратилди. Бу натижалар Ўзбекистоннинг нафақат миллий миқёсда, балки глобал даражада ҳам барқарор ривожланишга эришиш йўлида қатъий интилаётганини кўрсатади.

Келгусида амалга ошириладиган ислоҳотлар янада кенг қамровли бўлиб, иқтисодиётнинг рақамли трансформацияси, экологик хавфсизликни

таъминлаш, халқаро инвестицияларни жалб қилиш ва ижтимоий адолатни мустаҳкамлашга хизмат қилади.

Бу эса мамлакатимизни минтақада тараққиёт марказига айлантириш, ҳар бир фуқаронинг муносиб ҳаёт кечиришини таъминлаш ҳамда Ўзбекистонни барқарор ривожланиш мақсадларига эришишда етакчи давлатлар қаторига олиб чиқишга асос бўлади. Изчил амалга оширилаётган иқтисодий ва ижтимоий ислоҳотлар Янги Ўзбекистоннинг стратегик тараққиёт йўлида муҳим таянчга айланиб, келажак авлодларга янада фаровон, адолатли ва барқарор ҳаётни тақдим этади.

Келгусида иқтисодиётнинг рақамли трансформацияси, экологик хавфсизликни таъминлаш, халқаро инвестицияларни жалб қилиш ва ижтимоий адолатни мустаҳкамлаш орқали Ўзбекистон минтақада тараққиёт марказига айланиши кутилмоқда. Шу тариқа, ислоҳотлар иқтисодий ривожланишнинг муҳим таянчи бўлиб, келажак авлодларга фаровон ва барқарор ҳаётни тақдим этади.

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ОПРЕДЕЛЕНИЕ СОДЕРЖАНИЯ ГИДРОКСИДА НАТРИЯ И КАРБОНАТА НАТРИЯ ПРИ НАЛИЧИИ ИХ В КИСЛОТНО-ОСНОВНОМ МЕТОДЕ ТИТРОВАНИЯ

Аннотация. *В статье рассматриваются теоретические и практические основы определения смеси гидроксида натрия (NaOH) и карбоната натрия (Na_2CO_3) методом кислотно-основного титрования. Одновременное присутствие этих двух оснований в растворе усложняет процесс титрования, поскольку Na_2CO_3 имеет двухступенчатую нейтрализацию. В исследовании использовались такие индикаторы, как фенолфталеин и метилоранж, каждый из которых применяется для определения различных стадий нейтрализации в растворе. Этот метод, основанный на титриметрии, является точным, экономичным и простым в использовании и широко применяется в промышленных и лабораторных условиях. В статье также представлены современные подходы к повышению точности результатов титрования и расчета состава смесей, основанные на современных зарубежных исследованиях (в том числе: Journal of Chemical Education, Analytica Chimica Acta). Глубоко проанализированы научные основы снижения ошибок и повышения точности определения NaOH и Na_2CO_3 с помощью методических подходов.*

Ключевые слова. *Кислотно-основное титрование, гидроксид натрия, карбонат натрия, двухступенчатая нейтрализация, фенолфталеин, метилоранж, титриметрия, анализ смесей, индикаторы, объемное определение.*

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DETERMINING THE AMOUNT OF SODIUM HYDROXIDE AND SODIUM CARBONATE WHEN THEY ARE PRESENT TOGETHER IN AN ACID-BASE TITRATION METHOD

Annotation: *This article discusses the theoretical and practical foundations of the determination of a mixture of sodium hydroxide (NaOH) and sodium carbonate (Na_2CO_3) by acid-base titration. The simultaneous presence of these two bases in the solution complicates the titration process, since Na_2CO_3 has a two-stage neutralization. The study used indicators such as phenolphthalein and methyl orange, each of which is used to determine different stages of neutralization in the solution. This method, based on titrimetry, is accurate, economical and easy to use, and is widely used in industrial and laboratory conditions. The article also presents advanced approaches to increasing the accuracy of titration results and calculating the composition of mixtures, based on modern foreign research (including: Journal of Chemical Education, Analytica Chimica Acta). The scientific foundations of reducing errors and increasing accuracy in the determination of NaOH and Na_2CO_3 through methodological approaches are analyzed in depth.*

Keywords: *Acid-base titration, sodium hydroxide, sodium carbonate, two-step neutralization, phenolphthalein, methyl orange, titrimetry, mixture analysis, indicators, volumetric determination.*

Введение

Методы кислотно-основного титрования являются одними из наиболее широко используемых аналитических методов в области химии для определения концентрации веществ. В этом методе количество кислоты или основания в растворе определяется путем измерения объема титранта, добавляемого до тех пор, пока он не прореагирует с другим веществом и не станет нейтральным. При работе со смесью таких веществ, как NaOH (гидроксид натрия) и Na_2CO_3 (карбонат натрия), с каждым из этих двух компонентов происходят отдельные реакции, что усложняет процесс титрования.

NaOH является сильным основанием и реагирует с кислотой в одну стадию:

$NaOH + HCl \rightarrow NaCl + H_2O$

Na_2CO_3 реагирует с кислотой в два этапа:

$Na_2CO_3 + HCl \rightarrow NaHCO_3 + NaCl$

$NaHCO_3 + HCl \rightarrow NaCl + CO_2 + H_2O$

Для разделения этих реакций и определения количества каждого компонента используется метод двухиндексного титрования. В этом методе на первом этапе наблюдают нейтрализацию первой части NaOH и Na_2CO_3 с помощью индикатора фенолфталеина, а на втором этапе определяют нейтрализацию оставшейся части Na_2CO_3 с помощью индикатора метилоранжа.

Цель опыта

Определить состав смеси NaOH и Na_2CO_3 методом двухиндексного титрования.

Инструменты: бюретка, пипетка, колба, эрленмейера, подставка и зажим, вольфрамовая трубка,

химические вещества:раствор гидроксида натрия (NaOH), раствор карбоната натрия (Na_2CO_3), раствор серной кислоты (H_2SO_4), индикатор фенолфталеин, метиловый оранжевый индикатор

Теоретическая основа: При работе со смесью NaOH и Na_2CO_3 происходят отдельные реакции с каждым из этих двух компонентов, что усложняет процесс титрования. NaOH является сильным основанием и реагирует с кислотой в одну стадию:

$NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

Na_2CO_3 реагирует с кислотой в два этапа:

$Na_2CO_3 + H_2SO_4 \rightarrow NaHCO_3 + Na_2SO_4$

$NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + CO_2 + H_2O$

Для разделения этих реакций и определения количества каждого компонента используется метод двухиндексного титрования. В этом методе на первом этапе наблюдают нейтрализацию первой части NaOH и Na_2CO_3 с помощью индикатора фенолфталеина, а на втором этапе определяют нейтрализацию оставшейся части Na_2CO_3 с помощью индикатора метилоранжа.

Процедура эксперимента

Очистите все оборудование и промойте его соответствующими растворами. С помощью пипетки перенесите 25 мл смеси NaOH и Na_2CO_3 в колбу Эрленмейера. Приготовьте раствор H_2SO_4 концентрацией 0,1 М с помощью бюретки и используйте его в качестве титранта. Добавьте в колбу 2 капли индикатора фенолфталеина. Медленно добавляйте раствор H_2SO_4, наблюдая за изменением цвета раствора. При достижении точки нейтрализации с использованием фенолфталеина замените индикатор и добавьте метилоранж. Продолжайте медленно добавлять раствор H_2SO_4 до тех пор, пока не будет достигнута вторая точка нейтрализации. Определите объем H_2SO_4, израсходованный на каждом этапе. Запишите результаты эксперимента и выполните расчеты.

Результаты эксперимента:

|Объем титранта (мл) Нейтрализация фенолфталеином Нейтрализация метилоранжем

| X | Y1 | Y2 | | X2 - X1 | Г1 - Г2 | (Y1 - Y2) × 2 |

Расчеты:

Количество NaOH: (X2 - X1) × (0,1 M H_2SO_4)

Количество Na_2CO_3: (Y1 - Y2) × (0,1 M H_2SO_4) × 2

Заключение

С помощью этого эксперимента можно будет определить состав смеси NaOH и Na_2CO_3. При использовании метода двухиндексного титрования количество каждого компонента определяется отдельно, что важно в области аналитической химии.

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МОРФОФУНКЦИОНАЛЬНАЯ ОРГАНИЗАЦИЯ МЕЗЕНТЕРИАЛЬНЫХ ЛИМФАТИЧЕСКИХ УЗЛОВ КАК ПЕРИФЕРИЧЕСКИХ ОРГАНОВ ИММУННОЙ СИСТЕМЫ

Аннотация: *Мезентериальные лимфатические узлы — важная часть GALT, обеспечивающая фильтрацию кишечной лимфы, запуск иммунных реакций и поддержание толерантности к пищевым антигенам и микробиоте. В обзоре кратко освещены их строение, функции и роль ключевых структур — коркового и паракортикального отделов, высокоэндотелиальных венул, лимфатических синусов и стромы — в регуляции миграции иммунных клеток и поддержании иммунного гомеостаза кишечника.*

Ключевые слова: *Мезентериальные лимфатические узлы; кишечно-ассоциированная лимфоидная ткань; GALT; морфофункциональная организация; периферические органы иммунной системы.*

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MORPHOFUNCTIONAL ORGANIZATION OF MESENTERIC LYMPH NODES AS PERIPHERAL ORGANS OF THE IMMUNE SYSTEM

Annotation: *Mesenteric lymph nodes are a key component of GALT, responsible for filtering intestinal lymph, initiating immune responses, and maintaining tolerance to dietary antigens and the commensal microbiota. This review briefly highlights their structure, functions, and the role of major elements — the cortical and paracortical compartments, high endothelial venules, lymphatic sinuses, and stromal components — in regulating immune cell migration and sustaining intestinal immune homeostasis.*

Key words: *Mesenteric lymph nodes; gut-associated lymphoid tissue; GALT; morphofunctional organization; peripheral immune organs.*

Актуальность

Мезентериальные лимфатические узлы (МЛУ) — ключевые органы, дренирующие кишечник и обеспечивающие фильтрацию лимфы, иммунную защиту и толерантность к пищевым и микробным антигенам. Как основной индуктивный центр GALT, МЛУ запускают адаптивные иммунные ответы и поддерживают баланс между эффекторными и регуляторными механизмами. Нарушения их структуры и функций связаны с воспалительными заболеваниями кишечника, что подчёркивает их значение для понимания патогенеза и разработки подходов к модуляции мукозального иммунитета.

Цель исследования

Охарактеризовать морфофункциональную организацию мезентериальных лимфатических узлов как периферических органов иммунной системы на основе современных данных, с уточнением роли их основных структурных зон в поддержании иммунного гомеостаза кишечника.

Методы исследования

Работа представляет обзор строения и функций мезентериальных лимфатических узлов и их роли в GALT. Описаны основные элементы — капсула, трабекулы, корковый и паракортикальный слои с лимфоцитами и венулами, мозговое вещество, лимфатические синусы и строма. Особое внимание уделено их роли в толерантности к антигенам, взаимодействии с микробиотой и изменениях при воспалении кишечника.

Результаты исследования

Мезентериальные лимфатические узлы имеют организованную структуру: лимфа проходит через синусы к эфферентному сосуду, корковый слой содержит В-фолликулы, паракортикальная зона — Т-лимфоциты, мозговое вещество — плазматические клетки и макрофаги. Высокоэндотелиальные венулы обеспечивают приток лимфоцитов, а макрофаги в синусах способствуют контакту антигенов с иммунными клетками.

МЛУ как часть GALT обрабатывают кишечные антигены, формируют регуляторные Т-клетки и IgA-продуцирующие плазмоциты, поддерживая оральную толерантность и препятствуя проникновению микробов в кровоток. Их структура и функция адаптируются под влияние микробиоты и воспаления, обеспечивая баланс между иммунной защитой и толерантностью.

Вывод

Морфофункциональная организация мезентериальных лимфатических узлов обеспечивает иммунный фильтр и адаптивный иммунитет кишечника. Зоны, синусы и высокоэндотелиальные венулы поддерживают баланс защиты и толерантности; их нарушения связаны с воспалительными и иммунопатологическими процессами.

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РАБОТА С ТЕКСТОМ КАК ОСНОВНОЙ СПОСОБ ФОРМИРОВАНИЯ ЧИТАТЕЛЬСКОЙ ГРАМОТНОСТИ

Аннотация. *В данной статье рассмотрена роль работы с текстом в формировании читательской грамотности у школьников младших классов. Дано определение понятию «читательская грамотность» и «функциональная грамотность». Рассмотрены основные навыки, которые входят в понятие читательской грамотности, приемы и методы работы с текстом, а также способы проверки читательской грамотности младших школьников.*

Ключевые слова. *Грамотность, читательская грамотность, функциональная грамотность, приемы, методы, навыки и умения, младшие школьники.*

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WORKING WITH TEXT AS THE MAIN WAY OF DEVELOPING READING LITERACY

Abstract. *This article examines the role of working with text in developing reading literacy in elementary school students. The concepts of "reading literacy" and "functional literacy" are defined. The article discusses the key skills included in reading literacy, techniques and methods for working with text, and methods for assessing the reading literacy of elementary school students.*

Keywords: *Literacy, reading literacy, functional literacy, techniques, methods, skills, and abilities, elementary school students.*

Читательская грамотность является одним из ключевых навыков, которые необходимы для успешной адаптации и развития в современном информационном обществе. Способность читать, понимать и анализировать

тексты является необходимой предпосылкой для получения знаний и понимания окружающего мира.

В этой связи, работа с текстом является одним из основных способов формирования читательской грамотности.В эпоху цифровых технологий и информационного изобилия, когда потоки данных обрушиваются на нас ежесекундно, читательская грамотность становится не просто полезным навыком, а жизненной необходимостью. Она является фундаментом для успешной адаптации в современном мире, позволяя критически оценивать информацию, извлекать из нее смысл и использовать полученные знания для решения разнообразных задач. Работа с текстом, в свою очередь, выступает ключевым инструментом в формировании этой самой читательской грамотности, предоставляя возможность не только понимать написанное, но и анализировать, интерпретировать и интегрировать полученные сведения в собственную систему знаний.

Первый и, пожалуй, самый важный этап работы с текстом – это понимание. Оно заключается в способности распознавать значения слов, понимать грамматические конструкции и улавливать общий смысл прочитанного. Но понимание – это не просто механическое декодирование символов в слова. Это активный процесс взаимодействия с текстом, требующий от читателя умения устанавливать связи между отдельными предложениями, абзацами и главами, а также между текстом и собственным опытом и знаниями. Развитие навыков понимания начинается с освоения базовых лингвистических концепций, но не ограничивается ими. Оно требует постоянной практики чтения разнообразных текстов, внимания к деталям и умения задавать вопросы к прочитанному.

После того как текст понят на уровне общего смысла, наступает этап анализа. Анализ текста – это процесс разложения текста на составные части, выявления его структурных элементов, авторских намерений и идеологических посылок. Он включает в себя критическую оценку информации, выявление логических ошибок и противоречий, а также определение достоверности источников. Анализ текста – это инструмент, который позволяет читателю не только понять, что говорит автор, но и зачем он это говорит, какую цель преследует и насколько можно доверять его словам. Развитие навыков анализа требует критического мышления, умения замечать детали и находить закономерности, а также знания основ риторики и теории аргументации.

Интерпретация – это процесс придания тексту личного смысла, основанный на собственном опыте, знаниях и убеждениях. Это творческий процесс, в ходе которого читатель активно взаимодействует с текстом, сопоставляет его с собственной картиной мира и находит в нем новые смыслы и значения. Интерпретация не должна быть произвольной или субъективной. Она должна основываться на анализе текста и учитывать авторский замысел, исторический контекст и культурные особенности. Развитие навыков интерпретации требует открытости к новым идеям, умения

смотреть на вещи с разных точек зрения и готовности пересматривать собственные убеждения.

Последний и самый важный этап работы с текстом – это интеграция. Интеграция – это процесс включения полученных знаний в собственную систему представлений о мире и использование их для решения практических задач. Это умение применять прочитанное для аргументации своей точки зрения, для принятия решений, для построения коммуникации с другими людьми. Интеграция – это показатель того, что читательская грамотность стала не просто набором навыков, а частью его личности, инструментом, который он использует ежедневно в своей жизни. Развитие навыков интеграции требует критического рефлексивного мышления, умения находить связи между разными областями знаний и готовности к постоянному самосовершенствованию.

Таким образом, осознанное чтение является основой саморазвития личности – грамотный читатель понимает текст, размышляет над его содержанием, легко выражает свои мысли и свободно общается.

Разнообразие текстов, развитие навыков понимания, выразительного чтения, критического мышления, словарного запаса, грамматических навыков, эмпатии и социального мышления являются ключевыми компонентами, которые помогают формировать читательскую грамотность. Поэтому, для успешного развития в современном информационном обществе, необходимо развивать навыки работы с текстом.

Работа с текстом является одним из основных способов формирования читательской грамотности у детей. Для того чтобы работа с текстом была эффективной, необходимо использовать различные приемы, включая анализ текста, чтение вслух, групповую работу с текстом и другие. Главная цель работы с текстом – помочь детям развивать навыки чтения, понимания и анализа текста, а также учиться выделять главное, формулировать вопросы и выводы, и развивать критическое мышление. Работа с текстом должна начинаться с раннего возраста, и учителям следует использовать разнообразные методы и подходы для того, чтобы сделать учебный процесс интересным и увлекательным для детей.

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КЛИНИЧЕСКАЯ ХАРАКТЕРИСТИКА, ДИАГНОСТИКА И ПРОФИЛАКТИКА ПРОФЕССИОНАЛЬНЫХ ЗАБОЛЕВАНИЙ НОСА У РАБОТНИКОВ С ВОЗДЕЙСТВИЕМ ХИМИЧЕСКИХ ФАКТОРОВ

Аннотация*: Профессиональные заболевания верхних дыхательных путей, особенно полости носа, занимают одно из ведущих мест в структуре профессиональной патологии органов дыхания. Слизистая оболочка носа является первым барьером на пути вдыхаемого воздуха, поэтому именно она наиболее подвержена воздействию химических агентов — раздражающих газов, паров кислот и щелочей, органических растворителей, аэрозолей и пыли химического происхождения. Проблема профессиональных поражений носа остаётся актуальной, так как данные состояния приводят к стойким функциональным нарушениям дыхания и обоняния, снижению трудоспособности и ухудшению качества жизни работников.*

Ключевые слова: *профессиональные заболевания, нос, химические факторы, диагностика, профилактика, атрофический ринит.*

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CLINICAL CHARACTERISTICS, DIAGNOSIS AND PREVENTION OF OCCUPATIONAL DISEASES OF THE NOSE IN WORKERS EXPOSED TO CHEMICAL FACTORS

Annotation: *Occupational diseases of the upper respiratory tract, particularly the nasal cavity, are among the leading causes of occupational respiratory diseases. The nasal mucosa is the first barrier to inhaled air, making it particularly susceptible to chemical agents—irritating gases, acid and alkali vapors, organic solvents, aerosols, and chemical dust. Occupational nasal lesions remain a pressing issue, as these conditions lead to persistent functional impairments of respiration and olfactory function, decreased productivity, and a deterioration in the quality of life of workers.*

Keywords: *occupational diseases, nose, chemical factors, diagnostics, prevention, atrophic rhinitis.*

Введение

По данным ВОЗ и национальных центров гигиены труда, до 20–30 % работников химической промышленности отмечают симптомы раздражения слизистой носа, а хронический профессиональный ринит диагностируется у 10–15 % из них. По данным современных исследований (Костюченко, 2017; Watelet et al., 2020), длительное воздействие химических факторов может привести к развитию профессионального атрофического ринита, сопровождающегося стойкими функциональными нарушениями. Чаще всего заболевание встречается у работников, контактирующих с формальдегидом, аммиаком, фенолами, парами кислот и щелочей, солями тяжёлых металлов**.** Наибольший риск имеют: операторы химических производств, маляры, лакокрасочники, работники фармацевтических и резиновых цехов, лабораторные специалисты, сотрудники нефтехимических предприятий.

Согласно данным современной литературы, хронический ринит профессионального генеза чаще всего наблюдается у работников химической, лакокрасочной, фармацевтической и целлюлозно-бумажной промышленности. Наиболее значимыми химическими агентами считаются формальдегид, аммиак, хлор, сернистый ангидрид, фенолы и соединения тяжёлых металлов. Продолжительное воздействие данных веществ вызывает нарушение мукоцилиарного клиренса, метаплазию эпителия и формирование гипертрофических или атрофических изменений слизистой оболочки.

Цель исследования

Изучить клинические особенности, диагностические критерии и профилактические меры при профессиональных заболеваниях носа у лиц, работающих в условиях воздействия химических факторов.

Материалы и методы

Для анализа были использованы литературные источники отечественных и зарубежных авторов за последние 10 лет, а также данные наблюдения за работниками химических, фармацевтических и лакокрасочных предприятий.

Проведён анализ клинических проявлений, данных риноскопии, цитологических и гистологических исследований, а также оценка эффективности профилактических мероприятий.

Использованы методы:

- анкетирование работников;
- клинический осмотр (передняя и задняя риноскопия, эндоскопия носа);
- цитологическое исследование мазков-отпечатков слизистой;
- функциональная оценка мукоцилиарного клиренса.

Результаты и обсуждение

Основными химическими факторами, вызывающими профессиональные поражения слизистой носа, являются аммиак, формальдегид, сернистый ангидрид, хлор, фенолы и пары органических растворителей. Эти вещества оказывают раздражающее, токсическое и

сенсибилизирующее действие. Продолжительное воздействие химических агентов приводит к развитию хронического воспаления, нарушению барьерных и трофических функций слизистой оболочки, её атрофии или гипертрофии, на ранних стадиях заболевания отмечаются жалобы на: сухость, жжение, зуд в носу, заложенность и слизистые выделения, чихание, раздражение глаз, формированию эрозивно-язвенных изменений и перфораций носовой перегородки. При хроническом течении: постоянная сухость, образование корок, носовые кровотечения, деформация и перфорация перегородки, снижение обоняния, головные боли, ухудшение сна. Для установления связи заболевания с профессией требуется заключение профпатолога. По данным Johansson и соавт. (2019), своевременные профилактические меры снижают риск развития профессиональных заболеваний носа на 30–40%. Профилактика профессиональных поражений носа основана на снижении концентрации вредных веществ и укреплении защитных свойств слизистой.

Меры профилактики включают:

1. **Технические мероприятия:**
   - герметизация производственных установок,
   - вентиляция и вытяжные системы,
   - автоматизация технологических процессов.
2. **Организационные меры:**
   - ротация работников,
   - ограничение времени пребывания в зоне воздействия,
   - обязательные предварительные и периодические медосмотры.
3. **Индивидуальная защита:**
   - использование респираторов и фильтров,
   - промывание полости носа изотоническими растворами после смены,
   - применение мазей с витаминами А и Е для регенерации слизистой.
4. **Медицинская профилактика:**
   - санация очагов инфекции,
   - профилактическое лечение ЛОР-врачом,
   - динамическое наблюдение работников групп риска.

Выводы:

1. Профессиональные заболевания носа у работников химических производств обусловлены длительным воздействием раздражающих и токсических веществ.
2. Клиническая картина характеризуется воспалительными, атрофическими и деструктивными изменениями слизистой оболочки носа.
3. Ранняя диагностика и проведение профилактических мероприятий позволяют предупредить развитие тяжёлых форм заболевания.
4. Эффективная профилактика возможна при комплексном подходе — сочетании технических, организационных и медицинских мер защиты.

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РОЛЕВОЙ КОНФЛИКТ В ТРУДОВЫХ КОЛЛЕКТИВАХ (АНАЛИЗ НА ОСНОВЕ РОЛЕЙ БЕЛБИНА)

Аннотация: *В статье анализируются психологические механизмы ролевого конфликта в трудовых коллективах на основе ролевой теории и модели командных ролей Белбина. Вначале рассматриваются концепция открытой системы К. Кац и Р. Кана, а также такие понятия, как role conflict, role ambiguity и role overload, раскрывается их влияние на производительность труда, стресс, мотивацию и качество внутриколлективной коммуникации. Далее исследуются девять командных ролей по Белбину — Plant, Shaper, Coordinator, Implementer, Teamworker, Resource Investigator, Monitor Evaluator, Completer Finisher и Specialist — и типичные конфликты между ними (Plant–Implementer, Shaper–Teamworker, Coordinator–Shaper и др.) с психологической точки зрения. На основе подходов Роббинса, Форсайта, Стогдилла, Гоулмана и Денисона обосновывается связь ролевого конфликта с командной эффективностью, результативностью лидерства и организационной культурой. На примере трудовых коллективов Узбекистана отдельно выделены такие культурные факторы, как принцип «старший–младший», неформальное лидерство, конформизм, избегание открытой критики («чувствовать себя неловко»), которые усиливают ролевые противоречия. В статье предлагаются практические рекомендации по снижению ролевого конфликта и оптимизации командной работы посредством диагностики по Белбину, применения инструментов ТКИ и ROCI-II, фасилитации, кооперативного подхода к управлению конфликтами и лидерства, основанного на эмоциональном интеллекте.*

Ключевые слова: *трудовой коллектив, ролевая теория, ролевой конфликт, командные роли Белбина, неопределённость роли, психология организации, управление конфликтами, эмоциональный интеллект, организационная культура.*

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ROLE CONFLICT IN WORKPLACE TEAMS (AN ANALYSIS BASED ON BELBIN'S TEAM ROLES)

Abstract: *This article explores the psychological mechanisms behind role conflict in workplace teams, drawing on role theory and Belbin's team role model.*

It begins with an overview of Katz and Kahn's open systems theory and discusses key concepts such as role conflict, role ambiguity, and role overload — highlighting their impact on productivity, stress, motivation, and internal team communication. The paper then examines Belbin's nine team roles — Plant, Shaper, Coordinator, Implementer, Teamworker, Resource Investigator, Monitor Evaluator, Completer Finisher, and Specialist — and typical psychological conflicts between them (e.g., Plant vs. Implementer, Shaper vs. Teamworker, Coordinator vs. Shaper). Drawing on the work of Robbins, Forsyth, Stogdill, Goleman, and Denison, the study links role conflict to team effectiveness, leadership outcomes, and organizational culture. Using examples from Uzbek work environments, it highlights cultural factors such as the "senior–junior" principle, informal leadership, conformity, and the tendency to avoid direct criticism ("feeling awkward"), which intensify role tensions. The article offers practical recommendations for reducing role conflict and improving teamwork through Belbin-based diagnostics, the use of TKI and ROCI-II tools, facilitation techniques, cooperative conflict management, and emotionally intelligent leadership.

Keywords: *work team, role theory, role conflict, Belbin team roles, role ambiguity, organizational psychology, conflict management, emotional intelligence, organizational culture.*

Эффективность трудового коллектива, прежде всего, напрямую зависит от того, насколько чётко каждый сотрудник осознаёт своё место, а также от того, насколько ясно определены его функции, ответственность и ожидаемые результаты деятельности. Многие социально-психологические проблемы, возникающие внутри организации, нередко интерпретируются как межличностные конфликты, однако их истинная причина зачастую кроется в неправильном распределении ролей, размытости границ между ними либо несоответствии между ролевыми ожиданиями, сформированными руководством, и реальным поведением сотрудников. Поэтому при изучении групповых процессов ролевая теория рассматривается как один из ключевых методологических подходов в психологии труда и организационном поведении.

Согласно ролевой теории, каждый сотрудник занимает определённую функциональную позицию в организационной системе, и в отношении этой позиции существуют ролевые ожидания, формируемые другими членами коллектива, требования роли, устанавливаемые руководством, а также реальное ролевое поведение, которое проявляет человек в процессе выполнения своих обязанностей. Если ролевые ожидания неопределённы или противоречивы, у сотрудника возникает несогласованность в исполнении задач, что углубляет конфликты внутри коллектива. Особенно в современных организациях, где межотдельные взаимодействия являются интенсивными, эффективность сотрудничества между ролями во многом

определяется тем, насколько чётко каждый работник понимает и принимает свою роль.

Кроме того, нечеткое распределение ролей в трудовом коллективе, размытость зон ответственности или возложение на одного сотрудника нескольких несовместимых задач усиливает такие психологические состояния, как role ambiguity (ролевая неопределённость), role conflict (ролевой конфликт) и role overload (ролевая перегрузка). Эти состояния, в свою очередь, вызывают стресс, снижение мотивации, нарушения в коммуникации, замедление процесса принятия решений и ухудшение общего социально-психологического климата в коллективе. Следовательно, чёткое определение ролей является важным фактором не только организационной эффективности, но и психологической устойчивости коллектива.

Одним из наиболее часто наблюдаемых явлений в повседневной управленческой практике является ситуация, когда члены коллектива стремятся взять на себя одну и ту же задачу или, наоборот, стараются переложить важные обязанности друг на друга. Подобные случаи являются прямым признаком неясности в распределении ролей. Поэтому, каким бы сильными ни были лидерские качества руководителя, управленческая культура и система коммуникации в организации, при отсутствии чётко определённых ролей внутри коллектива неизбежно формируются скрытые противоречия, которые со временем могут перерасти в открытые конфликты. Ролевая теория как раз объясняет внутренние механизмы этих процессов и помогает выявить психологические факторы, необходимые для согласованной и эффективной работы команды.

Классическая модель Каца и Кана рассматривает организацию как открытую систему и подчёркивает, что каждый сотрудник выполняет в этой системе определённую роль, которая регулируется ролевыми ожиданиями, формируемыми другими членами коллектива, а также ролевыми требованиями, устанавливаемыми руководством [52] . Согласно данному подходу, роль сотрудника не ограничивается лишь его должностной инструкцией; напротив, роль представляет собой широкое системное понятие, включающее в себя неформальные ожидания, возникающие в процессе межличностного взаимодействия, социальные сигналы, формирующиеся в коммуникации внутри коллектива, а также стандарты поведения, задаваемые организационной культурой. Поэтому чёткое определение роли является основой командного равновесия, устойчивого взаимодействия и эффективного трудового процесса.

Несоответствие между ролевыми требованиями и фактическим поведением сотрудника закономерно приводит к возникновению role conflict (ролевого конфликта) и role ambiguity (неопределённости роли). Ролевой конфликт чаще всего формируется тогда, когда к работнику поступают взаимоисключающие ожидания из разных источников, тогда как ролевую

[52] Katz, D., Kahn, R. L. The Social Psychology of Organizations. — New York: Wiley, 1978. — 838 p.

неопределённость провоцируют неясные границы обязанностей, размытые полномочия, неопределённые зоны ответственности или недостаточно описанные рабочие процессы. Особенно проблемной ситуация становится в тех случаях, когда неопределённость роли достигает высокого уровня: сотруднику становится сложно очертить рамки своих функций, он не может дать чёткий ответ на вопрос «кто за что отвечает?»[53]. В итоге сотрудник начинает испытывать состояние неопределённости, внутренней нестабильности и утраты уверенности, что негативно отражается на его индивидуальной эффективности.

Длительно сохраняющаяся неопределённость роли приводит к функциональным сбоям в работе команды, возникновению ситуаций перекладывания ответственности, нарушению коммуникационных цепочек и росту уровня стресса. В подобных условиях членам коллектива становится всё труднее согласовывать действия, в выполнении задач появляются дублирование или, наоборот, пробелы, а командное доверие заметно ослабевает. Именно поэтому модель Каца и Кана подчёркивает исключительную важность чёткого определения ролей для устойчивости группы, эффективного управления организационным поведением и профилактики конфликтов[54]. Чем яснее структурированы роли, тем выше уровень взаимодействия, мотивации, взаимной поддержки и распределённой ответственности внутри коллектива. Системная определённость ролей в организации выступает не только индикатором эффективности, но и считается одним из наиболее действенных психологических механизмов предотвращения конфликтов.

Ролевые конфликты (см. рис. 1) проявляются в различных формах, и каждая из них по-своему влияет на психологическое состояние сотрудника, его участие в трудовом процессе и общую функциональность команды.



Рисунок 1. Ролевые конфликты

— Интерролевой конфликт возникает тогда, когда сотрудник одновременно выполняет две или более роли, которые трудно совместимы между собой. Например, если руководителю приходится одновременно быть лидером команды и техническим исполнителем, столкновение требований по времени, ресурсам и ожиданиям усиливает ролевое напряжение.

— Интраролевой конфликт появляется в случаях, когда в пределах одной роли работнику предъявляются противоречивые требования из разных источников. В такой ситуации человек пытается удовлетворить две разные системы ожиданий в рамках одной должности, что приводит к

[53] Rizzo, J. R., House, R. J., Lirtzman, S. I. Role Conflict and Role Ambiguity: A Conceptual Critique // Administrative Science Quarterly. — 1970. — Vol. 15, No. 2. — P. 150–163.
[54] Katz, D., Kahn, R. L. The Social Psychology of Organizations. — New York: Wiley, 1978. — 838 p.

психологическому дискомфорту и функциональным трудностям. Например, один руководитель настаивает на максимальной скорости, тогда как другой требует предельной точности.

— Конфликт «личность—роль» (person–role conflict) формируется тогда, когда индивидуальные ценности, темперамент, компетенции или личностные особенности сотрудника не совпадают с требованиями возложенной на него роли. Так, интроверту может быть сложно выполнять обязанности, связанные с интенсивным межличностным взаимодействием, либо работнику могут поручить задачи, противоречащие его ценностям.

— Ролевая перегрузка (role overload) возникает, когда объём возложенных обязанностей превышает физические или психологические возможности сотрудника. В этом случае человек испытывает чувство «неуспевания», что приводит к стрессу, утомлению и резкому снижению мотивации[55].

Эти четыре вида ролевых конфликтов негативно отражаются не только на индивидуальной эффективности сотрудника, но и подрывают общую устойчивость коллектива, ослабляют доверие между членами команды, затрудняют коммуникацию и нарушают ритм рабочей деятельности.

В условиях современных трудовых коллективов особое значение приобретает модель командных ролей Белбина, разработанная Мередитом Белбиным. Данная концепция объясняет эффективность команды не только через должностные обязанности и технические навыки, но прежде всего через психологические поведенческие паттерны её участников. По мнению Белбина, вклад каждого сотрудника в совместную деятельность определяется его естественным стилем мышления, особенностями коммуникации и тем, какую роль он занимает в группе. На этой основе исследователь выделяет девять ролей, которые являются ключевыми для продуктивной командной работы (см. рис. 2).

[55] Rizzo, J. R., House, R. J., Lirtzman, S. I. Role Conflict and Role Ambiguity: A Conceptual Critique // Administrative Science Quarterly. — 1970. — Vol. 15, No. 2. — P. 150–163.

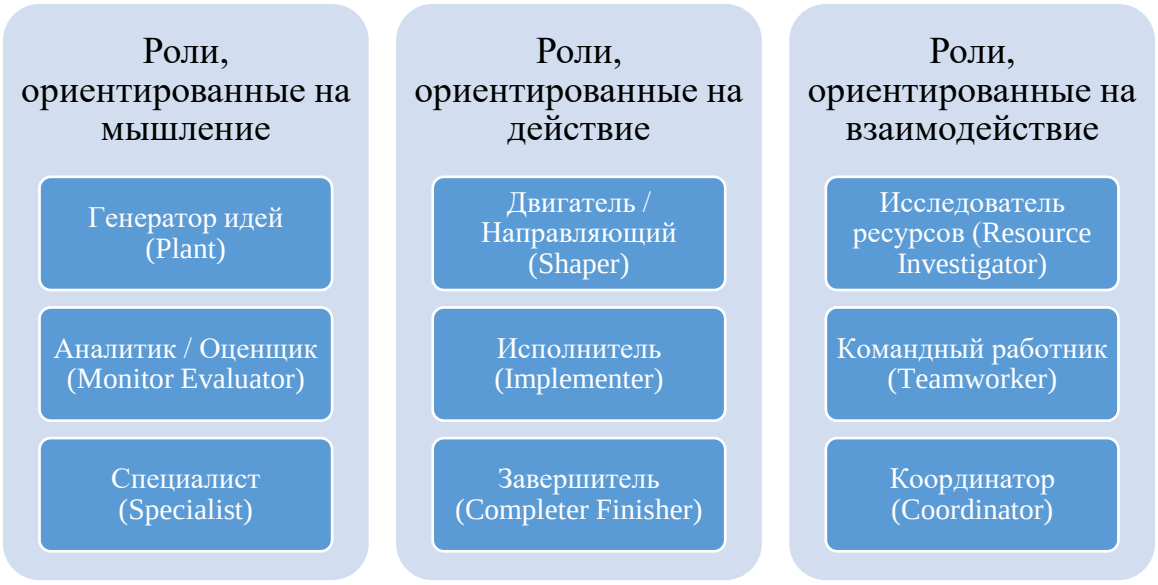


Рисунок 2. Модель командных ролей Белбина — 3 основные

Plant (Генератор идей) — творческий участник команды, генерирующий новые концепции и предлагающий инновационные решения, однако иногда может упускать важные детали.

Shaper (Двигатель / Направляющий) — энергичный и напористый член команды, который продвигает её вперёд, быстро принимает решения под давлением и задаёт динамику, но порой проявляет излишнюю резкость.

Coordinator (Координатор) — естественный лидер, объединяющий команду, грамотно распределяющий задачи и определяющий стратегическое направление работы.

Implementer (Исполнитель) — участник, обеспечивающий практическую реализацию идей благодаря дисциплине, структурированности и ориентации на результат; однако может медленно адаптироваться к изменениям.

Teamworker (Командный работник) — поддерживающий член команды, который отвечает за психологический климат, проявляет дипломатичность, гибкость и помогает сглаживать конфликты, хотя иногда может сомневаться при принятии решений.

Resource Investigator (Исследователь ресурсов) — оптимистичный, инициативный участник, который ищет внешние возможности, устанавливает новые связи и контакты; при этом иногда может не доводить начатое до конца.

Monitor Evaluator (Аналитик / Оценщик) — объективный анализатор, логичный и стратегичный мыслитель, который способен трезво оценивать идеи, хотя его сдержанность может восприниматься как холодность.

Completer Finisher (Завершитель) — внимательный к деталям и крайне ответственый член команды, который следит за качеством и доведением задач до идеального результата; однако чрезмерный перфекционизм нередко становится источником стресса.

Specialist (Специалист) — эксперт с глубокой профессиональной подготовкой, который привносит в команду уникальные знания и компетенции, но обычно действует в узкой области[56].

Согласованное взаимодействие этих ролей обеспечивает функциональную устойчивость команды, её внутреннюю гармонию и высокую эффективность. В то время как несоответствие или дисбаланс между ролями закономерно ведёт к усилению ролевых конфликтов.

В своих исследованиях Роббинс подчёркивает, что усиление ролевой неопределённости и ролевого конфликта внутри коллектива приводит к заметному снижению производительности сотрудников, дезорганизации коммуникационных процессов и ослаблению мотивации. В командах, где отсутствует ясность ролей, работники не могут получить ответ на ключевые вопросы: «кто за что отвечает?», «какое подразделение должно выполнять эту задачу?», «кто несёт ответственность за результат?». Вследствие этого возрастает количество разрывов между задачами, появляются дублирование функций, хаотичность в выполнении работ и трудности координации.

По мнению Роббинса, ролевой конфликт подрывает не только функциональную эффективность, но и психологическое благополучие работников: необходимость действовать под давлением противоречивых требований вызывает у сотрудника выражённое эмоциональное напряжение и внутренний стресс[57].

Концепция групповой динамики Форсайта позволяет ещё глубже раскрыть данный процесс. Согласно его подходу, чёткое определение ролей в команде является ключевым условием формирования доверия, сотрудничества и взаимной поддержки. В коллективах, где роли структурированы и ясно распределены, участники не дублируют функции друг друга, зоны ответственности не пересекаются, и команда функционирует как единая согласованная система.

Форсайт подчёркивает, что высокий уровень ролевой определённости способствует внутренней стабильности и повышает качество коммуникации, что, в свою очередь, оказывает прямое влияние на общую эффективность групповой деятельности[58].

Исследования Стогдилла в области лидерства научно доказывают, что грамотное распределение ролей внутри коллектива является решающим фактором эффективности руководителя. В его концепции задача лидера состоит не только в постановке задач, но и в выявлении степени согласованности или противоречивости ролей внутри команды, рациональном распределении ресурсов и управлении психологическим климатом группы.

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[56] Belbin, R. M. Management Teams: Why They Succeed or Fail. — Oxford: Butterworth-Heinemann, 2010. — 256 p.
[57] Robbins, S. P., Judge, T. A. Organizational Behavior. — New Jersey: Pearson Education, 2017. — 752 p.
[58] Forsyth, D. R. Group Dynamics. — Belmont, CA: Wadsworth Publishing, 2014. — 720 p.

Когда ролевое распределение нарушено, результативность лидерства резко падает: команда фрагментируется, процесс принятия решений замедляется, а уровень конфликтности возрастает[59]. Тем самым Стогдилл подчёркивает, что успех руководителя во многом определяется тем, насколько сбалансированы роли внутри коллектива.

Эти три ключевые теоретические подхода приводят к единому выводу: ролевой конфликт является одним из наиболее значимых психологических механизмов, снижающих эффективность команды. В коллективах, где роли чётко определены, формируются доверие, взаимная поддержка и конструктивное взаимодействие; напротив, в группах с размытыми ролевыми границами усиливаются напряжённость, стресс и организационная нестабильность.

В целом, ясное распределение ролей в трудовом коллективе, закрепление границ ответственности и размещение сотрудников на тех позициях, которые соответствуют их личным и профессиональным особенностям, имеет решающее значение для психологической устойчивости и организационной результативности. В командах, где каждый участник хорошо понимает своё место, функции и обязанности, рабочий процесс становится более согласованным, количество недопониманий сокращается, а качество кооперации возрастает. Наоборот, в условиях ролевой неопределённости возрастает риск конфликтов, избегание ответственности, перекладывание задач, скрытая конкуренция и снижение уровня доверия — всё это Поэтому анализ ролевого конфликта представляет собой не просто теоретическое понятие, а один из ключевых диагностических инструментов в практическом управлении и развитии команды. Выявление того, в каких точках возникают ролевые противоречия и неопределённость, позволяет определить корневые причины реальных проблем в рабочем процессе, устранить их и сформировать устойчивую, сбалансированную организационную среду. На основе такого анализа организация может пересмотреть распределение ролей, перестроить систему лидерства, укрепить командное взаимодействие и восстановить психологическое равновесие между сотрудниками.

Чёткая структуризация ролей способствует не только предотвращению конфликтов, но и повышает внутреннюю мотивацию работников, укрепляет доверие внутри коллектива и обеспечивает более рациональное использование организационных ресурсов. Именно поэтому изучение и управление ролевым конфликтом является важным практическим инструментом для устойчивого развития организации и достижения её стратегических целей.

Несмотря на то что возникновение ролевых конфликтов в трудовых коллективах обусловлено множеством факторов, модель командных ролей

[59] Bass, B. M. Stogdill's Handbook of Leadership: A Survey of Theory and Research. — New York: The Free Press, 1981. — 856 p.

Белбина, разработанная Мередитом Белбином, считается одним из наиболее эффективных подходов для выявления психологических источников таких противоречий. Девять ролей, предложенных Белбиным, позволяют определить, какие поведенческие паттерны и психологические тенденции доминируют в команде.

Характер этих ролей, их взаимодополняемость или, напротив, несовместимость напрямую влияет на степень устойчивости группы либо на вероятность возникновения конфликтов[60]. В связи с этим модель Белбина служит важной психологической основой для детального анализа механизмов формирования ролевых противоречий внутри коллектива.

Модель Белбина наглядно демонстрирует, каким образом командные роли могут взаимно дополнять друг друга или, наоборот, вступать в противоречие. Например, конфликт между ролями Plant и Implementer обусловлен психологическим расхождением между творческим мышлением и структурированным подходом. Plant склонен предлагать нестандартные, креативные и иногда радикальные идеи, тогда как Implementer предпочитает порядок, чёткость, стабильность и ориентацию на реальные возможности. В результате между концепцией и практическим выполнением формируется естественное психологическое напряжение.

Ещё один широко распространённый тип противоречий наблюдается между ролями Shaper и Teamworker. Shaper продвигает команду вперёд, акцентируя внимание на скорости, давлении и достижении результата. Teamworker, напротив, ориентируется на мягкость, дипломатию и поддержание психологического баланса в группе. Такой контраст приводит к тому, что один участник склонен усиливать динамику и требовательность, тогда как другой стремится смягчить взаимодействие, что неизбежно создаёт повышенное эмоциональное напряжение внутри команды[61].

Конфликт между ролями Coordinator и Shaper в большей степени связан с контролем над лидерской позицией. Coordinator предпочитает делегировать стратегические решения и выстраивать работу через распределение полномочий, тогда как Shaper стремится продвигать собственную сильную позицию и оказывать прямое воздействие на команду. Такое расхождение усиливает внутреннюю конкуренцию за «приоритет лидерства» и может привести к напряжённости в вопросах управления.

Конфликты резко обостряются в тех случаях, когда в команде роли распределены неясно, границы обязанностей не определены или зоны ответственности накладываются друг на друга. По мнению Роббинса, усиление ролевой неопределённости (role ambiguity) и ролевого конфликта (role conflict) приводит к снижению общей функциональности команды, нарушениям в коммуникации и росту психологического напряжения[62].

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[60] Belbin, R. M. Management Teams: Why They Succeed or Fail. — Oxford: Butterworth-Heinemann, 2010. — 256 p.
[61] Forsyth, D. R. Group Dynamics. — Belmont, CA: Wadsworth Publishing, 2014. — 720 p.
[62] Robbins, S. P., Judge, T. A. Organizational Behavior. — New Jersey: Pearson Education, 2017. — 752 p.

Когда Plant стремится предложить новые идеи, Monitor Evaluator может подвергнуть их жёсткой критике; когда Resource Investigator пытается привнести внешние возможности, Completer Finisher нередко считает их рискованными; а Implementer — отвергать как недостаточно практичные. Подобные взаимодействия являются типичными механизмами в тех командах, где распределение ролей ещё не сформировано должным образом.

Ролевой конфликт наносит ущерб не только функциональному взаимодействию, но и психологическому состоянию коллектива. Исследования Риццо, Хауса и Лиртцмана показывают, что ролевая неопределённость резко повышает уровень стресса, снижает психологическую гибкость сотрудника и приводит к падению продуктивности труда[63].

Согласно Роббинсу, в коллективах, где присутствует ролевой конфликт, наблюдается снижение мотивации, утрата инициативы, формирование пассивного поведения у сотрудников, а также ухудшение качества коммуникации.

Форсайт подчёркивает, что одним из социальных последствий ролевого конфликта является усиление недоверия внутри коллектива и формирование скрытой конкуренции между его участниками. Длительно продолжающиеся противоречия, по его мнению, неизбежно приводят к росту эмоционального истощения (emotional burnout) и значительному ослаблению психологической устойчивости сотрудников.[64].

Трудовые коллективы Узбекистана обладают уникальными историческими, социальными и культурными особенностями, которые напрямую влияют на формирование как формальных, так и неформальных ролей внутри команды. Несмотря на то что во многих организациях должностные инструкции и служебные обязанности прописаны достаточно чётко, на практике именно неформальные роли зачастую оказываются более значимыми. Эти роли возникают не вследствие нормативных документов, а на основе внутренних социальных отношений, национального менталитета и традиционных ценностей, присущих коллективу.

Во-первых, в трудовых коллективах Узбекистана ярко выражена модель коммуникации, основанная на принципе «катта–кичик» (старший–младший). В таких условиях социальная дистанция формируется в зависимости от возраста, опыта или авторитета в организации, и распределение ролей определяется не столько формальными должностными функциями, сколько социальным статусом. В результате реальная роль сотрудника проистекает не из его официальной позиции, а из неформального положения «старшего» или «младшего» внутри коллектива. Это ведёт к несоответствию ролей, ролевой неопределённости и усилению скрытых конфликтов.

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[63] Rizzo, J. R., House, R. J., Lirtzman, S. I. Role Conflict and Role Ambiguity: A Conceptual Critique // Administrative Science Quarterly. — 1970. — Vol. 15, No. 2. — P. 150–163.

[64] Forsyth, D. R. Group Dynamics. — Belmont, CA: Wadsworth Publishing, 2014. — 720 p.

Во-вторых, во многих локальных организациях руководители склонны брать на себя практически все задачи. Подобная культурная модель — «всё выполняет один человек» — приводит к нарушению формального распределения ролей, формированию у сотрудников пассивных ожиданий и дальнейшему углублению ролевых противоречий. В подобных условиях конфликт между ролями Coordinator и Shaper усиливается естественным образом: руководитель, обладая выраженными качествами Shaper, стремится ускорить все процессы, однако из-за недостаточной ролевой самостоятельности команды большая часть нагрузки вновь концентрируется на нём.

В-третьих, для узбекских трудовых коллективов характерен высокий уровень конформизма. Сотрудники чаще предпочитают адаптироваться к группе, чем открыто выражать собственное мнение. В такой ситуации конфликты Plant—Implementer или Plant—Monitor Evaluator проявляются не в прямой форме, а в виде скрытого психологического напряжения. Чтобы избежать критики, команда может молчаливо согласиться с идеями Plant, однако впоследствии отказаться от их практической реализации — это типичное проявление пассивного сопротивления.

В-четвёртых, влияние неформальных лидеров во многих коллективах оказывается сильнее, чем авторитет официального руководителя. Наличие таких лидеров усложняет внутреннюю иерархию группы, усиливая соперничество и властные противоречия между ролями Coordinator–Shaper, Coordinator–Resource Investigator и другими. В результате ролевые конфликты приобретают многоуровневый и многослойный характер.

В-пятых, из-за культурных установок «не ставить в неловкое положение» или «не создавать неудобства» культура открытого обсуждения развита слабо. Вследствие этого сотрудники нередко не могут отказаться от ролей, которые им не подходят или которые предполагают чрезмерную нагрузку, поскольку такое поведение воспринимается как дискомфорт для других. Это усиливает проявления ролевой перегрузки (role overload) и конфликта «личность–роль» (person–role conflict), однако данные проблемы часто остаются невыраженными вовремя и постепенно превращаются в глубокие внутренние противоречия внутри команды.

Ещё одной характерной особенностью ролевых конфликтов в узбекских трудовых коллективах является то, что, несмотря на наличие чётко прописанных формальных ролей и должностных инструкций, на практике сотрудники чаще руководствуются традиционным, неформальным распределением обязанностей. Иначе говоря, реальное распределение ролей в рабочем процессе формируется не столько официальной системой, сколько внутренними социальными механизмами самой группы. В результате столкновение формальной и неформальной ролей становится одним из ключевых источников ролевого конфликта.

Поэтому в условиях Узбекистана анализ ролевых противоречий требует учёта не только психологических ролей по Белбину, но и таких

факторов, как организационная культура, стиль руководства, неформальные социальные нормы, вертикальная субординация, национальные ценности и тенденции коллективизма. Все эти элементы играют важную роль в понимании того, как формируется конфликт, в какой форме он проявляется и какими методами его можно эффективно управлять.

Для уменьшения ролевых конфликтов в трудовых коллективах и обеспечения функциональной стабильности команды особое значение имеет реконсигурация ролей и практические управленческие меры, основанные на модели Белбина. Поскольку у каждого сотрудника существуют собственные поведенческие паттерны, когнитивные предпочтения и коммуникативные стили, корректное определение ролей и их адекватное распределение внутри группы является ключевым этапом формирования психологического баланса команды.

В первую очередь необходимо провести комплексную диагностику состава коллектива по ролям Белбина, то есть объединить самооценку сотрудников (SPI), наблюдательные оценки коллег (Observer Assessment) и анализ реальных рабочих процессов, чтобы составить «ролевую карту» команды. Такая карта наглядно выявляет существующие дисбалансы — чрезмерную представленность одних ролей или, напротив, полное отсутствие других.

Как подчёркивает Белбин, естественные психологические противоречия между отдельными ролевыми парами могут напрямую влиять на функциональную устойчивость команды. Например, в дуэте Plant и Implementer ярко проявляется конфликт между творческим мышлением и структурированным подходом: Plant выдвигает нестандартные, новаторские идеи, тогда как Implementer настаивает на их адаптации к реальным операционным процессам.

Аналогичным образом быстрый, напористый стиль Shaper может противоречить гибкому и мягко-дипломатичному подходу Teamworker. Конфликт между ролями Coordinator и Shaper, в свою очередь, чаще всего связан с внутренним соперничеством за лидерское влияние, что отражается на качестве стратегических решений внутри команды.

Поэтому перераспределение ролей, адаптация задач и обеспечение соответствия «личность–роль» существенно снижает уровень ролевых конфликтов[65]. В долгосрочной перспективе такой подход укрепляет принцип «правильный человек — на правильной роли», уменьшает избыточное эмоциональное напряжение внутри команды и позволяет каждому участнику работать в соответствии со своим естественным потенциалом.

Особенно высокая эффективность достигается тогда, когда при определении роли учитываются сильные стороны сотрудника, его тип темперамента (например, различия между интровертом и экстравертом),

[65] Belbin, R. M. Management Teams: Why They Succeed or Fail. — Oxford: Butterworth-Heinemann, 2010. — 256 p.

стиль работы и индивидуальные компетенции. В этом случае общая результативность команды возрастает многократно.

Таким образом, модель Белбина позволяет гармонизировать распределение ролей не только на основе психологических критериев, но и в соответствии с реальными организационными потребностями.

Эффективное управление ролевыми конфликтами невозможно без применения современных инструментов конфликт-менеджмента, поскольку такие подходы позволяют выявить причины возникновения противоречий на психологическом, организационном и коммуникативном уровнях. Использование модели Томаса–Килманна помогает определить индивидуальную реакцию сотрудников на конфликт — будь то компромисс, конкуренция, приспособление, избегание или сотрудничество — и тем самым выбрать наиболее подходящую стратегию управления ситуацией.

Модель ТКИ также демонстрирует, какой именно поведенческий механизм лежит в основе ролевого конфликта: например, Shaper чаще вступает в противоборство, используя стратегию конкуренции, тогда как Teamworker склонен к приспособлению или сотрудничеству. Понимание этих различий является критически важным для руководителя, поскольку позволяет ему подобрать наиболее адекватный стиль взаимодействия и минимизировать напряжённость в команде.

Инструмент ROCI-II, разработанный Рахимом, позволяет оценивать конфликты не только на межличностном уровне, но и на уровне всей организационной системы. С помощью данного метода руководитель может определить, какой тип конфликта доминирует в коллективе — «личность–личность», «личность–группа» или «группа–группа» — и, исходя из этого, разработать соответствующую стратегию вмешательства.

Особая ценность ROCI-II заключается в том, что он выявляет не форму конфликта, а именно его источник: ролевую неопределённость, путаницу в распределении задач, дисбаланс власти и полномочий или нарушения в коммуникации. Благодаря этому метод становится особенно эффективным для диагностики и управления ролевыми противоречиями.

Применение фасилитационных техник создаёт в команде безопасное психологическое пространство для открытого обсуждения конфликтов. Нейтральный фасилитатор — это человек, не вовлечённый напрямую в спор, но обладающий профессиональными навыками ведения процесса. Он помогает участникам выразить свои позиции без эмоционального давления, прояснить ролевые ожидания и прийти к взаимному соглашению. Особенно эффективен данный подход при ролевых конфликтах, поскольку их корни нередко связаны с неправильно интерпретированными ожиданиями или неясностью в ответе на ключевой вопрос: «кто за что отвечает?».

Кооперативный подход к управлению конфликтами (Deutsch, Tjosvold) переводит команду с «модели соперничества» на «модель сотрудничества», тем самым устраняя наиболее глубокие причины ролевых противоречий. В рамках кооперативного взаимодействия члены коллектива воспринимают

конфликт не как игру с исходом «кто выигрывает — кто проигрывает», а как возможность совместного поиска наилучшего решения. Такой подход особенно эффективен при противоречиях между такими ролевыми парами, как Plant–Implementer или Shaper–Teamworker, поскольку обе стороны учатся ценить роль друг друга, признавать сильные стороны партнёра и согласовывать свои действия для достижения взаимодополняемости, а не противостояния.

Комплексное применение современных методов управления конфликтами способствует снижению ролевых противоречий, укреплению атмосферы доверия и прояснению ролевых ожиданий каждого сотрудника. В результате в команде восстанавливается функциональная гармония, конфликты переходят в конструктивное русло, а общая эффективность групповой деятельности заметно возрастает.

Смягчение конфликтов в значительной степени зависит от уровня эмоционального интеллекта и культуры лидерства, поскольку в командных процессах эмоциональное состояние человека, его способность к саморегуляции, пониманию других и адекватному реагированию на ситуацию является центральным психологическим механизмом управления ролевыми противоречиями. Модель эмоционального интеллекта, предложенная Гоулманом, подчёркивает, что пять ключевых компонентов — самосознание, самоконтроль, внутренняя мотивация, эмпатия и социальные навыки — играют решающую роль в формировании позитивного психологического климата в коллективе.

Руководитель с высоким уровнем эмоционального интеллекта способен своевременно распознавать признаки конфликта, улавливать скрытые чувства сотрудников, избегать излишней реактивности в стрессовых ситуациях и предлагать конструктивные, эмоционально уравновешенные решения. Эмпатичный подход такого лидера помогает понять неформальные потребности работников и их ролевые ожидания, что становится одним из ключевых факторов предотвращения ролевых конфликтов и формирования психологически безопасной атмосферы в команде[66].

Модель организационной культуры Денисона подчёркивает, что эффективность работы команды определяется балансом между четырьмя ключевыми измерениями — миссией, участием (инволвментом), стабильностью и адаптивностью. Чётко сформулированная миссия даёт сотрудникам ясный ответ на вопрос «кто что делает?», что снижает уровень ролевой неопределённости. Участие в управлении обеспечивает вовлечённость персонала в процесс принятия решений, благодаря чему их ролевые ожидания становятся более согласованными, а уровень недовольства снижается. Компонент стабильности способствует предотвращению ролевых конфликтов за счёт ясного формирования командных норм и правил; чем понятнее эти нормы, тем реже возникают

[66] Goleman, D. Emotional Intelligence. — New York: Bantam Books, 1995. — 352 p.

противоречия. Адаптивность позволяет своевременно пересматривать роли, обеспечивать гибкость команды в изменяющихся условиях и восстанавливать функциональное соответствие при новых требованиях среды. Недостаток одного из этих элементов или их дисбаланс приводит к усилению ролевых конфликтов, снижению уровня доверия в коллективе, падению эффективности лидерства и росту психологического напряжения. Именно поэтому руководителям необходимо тщательно анализировать структурные и культурные диспропорции в своих командах на основе модели Денисона и при необходимости пересматривать организационный дизайн и систему управления[67].

Приведённые выше подходы наглядно демонстрируют, что сокращение ролевых конфликтов достигается не только за счёт формального перераспределения обязанностей, но и благодаря эмоциональной компетентности руководителя и зрелости организационной культуры. Следовательно, создание в команде психологически безопасной среды, развитие культуры открытого общения и формирование стиля лидерства, основанного на эмоциональном интеллекте, являются одними из наиболее эффективных инструментов устранения глубинных причин ролевых противоречий.

В заключение можно отметить, что эффективные практические меры по снижению ролевых конфликтов значительно повышают как общую результативность команды, так и её психологическую устойчивость. Чёткое определение ролей помогает сотрудникам лучше понимать свои обязанности, ясно видеть границы ответственности и предотвращать такие явления, как дублирование функций или уклонение от выполнения задач. Перераспределение обязанностей обеспечивает справедливое распределение нагрузки, уменьшает вероятность ролевой перегрузки и способствует росту мотивации. Кроме того, назначение ролей в соответствии с сильными сторонами сотрудников позволяет каждому проявить свой естественный потенциал, что положительно отражается на командных результатах.

Укрепление психологической безопасности в коллективе также является ключевым фактором снижения ролевых конфликтов. Когда сотрудники могут открыто выражать своё мнение, получать конструктивную обратную связь и воспринимать ошибки не как повод для наказания, а как возможность для развития, неопределённость, связанная с ролями, устраняется значительно быстрее. Открытость коммуникационных каналов — как вертикальных, так и горизонтальных — предотвращает недоразумения и формирование ложных ожиданий внутри команды.

Развитие лидерской культуры, предполагающее наличие у руководителя эмоционального интеллекта, готовность к диалогу, справедливое распределение ролей и умелое управление психологическим климатом, играет стратегическую роль в предупреждении ролевых

[67] Denison, D. R. Corporate Culture and Organizational Effectiveness. — New York: Wiley, 1990. — 280 p.

противоречий. Если лидер последовательно придерживается такого подхода, сотрудники лучше осознают свои функции, кооперация усиливается, а внутренняя конкуренция принимает конструктивный характер.

Когда все эти меры применяются в комплексе, в трудовом коллективе укрепляется психологическая стабильность, снижается уровень конфликтности, растёт инициативность и усиливается командное взаимодействие. В результате процесс достижения стратегических целей организации ускоряется. Таким образом, системное управление ролевыми конфликтами выступает не только инструментом их предотвращения, но и важным механизмом развития команды, раскрытия её потенциала и формирования эффективного организационного климата.

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ФАРМАКОЛОГИЧЕСКИЕ И БИОХИМИЧЕСКИЕ ИССЛЕДОВАНИЯ СУЛЬФОПАРИНА

Аннотация: *В настоящее время во всем мире отмечается возрастание интереса к препаратам на основе хитина, его производным и возможностям их использования в различных областях медицины (1,2). Одним из таких лекарственных средств является сульфопарин, который обладает противосклеротическими свойствами. Сульфопарин является комплексом хитозана с сульфогруппами, разработанный сотрудниками института химии и физики полимеров АН РУз (3). Вместе с тем, следует отметить, что на сегодняшний день проблема создания отечественных высокоэффективных лекарственных средств весьма актуальна, т.к. многие противосклеротические препараты наряду с основными свойствами вызывают ряд нежелательных явлений, связанных либо токсическими свойствами, либо побочными действиями этих препаратов.*

Ключевые слова: *Сульфопарин, сульфогруппа, препарат, живот, раствор, интервал, прием, помощ, зонд.*

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PHARMACOLOGICAL AND BIOCHEMICAL STUDIES OF SULFOPARIN

Annotation: *Currently, there is an increasing global interest in chitin-based drugs, its derivatives, and their potential applications in various fields of medicine (1,2). One such medicinal product is Sulfoparin, which possesses anti-sclerotic properties. Sulfoparin is a complex of chitosan with sulfo groups, developed by researchers at the Institute of Chemistry and Physics of Polymers of the Academy of Sciences of the Republic of Uzbekistan(3). At the same time, it should be noted that the development of highly effective domestic pharmaceutical agents remains very relevant today, since many anti-sclerotic drugs, along with their main therapeutic properties, cause a number of undesirable effects associated either with their toxic characteristics or with side effects.*

Keywords: *Sulfoparin, sulfo group, drug, animal, solution, interval, administration, assistant, probe.*

Материал и методы исследования

Острую внутрижелудочную токсичность Сульфопарина изучали на 60 белых мышах, массой тела 18-22 г обоего пола. Животные разделили на 6 групп по 10 животных. Животным 5 опытных групп натощак вводили в желудок водный раствор препарата при помощи шприца с металлическим зондом в дозах 1000; 1500; 2000;2500 и 3000 мг/кг массы тела. Большие дозы препарата вводили в два приема с интервалом в 1 час. Шестая группа животных служила контролем, т.е. им вводили тем же путем физиологический раствор. Животные находились под наблюдением в течение первого дня эксперимента и в динамике в течение 2-3 недель.

При оценке острой токсичности препарата учитывалась максимально - переносимая и абсолютно-смертельная дозы. Расчет ошибки $ЛД_{50}$ проведен по методу, предложенным Миллером и Тейтнером, определением $ЛД_{34}$ и $ЛД_{86}$. На основании полученных данных при помощи статической обработки методом В.Б. Прозоровского вычисляли величины $ЛД_{50}$ (4).

Изучение хронической токсичности Сульфопарина проводили на 80 белых крысах с массой тела 110-120 грамм обоего пола. Животные были разделены на 4 группы по 20 животных в каждой группе. 1-группа животных получала Сульфопарин в дозе 500 мг/кг; 2-группа получала Сульфопарин в дозе 100,0 мг/кг; 3-группа получала препарата в дозе 25 мг/кг внутри желудочно ежедневно в течение 3-х месяцев. 4-группа служила контролем (5,7).

Показателями токсичности явились поведение животных, выживаемость, время наступления смертельных исходов, появление симптомов интоксикации, динамика массы тела, содержания гемоглобина, активность щелочной фосфатазы, АсТ и АлТ, каталазы. Содержание гемоглобина, эритроцитов и лейкоцитов в периферической крови исследовали классическим, общепринятым методом и активность ферментов щелочной фосфатазы, АсТ, АлТ в сыворотке крови – биотестами фирмы Лахема (Чехия). Исследования гематологических и биохимических показателей проводили после завершения эксперимента (6).

Полученные результаты исследований подвергали статистической обработки. Использовались методы вариационной статистики с расчетом средней арифметической изучаемого показателя (M), среднего квадратического отклонения, стандартной ошибки среднего (m), относительных величин (%), статическая значимость, полученных измерений, при сравнении средних величин определяли по критерию Стьюдента (t) с вычислением вероятности ошибки (P) при проверке нормальности распределения (по критерию эксцесса) и равенства генеральных дисперсий (F-критерий Фишера). За статистически значимые изменения принимали уровень достоверности $P<0,05$.

Результаты исследования и их обсуждение

Результаты наших исследований показали, что у интактных животных 1-ой группы после введения водной раствор препарата в дозе 1000 мг/кг

изменений в поведении и функциональном состоянии не наблюдалось. Однако, с увеличением дозы животные становились вялыми, малоподвижными, живо реагировали на внешние раздражатели. Аппетит у животных нарушался, вид животных становился неоприятный, шерст взъерошенной. Гибель животных наступила от остановки дыхания (таблица 1).

Таблица 1

Зависимость сроков гибели белых мышей от вводимой дозы препарата Сульфопарина

Доза препарата, в мг/кг	Количество животных	Сроки гибели			Всего погибло	% гибели
		В течение 1-х суток	В течение 3-х суток	В последующие дни		
1000	10	0	0	0	0	0
1500	10	0	1	1	2	20
2000	10	0	3	1	4	40
2500	10	1	4	1	6	60
3000	10	2	7	1	10	100

Определены максимально-переносимая и абсолютно-смертельная доза препарата на уровне 1000 мк/кг и 3000 мг/кг (Таблица 2). Выявлено, что средне-смертельная доза ($ЛД_{50}$) препарата Сульфопарин равен на 2150 (2425,4-1874,6) мг/кг. Следовательно, по классификации лекарственных средств по токсичности препарат относится к малотоксичным веществам (IV класс) (3,4,5).

Таблица 2

Параметры острой токсичности препарата Сульфопарин при однократном внутрижелудочном введении белым мышам

Наименование вида животных	$ЛД_{16}$	$ЛД_{50}$	$ЛД_{84}$
Белые мыши	1450	2150(2425,4 ÷1874,6)	2800

При изучении хронической токсичности препарата Сульфопарин за время эксперимента общее состояние опытных животных не нарушалось, симптомов интоксикации не выявлено, гибели животных не наблюдалось. На коже местных изменений не обнаруживалось, мест очагового облысения и язв не отмечалось. Животные были опрятны, шерстяной покров гладкий, блестящий, активны и адекватно реагировали на внешние раздражители, также не установлено статистически достоверных отставаний прироста массы тела у всех опытных животных по сравнению с контрольными животными (Таблица 3).

Таблица 3

Динамика массы тела белых крыс при внутрижелудочном многократном введении препарата Сульфопарин, в граммах

Наименование групп животных и вводимая доза препарата	Стат. пока-затели	Время исследований (месяцы)				
		Фон	1	2	3	Восст. период
Контроль	M±m	140±4,1	148±4,3	157±4,2	165±7,6	173±7,9
Сульфопарин, 500 мг/кг	M±m, P	142±6,6 >0,05	151±10,1 >0,05	159±7,8 >0,05	164±6,1 >0,05	171±6,5 >0,05
Сульфопарин, 100 мг/кг	M±m, P	141±9,9 >0,05	149±12,3 >0,05	155±4,8 >0,05	167±5,8 >0,05	170±7,2 >0,05
Сульфопарин, 25 мг/кг	M±m, P	143±7,9 >0,05	147±5,6 >0,05	158±7,2 >0,05	163±4,9 >0,05	174±7,4 >0,05

Далее изучена динамика количества гемоглобина, эритроцитов и лейкоцитов в периферической крови. Как видно из данных, представленных в таблице 4, вышеуказанные гематологические показатели в периферической крови не выявила статически значимых различий у животных опытной группы по сравнению с контрольными данными.

Таблица 4

Содержание гематологических показателей в периферической крови белых крыс при внутрижелудочном многократном введении препарата Сульфопарин

Наименование групп животных и вводимая доза препарата	Стат. пока затели	Гематологические показатели		
		Содержание гемоглобина, г/л	Содержание эритроцитов, млн/л	Содержание лейкоцитов, Т/л
Контроль	M±m	127,0±5,8	4,90±5,8	8,09±0,3
Сульфопарин, 500 мг/кг	M±m, P	130,0±5,5 >0,05	4,87±0,25 >0,05	8,16±0,31 >0,05
Сульфопарин, 100 мг/кг	M±m, P	129,0±3,6 >0,05	4,85±0,44 >0,05	8,17±0,17 >0,05
Сульфопарин, 25 мг/кг	M±m, P	131,0±9,1 >0,05	4,82±0,4 >0,05	8,14±0,32 >0,05

Также было изучено в условиях эксперимента у крыс активности ферментов щелочной фосфатазы, АсТ, АлТ и каталазы в крови. По итогам полученных данных у опытных животных было выявлено, что активности ферментов щелочной фосфатазы, АсТ, АлТ и каталазы в крови не отличались от контрольных значений (таблица 5).

Таблица 5

Биохимические показатели сыворотки крови белых крыс при внутрижелудочном многократном введении препарата Сульфопарин

Наименование групп животных и вводимая доза препарата	Стат. Пока затели	Биохимические показатели			
		Активность щелочной фосфатазы, моль/л.ч	Активность АсТ, моль/л.ч	Активность АлТ, моль/л.ч	Активность каталазы, мкат/л
Контроль	M±m	140±4,1	148±4,3	157±4,2	165±7,6
Сульфопарин, 500 мг/кг	M±m, P	142±6,6 >0,05	151±10,1 >0,05	159±7,8 >0,05	164±6,1 >0,05
Сульфопарин, 100 мг/кг	M±m, P	141±9,9 >0,05	149±12,3 >0,05	155±4,8 >0,05	167±5,8 >0,05
Сульфопарин, 25 мг/кг	M±m, P	143±7,9 >0,05	147±5,6 >0,05	158±7,2 >0,05	163±4,9 >0,05

Из данных, представленных в таблице 5 видно, что статически достоверных различия в активности изученных ферментов в крови опытных крыс по сравнению с контрольными результатами, не установлены.

Выводы:

1. Изучением острой внутрижелудочной токсичности препарата на белых мышах установлено, что по токсичности препарат Сульфопарин относится к малотоксичным веществам
2. При длительном хроническом внутрижелудочном введении Сульфопарин не оказывает отрицательного влияния на поведение и динамику массы тела животных.
3. Препарат не оказывает токсического действия на гематологические и биохимические показатели в организме экспериментальных животных.

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ЭХОГРАФИЯ ОБЩЕЙ СОННОЙ АРТЕРИИ В ОЦЕНКЕ ПРОГНОЗА РИСКА РАЗВИТИЯ ИШЕМИЧЕСКОГО ИНСУЛЬТА У БОЛЬНЫХ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА (ОБЗОР ЛИТЕРАТУРЫ)

Аннотация. *Эхография общей сонной артерии представляет собой высокоинформативный, неинвазивный и доступный метод оценки сосудистых изменений у пациентов с сахарным диабетом 2 типа. Увеличение толщины комплекса интима–медиа и наличие атеросклеротических бляшек служат важными маркерами повышенного риска ишемического инсульта и сердечно-сосудистых осложнений. Особое значение эхографическое исследование имеет у бессимптомных пациентов для раннего выявления уязвимых бляшек и своевременной стратификации риска. Использование современных методов визуализации, таких как дуплексное сканирование, МРТ- и КТ-ангиография, способствует более точной оценке морфологических и гемодинамических характеристик сосудистой стенки. Таким образом, эхография сонных артерий является важным инструментом в системе профилактики инсульта и кардиоваскулярных событий у больных с сахарным диабетом 2 типа.*

Ключевые слова. *эхография сонных артерий, толщина интима–медиа, бляшки, сахарный диабет 2 типа, ишемический инсульт, сердечно-сосудистый риск.*

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ULTRASONOGRAPHY OF THE COMMON CAROTID ARTERY IN ASSESSING THE RISK OF ISCHEMIC STROKE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS (Literature review).

Abstract. *Ultrasonography of the common carotid artery is a highly informative, non-invasive, and accessible method for evaluating vascular changes in patients with type 2 diabetes mellitus. An increase in intima–media thickness and the presence of atherosclerotic plaques serve as important markers of an elevated risk of ischemic stroke and cardiovascular complications. Ultrasonographic examination is particularly significant in asymptomatic patients for the early detection of vulnerable plaques and timely risk stratification. The use of modern imaging techniques, such as duplex scanning, MRI, and CT angiography, allows for a more accurate assessment of the morphological and hemodynamic characteristics of the vascular wall. Thus, carotid artery ultrasonography is an important tool in the prevention of stroke and cardiovascular events in patients with type 2 diabetes mellitus.*

Keywords: *carotid artery ultrasonography, intima–media thickness, plaques, type 2 diabetes mellitus, ischemic stroke, cardiovascular risk.*

Распространенность ишемического инсульта у больных с сахарным диабетом 2 типа в последние годы значительно возросла, что отражает тесную взаимосвязь между метаболическими нарушениями и сосудистыми катастрофами. По данным эпидемиологических исследований, у пациентов с сахарным диабетом риск развития ишемического инсульта в 2–4 раза выше, чем у лиц без нарушений углеводного обмена. Учитывая рост распространенности диабета во всем мире, доля инсультов, ассоциированных с этим заболеванием, продолжает увеличиваться и, по некоторым данным, составляет до 20–30% всех случаев ишемического инсульта.

Патогенетической основой этого является сочетание хронической гипергликемии, инсулинорезистентности, дислипидемии и эндотелиальной дисфункции, что ускоряет развитие атеросклеротических поражений мозговых и сонных артерий. Особенно высок риск инсульта у пациентов с длительным течением диабета, артериальной гипертензией и выраженным

атеросклеротическим поражением сосудов шеи. Современные неинвазивные методы визуализации сосудистой системы позволяют комплексно оценивать состояние сонных артерий и параметры, отражающие атеросклеротическое поражение, без необходимости проведения инвазивных вмешательств. Так, ультразвуковое исследование (УЗИ) сонных артерий является методом выбора для оценки толщины комплекса интима–медиа (КИМ), наличия и характеристик атеросклеротических бляшек, а также степени стеноза. Этот метод сочетает в себе безопасность, доступность и высокую диагностическую точность при скрининге и динамическом наблюдении пациентов с сахарным диабетом 2 типа. В то же время допплеровские методики, включая цветовое и энергетическое допплеровское картирование, позволяют оценить не только анатомические, но и гемодинамические параметры — линейную скорость кровотока, турбулентность и индекс резистентности, что особенно важно для раннего выявления сосудистых нарушений. Магнитно-резонансная ангиография (МРА) и компьютерная томографическая ангиография (КТА) применяются для детальной визуализации сосудистого русла, уточнения степени стенозирования и структуры бляшек, но из-за стоимости и радиационной нагрузки используются преимущественно в сложных диагностических случаях. Таким образом, ультразвуковая визуализация сонных артерий занимает центральное место в оценке риска развития ишемического инсульта у больных с сахарным диабетом 2 типа, обеспечивая оптимальное сочетание информативности, безопасности и доступности. [1]

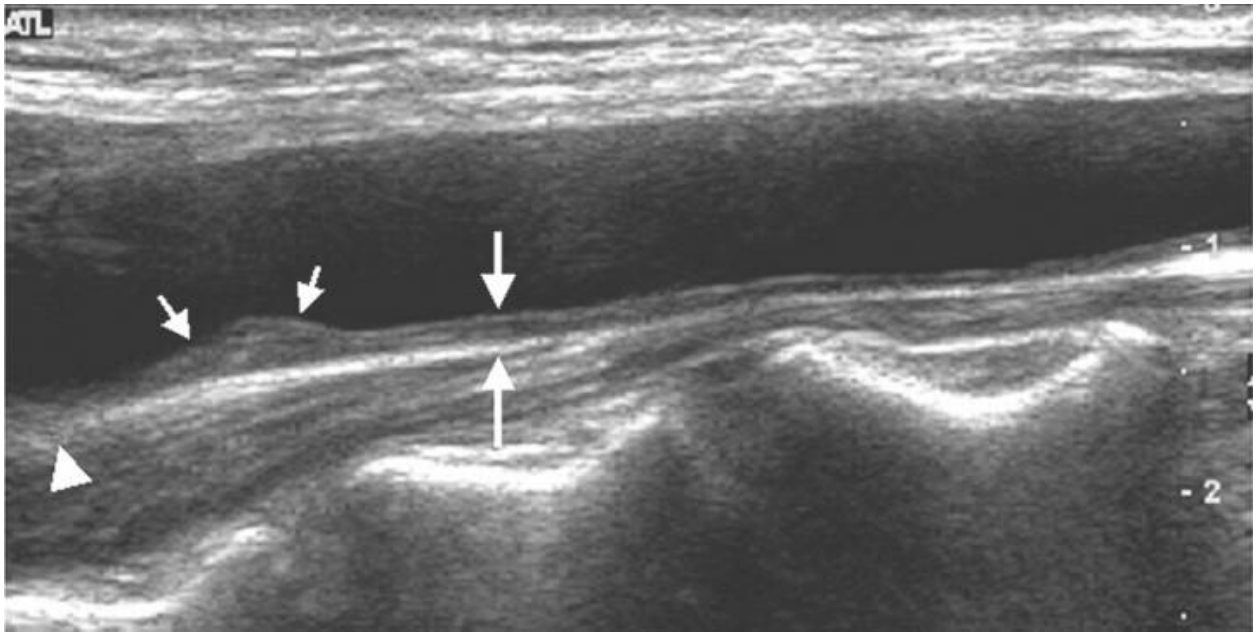
В настоящее время сахарный диабет диагностирован более чем у 463 миллионов человек по всему миру, и это число продолжает расти. Заболевание сопровождается развитием как микрососудистых осложнений — диабетической нефропатии, нейропатии и ретинопатии, — так и макрососудистых, к которым относятся ишемическая болезнь сердца, заболевание периферических артерий и инсульт. Рост распространённости диабета приводит к увеличению частоты этих осложнений, что значительно ухудшает качество жизни пациентов и повышает нагрузку на систему здравоохранения.

Микроангиопатические поражения при диабете могут приводить к тяжёлым последствиям, включая хроническую почечную недостаточность, потерю зрения и поражение периферических нервов. Макро- и микрососудистые осложнения считаются основными причинами инвалидизации и смертности как при сахарном диабете 1 типа (СД1), так и при сахарном диабете 2 типа (СД2). Поэтому раннее выявление факторов, способствующих их развитию, имеет ключевое значение для профилактики тяжёлых сосудистых событий.

Одним из наиболее информативных и доступных методов оценки сосудистых изменений является ультразвуковое исследование сонных артерий. Этот неинвазивный, точный и экономически эффективный метод широко применяется в клинической практике для оценки риска сердечно-

сосудистых осложнений. Многочисленные исследования показали, что параметры, определяемые при ультразвуковом исследовании сонных артерий, тесно связаны с наличием и выраженностью как микро-, так и макрососудистых осложнений у пациентов с диабетом. В частности, установлена достоверная ассоциация между увеличением толщины комплекса интима–медиа сонной артерии и развитием диабетической ретинопатии, что подчёркивает диагностическую ценность данного показателя в комплексной оценке сосудистого статуса больных сахарным диабетом.[2]

Рис.1.



Продольное сканирование ультрасонограммы сонной артерии. Показано измерение толщины интима-медии общей сонной артерии (ОСА) (*большие стрелки*) на дальней стенке общей сонной артерии. Видна каротидная бляшка (*маленькие стрелки) в дистальном отделе общей сонной артерии. Наконечник стрелки* указывает на бифуркацию сонной артерии.

Макрососудистые изменения включают ускоренное формирование атеросклеротических бляшек в крупных артериях, таких как сонные и коронарные, что повышает вероятность тромбоза и острого инсульта. Одним из ранних маркеров атеросклероза является увеличение толщины комплекса интима–медиа (ТИМ) сонных артерий.

Микрососудистые изменения проявляются повреждением капилляров и артериол, утолщением базальной мембраны и снижением эластичности сосудов, что нарушает микроциркуляцию головного мозга. Нарушения нейроваскулярной регуляции, выявляемые с помощью функциональной МРТ и анализа гемодинамического отклика, демонстрируют снижение способности сосудов адекватно реагировать на потребности мозга в кислороде, даже при отсутствии видимых структурных повреждений.

Учитывая высокую распространённость СД2 и его значительное влияние на формирование сосудистых осложнений, разработка эхографических критериев для прогнозирования ишемического инсульта у этих пациентов имеет практическую и научную значимость. Ультразвуковое измерение ТИМ общей сонной артерии служит одним из наиболее ранних и чувствительных маркеров субклинического атеросклероза, позволяя выявлять лиц с повышенным цереброваскулярным риском и проводить своевременные профилактические мероприятия.[3]

У пациентов с сахарным диабетом 2-го типа наблюдаются ранние изменения нейроваскулярной связи и нарушение гемодинамической реакции головного мозга. Используя функциональное МРТ с анализом BOLD-сигнала и метод деконволюции, связанной с событиями, выявили, что у больных диабетом форма гемодинамического отклика (HRF) при визуальных стимулах отличается от таковой у здоровых лиц. Эти отличия отражают дефект нейроваскулярной регуляции, возникающий на ранних этапах заболевания, даже при отсутствии структурных повреждений мозга.

Снижение BOLD-сигнала у пациентов с СД2, по мнению исследователей, связано не только с уменьшением нейрональной активности, но и с нарушением нейроваскулярной связи вследствие микрососудистых изменений. Таким образом, функциональные нарушения мозгового кровотока при диабете 2-го типа могут служить ранним маркером церебральной микроангиопатии и предвестником нейродегенеративных процессов. Эти данные указывают на то, что функциональные изменения мозгового кровотока при диабете 2-го типа могут предшествовать развитию нейродегенеративных процессов и служить ранним индикатором нарушений церебральной микроциркуляции. [4]

С момента внедрения ультразвукового исследования сонных артерий (УЗИ СА) для оценки атеросклероза в клинической практике и эпидемиологических исследованиях изучается толщина комплекса интима-медиа (ИМТ). УЗИ не позволяет дифференцировать интиму и медиальный слой сосудистой стенки, поэтому эти два компонента объединяются в один показатель. ИМТ может измеряться в различных сегментах сонной артерии — в общей сонной артерии (ОСА), луковице или внутренней ветви, а также на ближней и дальней стенках и под разными углами. В последние годы стало очевидно, что ТИМ ОСА и ТИМ луковицы следует рассматривать как отдельные показатели, хотя они и коррелируют между собой. Так, ТИМ-ОСА в основном ассоциирована с гипертонией, тогда как ТИМ в луковицы с высоким уровнем ЛПНП и курением. Генетические исследования показывают, что несколько генов и полигенетический риск ишемической болезни сердца связаны с ТИМ-луковицы, но не с ТИМ-ОСА. ТИМ-ОСА преимущественно связана с инсультом, а ТИМ-луковицы с ишемической болезнью сердца. Эти данные свидетельствуют о том, что разные сегменты сонной артерии могут отражать

различные патофизиологические процессы атеросклероза и не должны рассматриваться как эквивалентные показатели.[5]

Сахарный диабет существенно повышает риск развития инсульта, так как ускоряет прогрессирование атеросклероза. У пациентов с диабетом утолщается стенка сонных артерий (толщина интима–медиа, ТИМ), увеличивается число и уязвимость атеросклеротических бляшек, а индекс пульсации (ИП) отражает повышенное сосудистое сопротивление и риск сердечно-сосудистых осложнений.

Ультразвуковое исследование сонных артерий позволяет выявить эти изменения на ранних стадиях. Дуплексное сканирование показывает, что ТИМ и ИП выше у пациентов с диабетом, особенно у пожилых и гипертоников, и ниже у женщин и при кардиоэмболическом инсульте. Более высокая ТИМ указывает на ускоренное сосудистое старение, а повышенный ИП — на увеличение сопротивления микроциркуляции.

Эти показатели являются надежными маркерами для оценки цереброваскулярного риска и раннего выявления сосудистых изменений у пациентов с диабетом, что позволяет своевременно прогнозировать и предотвращать развитие инсульта.[6]

Ограничением измерения толщины интима–медиа сонной артерии (ТИМ-СА) является трудность визуализации всех её сегментов, особенно внутренней сонной артерии (ВСА). Например, в исследовании Atherosclerosis Risk in Communities (ARIC) не удалось визуализировать 51,4% сегментов ВСА, тогда как сегменты общей сонной артерии (ОСА) визуализировались в 91% случаев. В Роттердамском исследовании измерения ТИМ были возможны в 96% сегментов ОСА, но только в 31% сегментов ВСА. Несмотря на технический прогресс в ультразвуковой визуализации, ВСА остаётся наиболее сложным сегментом для оценки, что снижает надёжность её измерений. В то же время ни один сегмент сонной артерии не показал однозначного преимущества в прогнозировании сердечно-сосудистых заболеваний. Существуют данные, что ТИМ ОСА может быть немного более информативным для прогнозирования инсульта, тогда как ТИМ ВСА может лучше предсказывать риск ишемической болезни сердца. Таким образом, при оценке цереброваскулярного риска у пациентов важно учитывать как технические ограничения визуализации, так и возможность сочетанного анализа различных сегментов сонной артерии [7].

Сонная артерия включает четыре сегмента: общую сонную артерию (ОСА), каротидную луковицу, наружную и внутреннюю сонные артерии (ВСА). В исследовании CAPS показано, что толщина комплекса интима–медиа (ТИМ-СА) является независимым предиктором сердечно-сосудистых событий, однако её добавление к модели SCORE не улучшает классификацию индивидуального риска. Результаты мета-анализов остаются противоречивыми. В одном из них увеличение ТИМ-СА на 0,1 мм ассоциировалось с ростом риска инфаркта миокарда на 10–15%, тогда как другой мета-анализ, оценивавший только ТИМ-ОСА, не выявил значимого

прироста прогностической информации по сравнению со стандартными методами оценки риска. Более современные исследования с использованием высокоточного ультразвука показали, что ТИМ-ВСА сильнее коррелирует с риском сердечно-сосудистых событий и лучше прогнозирует инсульт, тогда как ТИМ-ОСА отражает преимущественно риск коронарных осложнений. Противоречия в данных объясняются отсутствием унифицированных методологических подходов. При этом измерения ТКИМ в области каротидной луковицы и ВСА считаются более информативными, поскольку именно в этих зонах чаще формируются атеросклеротические бляшки. Оценка их объёма и распределения является более точным показателем атеросклеротического поражения, чем фиксирование самого факта их наличия. Комбинированное использование ТКИМ и характеристик бляшек повышает точность прогноза сердечно-сосудистых событий. Объём бляшки, измеренный с помощью 3D-ультразвука, хорошо коррелирует с индексом кальцификации коронарных артерий (CAC). В перспективе 3D-мониторинг динамики бляшек может стать ценным инструментом для оценки эффективности профилактической и терапевтической стратегии.[8]

Ключевое значение в развитии атеросклеротических изменений сосудистой стенки у пациентов с диабетом имеет липидный дисбаланс. Повышение уровня триглицеридов, особенно в постпрандиальный период, приводит к эндотелиальной дисфункции и утолщению комплекса интима–медиа сонных артерий. Гипертриглицеридемия является значимым фактором прогрессирования атеросклероза у больных с диабетом 2 типа. У таких пациентов толщина сосудистой стенки была достоверно выше, чем у лиц без диабета, а наибольшее влияние на увеличение ТКИМ оказывали возраст и постпрандиальные триглицериды. Эти данные подтверждают роль постпрандиальной гипертриглицеридемии как независимого предиктора субклинического атеросклероза и повышенного риска ишемического инсульта у пациентов с сахарным диабетом 2 типа. [9]

В отличие от большинства предыдущих работ, где изучалась общая связь между толщиной комплекса интима–медиа (ТИМ) и риском инсульта, данное исследование направлено на оценку взаимосвязи ТИМ и признаков атеросклероза сонных артерий с конкретными подтипами ишемического инсульта. Такой подход позволяет углублённо понять патогенетические различия сосудистых поражений и может способствовать повышению точности индивидуального прогноза сосудистых осложнений у пациентов.[10]

Поскольку инсульт является гетерогенным заболеванием с различными подтипами, важно учитывать различия в этиологии и факторах риска. Пациенты с кардиоэмболическими или лакунарными инфарктами имеют иной патогенетический профиль, чем больные с ишемическим инсультом, связанным с атеротромботическим поражением крупных сосудов. Кроме того, необходимо разграничивать ишемический и геморрагический инсульт

при анализе взаимосвязи толщины интима–медиа и риска сосудистых катастроф.

Несмотря на имеющиеся данные, остаётся недостаточно изученным вопрос о взаимосвязи между выраженностью утолщения комплекса интима–медиа и клинической тяжестью ишемического инсульта при различных подтипах заболевания. Увеличение ТИМ-ОСА связано с риском ишемического инсульта и его подтипами, особенно атеротромботическим, независимо от сердечно-сосудистых факторов риска. Исследования показывают различия в зависимости от подтипа инсульта: **Атеротромботический инсульт** — высокий ТИМ, более выраженные бляшки, стенозы >30–50%; **Лакунарный инсульт** — умеренное утолщение ТИМ, микрососудистое повреждение; **Кардиоэмболический инсульт** — относительно низкие значения ТИМ Максимальная ТИМ, особенно в области бифуркации, тесно связана с бессимптомными инфарктами мозга и повышает риск будущего инсульта даже у лиц без сердечно-сосудистых заболеваний.[11]

Измерение толщины комплекса интима–медиа (ТИМ) сонной артерии признано надёжным неинвазивным методом оценки субклинического и раннего атеросклероза, который независимо ассоциируется с риском инсульта и других сердечно-сосудистых событий. Максимальная ТИМ, особенно в области бифуркации сонной артерии (bIMT), тесно связана с бессимптомным инфарктом мозга (БИМ) и повышает вероятность будущего инсульта даже у лиц без клинических проявлений сердечно-сосудистых заболеваний. Бессимптомный инфаркт мозга, выявляемый с помощью МРТ, является важным предиктором инсульта: метаанализ 13 исследований показал, что наличие БИМ более чем вдвое увеличивает риск развития инсульта. Оценка БИМ с использованием МРТ может служить полезным инструментом для выявления групп высокого риска, хотя прогнозирование инсульта у бессимптомных лиц остаётся сложной задачей. Данные также показывают, что локальные особенности сосудов играют ключевую роль. Геометрия артерии и локальные механические факторы, такие как напряжение касательных сил крови на стенку, объясняют, почему максимальная ТИМ в области бифуркации более информативна для прогнозирования риска инсульта, чем ТИМ в области общей сонной артерии (ОКА) или внутренней сонной артерии (ВСА). Таким образом, измерение ВСА с помощью ультразвука представляет собой перспективный метод скрининга и позволяет идентифицировать лиц с повышенным риском цереброваскулярных событий.[12]

Бессимптомные инфаркты мозга (БИМ) выявляются как маленькие очаги повреждённой ткани, которые не проявляются клинически, но повышают риск инсульта. Для точного анализа измерялись размеры очагов, и классифицировали их по локализации: передняя и задняя сосудистые области, корковые доли и подкорковые лакунарные очаги.

Даже небольшие, бессимптомные повреждения мозга можно выявить с помощью МРТ, что позволяет прогнозировать риск будущего инсульта. Эти данные важны для ранней диагностики и оценки состояния сосудов, особенно в сочетании с ультразвуковыми измерениями толщины стенки сонных артерий (ТИМ), которые отражают атеросклеротическую нагрузку и сосудистый риск.[13]

Инсульт является одной из ведущих причин смертности и инвалидизации во всём мире, занимая второе место среди причин смерти. Около 85% случаев приходится на ишемический инсульт, который развивается преимущественно вследствие эмболии или поражения мелких сосудов. Одним из основных источников эмболов выступает атеросклероз сонных артерий, ответственный примерно за 15–20% ишемических инсультов. Разрыв или нестабильность атеросклеротических бляшек в области бифуркации общей или внутренней сонной артерии вызывает тромбообразование и эмболию, приводя к транзиторным ишемическим атакам или инсульту.

Современные методы лечения каротидного атеросклероза — медикаментозная терапия, эндартерэктомия и ангиопластика со стентированием — делают его важным и потенциально обратимым фактором риска инсульта. Ультразвуковая допплерография (УЗДГ) представляет собой безопасный, доступный и воспроизводимый метод, позволяющий оценивать состояние сонных артерий, включая толщину комплекса интима–медиа (ТИМ), степень стеноза, морфологию и площадь бляшек. Показатель ТИМ, отражающий расстояние между интима-люминальным и медиально-адвентициальным слоями, является надёжным маркером субклинического атеросклероза: у здоровых людей он варьирует от 0,25 до 1,0 мм, а значения свыше 1,0 мм считаются патологическими. Каротидная бляшка определяется как локализованное утолщение сосудистой стенки ≥0,5 мм или на 50% больше соседних участков, либо при ТИМ >1,5 мм. Современные данные указывают, что площадь и объём бляшки являются более точными показателями атеросклеротического поражения и сердечно-сосудистого риска, чем только толщина ТИМ.

Дополнительные гемодинамические параметры — индекс пульсации (ИП) и индекс резистентности (ИР) — отражают дистальное сосудистое сопротивление и податливость сосудистой стенки. Повышение этих показателей связано с нарушением микроциркуляции и повышенным риском ишемических инсультов. Общая сонная артерия (ОСА), являясь частью эластического артериального дерева, также служит важным объектом для оценки ремоделирования сосудов: её диаметр коррелирует с клинико-биохимическими показателями, такими как уровень мозгового натрийуретического пептида, гипертрофия левого желудочка, соотношение альбумин/креатинин и выраженность ишемической болезни сердца. Увеличение диаметра ОСА ассоциировано с повышенным риском сердечно-

сосудистых событий и смертности, что отражает процессы артериального ремоделирования.

Инсулинорезистентность и нарушения углеводного обмена способствуют артериальному ремоделированию через метаболические и воспалительные механизмы. Хотя ТИМ традиционно используется как маркер атеросклероза и предиктор сердечно-сосудистых заболеваний, особенно у пациентов с сахарным диабетом 2 типа, данные о её связи с параметрами углеводного обмена и инсулинорезистентностью остаются противоречивыми. В то же время показатели ИП и ИР могут отражать микрососудистое повреждение, ассоциированное с нарушениями метаболизма глюкозы, однако их клиническая роль требует дальнейшего изучения.

Магнитно-резонансная томография (МРТ) сосудистой стенки является перспективным неинвазивным методом, обеспечивающим детальную визуализацию структуры и состава сосудистой стенки с высоким пространственным разрешением. Этот подход позволяет выявлять нестабильные атеросклеротические бляшки, потенциально предрасположенные к разрыву, а также оценивать воспалительные и дегенеративные изменения в стенках сонных артерий. Совместное использование УЗДГ и МРТ создаёт новые возможности для ранней диагностики, мониторинга и стратификации риска ишемического инсульта, особенно у пациентов с метаболическими нарушениями, такими как сахарный диабет 2 типа.[14]

Проведённые исследования подтверждают, что ультразвуковая и магнитно-резонансная визуализация сонных артерий играют ключевую роль в ранней диагностике и прогнозировании риска ишемического инсульта у пациентов с сахарным диабетом 2 типа. Толщина комплекса интима–медиа (ТКИМ) и наличие атеросклеротических бляшек служат надёжными маркерами субклинического атеросклероза и отражают степень сосудистого ремоделирования. Наиболее выраженное утолщение сосудистой стенки наблюдается у пациентов с постпрандиальной гипертриглицеридемией и ожирением, что указывает на значимость нарушений липидного обмена как ведущего фактора прогрессирования сосудистых изменений.

Использование высокочастотного ультразвука в В-режиме позволяет неинвазивно оценивать морфологическое состояние сосудистой стенки и динамику атеросклеротического процесса, а внедрение трёхмерной магнитно-резонансной визуализации сосудистой стенки (3D CMR VWI) значительно расширяет диагностические возможности в оценке структуры и состояния сонных артерий.

Метод 3D CMR VWI, продемонстрировавший высокую точность в сравнении с цифровой субтракционной ангиографией, может рассматриваться как перспективный инструмент для комплексной визуализации сосудов, оценки уязвимости атеросклеротических бляшек и

раннего выявления пациентов с повышенным риском ишемического инсульта. [15]

Заключение

Комплексная оценка состояния сонных артерий является ключевым инструментом для раннего выявления и прогнозирования риска ишемического инсульта, особенно у пациентов с сахарным диабетом 2 типа. У этой категории больных атеросклероз развивается быстрее и сопровождается утолщением комплекса интима–медиа (ТКИМ) и формированием нестабильных бляшек. Увеличение ТИМ подтверждается как надёжный маркер субклинического атеросклероза и предиктор сердечно-сосудистых осложнений. При диабете 2 типа этот показатель отражает эндотелиальную дисфункцию, метаболические нарушения и дислипидемию, а постпрандиальная гипертриглицеридемия выделяется как независимый фактор риска прогрессирования атеросклероза. Ультразвуковое исследование сонных артерий остаётся базовым и воспроизводимым методом оценки состояния сосудов, тогда как современные методы, такие как трёхмерная МР-визуализация сосудистой стенки (3D CMR VWI), обеспечивают детальное изображение морфологии бляшек и признаков нестабильности. В исследовании 3D CMR VWI показала высокую точность по сравнению с цифровой субтракционной ангиографией, подтверждая её перспективность для клинической практики.

Сочетание ультразвука и 3D CMR VWI позволяет комплексно оценить функциональное и морфологическое состояние сосудов, повысить точность стратификации риска и раннее выявление пациентов с высоким риском инсульта. Это создаёт основу для индивидуализированной профилактики, оптимизации терапии и снижения смертности у больных с сахарным диабетом 2 типа. Использование современных неинвазивных методов визуализации, таких как ультразвуковая диагностика в сочетании с 3D CMR VWI, является перспективным подходом для прогнозирования и профилактики ишемического инсульта у пациентов группы высокого риска.

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ПРИМЕНЕНИЕ ИММОБИЛИЗОВАННЫХ ФЕРМЕНТОВ ПРИ ОСТРЫХ ГНОЙНЫХ ИНФЕКЦИЯХ МЯГКИХ ТКАНЕЙ И ОЦЕНКА ИХ КЛИНИЧЕСКОЙ ЭФФЕКТИВНОСТИ

Аннотация*: Острые гнойные инфекции мягких тканей являются распространёнными хирургическими патологиями, сопровождающимися выраженным воспалением, некрозом и риском тяжёлых осложнений. Иммобилизованные ферменты используются как перспективное средство локальной терапии для ускорения очищения раны и стимуляции репарации. В обзоре представлены современные данные о механизмах действия протеолитических, липолитических и нуклеазных ферментов, их преимуществах, клинической эффективности и возможных ограничениях. Обобщены результаты клинических исследований, доказавших, что применение иммобилизованных ферментов ускоряет эвакуацию гнойного отделяемого, уменьшает воспалительную реакцию и способствует более быстрому формированию грануляций.*

Ключевые слова: *иммобилизованные ферменты, гнойные инфекции мягких тканей, некролиз, раневой процесс, ферментная терапия.*

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APPLICATION OF IMMOBILIZED ENZYMES IN ACUTE PURULENT SOFT TISSUE INFECTIONS AND ASSESSMENT OF THEIR CLINICAL EFFECTIVENESS

Abstract: *Acute purulent soft tissue infections are common surgical conditions characterized by pronounced inflammation, tissue necrosis, and a high risk of severe complications. Immobilized enzymes are used as a promising method of local therapy aimed at accelerating wound cleansing and stimulating tissue repair. This review summarizes current data on the mechanisms of action of proteolytic, lipolytic, and nuclease enzymes, their advantages, clinical efficacy, and potential limitations. The results of clinical studies are presented, demonstrating that the use of immobilized enzymes accelerates the removal of*

purulent exudate, reduces inflammatory reactions, and promotes faster granulation tissue formation.

Keywords: *immobilized enzymes, purulent soft tissue infections, necrolysis, wound healing, enzyme therapy.*

Введение

Острые гнойные инфекции мягких тканей (ОГИМТ) включают абсцессы, флегмоны, карбункулы, инфицированные раны и другие гнойно-воспалительные процессы. Заболевания характеризуются быстрым распространением инфекции, выраженной интоксикацией, формированием некротических очагов и риском системных осложнений. Стандартное лечение основано на хирургическом вскрытии и дренировании гнойного очага, антибактериальной терапии и местной обработке раны. Однако в условиях роста антибиотикорезистентности и увеличения числа тяжёлых форм заболевания возникает необходимость в эффективных локальных методах терапии.

Иммобилизованные ферменты рассматриваются как перспективное направление современной раневой терапии. Фиксация ферментных молекул на твердых или гелеобразных носителях обеспечивает их стабильность, пролонгированное действие и направленное воздействие на патологический субстрат. Применение иммобилизованных протеаз, липаз и ДНК-аз позволяет значительно ускорить очищение раны, сократить выраженность воспаления и стимулировать регенеративные процессы.

Механизм действия и преимущества иммобилизованных ферментов

1. Иммобилизованные протеолитические ферменты

Протеазы (трипсин, химотрипсин, папаин, коллагеназа) расщепляют некротические ткани и белковые компоненты гнойного экссудата. Их иммобилизация на полимерных матрицах обеспечивает: устойчивость к ингибиторам; более длительное действие; равномерное распределение в раневой полости.

Клинические исследования показывают, что применение протеаз ускоряет очищение раны и сокращает сроки перехода воспалительной фазы в грануляционную [1,2].

2. Иммобилизованные липазы. Липолитические ферменты участвуют в разрушении жировых некрозов, что особенно важно при флегмонах и абсцессах подкожной клетчатки. Их использование снижает плотность инфицированных тканей.

3. Иммобилизованные ДНК-азы. ДНК-азы расщепляют внеклеточные сети (NETs), образующие вязкий гной. Это способствует лучшей эвакуации отделяемого и снижению бактериальной нагрузки [3].

Клиническая эффективность ферментной терапии. Исследования последних лет демонстрируют, что включение иммобилизованных ферментов в комплексное лечение ОГИМТ приводит к:

1. Быстрому очищению раны от некроза.Сравнительные анализы показывают, что ферментные препараты уменьшают сроки очищения на 2–4 дня [4].

2. Снижению микробной контаминации. Под влиянием ферментов разрушаются биоплёнки микроорганизмов, что повышает чувствительность флоры к антибиотикам.

3. Улучшению микроциркуляции.Снижение отёка и воспаления способствует восстановлению местного кровотока.

4. Ускорению репарации. Применение ферментов способствует более быстрому образованию грануляций и эпителизации.

Ограничения и безопасность

Несмотря на высокий потенциал метода, существуют определённые ограничения: чувствительность к компонентам фермента; необходимость правильного подбора носителя; риск избыточного протеолиза при неправильном применении.

Тем не менее большинство клинических исследований отмечает хорошую переносимость иммобилизованных ферментов [5].

Перспективы использования. Наиболее перспективными направлениями считаются:

создание многокомпонентных ферментных композиций;

применение ферментов в составе наноматериалов;

комбинирование ферментотерапии и антимикробных покрытий;

внедрение ферментных повязок, работающих по принципу «контролируемого высвобождения».

Заключение

Иммобилизованные ферменты представляют собой эффективный метод локальной терапии острых гнойных инфекций мягких тканей. Их применение ускоряет очищение ран, уменьшает воспалительный процесс и стимулирует регенерацию. Учитывая высокую клиническую значимость метода, необходимо дальнейшее изучение способов оптимизации носителей и создание стандартизированных протоколов применения.

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КЛИНИЧЕСКОЕ И ПАТОГЕНЕТИЧЕСКОЕ ЗНАЧЕНИЕ ИММОБИЛИЗОВАННЫХ ПРОТЕОЛИТИЧЕСКИХ ФЕРМЕНТОВ ПРИ ОСТРЫХ ГНОЙНЫХ ЗАБОЛЕВАНИЯХ МЯГКИХ ТКАНЕЙ

Аннотация. *Использование иммобилизованных протеолитических ферментов при острых гнойных инфекциях мягких тканей представляет собой механистически обоснованный подход, направленный на усиление очистки раны, снижение устойчивости биоплёнок и ускорение регенерации. В данном обзоре обобщены современные данные о технологиях иммобилизации, молекулярных механизмах действия протеолитических ферментов в гнойной среде, их взаимодействии с воспалительными путями организма хозяина и влиянии на клинические исходы. Также обсуждаются ограничения, вопросы безопасности и направления дальнейших исследований.*

Ключевые слова: *иммобилизованные ферменты; протеолитические ферменты; гнойные инфекции мягких тканей; патогенез; очистка раны.*

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CLINICAL AND PATHOGENETIC SIGNIFICANCE OF IMMOBILIZED PROTEOLYTIC ENZYMES

Abstract . *The use of immobilized proteolytic enzymes in acute purulent soft-tissue infections offers a mechanistically grounded approach to enhance wound debridement, reduce biofilm resistance and accelerate regeneration. This review summarizes current knowledge about immobilization technologies, molecular mechanisms of action of proteolytic enzymes in purulent environments, interactions with host inflammatory pathways, and implications for clinical outcomes. Limitations, safety issues and directions for further research are discussed.*

Keywords: *immobilized enzymes; proteolytic enzymes; purulent soft-tissue infections; pathogenesis; wound debridement.*

Введение

Острые гнойные поражения мягких тканей (абсцессы, флегмоны, инфицированные раны) остаются одной из ведущих причин хирургической заболеваемости и госпитализации. Ключевая задача терапии — удаление некроза и дезорганизованного экссудата, прерывание инфекционно-воспалительного цикла и восстановление микроциркуляции. Важную роль в этих процессах играют ферменты; однако в свободной форме они часто быстро инактивируются в агрессивной раневой среде. Метод иммобилизации ферментов обеспечивает их устойчивость и пролонгацию действия, что имеет прямое значение для патогенеза и клиники лечения ОГЗМТ [1–3].

Технологические подходы к иммобилизации. Иммобилизация — фиксация фермента на твёрдом или полутвёрдом носителе (полимеры, коллагеновые матрицы, гидрогели, наноматрицы). Методики могут быть физическими (адсорбция, встраивание) и химическими (сшивка, ковалентная связь). Основные преимущества: повышение термостабильности, сопротивляемость протеолитическим ингибиторам, целевое локальное действие и снижение системной абсорбции [2,6]. Выбор носителя и способа фиксации определяют кинетику высвобождения и клиническую пригодность препарата.

Молекулярные и клеточные механизмы действия. Протеолитические ферменты (трипсин, химотрипсин, коллагеназы) катализируют гидролиз денатурированных белков и фибриновых пленок, уменьшая плотность некротического субстрата и разрушающее влияние биоплёнок микроорганизмов. Это стимулирует: облегчение механического дренажа и удаления некроза; снижение барьерных свойств биоплёнок (улучшение проникновения антибиотиков); уменьшение местной гипоксии за счёт восстановления микроциркуляции; модуляцию воспалительной реакции через снижение DAMP-сигналов.

ДНК-азы в составе комплексных препаратов уменьшают вязкость экссудата и способствуют разрыву внеклеточной ДНК, структурно укрепляющей биоплёнки [4].

Взаимодействие с иммунными и репаративными механизмами. Локальная деградация некротических белков снижает системный «стресс-сигнал», уменьшает активацию нейтрофилов и продукцию провоспалительных цитокинов (IL-6, TNF-α), что в совокупности улучшает заживление. Иммобилизованные ферменты действуют преимущественно локально и не подавляют системный иммунитет, что важно у пациентов с сопутствующей иммунодефицитной патологией [3,5].

Клинические эффекты и доказательная база. Клинические исследования и наблюдательные серии показывают: сокращение времени до очищения раны, уменьшение объёма некрэктомий, более раннее формирование грануляционной ткани и уменьшение длительности госпитализации при использовании иммобилизованных ферментных систем в составе комплексной терапии [5]. Однако большая часть данных —

небольшие клинические серии и проспективные наблюдения; высококачественных РКИ пока недостаточно.

Ограничения и проблемы безопасности.

Возможность местной аллергизации (редко);

Вопросы стандартизации доз и носителей;

Экономическая доступность технологий в разных системах здравоохранения;

Недостаток крупномасштабных сравнительных исследований [6,7].

Заключение

Иммобилизованные протеолитические ферменты имеют убедительное патогенетическое обоснование и демонстрируют клиническую полезность как компонент комплексной терапии острых гнойных поражений мягких тканей. Необходимы многоцентровые рандомизированные исследования, стандартизация форм и протоколов применения, а также экономическая оценка внедрения технологий.

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РЕАБИЛИТАЦИЯ ДЕТЕЙ С ВРГН ПРИ НЕБЛАГОПРИЯТНЫХ ПОСЛЕОПЕРАЦИОННЫХ ИСХОДАХ

Аннотация: *Врожденная расщелина губы и неба (ВРГН) является одной из наиболее распространённых черепно-лицевых аномалий, оказывающих влияние не только на анатомо-функциональное состояние, но и на психосоциальное благополучие ребёнка. Целью данной работы является комплексная оценка качества жизни детей с ВРГН и определение эффективных путей его улучшения. Полученные данные свидетельствуют о значительном снижении показателей эмоционального и социального функционирования у детей с ВРГН, особенно до завершения хирургического лечения. Предложена модель мультидисциплинарного сопровождения, направленная на повышение уровня адаптации и социальной интеграции.*

Ключевые слова: *врожденная расщелина губы и неба, качество жизни, дети, реабилитация, мультидисциплинарный подход.*

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TACTICS OF TREATMENT OF CHILDREN WITH CONGENITAL CLEFT OF THE UPPER LIP AND PALATE: AN INTERDISCIPLINARY PROBLEM

Abstract: *Congenital cleft lip and palate (CRGN) is one of the most common craniofacial anomalies that affect not only the anatomical and functional state, but also the psychosocial well-being of the child. The purpose of this work is a comprehensive assessment of the quality of life of children with HCV and the identification of effective ways to improve it. The data obtained indicate a significant decrease in the indicators of emotional and social functioning in children with VGN, especially before the completion of surgical treatment. A*

model of multidisciplinary support is proposed, aimed at increasing the level of adaptation and social integration.

Keywords: *congenital cleft lip and palate, quality of life, children, rehabilitation, multidisciplinary approach.*

Введение

Врожденная расщелина губы и неба (ВРГН) относится к числу наиболее частых врождённых пороков развития, встречаясь, по данным ВОЗ, у 1 из 700 новорождённых. Данное состояние вызывает выраженные функциональные нарушения речи, дыхания, питания и слуха, а также оказывает существенное влияние на психоэмоциональное развитие ребёнка и его социальную адаптацию.

Современные подходы к лечению ВРГН основаны на ранней хирургической коррекции, ортодонт чёской и логопедической реабилитации, однако вопрос качества жизни остаётся недостаточно изученным и часто недооценивается в медицинской практике. Лечение пациентов с расщелиной губы и неба (РГН), является одной из сложнейших задач современной стоматологии и челюстно-лицевой хирургии.

В Республике Узбекистан на сегодняшний день рождаемость детей с врождённой расщелиной верхней губы и нёба выше среднестатистической по стране. Нарушения таких жизненно важных функций, как дыхание, питание и речь, эстетические дефекты, сопутствующие врожденной расщелине верхней губы и неба, пагубно сказываются на общем физическом и интеллектуальном развитии ребёнка. Чувство ущербности, реакция окружающих на речь вызывают у такого ребенка тяжелые переживания, что, естественно, отражается на формировании его психики. Эти психологические наслоения в свою очередь еще больше усугубляют нарушения речи. Не устраненные в детском возрасте речевые дефекты впоследствии препятствуют выбору профессии, мешают в труде и повседневной жизни.

Проведения комплексных исследований врожденных аномалий челюстно-лицевой области с целью их профилактики и активного участия в этой работе наряду с врачами различных специальностей (генетики, иммунологи, акушеры-гинекологи, педиатры (неонатологи), неврологи, кардиологи, психологи, социологи, медики-экологи) и стоматологов. Это позволит расширить заботу об охране здоровья ребенка и создать благоприятные условия для формирования зубочелюстно-лицевой системы.

Цель исследования

Провести комплексную оценку качества жизни детей с врожденной расщелиной губы и неба и определить наиболее эффективные пути его улучшения с учётом медицинских и психосоциальных факторов.

Материал и методы исследования

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 урана- 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 зуб альвеолярной 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

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 зуб альвеолярной дуги у новорожденных детей в периоде до и после использования предложенного обтуратора, влияние его на рост и развитие альвеолярного отростка. Изученные изменения и их систематизация приводит к снижению челюстно-лицевых патологий, а также росту и развитию определению что способствует к не гармоническому 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». Полученные результаты подтверждают, что качество жизни детей с ВРГН определяется не только медицинскими, но и психологическими и социальными аспектами. Эффективная помощь требует мультидисциплинарного подхода, включающего участие хирурга, ортодонта, логопеда, психолога и социального работника.

Ключевую роль играет раннее информирование родителей и их активное участие в процессе лечения. Важным направлением является внедрение программ психологической поддержки и профилактики школьной дезадаптации.

Ряд зарубежных исследований (Smith et al., 2021; Johansson et al., 2022) подтверждают, что системная реабилитация и регулярная психологическая коррекция способствуют улучшению эмоциональной устойчивости и повышению уровня социальной интеграции у таких детей.

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SPECIFIC VARIATIONS IN THE CYP 21A2 GENE IN WOMEN OF REPRODUCTIVE AGE WITH HYPERANDROGENIA

Abstract. *In our study, according to the sequencing analysis of the CYP21A2 gene, only single nucleotide polymorphism mutations were detected in patients with hyperandrogenism, and 3.97% (n=5) of them had a homozygous wild-type genotype, 46.8% (n=59) had a heterozygous genotype (there is one minor allele) was confirmed.*

Key words: *hyperandrogenism, CYP21A2 gene, molecular genetic analysis, congenital adrenal hyperplasia.*

Relevance of the topic

Hyperandrogen syndrome in women of reproductive age remains one of the most pressing problems of endocrine gynecology. The syndrome of hyperandrogenism in women leads from their appearance to the violation of reproductive functions [1]. In 2010, polycystic ovary syndrome (PCOS) occurred in 5-10%, but now this indicator is 15-20%. For this reason, this syndrome causes women to lose their quality of life [2]. The state of hyperandrogenism is directly caused by the violation of androgen metabolism in the body. In women, hyperandrogenism occurs in polycystic ovary syndrome, in the non-classical type of congenital hyperplasia of the cortex of the adrenal gland (non-classical congenital adrenal hyperplasia), when the work of aramatase and 5a-reductase enzymes is disturbed [3,4]. Based on this, since there are many sources of development of hyperandrogenism, there are difficulties in differential diagnosis. Determining the percentage of women of reproductive age with non-classical congenital adrenal hyperplasia and hyperandrogenism will help determine the next stage of treatment. It is known from the literature that in the development of non-classical congenital adrenal hyperplasia, 21-hydroxylase enzyme deficiency is the cause in 90% of cases [5,6,7]. Various changes in the structure of the CYP21A2 gene, which encodes this enzyme, reduce the activity of the enzyme. To confirm the diagnosis of non-classic congenital adrenal hyperplasia, molecular-genetic examination is important.

Research objective.

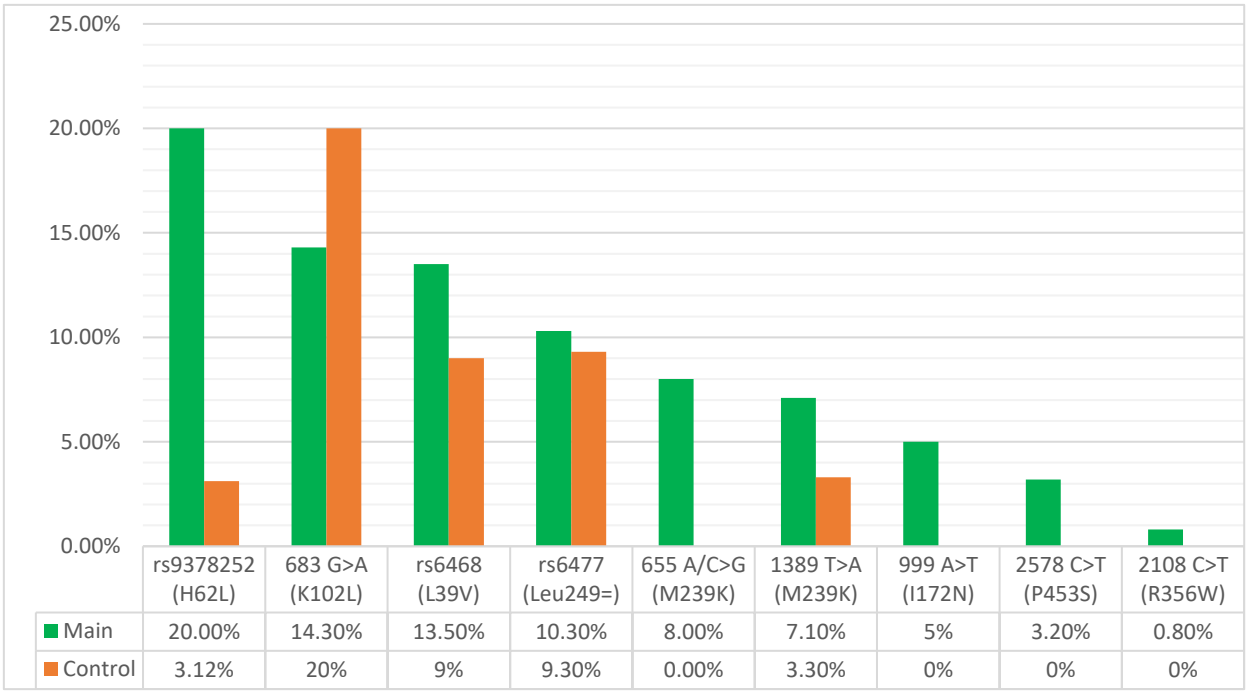
Determination of a differentiated approach to diagnosis by identifying specific changes in the structure of the CYP 21A2 gene in women of reproductive age with hyperandrogenism.

Object and method of research

The study was conducted at the Regional Population Reproductive Health Center. From the women who applied, 126 women of reproductive age with a high level of androgens in the blood were selected. 32 women without reproductive disorders were selected as a control group. Peripheral blood was taken from the selected women for molecular genetic testing. Molecular genetic studies were conducted in the laboratory of the Republican Scientific and Practical Center of Sports Medicine. Sequencing analysis of the CYP21A2 gene was performed.

Results and their discussion

According to the results of the sequencing analysis of the CYP21A2 gene, which was carried out in our study, no mutation types strongly affecting the conformation of the expressed enzyme, such as deletion, translocation, micro- and macroconversion, were detected in the main group. Polymorphism characteristic of mutations of the single nucleotide polymorphism (SNP) type 683 G>A (K102L) minor allele in 14.3% of patients (n=18) and 20% (n=6) of the control group, polymorphism rs6468 (L39V) in 13.5% (n=17) of patients and 9.3% of the control group (n=3), polymorphism rs9378252 (H62L) in 19.8% (n=25) of patients and 3.12% (n=1) of the control group ($p<0.05$), rs6477 (Leu249=) 10.3% (n=13) of patients and 9.3% (n=3) in the control group, 13.89 T>A (M239K) in 7.1% (n=9) of patients and 3.3% (n=1) in the control group, the non-wild or minor allele was detected ($p>0.05$), while the minor allele characteristic of polymorphisms such as 2578 C>T (P453S), 655 A/C>G, 999 A>T (I172N) ($p>0.05$), 2108 C>T (R356W) was detected only in patients, and 3.2% (n=4), 8% (n=10), 5% (n=6) and 0.8% (n=1) respectively.



	rs9378252 (H62L)	683 G>A (K102L)	rs6468 (L39V)	rs6477 (Leu249=)	655 A/C>G (M239K)	1389 T>A (M239K)	999 A>T (I172N)	2578 C>T (P453S)	2108 C>T (R356W)
Main	20.00%	14.30%	13.50%	10.30%	8.00%	7.10%	5%	3.20%	0.80%
Control	3.12%	20%	9%	9.30%	0.00%	3.30%	0%	0%	0%

Figure 1. *Results of CYP21A2 gene sequencing in patients of the main and control groups. Indications: * - compared to the control group - p<0.05.*

The results of the distribution of the results of various polymorphisms identified in the CYP21A2 gene by alleles and genotypes in the main and control groups were studied.

According to Table 1, the distribution of the result of polymorphisms identified in the main and control groups by alleles was verified at the population level based on the Hardy-Weinberg law. According to the results obtained in the main and control groups, no significant deviation from the observed or theoretical results was found for all identified polymorphisms ($\chi 2<3.85$; $P>0.05$). This indicates that the results obtained during the study violate the Hardy-Weinberg law.

Table 1

Distribution of alleles and genotypes of polymorphisms identified during the sequencing of the CYP21A2 gene in the main and control groups distribution

	Main group					Control group				
	Allel		Genotypes			Allel		Genotypes		
Polymorphism Type	Wild type (%)	Minor type (%)	Homozygous wild (%)	Heterozygous (%)	Homozygous nonwild (%)	Wild type (%)	Minor type (%)	Homozygous wild (%)	Heterozygous (%)	Homozygous nonwild (%)
683 G>A	92,0	8,0	77	12,7	1,6	90,0	10,0	80	20	0
rs9378252	89,7	10,3	80,2	19	0,8	98,4	1,6	96,875	3,125	0
rs6468	82,8	7,2	86,5	12,7	0,8	95,3	4,7	90,625	9,375	0
rs6477	94,4	5,6	89,6	9,5	0,8	95,32	4,68	90,625	9,375	0
655A/C>G	96,03	3,97	92	7,9	0,0	100	0	100	0	0
1389 T>A	96,43	3,57	92,9	7,1	0	96,8	3,2	93,75	6,25	0
2578 C>T	98,4	1,6	96,83	3,17	0	100	0	100	0	0
999 A>T	97,6	2,4	95,2	4,8	0	100	0	100	0	0
2108 C>T	99,6	0,4	99,2	0,8	0	100	0	100	0	0

Table 2

Results of the study of various polymorphisms identified in the CYP21A2 gene in patients of the main group using the Hardy-Weinberg law

	Main group							
	Observed			Expected			$\chi 2$	p-value
Polymorphism Type	Homozygous wild	Heterozygous	Homozygous nonwild	Homozygous wild	Heterozygous	Homozygous nonwild		
683 G>A	0,857	0,127	0,016	0,848	0,146	0,006	2,1	0,34
rs6468	0,865	0,127	0,008	0,862	0,132	0,005	0,23	0,89
rs9378252	0,802	0,19	0,008	0,80	0,19	0,01	0,1	0,95
rs6477	0,896	0,095	0,008	0,889	0,11	0,0	1,0	0,58
655 A/C>G	0,92	0,079	0,0	0,922	0,076	0,0	0,21	0,90
1389 T>A	0,929	0,071	0,0	0,93	0,069	0,0	0,17	0,92
2578 C>T	0,968	0,032	0,0	0,968	0,031	0,0	0,03	0,98
999 A>T	0,952	0,048	0,0	0,952	0,048	0,0	0,07	0,96
2108 C>T	0,992	0,08	0,0	0,992	0,08	0,0	0,0	0,99

Instruction: df=1

Table 3
Results of the study of various polymorphisms identified in the CYP21A2 gene in the control group of subjects using the Hardy-Weinberg law

	Control group							
	Observed			Expected			χ2	p-value
Polymorphism Type	Homozygous wild	Heterozygous	Homozygous nonwild	Homozygous wild	Heterozygous	Homozygous nonwild		
683 G>A	0,813	0,187	0,031	0,821	0,17	0,008	0,34	0,84
rs6468	0,9062	0,0937	0,0	0,908	0,089	0,0	0,07	0,96
rs9378252	0,96875	0,0313	0,0	0,969	0,03	0,0	0,008	0,98
1683 G>T	0,96875	0,0313	0,0	0,969	0,03	0,0	0,008	0,98
rs6477	0,9062	0,0937	0,0	0,908	0,089	0,0	0,07	0,96
1389 T>A	93,75	6,25	0	0,9375	0,061	0,0	0,03	0,98

Instruction: df=1

As noted above, the combination of several mutant alleles in the CYP21A2 gene significantly increases the risk of developing hyperandrogenism in women due to the occurrence of adrenal hyperplasia of the non-class type. Therefore, based on the results of sequencing, the frequency of occurrence of combined mutations in the heterozygous form in some patients of the main group was analyzed, and combined mutations were calculated. As a result, it was found that patients with two different mutant alleles were 18.3% (n=23), and patients with three different mutant alleles were 2.4% (n=5).

Table 4

Comparison of double and triple analysis of combined mutations resulting from CYP21A2 gene sequencing

Combined two types of genotypes	Patients n=126	%	Combined three types of genotypes	Patients n=126	%
683 GA-rs9378252 AT	4	3,2	683 GA-1389 TA-rs6477 CG	1	0,8
683 GA-1389 TA	2	1,6	2108 TA-rs6477 CG-rs9378252 AT	1	0,8
683 GA-rs6468 CG	4	0,8	683 AG-rs9378252 AT-rs6477 CG	2	1,6
999 TA-rs6468 CG	2	1,6	999TA- rs9378252 AT-rs6477 CG	1	0,8
999 TA- rs6477 CG	1	0,8			
999 TA- rs9378252 AT	1	0,8			
rs9378252 AT-rs6468 CT	1	0,8			
rs9378252 AT-rs6477 CG	1	0,8			
rs6468 CT-2578 CT	1	0,8			
rs9378252 AT- 2578 CT	2	1,6			
rs6468 CT- rs6477 CG	4	3,2			
Overall	23	18,3	Overall	5	2,4

Conclusion

According to the results of the sequencing analysis of the CYP21A2 gene, mutations characteristic of only a single nucleotide polymorphism were detected in patients with hyperandrogenism, and it was confirmed that 3.97% (n=5) of them had a non-wild homozygous genotype, and 46.8% (n=59) had a heterozygous genotype (with one minor allele). It was confirmed that all identified polymorphisms correspond to the Hardy-Weinberg law ($\chi 2<3.85$; $P>0.05$). The correlation between the identified polymorphisms and the identified clinical and biochemical changes in patients allows us to identify mutant alleles that cause congenital adrenal hyperplasia.

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TIBBIYOTDA RENTGEN NURLARINING DIAGNOSTIKADAGI O‘RNI

Annotatsiya: *Ushbu maqolada rentgen nurlarining zamonaviy tibbiyotdagi diagnostik va davolash jarayonlaridagi o‘rni, ularning fizik asoslari, qo‘llanish sohalari hamda xavfsizlik tamoyillari yoritiladi. Rentgenografiya, kompyuter tomografiyasi va angiografiya kabi zamonaviy tasvirlash usullari yordamida inson organizmining ichki tuzilishi invaziv bo‘lmagan tarzda aniq tasvirlanadi. Raqamli rentgen texnologiyalari tasvir sifatini oshirishi, nurlanish darajasini kamaytirishi hamda diagnostika jarayonini tezlashtirishi isbotlangan. Shu bilan birga, ionlanuvchi nurlarning biologik ta'siri, xavf omillari va himoyalanish choralariga alohida e'tibor qaratilgan. Zamonaviy rentgen tizimlaridan oqilona foydalanish tibbiy tashxis aniqligini oshirib, bemor xavfsizligini ta'minlashga xizmat qiladi.*

Kalit so‘zlar: *rentgen nurlari, diagnostika, ionlovchi nurlanish, kompyuter tomografiya, angiografiya, radiatsiya xavfsizligi.*

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X-RAY TECHNOLOGY AND MODERN MEDICINE: ITS SIGNIFICANCE IN DIAGNOSTIC IMAGING

Abstract: *This article explores the role of X-rays in modern medicine, including their physical principles, diagnostic applications, and safety considerations. Imaging techniques such as radiography, computed tomography (CT), and angiography enable accurate visualization of internal anatomical structures without invasive procedures. Digital X-ray systems provide enhanced image quality, reduced radiation exposure, and faster diagnostic workflow. The study also addresses the biological effects of ionizing radiation, associated risks, and protective measures to ensure patient and medical staff safety. The rational use of modern X-ray technologies contributes to improved diagnostic accuracy and enhanced patient safety in clinical practice.*

Keywords: *X-rays, diagnostics, ionizing radiation, computed tomography, angiography, radiation safety.*

Kirish

Zamonaviy tibbiyotda tasvirlash texnologiyalari diagnostika jarayonining eng muhim tarkibiy qismi hisoblanadi. Ionlovchi elektromagnit nurlarga asoslangan rentgen tizimlari kasalliklarni erta aniqlash, suyak singanlarini baholash, o‘pka kasalliklarini aniqlash, yurak-qon tomir tizimi o‘zgarishlarini kuzatishda muhim o‘rin egallaydi.

Rentgen nurlarining tibbiyotga kirib kelishi 1895-yilda Vilgelm Konrad Rentgen tomonidan ularning tasodifan kashf etilishi bilan boshlandi. 1896-yilda olim rafiqasining qo‘li suyaklari tasvirini olishga muvaffaq bo‘ldi va bu tibbiyot tarixidagi eng katta inqiloblardan biriga aylandi. Bugungi kunda rentgen apparatlari analog qurilmalardan raqamli tizimlarga o‘tdi, natijada yuqori aniqlik, past nurlanish darajasi va tezkor tahlil imkoniyati yaratildi.

Maqolada rentgen nurlari fizik asoslari, ularning diagnostikadagi qo‘llanilishi, zamonaviy apparat turlari hamda xavfsizlik tamoyillari ilmiy asosda yoritiladi.

Adabiyotlar sharhi

Ilmiy manbalarda rentgen nurlarining tibbiy diagnostikadagi qo‘llanilishi keng o‘rganilgan. Klassik tadqiqotlarda (Rentgen, 1895; Johns & Cunningham, 1983) ionlanuvchi nurlar to‘qimalar orqali o‘tishida ularning zichligi muhim rol o‘ynashi aytiladi. Zamonaviy diagnostika bo‘yicha adabiyotlar (Bushberg, 2012; Seeram, 2015) raqamli detektorlarning sezgirligi tasvir sifatini oshirishi va radiatsiya dozasini kamaytirishini ko‘rsatadi. KT, angiografiya va raqamli fluoroskopiya usullari haqidagi izlanishlar (Hounsfield, 1972; Kalender, 2005) tibbiy amaliyotda yuqori aniqlikdagi 3D tasvirlar olish imkonini yaratganini ta’kidlaydi. Shuningdek, radiatsiya xavfsizligi bo‘yicha xalqaro tavsiyalar (ICRP, 2007) bemor va tibbiyot xodimlari uchun nurlanish dozasini minimallashtirish zarurligini ko‘rsatadi.

Tadqiqot metodologiyasi

Maqolani tayyorlash davomida quyidagi ilmiy-uslubiy yondashuvlardan foydalanildi:

1. Nazariy tahlil. Rentgen nurlarining fizik tabiatiga oid manbalar o‘rganildi.

Diagnostik tasvirlash usullarining texnik asoslari tahlil qilindi.

2. Qiyosiy tahlil

Turli rentgen apparatlari, jumladan: an’anaviy rentgen, raqamli rentgen, KT, angiografiya, stomatologik rentgen, mobil va portativ tizimlar o‘zaro taqqoslab o‘rganildi.

3. Radiatsiya xavfsizligi tahlili

ICRP normativlari, milliy me’yoriy hujjatlar, zamonaviy rentgen apparatlaridagi himoya texnologiyalari tahlili o‘tkazildi.

Tahlil va natijalar

1. Rentgen nurlarining ishlash mexanizmi

Rentgen apparatida yuqori kuchlanish ostida elektronlar tezlashtiriladi va metall anodga urilganda ionlovchi elektromagnit nurlar hosil bo‘ladi. Ular inson tanasi orqali o‘tib, turli to‘qimalarda turlicha so‘riladi:

Suyaklar – ko‘proq nurni ushlab qoladi → tasvirda oq.

Yumshoq to‘qimalar – o‘rtacha so‘riladi → kulrang.

Havo bo‘shliqlari – nurni deyarli ushlab qolmaydi → qoramtir.

2. Zamonaviy raqamli rentgen apparatlarining afzalliklari

- Yuqori sifatli tasvir

Detektorlarning sezgirligi ko‘proq bo‘lgani sababli tasvir aniq va kontrast bo‘ladi.

- Nurlanishning kamaytirilgan darajasi

Raqamli tizimlar an’anaviy plyonkali rentgenga nisbatan 40–70% kam nurlanish beradi.

- Tezkor natija.

Tasvirlar bir necha soniya ichida ekranga chiqadi.

- Saqlash va almashish qulayligi (PACS tizimi).

Tasvirlar raqamli formatda yuborilishi, saqlanishi va tahlil qilinishi mumkin.

- Sun’iy intellekt yordamida tahlil.

Ba’zi tizimlar pnevmoniya, o‘smalar va o‘pka nodulyar o‘zgarishlarini avtomatik aniqlay oladi.

3. Rentgen apparatlari turlari

• Stasionar raqamli rentgen. Klinikalar va kasalxonalarda keng qo‘llaniladi.

• Mobil (portativ) rentgen. Harakatsiz bemorlar, reanimatsiya yoki tez tibbiy yordam sharoitida.

• C-Arm rentgen. Jarrohlik amaliyotlarida real vaqt tasviri uchun.

• Stomatologik rentgen. Periapikal, bitewing, okklyuzal kabi turlar mavjud.

• Mamografiya. Sut bezlari kasalliklarini erta aniqlashda.

• Angiografiya. Kontrast modda yordamida qon tomirlarni tasvirlash.

• Florografiya. Ommaviy skrining (ayniqsa o‘pka kasalliklari) uchun.

4. Rentgen nurlarining salbiy tomonlari

Ionizatsiya ta’siri tufayli: DNKga zarar yetkazishi, saraton xavfini oshirishi, suyak iligi faoliyatini susaytirishi mumkin.

Homilador ayollar uchun xavf. Rentgen faqat majburiy holatlarda qo‘llanadi va qo‘rg‘oshin himoyasi talab etiladi.

5. Rentgen nurlanishidan himoyalanish

1. Qo‘rg‘oshinli himoya vositalari. Fartuk, qalqonsimon bez himoyasi, qo‘rg‘oshinli ekran.

2. Nurlanish dozasini minimallashtirish. Keraksiz tekshiruvlardan qochish.

3. Zamonaviy texnologiyalar. Dozimetr, past dozali rejimlar, raqamli detektorlar.

Xulosa

Rentgen nurlari zamonaviy tibbiyotda diagnostikaning eng muhim va ishonchli usullaridan biri hisoblanadi. Ular yordamida suyaklar, yumshoq to‘qimalar, organlar va qon tomirlarni aniqlik bilan tekshirish mumkin. Zamonaviy raqamli rentgen apparatlari nurlanish darajasini kamaytirib, tasvir sifati va tahlil tezligini oshirmoqda.

Biroq ionlovchi nurlanishning ma’lum xavflari mavjud bo‘lgani sababli, rentgen tekshiruvlari faqat shifokor tavsiyasiga muvofiq, himoya vositalaridan foydalangan holda amalga oshirilishi lozim. Radiatsiya xavfsizligi qoidalariga qat’iy rioya qilish bemor va tibbiyot xodimlari salomatligini himoya qiladi.

Zamonaviy rentgen texnologiyalarining rivojlanishi diagnostika aniqligini oshirish bilan birga, bemor xavfsizligini ta’minlashning yangi imkoniyatlarini yaratmoqda.

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EPIDEMIOLOGICAL FACTORS INFLUENCING THE PREVALENCE OF ORAL MUCOSAL DISORDERS AND DENTAL CARIES: AN UPDATED LITERATURE REVIEW

Summary. *Oral mucosal disorders and dental caries remain among the most widespread conditions affecting global populations, with their prevalence influenced by a complex interaction of environmental, microbiological, and behavioral factors. Recent epidemiological studies demonstrate a steady increase in both mucosal pathologies and carious lesions across various age groups, especially among children and adolescents. Understanding the early mechanisms of demineralization, alterations in oral microbiota, and host susceptibility is essential for developing targeted preventive strategies. This literature review synthesizes contemporary data on the distribution, clinical features, and risk determinants of oral mucosal disorders, while highlighting their relationship with dental caries progression. Emphasis is placed on modern preventive approaches, including remineralization therapy and microbiome-modulating interventions, which are crucial for improving oral health outcomes.*

Keyword. *oral mucosal disorders; dental caries; oral microbiome; epidemiology; prevention; remineralization therapy.*

Oral hygiene is an important factor that affects the development of caries. Thorough and regular brushing of teeth can partially compensate for the effect of other factors (early infection with Str. mutans and excessive consumption of easily fermentable carbohydrates) [2].

However, many parents believe that there is no connection between the health of temporary and permanent teeth and therefore do not pay due attention to oral hygiene [15]. It should be borne in mind that young children do not need dental care, this procedure should be performed for them by adults [2]. It is important that parents start brushing their children's teeth in a timely manner. Even before the first teeth appear, mom or dad needs to clean the child's mouth using a napkin moistened with boiled water or a rubber fingertip. About six months, when the first teeth erupt, you need to start using a soft baby brush, which should be changed every 3 months, and a paste with a calcium content. It is necessary to brush your teeth in the morning before Breakfast and in the evening after the last meal [9].

For regions that are endemic in terms of fluoride content in water, you can use fluoride-containing pastes. However, recommendations for the age at which these products can be used and dosage vary from country to country and from organization to organization (for more information, see the sub-Chapter on the

role of fluoride compounds). It is important that parents gradually impart knowledge and lay the foundations of hygiene education according to the age of the child to develop habits first, and then in the future to form a persistent skill of brushing teeth [10]. Starting from 2.5-3 years of age, many children begin to brush their teeth themselves, but due to immaturity of motor skills and lack of persistent skill, the child will not be able to fully and correctly conduct oral hygiene on their own. Parents should be supervised and assisted in brushing their teeth [3].

It should be taken into account that the family lifestyle, hygiene habits and knowledge of dental health of parents are a factor directly related to the possibility of developing caries in their children [12].

To date, experts have proposed a variety of methods, measures and means for the treatment and prevention of dental caries [12, 17]. According to modern research, xylitol has proven itself to be a natural sweetener that does not give in to fermentation, and therefore is not perceived by bacteria. The ability of xylitol to restrain the adhesion of pathogenic microorganisms to the surface of teeth, block the reproduction and formation of acids of pathogenic microorganisms, and reduce the titer of S. mutans in saliva and plaque is confirmed by some experimental works [1]. At the same time, the scale of research does not give a reason for the widespread introduction of xylitol [19]. This is contradicted by the results of using xylitol in young children [5, 8]. the authors achieved a reduction in the increase in the intensity of dental caries by 86.7 % [15]. WalshL. J.'s works are devoted to the effect of ultraviolet rays on biofilms [5].

There are data on the use of triclosan and chlorhexidine-agents aimed at the effect of a bacterial factor, but their use in the practice of a pediatric dentist is difficult [20]. Other authors do not agree with this: when applying 40% chlorhexidine varnish, the caries growth rate was reduced to 38 % [9]. At the same time, a systematic review of the literature showed that the evidence for the caries-preventive effect of chlorhexidine varnish in children was inconclusive [5]. Artyunov et al. it is recommended to use a polymer film "diplen f" for children, containing a complex of sodium fluoride and chlorhexidine. The authors proved the effectiveness of application and caries-static effect by combining "diplen f" with "R. O. C. Sbaby" toothpaste [4]. Studies have shown that the local use of calcium-phosphate-containing products "R. O. C. S. MedicalMinerals" for two years can significantly reduce the growth of dental caries in children [10]. To restore the areas of enamel demineralization and increase its caries resistance, calcium, phosphate, and fluoride preparations contained in a solution of calcium gluconate, remodent, and GCToothMousse are used [13]. The effectiveness of a favorable effect on the hard tissues of the tooth is estimated by reducing the growth of caries by 50-60 % [14]. GCToothMousse is not used in patients with a burdened allergic history [5]. The positive effect of the remineralizing gel "Belagelsa/R", developed by the company "Vlad Miva", is demonstrated by [7].

Quite recently, in order to prevent dental caries in children, probiotics have been introduced, among the positive properties of which are the ability to normalize the microbial landscape due to the production of bacteriocin, adhesion

retarders [5], and according to SookheeS. [4], inhibit the growth of cariesogenic bacteria.

A significant contribution to the inadmissibility of the development of carious disease is played by fluorine ions, which was reflected in the previous studies [12]. The ability to restore fluoride is shown in the foci of destructive enamel, if the content of this trace element in the oral fluid is 0.1 mg/liter. At low values of this trace element in drinking water, the desired concentration can not be achieved. Therefore, endogenous and exogenous prevention of dental caries is particularly relevant in endemic areas [8]. As an external source of fluoride, according to various prevention schemes, pastes [2], rinses, gels, varnishes, foams [16] are offered, including the active use of non-invasive and invasive sealing of fissure [1]. In the literature, various methods of endogenous use of fluoride are proposed by enriching drinking water, salt, milk with it, or by taking sodium fluoride tablets as prescribed by a doctor. The effectiveness of the method is estimated by reducing caries by 50-60 %, but due to the cumulative effect, prolonged use on a regular basis is important [14].

Local use of fluoride-containing products involves the use of toothpastes, fluoride-containing lacquers: Duraphat, Bifluorid 12, FluorProtector, gels: NurpoAPF, Elmex, Silcot-varnish, FluocalGel, Fluor-Dose-varnish, solutions of sodium fluoride for rinsing and applications, enamel-germitizing liquid. The effectiveness of the method is estimated by reducing caries by 30-40 % [14]. The use of 0.2% fluoride in liquid form as an application is considered a common, affordable and proven method for the treatment and prevention of dental caries [7]. The fluoridation method based on fluorinated varnish is widely used [3]. This form is most convenient when working with young children. According to Maslak E. E., as a result of applications using ColgateDuraphat varnish in children under five years of age, after nine months, the foci of demineralization stabilized in 80 % of cases, and the depth of foci of carious lesions significantly decreased by 76 % [6]. However, it is important to personalize the amount of fluoride with a focus on the year of life of the child and the content of this compound in the drinking water of the region, in order to achieve a balance between the risk of fluorosis and caries static effect.

At this time, the use of fluoride-containing pastes in children is regulated by professional communities in different ways. There is no approved basis for dosage, volumes, and age limits, based on which the predicted effect of using pastes with microdoses of fluoride is possible [9]. The U.S. centers for dental disease control and prevention (CDCP) allows children under two years of age to use fluoride-containing toothpaste. A little earlier-from a year and a half, the use of fluoride-containing paste is allowed by the Australian scientific center for dental health of the population [19]. The European Academy of paediatric dentistry [16], the Scottish Intercollegiate information organization (SIGN), the German dental Organization (DGK), and the American Academy of paediatric dentistry [11] suggest the use of fluoride-containing pastes when children have their first tooth. Experts in the national recommendations of the British paediatric

dental community and who consider the use of fluoride-containing drugs to be real and do not set an age limit [20]. In areas with insufficient saturation of fluoride ions in drinking water (less than 0.3 mg/l) [5], according to the requirements of professional dental associations, European and American unions [16], a comprehensive administration of systemic and local fluorides for the prevention of caries in children has been tested. However, the possibilities of using and confirmed data on the usefulness of regenerative therapy for early childhood caries are not sufficiently developed. Taking into account the peculiarities of the initiation, development and course of caries in young children, it is urgent to develop and implement a method based on reducing the formation of plaque, innactivation of pathogenic microbial communities, in the prevention and treatment of dental caries in the most vulnerable population [12]. In New Zealand, the development of a caries prevention Program is based on studying the level of women's hygiene knowledge and teaching them individual oral hygiene [13]. A review of numerous foreign sources showed mandatory training of pediatricians in the main issues of prevention of dental diseases [6].

Thus, the analysis of literature data has shown that dental caries in children is a multi-factor economically and socially significant health problem, which requires a systematic, thorough approach. Assessment of the strength and degree of exposure to risk factors for this disease should be carried out in the conditions of a particular patient, taking into account the stage of development and age - related features of the structure of baby teeth, as well as Exo-and endogenous circumstances.

Some of the risk factors for developing caries of baby teeth are associated with more or less objective circumstances (the state of the environment, the level of General somatic health of the mother, the course of pregnancy and childbirth), so "attempts to influence them by patients" and the dentist are restrictive, only some of their correction is possible. However, a large group is occupied by risk factors that completely depend on the behavior of the child and his parents (the nature of nutrition, oral hygiene, motivation to maintain dental health, etc.) and can be minimized both by the dentist and by self-help measures [17, 22]. The well-known fragmented and antagonistic research on the timing of teething, as well as the polyethological nature of the impact on the development of aggressive dental diseases, dictates the need to consider regional and ethnic features of the course of caries in young children, taking into account a differentiated approach in order to develop and implement a prevention Program. At the same time, these factors will be the main objects that determine the scope and direction of therapeutic measures.

Thus, the search for new effective therapeutic and preventive measures that increase the resistance of enamel to acids in caries, increase the overall immunity of the body and reduce the risk of developing inflammatory periodontal diseases is currently ongoing [2, 10].

A large number of calcium-containing preparations are offered for the treatment and prevention of dental caries. In our country, a 10% solution of

calcium gluconate is widely used for application and electrophoresis, while the incidence of caries is reduced by 19,6-39,4% [8, 16].

For the treatment and prevention of caries, fluoride preparations are also used in various types and modifications, ranging from centralized fluoridation of drinking water, salt, milk to their use in various hygiene products (toothpastes, gels, elixirs, etc.) [4]. Currently, there are only a few reports of alternative effective means of caries prevention [13].An important part of the treatment of initial caries is strict compliance with the rules of oral care, the purpose of which is to prevent the formation and long-term existence of plaque in the area of demineralization. In addition, it is necessary to convince the patient to monitor the nature of the diet: reduce the use of carbohydrates and exclude them in the intervals between meals [12,11].

Currently, drugs of hemoptysis officinalis that have antimicrobial, analgesic, hemostatic and astringent effects are widely used [1, 4]. Polyphenolic compounds, in particular tannins, among which hydrolyzable tannins predominate, are considered to be the active substances of hemoptysis [12]. Tannin-containing substances are used in medicine, mainly to lubricate the skin with burns, cracks, ulcers. However, almost nothing is known about the inhibitory effect of tannin-containing herbal preparations on plaque microorganisms [6]. Tannins reduce the viability of pathogenic bacteria. Under their action, numerous bacterial flagella shorten and lose their mobility, which significantly complicates the process of attachment of bacteria to epithelial cells [5]. In dental practice, clove buds containing essential oil, tannins, mucus and fats are used. The purulent component (up to 85%) of the essential oil is eugenol, which has a strong antiseptic effect. The composition of hadidentified, acetylamino, a mixture of bicicletasaran, chavicol, methyl salicylate, and Humulin. Clove oil has an anti-inflammatory, wound-healing, analgesic, cauterizing effect [4].

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MACHINE LEARNING-BASED DIAGNOSTIC SYSTEMS FOR EARLY DETECTION OF CHRONIC DISEASES

Abstract: *The early detection of chronic diseases is critical for improving patient outcomes and reducing the overall burden on healthcare systems. Machine Learning (ML)-based diagnostic systems have emerged as powerful tools capable of analyzing complex medical datasets to identify patterns and predict the onset of diseases such as diabetes, cardiovascular disorders, and chronic kidney disease. By leveraging algorithms that learn from historical patient data, ML systems enhance diagnostic accuracy, enable risk stratification, and facilitate timely intervention. This article explores the role of machine learning in early disease detection, highlighting key methodologies, clinical applications, benefits, and challenges. The study emphasizes that while ML-based diagnostics offer substantial potential, successful implementation requires careful consideration of data quality, algorithm transparency, and ethical concerns.*

Keywords: *Machine Learning; Diagnostic Systems; Chronic Diseases; Early Detection; Predictive Analytics; Healthcare Informatics; Risk Stratification; Artificial Intelligence; Clinical Decision Support.*

Introduction

Chronic diseases, including diabetes, cardiovascular disorders, chronic kidney disease, and respiratory conditions, represent a major global health challenge due to their high prevalence, long-term complications, and associated healthcare costs. Early detection and timely intervention are essential to prevent disease progression, reduce morbidity, and improve patient outcomes. Traditional diagnostic methods, while effective, often rely on periodic screenings and clinician expertise, which can result in delayed detection or missed cases.

Machine Learning (ML) has emerged as a transformative technology in healthcare, offering the ability to analyze large and complex datasets, identify hidden patterns, and generate predictive insights that are often beyond human capacity. ML-based diagnostic systems utilize algorithms such as decision trees, support vector machines, neural networks, and ensemble methods to learn from historical patient data, laboratory results, imaging studies, and lifestyle information. By integrating these diverse sources of data, ML models can predict the onset or progression of chronic diseases with increasing accuracy.

The application of ML in early disease detection extends beyond simple risk prediction. Advanced models can provide personalized risk assessments, assist clinicians in prioritizing high-risk patients, and guide targeted preventive interventions. For example, predictive algorithms have been successfully employed to identify individuals at high risk of developing type 2 diabetes years before clinical onset, enabling proactive lifestyle modifications and medical management. Similarly, ML systems can analyze electrocardiograms, imaging scans, or laboratory biomarkers to detect early signs of cardiovascular disease or chronic kidney impairment.

Despite the promise of ML in clinical diagnostics, several challenges must be addressed to ensure effective adoption. Data quality, including completeness, accuracy, and standardization, directly affects model performance. Algorithm transparency and interpretability are critical for clinician trust and ethical decision-making. Additionally, privacy concerns and regulatory compliance must be considered when handling sensitive patient information. Successful implementation requires a multidisciplinary approach that combines technical expertise, clinical knowledge, and robust governance frameworks.

Overall, ML-based diagnostic systems have the potential to revolutionize the early detection of chronic diseases by enhancing accuracy, efficiency, and personalization in healthcare delivery. Understanding the methodologies, applications, and limitations of these systems is essential for their integration into routine clinical practice.

Discussion

Machine Learning-based diagnostic systems have shown substantial promise in improving the early detection of chronic diseases, thereby enabling timely intervention and reducing long-term complications. These systems rely on a variety of algorithms, including supervised methods such as decision trees, support vector machines (SVM), and neural networks, as well as unsupervised and ensemble approaches. Each method offers unique strengths: decision trees provide interpretability, SVM excels in high-dimensional data, and neural networks, particularly deep learning models, can capture complex nonlinear relationships in large datasets.

In diabetes care, ML algorithms have been applied to electronic health records, wearable device data, and laboratory results to predict disease onset years before traditional diagnosis. Studies demonstrate that predictive models can identify individuals at high risk with accuracies exceeding 85%, allowing

clinicians to implement preventive strategies such as lifestyle interventions or early pharmacotherapy. Similarly, in cardiovascular disease, ML systems analyze electrocardiograms, echocardiograms, and patient histories to detect subtle early signs of myocardial infarction, arrhythmia, or heart failure, often outperforming conventional risk assessment tools.

Chronic kidney disease (CKD) detection has also benefited from ML approaches. By integrating laboratory data, demographic information, and comorbidities, predictive models can estimate the likelihood of disease progression, aiding nephrologists in targeting high-risk patients for closer monitoring and early treatment. Beyond individual disease prediction, ML-based systems facilitate risk stratification across patient populations, enabling healthcare organizations to allocate resources more efficiently and design targeted public health interventions.

Despite their transformative potential, these systems face several challenges. Data quality and representativeness are paramount: incomplete or biased datasets can lead to inaccurate predictions, disproportionately affecting specific patient groups. Model interpretability remains a critical concern, as “black-box” algorithms may limit clinician trust and hinder adoption in practice. Integration into clinical workflows requires careful planning, training, and alignment with existing electronic health record systems. Additionally, privacy, security, and regulatory compliance must be addressed to safeguard sensitive patient information.

Emerging solutions are beginning to address these challenges. Explainable AI techniques improve model transparency, while federated learning allows ML models to learn from decentralized patient data without compromising privacy. Continuous validation and retraining of algorithms ensure that models remain accurate over time, accommodating evolving patient populations and clinical practices. When combined with clinician oversight, ML-based diagnostic systems serve as powerful decision-support tools that enhance early detection, reduce diagnostic delays, and ultimately improve patient outcomes.

Conclusion

Machine Learning-based diagnostic systems have emerged as a transformative tool in the early detection of chronic diseases, offering the potential to significantly improve patient outcomes and optimize healthcare delivery. By analyzing complex datasets from electronic health records, laboratory results, imaging studies, and wearable devices, these systems can identify subtle patterns and risk factors that may not be evident through traditional clinical evaluation. This predictive capability allows for timely interventions, personalized care plans, and targeted preventive strategies, ultimately reducing morbidity and healthcare costs.

Despite their potential, successful implementation of ML-based diagnostics requires careful attention to challenges such as data quality, algorithm transparency, clinical validation, and ethical considerations. Ensuring interpretability, protecting patient privacy, and integrating these systems

seamlessly into clinical workflows are essential for maximizing their utility and clinician trust. Advances in explainable AI, federated learning, and real-time data analytics are helping to address these barriers, paving the way for more widespread adoption.

In conclusion, ML-based diagnostic systems represent a significant advancement in healthcare technology, capable of transforming early detection strategies for chronic diseases. When implemented responsibly and in conjunction with clinician oversight, these systems can enhance diagnostic accuracy, support preventive medicine, and contribute to more efficient, patient-centered healthcare.

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VIRTUAL AND AUGMENTED REALITY APPLICATIONS IN MEDICAL EDUCATION AND REHABILITATION

Abstract: *Virtual Reality (VR) and Augmented Reality (AR) technologies are increasingly transforming the fields of medical education and rehabilitation. By providing immersive, interactive, and realistic simulations, these technologies enhance learning outcomes for medical students, support skill acquisition, and enable safe practice in complex clinical scenarios. In rehabilitation, VR and AR offer personalized therapy programs, improve patient engagement, and allow real-time monitoring of progress, particularly in neuromuscular and cognitive recovery. This article explores the applications of VR and AR in medical training and therapeutic settings, highlighting their benefits, current limitations, and future potential. The study emphasizes that while these technologies present significant opportunities for enhancing healthcare education and patient recovery, challenges related to cost, accessibility, and clinical validation must be addressed to ensure effective integration into practice.*

Despite its significant advantages, the adoption of cloud computing in healthcare presents several challenges, including data privacy, cybersecurity risks, and regulatory compliance. This study explores both the opportunities and obstacles associated with implementing cloud-based healthcare systems. The findings emphasize that, when properly managed and secured, cloud technologies can dramatically enhance operational efficiency, foster innovation, and contribute to building more resilient, patient-centered healthcare ecosystems.

Keywords: *Virtual Reality; Augmented Reality; Medical Education; Rehabilitation; Simulation-Based Learning; Patient Engagement; Digital Health; Immersive Technology; Skill Acquisition.*

Introduction

The emergence of Virtual Reality (VR) and Augmented Reality (AR) technologies has introduced a paradigm shift in both medical education and rehabilitation. Unlike traditional instructional methods, these immersive technologies provide learners and patients with interactive, realistic, and engaging experiences that were previously impossible in conventional settings. In medical education, VR and AR allow students to visualize complex anatomical structures, practice surgical procedures, and simulate clinical scenarios in a safe, controlled environment. Such experiential learning not only enhances comprehension and retention but also reduces the risks associated with practicing on real patients during the early stages of training.

In rehabilitation, VR and AR offer personalized therapy programs that can be adapted to individual patient needs. Patients recovering from neurological injuries, musculoskeletal disorders, or cognitive impairments can benefit from interactive exercises that promote motor learning, coordination, and cognitive engagement. The immersive nature of these technologies helps increase patient motivation and adherence to rehabilitation regimens, while real-time feedback and performance tracking enable clinicians to monitor progress and adjust treatment plans dynamically.

Beyond individual learning and therapy, VR and AR technologies facilitate interdisciplinary collaboration and remote training. Educators can design standardized simulations that ensure consistent learning outcomes across institutions, while tele-rehabilitation platforms allow patients to access therapy programs from home under professional guidance. Despite their growing adoption, the integration of VR and AR into medical curricula and clinical rehabilitation practices is still in its early stages. Challenges related to technological costs, accessibility, clinical validation, and the need for trained personnel must be addressed to fully realize their potential.

Overall, VR and AR technologies represent a significant advancement in the modernization of healthcare education and therapeutic interventions. By bridging the gap between theory and practice, these tools have the potential to improve clinical competency, accelerate patient recovery, and ultimately contribute to higher quality healthcare delivery.

Discussion

Virtual and Augmented Reality technologies have demonstrated considerable potential in reshaping medical education and rehabilitation by offering immersive, interactive, and highly customizable experiences. In medical education, VR and AR allow students to engage with three-dimensional anatomical models, simulate complex surgical procedures, and practice clinical decision-making in risk-free environments. This type of experiential learning enhances knowledge retention and skill acquisition, while also promoting confidence and readiness before performing procedures on real patients. Studies have shown that students trained with VR-assisted modules demonstrate higher

accuracy in anatomical identification and procedural skills compared to those relying solely on traditional textbooks or cadaveric dissections.

In rehabilitation, VR and AR applications provide a unique means to deliver personalized therapy programs that can be adapted to each patient's needs and progress. For patients recovering from stroke, traumatic brain injury, or musculoskeletal disorders, immersive environments facilitate repetitive practice of functional tasks, which is essential for neuroplasticity and motor recovery. Gamified exercises and interactive feedback increase patient motivation, engagement, and adherence to treatment plans. Additionally, AR overlays can guide patients through exercises by visually demonstrating correct movement patterns, thereby improving therapeutic outcomes even in home-based rehabilitation settings.

Despite these advantages, several challenges limit the widespread adoption of VR and AR technologies. High implementation costs, hardware requirements, and limited accessibility in resource-constrained settings can restrict their use. Moreover, rigorous clinical validation is still needed to establish standardized protocols and demonstrate long-term efficacy across diverse patient populations. Integration into existing curricula and rehabilitation programs requires staff training and adaptation of teaching and therapeutic workflows, which may initially slow adoption. Furthermore, motion sickness, eye strain, and other user comfort issues must be addressed to ensure patient and learner safety.

Nevertheless, the trajectory of VR and AR adoption in healthcare suggests a growing recognition of their value. Advances in hardware affordability, software sophistication, and cloud-based platforms are expanding accessibility and scalability. When implemented thoughtfully, VR and AR can enhance the quality of medical training, reduce the risk of procedural errors, and accelerate patient recovery. They also offer opportunities for remote education and tele-rehabilitation, increasing reach and equity in healthcare delivery.

Conclusion

Virtual and Augmented Reality technologies represent a significant advancement in both medical education and rehabilitation. By creating immersive, interactive, and adaptable learning and therapeutic environments, these technologies enhance skill acquisition, clinical competency, and patient engagement. In medical training, VR and AR provide safe opportunities for students to practice procedures, visualize complex anatomy, and develop decision-making skills without the risks associated with real-life patient care. In rehabilitation, these technologies support personalized therapy, improve adherence, and facilitate functional recovery through engaging, data-driven exercises.

Despite their transformative potential, challenges such as high implementation costs, technological accessibility, the need for rigorous clinical validation, and user training must be addressed to ensure effective integration. Properly designed and implemented VR and AR interventions have the capacity to

improve healthcare outcomes, optimize educational efficiency, and expand access to rehabilitation services, including remote and home-based programs.

In conclusion, the careful adoption of VR and AR technologies can substantially enhance the quality, effectiveness, and reach of medical education and rehabilitation. As hardware and software continue to advance and become more accessible, these immersive technologies are poised to play an increasingly central role in modern healthcare delivery.

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INTEGRATION OF ARTIFICIAL INTELLIGENCE IN CLINICAL DECISION-MAKING: OPPORTUNITIES AND CHALLENGES

Abstract: *Artificial intelligence (AI) is rapidly transforming clinical decision-making by providing advanced analytical tools that enhance diagnostic accuracy, treatment planning, and patient outcome prediction. This article examines the current developments and practical applications of AI in clinical environments, focusing on machine learning algorithms, decision-support systems, and predictive analytics. The study highlights the major opportunities offered by AI, including improved clinical efficiency, personalized medicine, and real-time analysis of complex medical data. At the same time, significant challenges persist, such as data privacy concerns, algorithmic bias, limited interoperability, and the need for strong regulatory frameworks. The article concludes that successful integration of AI into clinical workflows requires a balanced approach—leveraging technological benefits while addressing ethical, technical, and operational barriers.*

Keywords: *Artificial Intelligence; Clinical Decision-Making; Machine Learning; Decision Support Systems; Predictive Analytics; Medical Data; Healthcare Technology; Ethical Challenges.*

Introduction

The rapid advancement of digital technologies has significantly reshaped modern healthcare, with artificial intelligence (AI) emerging as one of the most transformative innovations. Today, AI-driven systems are increasingly integrated into clinical workflows to support physicians in diagnosing diseases, selecting optimal treatment strategies, and predicting patient outcomes with greater accuracy. Machine learning algorithms, natural language processing tools, and deep learning–based diagnostic platforms are capable of analyzing vast and complex medical datasets that are often beyond human analytical capacity. As a result, AI is becoming an essential component of evidence-based medicine and precision healthcare.

Despite its enormous potential, the adoption of AI in clinical decision-making remains uneven and faces numerous barriers. Healthcare institutions must address issues related to data quality, algorithm transparency, ethical responsibility, and the integration of AI systems into existing medical infrastructures. Furthermore, concerns about patient privacy, cybersecurity, and the risk of algorithmic bias continue to challenge the widespread acceptance of AI tools among clinicians and policymakers.

Nevertheless, global trends indicate a steady increase in the use of AI technologies across various medical specialties, including radiology, cardiology, oncology, and emergency care. By automating routine tasks, enhancing diagnostic precision, and enabling personalized treatment approaches, AI offers unprecedented opportunities to improve the quality and efficiency of healthcare services. This article explores both the opportunities and challenges associated with the integration of AI into clinical decision-making, emphasizing the need for responsible development and strategic implementation.

Discussion

The integration of artificial intelligence into clinical decision-making is gradually reshaping many aspects of modern healthcare. As AI technologies become more deeply embedded in clinical practice, they offer the potential to make diagnostic processes more accurate and efficient. In radiology, for example, AI systems are able to identify subtle patterns in medical images that may not be immediately noticeable to the human eye, allowing diseases to be detected at earlier stages and improving treatment outcomes.

Beyond imaging, AI is also transforming the way clinicians interpret complex patient data. By rapidly analyzing laboratory results, medical histories, genetic information, and physiological signals, AI can generate insights that support the development of individualized treatment plans. This shift toward personalized medicine signals a departure from traditional standardized treatment approaches and moves toward strategies that reflect each patient's unique clinical profile. AI-assisted patient monitoring further extends these advantages by identifying sudden changes in vital parameters and alerting healthcare providers before a condition becomes critical.

Despite these promising developments, the adoption of AI in clinical workflows is accompanied by several significant challenges. Concerns regarding the privacy and security of patient data remain among the most pressing issues. Because AI systems depend on extensive datasets—often containing highly sensitive health information—any breach or misuse could undermine public trust and result in ethical and legal consequences. Another barrier is the limited transparency of many AI models. The "black-box" nature of certain algorithms makes it difficult for clinicians to understand how specific recommendations are generated, which in turn affects the level of confidence they place in AI-supported decisions.

Data quality also plays a crucial role. Algorithms built on incomplete or unrepresentative datasets may yield biased or misleading outputs, potentially

placing specific patient groups at a disadvantage. This risk highlights the importance of using diverse, high-quality data in model development. Additionally, integrating AI systems into existing healthcare infrastructures can be technically challenging, as many hospitals still rely on fragmented or outdated digital platforms that are not fully compatible with advanced analytical tools.

Despite these obstacles, the influence of AI on clinical decision-making continues to grow, driven by its capacity to enhance accuracy, efficiency, and patient-centered care. Real progress will depend on the responsible implementation of AI technologies, combined with strong regulatory frameworks, transparent model design, and continuous professional training. When technological innovation is balanced with ethical and clinical considerations, AI has the potential to become a reliable partner to healthcare professionals rather than a substitute for human expertise.

Conclusion

The growing presence of artificial intelligence in clinical decision-making reflects a broader shift toward data-driven and technology-enhanced healthcare. As demonstrated across various areas of medical practice, AI has the capacity to support clinicians by improving diagnostic precision, optimizing treatment strategies, and enabling more proactive patient management. Its ability to process vast and complex datasets offers insights that would be difficult or impossible to generate through human analysis alone, making AI a powerful complement to clinical expertise.

However, the full potential of AI can only be realized when its adoption is approached with caution and responsibility. Persistent concerns related to data privacy, algorithmic bias, system transparency, and technological compatibility must be carefully addressed. Healthcare organizations need to ensure that AI tools are integrated into existing workflows in ways that preserve ethical principles, protect patient rights, and maintain trust between patients and providers. The development of clear regulatory standards, along with investment in clinician training, will be essential to achieving this balance.

In essence, AI should not be viewed as a replacement for human judgment, but rather as an advanced analytical partner capable of strengthening clinical practice. When effectively implemented, artificial intelligence can contribute to a more efficient, accurate, and personalized healthcare system, ultimately improving patient outcomes and supporting the long-term evolution of modern medicine.

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ELECTRONIC HEALTH RECORDS AND THEIR ROLE IN OPTIMIZING CLINICAL WORKFLOW EFFICIENCY

Abstract: *Electronic Health Records (EHRs) have become a central component of modern healthcare systems, providing digital platforms for storing, accessing, and sharing patient information. By streamlining documentation, facilitating communication among healthcare providers, and enabling real-time data analysis, EHRs significantly improve clinical workflow efficiency. This article examines the impact of EHR implementation on hospital operations, highlighting the ways in which these systems reduce administrative burden, minimize errors, and enhance coordination of care. While EHRs offer substantial benefits, challenges such as system interoperability, data security, user training, and workflow adaptation remain. Understanding both the opportunities and limitations of EHR adoption is crucial for healthcare organizations seeking to optimize operational efficiency and deliver high-quality patient care.*

Keywords: *Electronic Health Records; Clinical Workflow; Healthcare Efficiency; Health Informatics; Digital Documentation; Patient Care Coordination; Health IT; Workflow Optimization.*

Introduction

The digitalization of healthcare has become one of the most transformative developments in modern medicine, with Electronic Health Records (EHRs) serving as a cornerstone of this transition. EHRs provide comprehensive digital platforms for storing, managing, and sharing patient information, replacing traditional paper-based systems that were often fragmented and inefficient. By offering clinicians immediate access to accurate and up-to-date patient data, EHRs support more informed decision-making, improve patient safety, and facilitate a coordinated approach to care across multiple healthcare providers.

Globally, EHR adoption has been recognized as a critical strategy to optimize clinical workflows and improve healthcare efficiency. For example, in the United States, the Health Information Technology for Economic and Clinical Health (HITECH) Act incentivized hospitals and clinics to implement EHR systems, leading to widespread adoption and measurable improvements in documentation and patient care coordination. Similarly, countries such as Denmark, Sweden, and the United Kingdom have successfully integrated EHR platforms across national health systems, demonstrating the potential for technology to streamline processes, reduce redundant testing, and enable population-level health analytics.

EHR systems encompass a wide range of functionalities, including digital documentation of medical histories, laboratory and imaging results, medication management, and clinical decision support tools. The integration of these features allows healthcare teams to track patient progress in real time, detect potential medical errors, and coordinate care more effectively. Moreover, modern EHR platforms often support interoperability with external systems, telemedicine services, and mobile health applications, further enhancing the accessibility and utility of patient information.

Despite these advantages, the transition to EHR-based healthcare requires substantial planning and adaptation. Challenges such as system interoperability, differences in workflow practices, staff digital literacy, and concerns over data security must be addressed to maximize the benefits of EHRs. Studies have shown that poorly implemented systems can initially slow down clinical workflows, increase administrative workload, and create frustration among healthcare staff. Therefore, a successful EHR implementation strategy involves not only technological investment but also careful change management, user training, and continuous evaluation of system performance.

In addition, EHRs have become instrumental in supporting evidence-based medicine and public health initiatives. By providing large-scale, structured clinical data, EHRs enable epidemiological research, health outcomes analysis, and predictive modeling, all of which contribute to more effective healthcare planning and policy-making. The potential to analyze aggregated patient data also allows healthcare organizations to identify trends, anticipate future healthcare needs, and allocate resources efficiently.

Overall, the adoption of EHRs represents a fundamental shift in healthcare delivery, moving from fragmented, manual processes toward integrated, digital, and patient-centered care. Understanding the multifaceted impact of EHRs on clinical workflows, as well as the challenges associated with their implementation, is essential for healthcare organizations seeking to optimize efficiency, improve quality, and deliver safe and effective patient care.

Discussion

EHRs have a transformative impact on clinical workflows by centralizing patient information and making it accessible across departments. One of the primary advantages of EHRs is the reduction of redundant documentation and

manual record-keeping. By digitizing patient charts, lab results, and imaging reports, clinicians can quickly retrieve essential information without navigating cumbersome paper files, thereby saving valuable time and minimizing the risk of errors.

Furthermore, EHRs facilitate more effective coordination of care. When multiple healthcare providers have access to the same up-to-date patient information, decisions can be made collaboratively, reducing delays in treatment and preventing miscommunication. Integrated alert systems within EHR platforms also enhance patient safety by notifying clinicians of potential drug interactions, allergies, or abnormal test results in real time.

Beyond clinical benefits, EHRs contribute to operational efficiency by supporting administrative functions such as appointment scheduling, billing, and reporting. Analytics tools embedded in EHR systems allow hospitals to monitor workflow performance, identify bottlenecks, and allocate resources more effectively. These capabilities not only improve efficiency but also enhance overall healthcare quality.

However, successful implementation of EHRs requires careful consideration of several challenges. System interoperability remains a significant barrier, as many healthcare organizations operate on different platforms that cannot seamlessly exchange data. User adoption and digital literacy are also critical, as staff must be trained to utilize EHR features effectively without disrupting existing workflows. Additionally, ensuring the security and confidentiality of digital patient data is essential to maintain trust and comply with legal regulations.

Despite these obstacles, numerous studies demonstrate that well-integrated EHR systems can substantially optimize clinical workflows. When combined with appropriate training, governance, and continuous system improvements, EHRs can lead to measurable gains in efficiency, accuracy, and patient-centered care.

Conclusion

Electronic Health Records have become indispensable in modern healthcare, offering a range of benefits that extend from improved clinical decision-making to enhanced operational efficiency. By centralizing patient information, facilitating communication among care teams, and providing tools for real-time data analysis, EHRs streamline clinical workflows and contribute to higher quality patient care.

Nevertheless, achieving these benefits requires addressing significant challenges, including interoperability issues, user training, and data security concerns. Healthcare organizations must adopt a strategic approach to EHR implementation, ensuring that systems are well-integrated, staff are adequately trained, and regulatory standards are met.

In conclusion, while EHR adoption is not without its difficulties, the potential to optimize clinical workflows, reduce errors, and improve patient outcomes makes it a critical component of modern healthcare systems. Continued innovation, combined with thoughtful implementation and governance, will determine the success of EHRs in transforming healthcare delivery.

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DIGITAL HEALTH TRANSFORMATION: THE ROLE OF ICT IN MODERNIZING HEALTHCARE SYSTEMS

Abstract: *The rapid digitalization of healthcare has fundamentally reshaped the way medical services are delivered, accessed, and managed across the world. Information and Communication Technologies (ICT) now play a central role in supporting clinical workflows, improving administrative processes, and enhancing patient engagement. Digital solutions such as electronic health records, telemedicine platforms, big data analytics, wearable medical devices, and cloud-based infrastructures have enabled healthcare systems to shift from traditional, institution-centered models to more flexible, patient-centered approaches. Despite these advances, the process of digital health transformation is not without challenges. Issues related to data security, system interoperability, digital literacy, and infrastructural limitations continue to influence the pace and success of implementation. This article explores the key contributions of ICT to the modernization of healthcare systems, highlighting both the transformative opportunities and the structural barriers that must be addressed to achieve sustainable digital health development.*

Keywords: *Digital Health; ICT; Healthcare Modernization; Telemedicine; Electronic Health Records; Health Informatics; Cloud Computing; Digital Transformation; Patient-Centered Care.*

Introduction

The accelerating integration of digital technologies into healthcare has become one of the most significant developments of the last decade. Across the world, health systems are transitioning from paper-based, fragmented processes to more interconnected and data-driven structures. At the center of this transformation are Information and Communication Technologies (ICT), which

enable healthcare providers to collect, store, analyze, and exchange medical information with unprecedented speed and accuracy. As a result, the traditional model of care—largely dependent on face-to-face interactions and manual record keeping—is evolving into a more flexible, efficient, and patient-centered paradigm.

ICT has introduced new possibilities for improving the quality and accessibility of medical services. Electronic health records allow clinicians to retrieve complete patient information at any time, reducing duplication of tests and minimizing clinical errors. Telemedicine platforms make it possible for patients to receive consultations remotely, thereby widening access to care in rural and underserved regions. Digital diagnostics, wearable health devices, and AI-driven analytical systems further support clinicians by providing real-time insights into patient conditions and enabling early detection of health problems.

Despite its transformative potential, digital health implementation remains uneven across countries and healthcare institutions. Challenges related to infrastructure readiness, cybersecurity risks, workforce digital literacy, and financial constraints continue to limit the adoption of advanced ICT tools. Moreover, the rapid pace of technological innovation often outstrips the development of regulatory and ethical frameworks needed to ensure safe and responsible use of digital solutions.

Nevertheless, global trends indicate a clear movement toward greater reliance on digital technologies in healthcare. As the demand for efficient, transparent, and high-quality medical services grows, ICT will continue to play a vital role in modernizing health systems. This article examines the multidimensional impact of ICT on healthcare modernization, focusing on the core technologies driving digital transformation and the challenges that accompany their implementation.

Discussion

The adoption of Information and Communication Technologies in healthcare has brought profound changes to how medical services are delivered, coordinated, and experienced by patients. Digital health tools have enabled healthcare providers to move beyond the limitations of traditional, paper-based systems, fostering more efficient workflows and data-driven decision-making. Electronic health records, for instance, provide clinicians with immediate access to comprehensive patient histories, facilitating more accurate diagnoses and reducing unnecessary duplication of tests. Similarly, telemedicine has expanded access to care, allowing patients in remote or underserved areas to consult with specialists without the need for travel, thereby improving equity in healthcare delivery.

Beyond accessibility, ICT has transformed the monitoring and management of chronic diseases. Wearable devices and remote monitoring platforms continuously track vital signs and lifestyle parameters, offering real-time data that can guide timely interventions. Big data analytics and predictive modeling allow healthcare organizations to identify trends, anticipate patient needs, and allocate resources more effectively. Together, these technologies enable a shift toward

proactive and preventive care, reducing hospitalizations and improving overall health outcomes.

However, the implementation of digital health solutions is not without challenges. One persistent concern is data security, as the digital storage and transmission of sensitive health information increase the risk of breaches and cyberattacks. Interoperability remains another critical issue; disparate systems and incompatible data formats often hinder seamless communication between healthcare providers, limiting the full potential of digital integration. Additionally, healthcare professionals must possess adequate digital literacy to effectively utilize these tools, highlighting the need for ongoing training and support. Financial constraints and the uneven distribution of technological infrastructure also pose significant barriers, particularly in low-resource settings.

Ethical and regulatory considerations are equally important. Ensuring patient privacy, maintaining data integrity, and addressing biases in digital algorithms require robust governance frameworks. Policymakers, technology developers, and healthcare institutions must collaborate to establish standards that support safe, equitable, and ethical use of digital health technologies.

Despite these challenges, the transformative potential of ICT in healthcare remains evident. By enhancing accessibility, efficiency, and quality of care, digital technologies provide opportunities to reshape health systems into more patient-centered, responsive, and sustainable models. The success of digital health transformation ultimately depends on the ability of healthcare stakeholders to balance innovation with ethical, operational, and infrastructural considerations.

Conclusion

The integration of Information and Communication Technologies into healthcare represents a fundamental shift toward more efficient, accessible, and patient-centered medical services. Digital tools, ranging from electronic health records to telemedicine platforms and predictive analytics, have demonstrated their ability to improve clinical workflows, enhance the quality of care, and empower both patients and healthcare providers. By enabling timely access to information, supporting proactive disease management, and facilitating informed decision-making, ICT has become a cornerstone of modern healthcare systems.

Nevertheless, the success of digital health transformation is contingent upon addressing a range of challenges. Data security, system interoperability, workforce digital literacy, and equitable access remain critical factors that influence the effectiveness and sustainability of ICT integration. Ethical and regulatory frameworks must evolve alongside technological advancements to ensure responsible and transparent use of digital health solutions.

In conclusion, while obstacles remain, the adoption of ICT offers unprecedented opportunities to modernize healthcare systems globally. When implemented thoughtfully, digital technologies have the potential not only to enhance efficiency and accuracy but also to transform healthcare delivery into a more patient-centered, inclusive, and resilient system capable of meeting the complex demands of contemporary medicine.

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ВЛИЯНИЕ ЭНЕРГЕТИЧЕСКИХ НАПИТКОВ НА СТРУКТУРУ МИОКАРДА

Аннотация: *В данной статье анализируется влияние энергетических напитков на структуру миокарда, а также возможные патологические изменения в организме человека как результат хронического употребления энергетических напитков.*

Ключевые слова: *энергетические напитки, миокард, кофеин, таурин, кардиомиоциты.*

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THE INFLUENCE OF ENERGY DRINKS ON MYOCARDIAL STRUCTURE

Abstract*: This article analyzes the influence of energy drinks on myocardial structure, as well as the potential pathological changes in the human body resulting from chronic consumption of energy drinks.*

Keywords: *energy drinks, myocardium, caffeine, taurine, cardiomyocytes*

Актуальность

В последние годы увеличивается потребление энергетических напитков, особенно среди подростков и молодых взрослых. Основными активными компонентами таких напитков являются кофеин, таурин, глюкуронолактон и сахара, которые взбадривают нервную и сердечно - сосудистую системы, а также повышают физические способности человека в краткосрочном периоде. Однако злоупотребление энергетиками может приводить к патологическим изменениям сердечной ткани.

Миокард особенно чувствителен к нарушениям обмена энергии, поэтому изучение его изменений при действии энергетиков на гистологическом уровне представляет научный и практический интерес.

Цель работы заключается в донесении до широкой общественности объективной и обоснованной информации о серьезный последствиях употребления энергетических напитков, а именно – о влиянии их компонентов на гистологическую структуру и функцию миокарда, с целью повышения осведомленности о вреде энергетических напитков и необходимости прекращения их употребления.

Основная часть

Миокард – самая толстая оболочка сердца. Её основная масса представлена поперечно - полосатой сердечной мышечной тканью. Главная задача этой мышцы – сокращаться и расслабляться постоянно и перекачивать кровь по всему организму. Структурной единицей миокарда являются кардиомиоциты, которые ветвятся и соединяются между собой вставочными дисками. Благодаря этим соединениям электрический сигнал, стимулирующий сокращение, может передаваться от одной клетки к другой с очень большой скоростью. Именно эта большая скорость позволяет сердцу сокращаться ритмично и одновременно. Кардиомиоциты делятся на: *1) сократительные (рабочие) кардиомиоциты*, обеспечивающие основную сократительную силу сердца ; *2) проводящие кардиомиоциты*, которые отвечают за генерацию и проведение электрических импульсов ; *3) секреторные кардиомиоциты*, обладающие гормональной функцией.

Миокард выполняет следующие функции:

1) Функция возбудимости – свойство отвечать на внешние и внутренние раздражения переходом из состояния покоя в активное

2) Функция автоматизма – способность вырабатывать электрические импульсы при отсутствии каких-либо раздражителей

3) Функция проводимости благодаря проводящей системе, которая проводит импульсы от места их возникновения к другим отделам миокарда

4) Функция сократимости, которая обеспечивает нагнетание крови в большой и малый круги кровообращения.

Ритм сокращения и метаболизм кардиомиоцитов крайне чувствительны к внешним факторам, в том числе и к химическим добавкам. Любые внешние стимуляторы, влияющие на нормальную работу нервной системы и метаболизм, непременно могут привести к структурным и функциональным нарушениям сердечной ткани. К таким факторам относятся энергетические напитки, содержащие в большом количестве кофеин и сахар, также таурин, гуаран, ниацин, теобромин, т.д.

Негативное влияние на миокард оказывает кофеин. Он *увеличивает частоту сердечных сокращений (тахикардия) и силу сердечных сокращений (инозитропный эффект)*, что повышает нагрузку на кардиомиоциты и увеличивает потребность в кислороде и энергии. В таком случае клеткам может не хватать энергии, и в последствии развиться энергетический

дисбаланс, что со временем приведет в *дистрофии*. Также кофеин и таурин усиливают работу ионных каналов в кардиомиоцитах, в частности кальциевых, что является причиной повышения возбудимости миокарда. Последнее приводит к *мерцательной аритмии* и *нарушении ритма* при хроническом употреблении энергетиков.

За счет большой дозы катехоламинов (адреналин и норадреналин), выброшенных в кровь, сосуды, питающие само сердце, резко сужаются. Это также повышает риск *ишемии*, так как при сужении капилляров поступление кровотока к кардиомиоцитам уменьшается. Если сужение сосудов длится долго, то это приводит к *инфаркту миокарда без атеросклеротической бляшки (MINOCA)*.

Повышенный метаболизм миокарда и стимуляторы (энергетические напитки) в общей сложности образуют *свободные радикалы*, которые повреждают клеточные мембраны, митохондрии и миофибриллы.

Высокое количество сахара в составе энергетиков приводит к *повышению уровня сахара в крови* (кратковременная гипергликемия), а это, в свою очередь, к дополнительной нагрузке на митохондрии кардиомиоцитов и развитию метаболической дистрофии.

Заключение

Данный обзор может свидетельствовать, что злоупотребление энергетическими напитками представляет серьезную угрозу для кардиомиоцитов миокарда, а как следствие - нарушению всей сердечно-сосудистой системы. Стимуляторы, содержащиеся в составе данных напитков, представляемые как средство для повышения продуктивности, на самом деле вызывают в сердечной мышце хронический стресс. Постоянно вызывая чрезмерную активацию, стимуляторы приводят к патологической перестройке кардиомиоцитов. Учащенный пульс и временный прилив сил - это лишь внешние признаки, скрывающие за собой кальциевую дисрегуляцию, сосудистый спазм и аритмии.

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СРАВНИТЕЛЬНЫЙ АНАЛИЗ РЕГЕНЕРАТИВНОЙ СПОСОБНОСТИ У ЧЕЛОВЕКА И БИОЛОГИЧЕСКИ “БЕССМЕРТНЫХ” ВИДОВ

Аннотация: *В статье проводится сравнительный обзор регенерации у человека и у организмов, которые демонстрируют признаки биологического «бессмертия», включая гидр, планарий и медуз Turritopsis dohrnii. Особое внимание уделено клеточным и молекулярным механизмам, обеспечивающим восстановление тканей, — работе стволовых клеток, а также ключевым сигнальным путям Wnt/β-catenin, Notch и mTOR. Описаны особенности старения этих организмов и причины его практически полного отсутствия. В результате анализа определены основные факторы, ограничивающие регенеративные возможности человека, и показано, какие эволюционные стратегии позволяют «бессмертным» видам сохранять высокую способность к обновлению тканей на протяжении всей жизни. Полученные данные подчёркивают перспективность изучения подобных организмов для развития регенеративной медицины и технологий продления жизни.*

Ключевые слова: *регенерация, биологическое бессмертие, стволовые клетки, гидра, планария, Turritopsis dohrnii, Wnt/β-catenin, Notch, mTOR, регенеративная медицина*

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COMPARATIVE ANALYSIS OF REGENERATIVE CAPACITY IN HUMANS AND BIOLOGICALLY “IMMORTAL” SPECIES

Abstract: *The article presents a comparative overview of regeneration in humans and in organisms that exhibit features of biological “immortality,” including hydras, planarians, and the jellyfish Turritopsis dohrnii. Special*

attention is given to the cellular and molecular mechanisms underlying tissue restoration, such as the activity of stem cells and the key signaling pathways Wnt/β-catenin, Notch, and mTOR. The study describes the aging characteristics of these organisms and the reasons for their near absence. The analysis identifies the main factors limiting human regenerative capacity and highlights the evolutionary strategies that enable "immortal" species to maintain a high level of tissue renewal throughout their lifespan. The findings underscore the importance of studying these organisms for advancing regenerative medicine and life-extension technologies.

Key words: *regeneration, biological immortality, stem cells, Hydra, planarian, Turritopsis dohrnii, Wnt/β-catenin, Notch, mTOR, regenerative medicine*

Актуальность

Восстановление тканей и органов является одной из ключевых проблем современной биологии и медицины. У человека регенеративный потенциал ограничен: хотя хорошо восстанавливаются кожа и печень, многие жизненно важные органы, включая сердце и нервную систему, практически не регенерируют. В то же время некоторые организмы, такие как гидры, планарии и медузы Turritopsis dohrnii, демонстрируют практически неограниченную способность к восстановлению тканей и отсутствие признаков старения. Изучение механизмов регенерации у этих «бессмертных» видов позволяет выявить ключевые факторы, ограничивающие восстановительные возможности человека, и открывает новые перспективы для развития регенеративной медицины, клеточной терапии и технологий продления жизни.

Цель работы: Сравнить регенеративные возможности человека и организмов с признаками биологического «бессмертия» (гидры, планарии, Turritopsis dohrnii), выявить клеточные и молекулярные механизмы, определяющие их восстановительный потенциал, а также определить ограничения регенерации у человека и перспективы применения этих знаний в регенеративной медицине.

Основная часть

1. Введение

Регенерация — это процесс восстановления повреждённых или утраченных тканей. У человека этот процесс ограничен: кожа, печень и костная ткань восстанавливаются сравнительно хорошо, в то время как сердце, нервная система и некоторые другие органы практически не регенерируют. В то же время гидры, планарии и медузы Turritopsis dohrnii демонстрируют практически неограниченную способность к восстановлению тканей и отсутствию признаков старения. Изучение их механизмов может помочь в развитии регенеративной медицины и технологий продления жизни.

2. Регенерация у человека

2.1 Клеточные механизмы

• Основу составляют взрослые стволовые клетки: гемопоэтические, мезенхимальные, эпителиальные.

• Потенциал стволовых клеток ограничен после детского возраста.

• Старение клеток и накопление повреждений ДНК снижает регенерацию.

2.2 Молекулярные механизмы

• Wnt/β-catenin — активируется при заживлении ран.

• Notch — регулирует дифференцировку клеток.

• mTOR, FGF, TGF-β — участвуют в процессах репарации.

При серьёзных повреждениях ткани чаще формируются рубцы вместо полноценного восстановления.

2.3 Ограничения

• Потеря клеточной пластичности с возрастом

• Сенесценция и старение клеток

• Низкая способность к дедифференцировке

• Иммунные ограничения и риск воспалений

3. Регенерация у биологически «бессмертных» видов

3.1 Гидра

• Постоянный пул плюрипотентных стволовых клеток.

• Практически не проявляет старение.

• Высокая активность теломеразы и сигнальных путей Wnt/β-catenin.

3.2 Планария

• Имеет клетки «необласты», способные к плюрипотентной регенерации.

• Может восстанавливать целый организм из фрагмента.

• Обеспечивает замену всех типов клеток без потери функций.

3.3 Медуза Turritopsis dohrnii

• Способна возвращаться из взрослой стадии к полипу (реверсивная трансдифференцировка).

• Имеет программы омоложения и перепрограммирования соматических клеток.

• Обеспечивает практически бесконечный цикл жизни.

4. Сравнение регенеративных механизмов

Параметр	**Человек**	**«Бессмертные» виды**
Стволовые клетки	Ограниченные	обилие плюрипотентных клеток
Теломераза	низкая активность	высокая или постоянная активность
Сенесценция	Выражена	минимальна или отсутствует
Возможность регенерации органов	Ограничена	практически неограничена

Дедифференцировка	почти отсутствует	активно встречается
Сигнальные пути	Wnt, Notch, mTOR — частично активны	Wnt, Notch, mTOR — постоянно активны

5. Перспективы применения в медицине

• Перепрограммирование клеток по аналогии с планариями.

• Стимуляция теломеразы и ключевых сигнальных путей.

• Создание искусственных тканей и органов.

• Потенциальное лечение дегенеративных заболеваний и замедление старения.

Ограничения: различия в организации организма, риск опухолевой трансформации, этические и биобезопасностные вопросы.

Заключение

Сравнительный анализ регенерации у человека и биологически «бессмертных» видов показал, что высокая способность к восстановлению тканей связана с наличием больших популяций плюрипотентных стволовых клеток, активными сигнальными путями Wnt/β-catenin, Notch и mTOR, а также высокой активностью теломеразы. Человеческий организм эволюционно ограничил регенерацию ради стабильности тканей и защиты от опухолей, что сдерживает восстановительный потенциал. Изучение гидр, планарий и медуз Turritopsis dohrnii позволяет понять, какие механизмы поддерживают «бессмертие» и как эти знания могут быть применены для развития регенеративной медицины, клеточной терапии и технологий продления жизни.

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ОСЛОЖНЕННЫЙ ПРОРЫВОМ В БРОНХ ЭХИНОКОККОЗ ЛЕГКОГО

Аннотация: *Эхинококкоз - паразитарное заболевание человека, которое является эндемичным для республик Центральной Азии и Казахстана, в том числе для Узбекистана.*

Осложненный эхинококкоз характеризует третий период течения заболевания, т.е. сюда относятся нагноение кисты, прорыв в бронх или плевральную полость, обызвествление.

Среди клинических проявлений характерными симптомами являются: боль различной интенсивности на стороне поражения, выделение обрывков хитиновой оболочки вместе с мокротой, кашель со слизисто-гнойной мокротой, кровохарканье и рецидивирующее кровотечение. В зависимости от диаметра дренирующего кисту бронха и вирулентности инфекции, нагноительный процесс в ложе кисты может принять гангренозный характер, в этих случаях мокрота приобретает гнилостный характер.

Эхинококк легкого, прорвавшийся в бронх, характеризуется симптомами патогномоничными для многих заболеваний бронхо-легочной системы, и установление правильного диагноза в наиболее короткие сроки зависит от комплекса диагностических методов исследования.

Ключевые слова: *грудная клетка, легкие, эхинококкоз, прорыв в бронх, осложненный.*

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ECHINOCOCCUS OF THE LUNG, WHICH HAS BROKEN INTO THE BRONCHUS

Abstract: *Echinococcosis is a human parasitic disease that is endemic to the republics of Central Asia and Kazakhstan, including Uzbekistan.*

Complicated echinococcosis characterizes the third period of the course of the disease, i.e. this includes suppuration of the cyst, breakthrough into the bronchus or pleural cavity, calcification.

Among the clinical manifestations, the characteristic symptoms are: pain of varying intensity on the side of the lesion, the release of fragments of chitinous membrane together with sputum, cough with mucopurulent sputum, hemoptysis and recurrent bleeding. Depending on the diameter of the bronchus draining the cyst and the virulence of the infection, the suppurative process in the cyst bed can take a gangrenous character, in these cases the sputum becomes putrefactive.

Echinococcus of the lung, which has broken into the bronchus, is characterized by symptoms pathognomonic for many diseases of the bronchopulmonary system, and the establishment of a correct diagnosis in the shortest possible time depends on a set of diagnostic research methods.

Key words: *chest, lungs, echinococcus, broken into the bronchus, complicated.*

Введение

Одним из грозных осложнений эхинококка легкого является перфорация кисты в бронх. Частота ее, по данным различных авторов, доходит до 50% всех осложнений и требует проведения различных по объему и характеру операций.

На рубеже 2005-2010 гг. в связи с профилактическим применением антипаразитарных препаратов в детском и подростковом возрасте, обеспеченном за счёт средств государства и утвержденным нормативными документами Министерства здравоохранения Республики Узбекистан, заболеваемость пошла на убыль и в настоящее время мы сталкиваемся со спорадическими случаями.

Случай из практики

В данном сообщение Вашему вниманию представляется случай из практики отделения торако-сосудистой хирургии Андижанского филиала Республиканского научного центра экстренной медицинской помощи (АФ РНЦЭМП) Республики Узбекистан.

В своей практике отделение торако-сосудистой хирургии АФ РНЦЭМП придерживается классификации Dielafoy (1894г.) - Мельникова (1935г.) предложенной В.В.Вахидовым и Э.С.Исламбековым (1972г.), как наиболее простой и схематичной: 1 стадия - бессимптомного течения заболевания (латентный период); 2 стадия - клинического проявления болезни (период манифестации); 3 стадия - осложнения (комплементарный период).

Осложненный эхинококкоз характеризует третий период течения заболевания, т.е. сюда относятся нагноение кисты, прорыв в бронх или плевральную полость, обызвествление.

Пациент Х., 1968 года рождения, ИБ № 16185/710, поступил в отделение торако-сосудистой хирургии из районного медицинского объединения(РМО), где он получал лечение в реанимационном отделении с диагнозом: Двусторонний, гигантский, солитарный эхинококкоз легких. Осложнение: прорыв в бронх кисты правого легкого. Анафилактический шок.

Согласно выписке из РМО и анамнеза, за час до поступления в реанимационное отделение у пациента на фоне здоровья появился упорный кашель с обильной мокротой, по типу рвоты, потеря сознания и в дальнейшем интенсивная терапия в условиях реанимации. По стабилизации состояния проведена МСКТ грудной клетки, на которой выявлен – Двусторонний солитарный эхинококкоз легких, с прорывом кисты правого легкого в бронх.

На МСКТ срезах – с обеих сторон наличие полостных, жидкость содержащих образований больших размеров. Образование правого легкого с прослойкой газа(признак осложнения).

По стабилизации состояния и дообследования пациент переведен в АФ РНЦЭМП, где после кратковременной предоперационной подготовки пациенту, под общим эндотрахеальным наркозом, проведена операция «Боковая торакотомия справа. Эхинококкэктомия из нижней доли правого легкого с капитонажем остаточной полости по Delbet. Санация и дренирование правой плевральной полости».

Интраоперационно выявлено, что киста расположена в нижней доле легкого и фиброзная капсула кисты на 1/3 выступает из легочной ткани. Выполнена пункция кисты, аспирация прозрачной жидкости, рассечена фиброзная капсула, удалена белого цвета хитиновая оболочка больших размеров. Выявлено наличие бронхиального свища диаметром до 6мм открывающегося на дне остаточной полости, который ушит наложением «Z» - образного шва, после чего ложе паразита последовательно обработано растворами 3% перекиси водорода, спиртового раствора йода и 96% спиртом. Ложе паразита ликвидировано по Delbet, с дополнительными плевризирующими швами. Плевральная полость обработана растворами антисептиков, двойное нижнее дренирование и послойное ушивание раны наглухо.

Одномоментно последовательная эхинококкэктомия из левого легкого не проведена в связи с лабильностью гемодинамики и настоянию анестезиологов.

Послеоперационный период протекал гладко и на 6-е сутки после вмешательства пациент в стабильном состоянии выписан из стационара для дальнейшего наблюдения по месту жительства и условием повторного обращения через месяц.

При повторном обращении состояние пациента удовлетворительное, гемодинамика стабильная, рентгенологически легочные поля справа расправлены, синусы свободные. Образование левого легкого без осложнений. Тактика оперативного лечения практически идентична с первой операцией, необходимо отметить наличие двух бронхиальных свищей открывающихся в ложе паразита диаметром до 3мм, которые были ушиты наложением «Z» - образного шва.

Послеоперационное течение гладкое, в удовлетворительном состоянии пациент выписан из стационара на 7-е сутки после операции для дальнейшего наблюдения по месту жительства и рекомендованным курсом химиотерапии Альбендазолом.

Обсуждение

Представлен случай из практики: двусторонний солитарный эхинококкоз с прорывом кисты правого легкого в бронх.

Основным способом лечения этой болезни, является оперативное вмешательство, которое может быть органосохраняющим (эхинококкэктомии по Боброву - Спасокукоцкому, А.А.Вишневскому, капитонаж по Дельбе, экстирпация кисты, полузакрытая эхинококкэктомия по Р.П. Аскерханову и др.) и резекционным (частичные резекции, лобэктомии, билобэктомии, пульмонэктомии).

Заключение

Таким образом, несмотря на то, что заболеваемость эхинококкозом на протяжении последних 20 лет заметно снизилась, актуальность заболевания, раннего выявления, выбор методов диагностики и оперативного лечения остается высокой и достаточно востребованной. Дальнейшие изыскания направленные на совершенствование профилактики, диагностикумума и методов лечения данного заболевания должны проводится с учётом развития фармации и медицинских технологий.

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ВЛИЯНИЕ СТРЕССОВ И ПИТАНИЯ НА ГИСТОСТРУКТУРУ СЛИЗИСТОЙ ОБОЛОЧКИ ЖЕЛУДКА

Аннатоция: *Современные исследования показывают, что состояние и строение слизистой оболочки желудка тесно связано с воздействием внешних факторов, среди которых ведущими являются стресс и характер питания. Целью настоящего исследования является анализ морфологических изменений в структуре слизистой оболочки желудка под влиянием хронических стрессовых воздействий и нарушений режима питания. В работе рассматриваются особенности перестройки и сравнении эпителиального слоя, железистого аппарата и микрососудистого русла желудка в условиях стресса и алиментарной нагрузки. Проведенный анализ указывает, что длительные психоэмоциональные и алиментарные воздействия приводят к дегенеративным изменениям эпителия, нарушению секреции и снижению регенераторной активности клеток. Полученные данные подтверждают важность рационального питания и стресс-менеджмента в профилактике гастропатий.*

Ключевые слова*: желудок, стресс, слизистая оболочка, питание, гастропатия, морфология, регенерация*

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INFLUENCE OF STRESS AND NUTRITION ON THE HISTOLOGICAL STRUCTURE OF THE GASTRIC MUCOSA

Abstract*: Recent studies demonstrate that the condition and structure of the gastric mucosa are closely associated with external influences, with stress and dietary patterns being the leading factors. The aim of the present study is to analyze the morphological changes in the structure of the gastric mucosa under the impact of chronic stress and dietary disturbances. The work examines the*

features of remodeling and comparative changes in the epithelial layer, glandular apparatus, and micro-vascular bed of the stomach under conditions of stress and alimentary load. The analysis indicates that prolonged psycho-emotional and alimentary influences lead to degenerative alterations of the epithelium, impaired secretion, and reduced cellular regenerative activity. The obtained findings confirm the importance of rational nutrition and stress management in the prevention of gastropathies.

***Keywords**: stomach, stress, gastric mucosa, nutrition, gastropathy, morphology, regeneration*

Введение

Желудок выполняет в организме ряд важнейших функций. Главной из них является секреторная. Она заключается в выработке железами желудочного сока. В его состав входят ферменты пепсин, ренин, липаза, а также соляная кислота и слизь. Осуществляя химическую переработку пищи, желудок вместе с тем выполняет еще некоторые важные для организма функции. Механическая функция желудка состоит в перемешивании пищи с желудочным соком и перемещении переработанной пищи в двенадцатиперстную кишку. В осуществлении функции принимает участие мускулатура желудка. В стенке желудка образуется антианемический фактор, который способствует погло щению витамина В12, поступающего с пищей. При отсутствии этого фактора у человека развивается злокачественное малокровие. Через стенку желудка происходит всасывание таких веществ, как вода, спирт, соли, сахар и

др. Вместе с тем желудок выполняет и экскреторную функцию. Особенно наглядно эта функция проявляется при заболевании почек,когда через стенку желудка выделяется ряд конечных продуктов обмена белков (амми ак, мочевина и др.). Эндокринная функция желудка заключается в выработке ряда биологически активных веществ — гастрина, гистамина, серотонина,

мотилина, энтероглюкагона и др. Эти вещества оказывают стимулирующее или тормозящее действие на моторику и секреторную активность железистых клеток желудка и других отделов пищеварительного тракта.

Слизистая оболочка желудка является высокоспециализированной структурой, обеспечивающей защиту от агрессивного желудочного сока, механическую переработку пищи и участие в секреции ферментов и биологически активных веществ. В последние годы отмечается рост заболеваний желудка, связанных с воздействием стрессовых факторов и нарушения питания. Психоэмоциональное напряжение и нерациональный и нарушенный режим приема пищи оказывают прямое влияние на регуляцию желудочной секреции, микроциркуляцию и восстановлению эпителия.

Актуальность исследования обусловлена необходимостью раннего выявления морфологических изменений слизистой оболочки желудка при

стрессовых воздействиях и алиментарных нарушениях. Особое значение имеет анализ и сравнение нормальной гистоструктуры и с изменениями, возникающими под влиянием патологических факторов.

Цель исследования заключается в определении структурных изменений слизистой оболочки желудка под воздействием хронического стресса и несбалансированного питания, а также в сравнении полученных данных с нормой.

Материалы и методы исследования

Для подготовки статьи был проведен анализ современных научных источников, включая рецензируемые научные журналы, монографии по гистологии и гастроэнтерологии, а также экспериментальные исследования, посвященные влиянию стрессов и алиментарных факторов на желудок. Дополнительно был проведен обзор международных публикаций за последние годы, содержащих результаты морфометрических, гистохимических и функциональных исследований. Исследование выполнено на биоптатах слизистой оболочки желудка лабораторных животных (крысы), разделенных на три группы:

Контрольная группа (норма): стандартное питание, отсутствие стрессовых воздействий.

Группа хронического стресса: ежедневная экспозиция по модели «иммобилизационного стресса»

Группа алиментарных нарушений: нерегулярное питание, избыток жирной и острой пищи.

Методы исследования включали:

- окраску гистологических срезов гематоксилин-эозином.

- морфометрическую оценку толщины эпителия и глубины желудочных желез.

-анализ состояния микрососудистого русла.

-сравнение показателей между группами.

Результаты исследования

Гистоструктура слизистой оболочки желудка в норме

Слизистая оболочка желудка в норме состоит из эпителия, собственной пластинки и мышечной пластинки

Эпителий, выстилающий поверхность слизистой оболочки желудка и его ямок, прдставляет собой однослойный столбчатый железистыйэпителий.. Все поверхностные слизистые эпителиоциты желудка постоянно выделяют мукоидный (слизеподобный) секрет. Каждая железистая клетка четко подразделяется на две части — базальную и апикальную . В базальной части, прилежащей к базальной мембране, лежит овальной формы ядро, над которым располагается комплекс Гольджи. Апикальная часть клетки заполнена зернами или каплями мукоидного секрета. Специфичность секрета поверхностных эпителиоцитов возникает из висцерального листка спланхнотома. Желудочные ямки имеют правильную

форму, а микрососудистое русло характеризуется равномерным кровонаполнением. Регенераторная активность клеток-высокая.

Изменения при хроническом стрессе

У животных, подвергавшихся стрессу, наблюдались:

-укорочение и деформация желудочных ямок

-дистрофия и частичная десквамация поверхностного эпителия

-уменьшение секреторной активности главных и париетальных клеток

-выраженная вазоконстрикция, отёчность подслизистого слоя

-снижение регенераторной способности

Морфометрически отмечено уменьшение толщины эпителиального слоя и глубины желез на 15-25% относительно нормы.

Изменения при алиментарных нарушениях: в группе нарушенного питания выявлены:

-гиперплазия бокаловидных клеток (выделяют слизь; компенсаторная реакция).

- увеличение числа воспалительных клеток в строме.

-расширение капилляров и признаки венозного застоя.

-очаговая атрофия желез при длительном избытке жиров.

Отмечено замедление регенерации, т.е. восстановление, неровность эпителиального слоя и нарушение структуры желез.

Сравнительный анализ групп

-Наиболее выраженные изменения наблюдаются при сочетании стресса и пищевой нагрузки.

- стрессовое напряжение преимущественно влияет на микроциркуляцию и регенерацию.

- Алиментарные нарушения- на секреторный аппарат и воспалительную реакцию.

- В обеих группах отмечается значительное снижение защитных свойств слизистой и повышенный риск гастропатий.

Заключение

Результаты исследования подтверждают, что длительное стрессовое напряжение и нарушения питания оказывают значительное отрицательное влияние на морфологическое состояние слизистой оболочки желудка. Установлено, что под воздействием стрессовых факторов и алиментарной нагрузки происходят дистрофические изменения эпителия, нарушение микроциркуляции, снижение секреторной и регенераторной активности. Сравнение с нормой показывает выраженное отклонение структурных параметров, что указывает на высокую уязвимость слизистой желудка при хронических вредных воздействиях.

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АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ: ТИХАЯ ПАНДЕМИЯ СОВРЕМЕННОСТИ

Аннотация: *Антибиотикорезистентность является глобальной угрозой здравоохранению и представляет собой стремительно распространяющуюся форму устойчивости микроорганизмов к существующим антимикробным препаратам. Данная статья рассматривает ключевые механизмы формирования антибиотикорезистентности, факторы её распространения, современные масштабы проблемы и направления борьбы. Анализ основан на данных ВОЗ, CDC, ECDC и научных публикациях последних лет. Показано, что рост устойчивых бактерий угрожает эффективности хирургии, онкологической терапии и реанимационной помощи. Рассмотрены инновационные методы лечения, включая бактериофаги и генетические технологии.*

Ключевые слова: *антибиотикорезистентность, супербактерии, глобальная угроза, антимикробная терапия.*

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ANTIBIOTIC RESISTANCE: A SILENT PANDEMIC OF OUR TIME

Abstract: *Antibiotic resistance is a global health threat characterized by the rapid spread of microbial resistance to existing antimicrobial drugs. This article examines the key mechanisms of resistance development, contributing factors, the current global situation, and strategies to combat the issue. The analysis is based on WHO, CDC, ECDC reports and recent scientific publications. Findings indicate that the rise of resistant bacteria jeopardizes the effectiveness of surgery, oncology, and intensive care. Innovative treatment methods such as bacteriophage therapy and genetic technologies are discussed.*

Keywords: *antibiotic resistance, superbugs, global threat, antimicrobial therapy.*

Введение

Антибиотики стали ключевым инструментом в современной медицине, значительно снизив смертность от бактериальных инфекций. Однако их чрезмерное и неправильное использование привело к возникновению микроорганизмов, устойчивых к большинству существующих препаратов. Антибиотикорезистентность (АР) сегодня рассматривается как «тихая пандемия», поскольку развивается постепенно, но последствия её масштабны и угрожают фундаментальным достижениям медицины.

По данным ВОЗ, ежегодно более 1,3 млн смертей происходит непосредственно из-за устойчивых инфекций. Это делает АР одной из самых серьёзных глобальных проблем XXI века. Ситуация осложняется тем, что разработка новых антибиотиков отстаёт от темпов эволюции бактерий, а системы контроля во многих странах остаются недостаточно эффективными.

Цель исследования — систематизировать актуальные данные о механизмах формирования антибиотикорезистентности, определить ключевые факторы её распространения и рассмотреть современные стратегии борьбы с данной угрозой.

Материалы и методы исследования

Для подготовки статьи был проведён анализ современных научных источников, включающих публикации из баз данных PubMed, Scopus и Google Scholar за период 2018–2024 гг., а также официальные рекомендации ВОЗ и Европейского центра по контролю заболеваний (ECDC). В обзор включены данные экспериментальных исследований, посвящённых формированию лекарственной устойчивости у бактерий, результаты клинических наблюдений за инфекциями, вызванными резистентными штаммами, а также эпидемиологическая статистика по распространённости антибиотикорезистентности в различных регионах.

Основная часть

Антибиотикорезистентность является одной из наиболее острых проблем современного здравоохранения. Она проявляется в способности бактерий противостоять действию антибиотиков, что приводит к снижению эффективности терапии и увеличению числа осложнений и смертей от инфекционных заболеваний. С каждым годом число устойчивых микроорганизмов растёт, включая такие опасные патогены, как метициллин-резистентный *Staphylococcus aureus* (MRSA), карбапенем-резистентные Enterobacteriaceae (CRE) и ванкомицин-резистентные Enterococcus (VRE).

Формирование устойчивости бактерий происходит через несколько механизмов. Генетическая адаптация проявляется в мутациях, которые изменяют структуру мишени антибиотика, а также в горизонтальном переносе генов устойчивости между бактериями с помощью плазмид, транспозонов и бактериофагов. Кроме того, биохимические механизмы обеспечивают бактериям выживание в присутствии антибиотиков: они могут продуцировать ферменты, разрушающие препараты, активировать эффлюкс-насосы для их выведения и снижать проницаемость клеточной стенки. Эти

механизмы позволяют бактериям быстро адаптироваться к лекарственной терапии и способствуют распространению супербактерий.

Развитие антибиотикорезистентности стимулируется рядом факторов. Одним из наиболее значимых является чрезмерное и неправильное использование антибиотиков в медицине, включая назначение при вирусных инфекциях, неполные курсы лечения и самолечение. Вторым важным фактором является применение антибиотиков в сельском хозяйстве для стимуляции роста животных, что создаёт резервуар резистентных бактерий, способных передаваться человеку через пищевую цепочку. Также формирование устойчивых штаммов происходит в условиях госпитальных инфекций, где высокая концентрация антибиотиков, инвазивные процедуры и ослабленные пациенты создают идеальную среду для селекции резистентных бактерий. Недостаточный контроль за инфекциями в медицинских учреждениях, особенно в странах с ограниченными ресурсами, дополнительно усиливает распространение супербактерий.

Антибиотикорезистентность оказывает серьёзное влияние на здоровье населения и систему здравоохранения в целом. Инфекции, вызванные устойчивыми бактериями, становятся опасными для жизни, а лечение требует использования более дорогих резервных антибиотиков, часто в комбинациях, что увеличивает продолжительность госпитализации и расходы на медицинскую помощь. Эффективность ключевых медицинских процедур, таких как хирургия, трансплантация органов, химиотерапия и уход за новорождёнными, напрямую зависит от доступности эффективных антибиотиков. Согласно прогнозам ВОЗ, если текущая тенденция сохранится, к 2050 году ежегодно от инфекций, вызванных резистентными бактериями, будет умирать до десяти миллионов человек, что делает проблему глобальной.

Для замедления распространения антибиотикорезистентности применяются современные стратегии. Ведётся разработка новых антибиотиков, эффективных против устойчивых штаммов, а также исследуются альтернативные методы терапии, такие как бактериофаговая терапия, применение антимикробных пептидов и CRISPR-технологий для разрушения генов устойчивости. Важным подходом является вакцинация, снижающая частоту инфекций и уменьшающая необходимость в антибиотиках. Также внедряются программы антимикробного надзора, направленные на контроль назначения и использования антибиотиков в медицинских учреждениях. Международное сотрудничество в рамках концепции One Health объединяет усилия медицины, ветеринарии и экологии для предотвращения глобального распространения супербактерий.

Заключение

Антибиотикорезистентность представляет собой одну из главных угроз современному здравоохранению. Рост устойчивых бактерий снижает эффективность терапии, увеличивает риск осложнений и ставит под угрозу ключевые медицинские процедуры. Для её преодоления необходим

комплексный подход: рациональное использование антибиотиков, развитие новых методов лечения, строгий контроль за инфекциями и международное сотрудничество. Только объединение усилий науки, медицины и общества позволит замедлить распространение супербактерий и сохранить эффективность антибиотиков для будущих поколений.

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ИСПОЛЬЗОВАНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА ДЛЯ АВТОМАТИЧЕСКОГО АНАЛИЗА ГИСТОЛОГИЧЕСКИХ ИЗОБРАЖЕНИЙ

Аннотация: *Развитие цифровой патологии и искусственного интеллекта (ИИ) открывает новые возможности для анализа гистологических изображений. Традиционные методы микроскопии требуют высокой квалификации врача-гистолога и значительных временных затрат. С помощью алгоритмов машинного обучения и глубоких нейронных сетей можно автоматически выявлять патологические изменения, классифицировать ткани и даже прогнозировать течение заболеваний. В статье рассматриваются основные направления применения ИИ в гистологии, современные методы обработки изображений, примеры успешных внедрений в клиническую практику, а также трудности и перспективы развития этой области.*

Ключевые слова: *искусственный интеллект, гистология, цифровая патология, машинное обучение, глубокие нейронные сети, диагностика рака, виртуальное окрашивание, анализ изображений.*

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USING ARTIFICIAL INTELLIGENCE FOR AUTOMATIC ANALYSIS OF HISTOLOGICAL IMAGES

Abstract: *The development of digital pathology and artificial intelligence (AI) opens up new opportunities for the analysis of histological images. Traditional microscopy methods require a highly qualified histologist and significant time investment. With the help of machine learning algorithms and*

deep neural networks, it is possible to automatically detect pathological changes, classify tissues, and even predict disease progression. This article discusses the main directions of AI applications in histology, modern image processing methods, examples of successful implementation in clinical practice, as well as challenges and future prospects of this field

Keywords: *artificial intelligence, histology, digital pathology, machine learning, deep neural networks ,cancer diagnosis ,virtual staining ,image analysis.*

Введение

Гистология является одной из ключевых дисциплин, лежащих в основе клинической диагностики. Анализ микроскопических срезов тканей позволяет выявить патологические изменения на клеточном уровне и поставить точный диагноз. Однако ручной анализ срезов требует высокой квалификации, опыта и занимает много времени. В условиях растущего количества биопсий и нехватки патологоанатомов возникает потребность в автоматизации процессов диагностики. Одним из наиболее перспективных направлений стала интеграция искусственного интеллекта в цифровую гистологию. Используя методы машинного и глубокого обучения, системы ИИ способны анализировать цифровые изображения тканей, распознавать паттерны клеток и структур, а также классифицировать их по патологическим признакам. Это позволяет повысить точность, стандартизировать интерпретацию и ускорить постановку диагноза.

Методы и материалы

В ходе исследования были задействованы передовые техники цифровой обработки визуальных данных и алгоритмы машинного обучения, обычно применяемые в гистопатологии. Проект состоялись теоретического изучения вопроса и его практической реализации.

Исходные данные

В качестве базы данных использовались открытые дата сеты цифровых гистологических изображений:

- *CAMELYON16uCAMELYON17* - наборы цифровых изображений лимфатических узлов с метастазами рака молочной железы, Предоставленные Digital Pathology Consortium.
- *Break His Dataset* - коллекция микроскопических изображений опухолей молочной железы (доброкачественных и злокачественных).
- *The Cancer Genome Atlas(TCGA)* - изображения тканей различных онкологических заболеваний с аннотированными диагнозами.

2. Искусственный интеллект и цифровая гистология

Искусственный интеллект - это совокупность методов, позволяющих компьютерам выполнять задачи, требующие человеческого мышления: распознавание образов ,классификация ,прогнозирование .В гистологии ИИ применяется для анализа цифровых изображений срезов ,полученных с помощью сканеров высокого разрешения (Whole Slide Imaging, WSI).

Основные направления применения ИИ в гистологии включают:

- Классификацию тканей(например ,нормальные и опухолевые участки);
- Сегментацию клеток и структур (ядра, цитоплазма ,сосуды и др.);
- Виртуальное окрашивание - цифровое моделирование окрашивания тканей без применения химических реактивов;
- Прогнозирование заболеваний (например , исходов онкологических процессов);
- Автоматическую диагностику редких патологий и обнаружение метастазов.

ИИ не заменяет врача , а служит инструментом поддержки решений .Врач- гистолог может быстрее и точнее подтверждать диагноз, опираясь на результаты алгоритмов.

3. Методы машинного и глубокого обучения

Современные методы анализа изображений основаны на глубоком обучении(deeplearning), в частности - на сверх точных нейронных сетях (Convolutional Neural Networks, CNN). Эти сети способны автоматически извлекать признаки из изображений, не требуя ручного описания.

Наиболее популярные архитектуры , применяемые в гистологии:

- Res Net - хорошо справляется с классификацией тканей;

U-Net - используется для сегментации клеток и сосудов;Vision Trans former (ViT) - новая архитектура , основанная на механизме внимания(attention),обеспечивающая высокую точность анализа больших изображений;

- CycleGANиPix2Pix - применяются для виртуального окрашивания срезов.

Например, при диагностике рака молочной железы нейросети обучаются на тысячах изображений, размеченных патологоанатомами. После обучения система способна самостоятельно отличать доброкачественные образования от злокачественных с точностью до 95-98%.

4. Применение ИИ в диагностике опухолей

Одним из наиболее исследованных направлений является использование ИИ в онкологической гистопатологии. В частности, алгоритмы

Применяются для:

- Обнаружения метастазов в лимфатических узлах(проект CAMELYON16/17),
- Классификации глиом мозга,
- Диагностики рака предстательной железы и молочной железы,
- анализ маркеров иммуногистохимии (например, Ki-67, HER2.)

В систематическом обзоре, опубликованном в npj Digital Medicine (Nature, 2024), было проанализировано более 100 исследований, и средняя чувствительность ИИ достигла 96.3%, а специфичность - 93.3%. Это сопоставимо с уровнем работы опытного патологоанатома. Кроме того, в

ряде случаев ИИ способен выявлять субвизуальные паттерны, которые не всегда распознаются человеком , что открывает новые возможности ранней диагностики.

5. Виртуальное окрашивание и нормализация изображений

Классическая гистология требует окрашивания срезов(например,

гематоксилин-эозином),что занимает время и ресурсы . С помощью нейросетей можно создавать виртуальное окрашивание - перевод

неокрашенных изображений в цифровой аналог сокрушённого среза. Такой подход демонстрируют модели Cycle GAN , обученные на парных данных: неокрашенный срез → окрашенный аналог. Это позволяет:

- Сократить расходы на реактивы,
- ускорить анализ,
- снизить вариативность между лабораториями.

Исследования , опубликованные в Light : Science & Applications(Baietal., 2023), показали, что виртуально окрашенные изображения по точности распознавания патологий не уступают традиционным.

6. Преимущества и ограничения

Преимущества применения ИИ в гистологии:

- Высокая точность и воспроизводимость результатов;
- Снижение нагрузки на врачей;
- Ускорение диагностики;
- Возможность анализа больших объёмов данных;
- Стандартизация интерпретации .Ограничения и проблемы:
- Необходимость больших размеченных наборов данных;
- Различия в протоколах окрашивания между лабораториями;
- Этические и юридические вопросы (ответственность за диагноз);
- Высокая стоимость внедрения цифровых сканеров и серверов хранения данных;
- Ограниченная прозрачность (“черный ящик ” нейросетей).

Не смотря на эти проблемы , разработка объяснимых моделей(Explainable AI) постепенно снижает недоверие врачей и регулирующих органов.

7. Перспективы развития

Будущее гистологии - за гибридными системами, где искусственный интеллект работает вместе с врачом. Уже сегодня ИИ используется как инструмент «второго мнения», а в ближайшие годы ожидается его интеграция в клинические информационные системы . Перспективными направлениями считаются:

- Объединение данных гистологии с геномикой и радиологией (мультимодальный анализ);
- Развитие облачных сервисов для удалённого анализа срезов;
- Использование ИИ в образовательных целях (обучение студентов и врачей на цифровых микропрепаратах);

- Создание международных стандартов для цифровой патологии.

Заключение

Искусственный интеллект становится неотъемлемой частью современной гистологии. Он позволяет автоматизировать рутинные процессы, повысить точность и объективность диагностики, а также открыть новые подходы к исследованию тканей. Однако для полноценного внедрения необходимы стандарты качества , надежные дата сеты, юридическая база и подготовка специалистов, способных эффективно использовать ИИ-инструменты. Взаимодействие между патоморфологом и системой искусственного интеллекта знаменует собой наступление новой главы в медицинской диагностике, а именно эпохи цифровой , интеллектуальной гистологии.

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ГИСТОЛОГИЧЕСКИЕ ОСНОВЫ ВЫСОКОЙ РЕГЕНЕРАТИВНОЙ СПОСОБНОСТИ ПЕЧЕНИ

Аннотация*: Печень обладает уникальной способностью практически полностью восстанавливаться после массивного повреждения, что делает её особым объектом изучения в гистологии и регенеративной медицине. В этой статье анализируются гистологические основы высокой регенеративной способности печени: микроскопическая архитектура, ключевые клеточные компоненты пространства Диссе и молекулярные механизмы, запускающие восстановление ткани. Рассмотрены роли гепатоцитов, звездчатых клеток (Ито), синусоидальных эндотелиальных клеток и макрофагов Купфера, а также сигнальные пути, включая HGF, EGF, IGF-1 и IL-6. Понимание этих процессов имеет практическое значение для клинического лечения заболеваний печени, хирургических вмешательств и трансплантации.*

Ключевые слова: *печень, регенерация, гепатоциты, клетки Ито, клетки Купфера, IL-6, HGF, гистология*

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HISTOLOGICAL BASIS OF THE HIGH REGENERATIVE CAPACITY OF THE LIVER

Abstract: *The liver possesses a unique ability to almost completely regenerate after extensive damage, making it a special subject of study in histology and regenerative medicine. This article analyzes the histological foundations of the liver's high regenerative capacity, including its microscopic architecture, key cellular components of the space of Disse, and molecular mechanisms that trigger tissue restoration. The roles of hepatocytes, stellate (Ito) cells, sinusoidal endothelial cells, and Kupffer macrophages are examined, along with signaling pathways such as HGF, EGF, IGF-1, and IL-6. Understanding these processes has practical significance for the clinical treatment of liver diseases, surgical interventions, and transplantation.*

Keywords: *liver, regeneration, hepatocytes, Ito cells, Kupffer cells, IL-6, HGF, histology*

Введение

Из всех органов человека только печень способна восстановить утраченную массу настолько полно, что её функции возвращаются почти к исходному уровню даже после удаления значительной части ткани. Этот феномен вызывает глубокий интерес: как орган, постоянно подверженный токсическому, метаболическому и механическому стрессу, остаётся высоким образом устойчивым к повреждениям и так быстро восстанавливается?

Ответ кроется в не одном, а в множестве механизмов — в тонкой гистологической архитектуре печени и в клеточных взаимодействиях, происходящих в перисинусоидальных пространствах. Именно там располагаются клетки, способные почти мгновенно реагировать на стресс и повреждения. Понимание этих механизмов важно не только с точки зрения теории морфологии: оно напрямую влияет на клинические подходы к лечению гепатотоксичных поражений, вирусного гепатита, травм, а также на прогноз после резекции и трансплантации печени.

Микроскопическая архитектура печени и её роль в регенерации

Микроскопическая структура печени обеспечивает основу для её восстановительных возможностей. Структурной единицей органа является печёночная долька: её геометрия — шестиугольная — с центральной веной в центре и портальными трактатами (содержащими ветви воротной вены, печёночной артерии и жёлчных протоков) по периферии. Такая организация позволяет эффективно распределять питательные вещества и кислород, поддерживая гепатоциты в оптимальных условиях для восстановления.

Синусоиды — это кровеносные капилляры, выстланные фенестрированным эндотелием, через которые мелкомолекулярные вещества из крови легко проникают к паренхиматозным клеткам. Между эндотелием и гепатоцитами расположено пространство Диссе, где расположены специализированные клетки: звездчатые клетки Ито, макрофаги Купфера и мезенхимальные перисинусоидальные клетки. Эти элементы не только структурно поддерживают синусоиды, но и активно участвуют в регенерации: они секретируют факторы, способствуют ремоделированию матрикса и модуляции клеточного роста, что позволяет ткани быстро адаптироваться к повреждению.

Механизмы регенерации печени

Регенерация печени — динамичный процесс, основанный на взаимодействии гепатоцитов и клеток микроокружения. Когда печень повреждается, существующие гепатоциты — а не стволовые клетки — быстро активируются. Сигнальные молекулы, такие как гепатоцитарный фактор роста (HGF), эпидермальный фактор роста (EGF), инсулиноподобный фактор роста (IGF-1) и трансформирующий фактор роста α (TGF-α), запускают синтез ДНК и переход клеток в фазу деления, что позволяет органу вернуть утраченную массу.

Но гепатоциты не действуют в вакууме: клетки Купфера (синусоидальные макрофаги) играют решающую роль. Они выделяют

цитокины, такие как интерлейкин-6 (IL-6) и фактор некроза опухоли α (TNF-α), подготавливая гепатоциты к пролиферации и создавая контролируемый воспалительный фон, необходимый для регенерации. Исследования показывают, что удаление клеток Купфера замедляет регенерацию, а их присутствие усиливает экспрессию HGF в звездчатых клетках Ито. Пространство Диссе также играет центральную роль: звездчатые клетки Ито активируются при повреждении, синтезируют компоненты матрикса и формируют каркас для вновь образующихся гепатоцитов. Эндотелиальные клетки синусоидов с их фенестрами обеспечивают обмен веществ и выделяют регенераторные сигналы. Перисинусоидальные мезенхимальные клетки участвуют в перестройке межклеточного матрикса, создавая благоприятные условия для деления и дифференцировки гепатоцитов. Особенно важно значение IL-6: он не просто запускает сигнальный каскад, но участвует в сложных путях регенерации через классическую и транс-сигнальность. Например, исследования показывают, что IL-6, вырабатываемый клетками Купфера и гепатоцитами, стимулирует пролиферацию макрофагов и гепатоцитов после частичной гепэктомии.

Заключение

Регенерация печени — это удивительно скоординированный процесс, в котором гепатоциты, клетки Ито, эндотелиальные клетки и макрофаги Купфера действуют сообща, создавая благоприятную микросреду для восстановления тканей. Благодаря такой согласованной работе орган способен быстро и эффективно восстанавливать свою структуру и функции даже после серьёзных повреждений.

Понимание этих механизмов имеет не только теоретическое, но и практическое значение: знания о гистологической организации и клеточном взаимодействии помогают совершенствовать подходы к лечению заболеваний печени, разрабатывать новые хирургические стратегии и повышать эффективность трансплантации. Печень остаётся ярким примером того, как гармония структуры и функции обеспечивает органу устойчивость и жизнеспособность.

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КЛЕТОЧНЫЕ МЕХАНИЗМЫ БАРЬЕРНО-ЗАЩИТНОЙ ФУНКЦИИ ЖЕЛУДКА

Аннотация: *Барьерно-защитнаяфункция желудка обеспечивает Сохранность его слизистой оболочки при воздействии агрессивных факторов — соляной кислоты, пепсина, желчных кислот и микроорганизмов. Основу этой защиты составляют клеточные и молекулярные механизмы, включающие секрецию слизи и бикарбоната, герметичность межклеточных контактов, процессы эпителиальной реституции, регуляцию кровотока и медиаторные системы простагландинов. В статье рассмотрены клеточные элементы желудочного барьера, их функции и механизмы регуляции, а также патогенетические факторы, нарушающие его целостность.*

Ключевые слова: *желудочный барьер, слизистая оболочка, эпителиальные клетки, плотные контакты, простагландины, слизь, реституция, Helicobacterpylori, НПВП.*

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CELLULAR MECHANISMS OF THE BARRIER-PROTECTIVE FUNCTION OF THE STOMAC

Abstract: *The barrier and protective function of the stomach ensures the preservation of its mucous membrane when exposed to aggressive factors such as hydrochloric acid, pepsin, bile acids, and microorganisms. The foundation of this protection consists of cellular and molecular mechanisms that include mucus and bicarbonate secretion, the tightness of intercellular junctions, epithelial restitution processes, regulation of blood flow, and prostaglandin-mediated systems. The*

article discusses the cellular components of the gastric barrier, their functions and regulatory mechanisms, as well as pathogenic factors that disrupt its integrity.

Keywords: *gastric barrier, mucous membrane, epithelial cells, tight junctions, prostaglandins, mucus, restitution, Helicobacter pylori, NSAIDs.*

Введение

Желудок выполняет две противоположные задачи:

Вырабатывает агрессивные вещества, необходимые для пищеварения, и одновременно защищает собственные ткани от их разрушительного действия. Соляная кислота, пепсин и желчные кислоты могут вызвать автолиз эпителия, если барьерные механизмы нарушены.

Главная роль в защите принадлежит слизистой оболочке, которая создаёт многоуровневую систему: слой слизи и бикарбоната, герметичный эпителий с плотными контактами и быстрые механизмы восстановления повреждений. Эти процессы регулируются простагландинами, оксидом азота, ростовыми факторами и цитокинами.

Понимание клеточных механизмов защиты желудка имеет большое клиническое значение, так как нарушение барьера лежит в основе

гастритов, язвенной болезни и побочных эффектов нестероидных противовоспалительных средств (НПВП).

Материалы и методы:

В исследовании использовались образцы слизистой оболочки желудка лабораторных животных (белых крыс массой 180–220 г), полученные после эвтаназии в соответствии с этическими нормами обращения с животными.

Для проведения анализа применялись следующие реактивы и материалы:

Фиксаторы (10% нейтральный формалин);

Красители — гематоксилин, эозин, альциановый синий, реактив Шиффа;

Микроскопы светового и электронного типов;

Стандартные лабораторные стекла, предметные и покровные.

Результаты:

1. Слизисто-бикарбонатный барьер

Первый уровень защиты обеспечивается поверхностными эпителиальными клетками (мукоцитами), которые выделяют слизь (муцины MUC5AC, MUC6) и бикарбонат (HCO_3^-).

Они формируют слой толщиной 0,5–1 мм с нейтральным pH у поверхности клеток, защищая слизистую от кислоты (pH≈1–2).

Дополнительную роль играют trefoil-пептиды (TFF1, TFF2), укрепляющие слизь и ускоряющие заживление, а также ионные обменники (NHE1), поддерживающие внутриклеточный баланс.

Секреция контролируется простагландинами (PGE_2), ацетилхолином и гастрином.

Снижение уровня простагландинов (например, при приёме НПВП) увеличивает проницаемость слизистой для кислоты и пепсина.

2. Межклеточные контакты эпителия

Второй уровень защиты — плотные контакты (tight junctions) между клетками.

Они состоят из белков клаудинов, окклюдина, JAM и ZO-1, герметизирующих параклеточный путь.

Проницаемость регулируется фосфорилированием белков, действием цитокинов (TNF-α, IL-1β) и простагландинов, стабилизирующих контакты.

При инфекции Helicobacter pylori (белки CagA, VacA) эти структуры разрушаются, что ведёт к утечке ионов и повреждению эпителия.

3. Эпителиальная реституция

При нарушении барьера эпителий восстанавливается за несколько минут благодаря миграции соседних клеток, ремоделированию актина и интегринов и действию факторов роста (EGF, TGF-β, HB-EGF) и TFF-пептидов.

Позже активируются стволовые клетки шейки желез, обеспечивающие полную регенерацию ткани.

Эти процессы зависят от простагландинов и адекватного кровотока.

4. Роль простагландинов и кровотока

Простагландины (PGE_2, PGI_2) синтезируются из арахидоновой кислоты при участии циклооксигеназ (COX-1, COX-2). Они усиливают секрецию слизи и бикарбонатов, поддерживают микроциркуляцию, снижают воспаление и стимулируют репарацию. НПВП блокируют COX, уменьшая уровень PGE_2, что вызывает ишемию слизистой, разрыв контактов и формирование эрозий.

5. Иммунные и воспалительные механизмы

Эпителиальные клетки желудка участвуют во врождённом иммунитете: они экспрессируют TLR-рецепторы, выделяют лизоцим и антимикробные пептиды, активируют макрофаги и дендритные клетки. При хронической инфекции H. pylori повышается уровень IL-8, TNF-α, IFN-γ, усиливающих воспаление и повреждение tight junctions, что ведёт к повышенной проницаемости и хроническому повреждению слизистой.

6. Нарушения барьера и их последствия

H. pylori — основной инфекционный фактор гастрита и язвы; белки CagA и VacA нарушают цитоскелет и tight junctions.

НПВП снижают простагландины, вызывают ишемию и разрушение эпителия.

Жёлчные кислоты и этанол растворяют слизь и повреждают мембраны.

Стресс и гипоксия снижают кровоток и секрецию слизи, способствуя стрессовым язвам.

7. Современные подходы к защите желудочного барьера

Аналоги простагландинов (мизопростол) — компенсируют дефицит PGE_2.

Блокаторы протонной помпы (омепразол) — снижают кислотность и ускоряют репарацию.

Препараты висмута и сукральфат — образуют защитную плёнку.

Пробиотики и антиоксиданты — уменьшают воспаление при H. pylori.

Перспективные исследования направлены на укрепление tight junctions и усиление синтеза TFF-пептидов.

Заключение

Барьерно-защитная система желудка—это многоуровневая структура, где ведущая роль принадлежит эпителиальным клеткам. Они создают слизисто-бикарбонатный слой, формируют плотные межклеточные контакты и обеспечивают быструю реституцию при повреждении. Нарушение этих механизмов, особенно под действием Helicobacterpylori и НПВП, приводит к воспалению и язвообразованию. Понимание клеточных механизмов защиты слизистой позволяет совершенствовать профилактику илечение заболеваний желудка, направляя терапию на восстановление естественных барьерных функций.

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ДИАГНОСТИЧЕСКОЕ ЗНАЧЕНИЕ ГИСТОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ ПРИ ЦИРРОЗЕ ПЕЧЕНИ

Аннотация: *Цирроз печени — это хроническое прогрессирующее заболевание, сопровождающееся глубокими структурно-функциональными изменениями в паренхиме органа. Гистологическое исследование имеет решающее значение в диагностике цирроза, обеспечивая точную оценку степени фиброза и выявление характерных морфологических признаков поражения ткани. В статье рассматривается роль гистологии в подтверждении диагноза, её преимущества и ограничения, а также возможности интеграции с неинвазивными методами диагностики. Отдельное внимание уделено значимости оценки фиброза для определения прогноза и выбора оптимальной терапевтической тактики.*

Ключевые слова: *цирроз печени, фиброз, биопсия печени, диагностика, морфологические изменения, неинвазивные методы, степень фиброза.*

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MORPHOGENESIS AND FUNCTIONAL CHARACTERISTICS OF THE ORGANS OF THE ENDOCRINE AND IMMUNE SYSTEMS IN NORMAL AND PATHOLOGICAL CONDITIONS

Annotation: *Liver cirrhosis is a chronic progressive disease characterized by profound structural and functional alterations in the parenchyma of the organ. Histological examination plays a crucial role in the diagnosis of cirrhosis, providing an accurate assessment of fibrosis severity and revealing characteristic*

morphological features of tissue damage. This article discusses the role of histology in confirming the diagnosis, its advantages and limitations, as well as the possibilities of integrating histological methods with non-invasive diagnostic approaches. Particular attention is given to the importance of fibrosis assessment for determining prognosis and selecting the optimal therapeutic strategy.

Key words: *liver cirrhosis, fibrosis, liver biopsy, diagnosis, morphological changes, non-invasive methods, degree of fibrosis.*

Цель исследования.

Целью исследования является определение роли гистологического метода в диагностике цирроза печени, оценке степени фиброза и выявлении морфологических изменений в тканях печени. Работа направлена на анализ преимуществ и ограничений гистологического подхода, а также на изучение возможностей его сочетания с современными неинвазивными диагностическими методами.

Методы исследования.

В исследовании применялись аналитический и сравнительный методы. Проведён обзор научной литературы, посвящённой диагностике цирроза печени, с особым вниманием к гистологическим исследованиям. Рассмотрены современные подходы к гистологическому анализу, включая традиционную и транскутанную биопсию печени, использование иммунохимических и молекулярных методов с маркерами фиброза и воспаления, а также системы оценки степени фиброза METAVIR и Ishak. Дополнительно изучены качественные и количественные методы анализа морфологических изменений тканей печени. Проведён сравнительный анализ эффективности неинвазивных диагностических технологий, таких как эластография и FibroScan, по отношению к гистологическим методам.

Результаты исследования.

Анализ показал, что гистологическое исследование остаётся «золотым стандартом» диагностики цирроза печени, обеспечивая наиболее точное определение степени фиброза и выявление микроскопических структурных изменений ткани. Метод позволяет дифференцировать цирроз от других заболеваний печени и оценивать сопутствующие патологические процессы — воспаление, некроз, стеатоз. Несмотря на развитие неинвазивных технологий, гистология сохраняет решающее значение в окончательном подтверждении диагноза и выборе оптимальной терапевтической стратегии.

Вывод.

Гистологическое исследование остаётся ключевым методом диагностики цирроза печени, позволяя точно определить степень фиброза и структурные изменения ткани. Несмотря на развитие неинвазивных технологий, таких как эластография, гистология сохраняет статус «золотого стандарта». Комплексное применение гистологических, ультразвуковых и томографических методов повышает точность диагностики и способствует выбору оптимальной терапевтической стратегии.

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КЛИНИЧЕСКИЕ ОСОБЕННОСТИ И ДИАГНОСТИКА ОСТРЫХ АЛЛЕРГИЧЕСКИХ РЕАКЦИЙ У ДЕТЕЙ: СОВРЕМЕННЫЕ ВЗГЛЯДЫ

Аннотация: *Острые аллергические реакции у детей представляют собой одну из наиболее актуальных проблем современной педиатрии. Рост распространённости аллергических состояний связан с влиянием экологических, генетических и иммунологических факторов. По данным международных наблюдений, число детей, переносящих различные формы острых аллергических реакций, неуклонно увеличивается, что требует своевременной диагностики и оказания неотложной помощи. Особое значение придаётся распознаванию ранних симптомов, оценке тяжести состояния и выбору оптимальной тактики лечения. В обзоре представлены современные сведения о патогенезе, клинических проявлениях и подходах к ведению детей с острыми аллергическими состояниями.*

Ключевые слова: *острые аллергические реакции; детская аллергология; анафилаксия; диагностика; неотложная помощь.*

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CLINICAL FEATURES AND DIAGNOSTICS OF ACUTE ALLERGIC REACTIONS IN CHILDREN: MODERN PERSPECTIVES

Abstract. *Acute allergic reactions in children represent one of the most urgent issues in modern pediatrics. The growing prevalence of allergic conditions is associated with environmental, genetic, and immunological factors. According to international observations, the number of children experiencing various forms of acute allergic reactions continues to increase, necessitating timely diagnosis and emergency care. Particular importance is given to the identification of early symptoms, assessment of the severity of the condition, and the selection of an optimal treatment strategy. This review presents current data on the pathogenesis, clinical manifestations, and management approaches for children with acute allergic conditions.*

Keywords: *acute allergic reactions; pediatric allergology; anaphylaxis; diagnostics; emergency care.*

Острые аллергические реакции у детей представляют собой одну из наиболее значимых проблем современной педиатрии и клинической иммунологии. За последние десятилетия заболеваемость аллергическими состояниями среди детского населения демонстрирует выраженную тенденцию к росту, что подтверждается многочисленными международными эпидемиологическими исследованиями. По данным Всемирной организации здравоохранения, до 30–40% детей в различных регионах земного шара имеют те или иные проявления аллергии, а примерно у 10% из них в течение жизни отмечаются эпизоды острых аллергических состояний, требующих неотложной медицинской помощи. В ряде стран Европы и Азии частота анафилаксии у детей возросла в несколько раз за последние 20 лет, что отражает глобальный характер данной медицинской проблемы.

Причины столь интенсивного роста связаны с многочисленными факторами: ухудшением экологической обстановки, изменением характера питания, ростом потребления высокоаллергенных продуктов, ранней антибиотикотерапией, нарушениями микробиома кишечника и дыхательных путей, увеличением контакта с синтетическими веществами, а также особенностями генетической предрасположенности. Немаловажным фактором является урбанизация, сопровождающаяся снижением естественной антигенной стимуляции иммунной системы ребёнка, что приводит к формированию гиперреактивных иммунных ответов.

Клинические проявления острых аллергических реакций у детей отличаются значительной вариабельностью — от лёгких кожных симптомов до тяжёлых, угрожающих жизни состояний, таких как генерализованная крапивница, отёк Квинке и анафилактический шок. Особая сложность заключается в том, что детский организм обладает рядом анатомо-физиологических особенностей, в частности повышенной сосудистой и бронхиальной реактивностью, лабильностью иммунной системы, склонностью к генерализации воспалительной реакции. Это создает высокий риск стремительного развития тяжелых осложнений при контакте с аллергеном.

Несмотря на развитие современной медицины и совершенствование диагностических алгоритмов, раннее выявление острых аллергических реакций по-прежнему остается сложной задачей, поскольку начало заболевания может быть стёртым или маскироваться под другие острые состояния — инфекционные, гастроэнтерологические, респираторные. Ошибки в интерпретации симптомов приводят к задержке терапии, что повышает вероятность тяжелых последствий. В связи с этим особое значение имеет обучение родителей и медицинских работников навыкам своевременного распознавания начальных симптомов аллергии и алгоритмам оказания первой помощи.

Современные научные исследования демонстрируют, что эффективное ведение детей с острыми аллергическими состояниями должно включать интегральную оценку факторов риска, изучение индивидуальной

чувствительности, мониторинг состояния иммунной системы, а также применение современных методов специфической и неспецифической профилактики. Правильная интерпретация патогенетических механизмов — от высвобождения медиаторов воспаления до системных иммунных нарушений — является основой рациональной терапии, которая способна значительно снизить частоту и тяжесть острых аллергических реакций.

В условиях роста глобальной аллергизации детского населения всё более актуальным становится необходимость комплексного подхода, включающего раннюю диагностику, профилактику, стандартизированные протоколы оказания неотложной помощи, а также образовательные программы для семей групп риска. Всё это определяет высокую важность дальнейших исследований, направленных на оптимизацию тактики ведения острых аллергических состояний у детей и снижение неблагоприятных последствий.

В связи с этим изучение клинических особенностей, факторов риска, патогенетических механизмов и стратегий оказания неотложной помощи детям с острыми аллергическими реакциями приобретает особую актуальность. Своевременное выявление предрасположенности, оценка триггерных факторов и внедрение современных протоколов ведения представляют собой важнейшие задачи, направленные на снижение тяжести и частоты острых аллергических осложнений в детском возрасте.

По прогнозу течения и риску развития жизнеугрожающих состояний острые аллергические заболевания могут возникать в любом возрасте как впервые в жизни, так и повторно. Они характеризуются внезапным началом, непредсказуемым течением, риском развития жизнеугрожающих осложнений, необходимостью оказания немедленной врачебной помощи «на месте».

В последние годы отмечается учащение развития лекарственной аллергии у детей. Наиболее часто ее возникновение отмечается к антибиотикам. Нередко аллергические реакции возникают при назначении сульфаниламидных и белковых препаратов, неспецифических противовоспалительных средств, антибиотиков других групп, витаминов группы В [2]. Лекарственные препараты являются наиболее частой причиной возникновения системных аллергических реакций (анафилактического шока, крапивницы, отеков Квинке), острых токсико-аллергических реакций (многоформная экссудативная эритема, синдром Лайелла, синдром Стивенса-Джонсона), у ряда больных они становятся причиной обострения атопического дерматита, бронхиальной астмы, аллергического ринита и возникновения контактного дерматита [2].

Материалы и методы

Для определения частоту обращаемости по поводу острых аллергических состояний (ОАС) у детей, мы изучили карты вызовов СМП г. Бухары в последние 4 года (2015-2018 гг). Всего было зарегистрировано 22640 детей по поводу различных ОАС.

Мальчиков было несколько больше -58,7%, чем девочек- 41,3%. Возраст детей находился в пределах от 2-х до 7 лет.

Обсуждение

Проанализировали полученный материал, выяснилось, что обращаемость детей с ОАС в СМП города Бухары за изученный период (2015-2018 гг.) имела тенденцию к увеличению. Частота вызовов по поводу ОАС у детей по отношении к общему числу вызовов составила в 2015 г - 3,3%, а в 2018 г. - 6,4%, то есть увеличилась почти в 2 раза.

Число вызовов по поводу ОАС у детей по отношению к 1000 детскому городскому населению, в последний 4 года увеличилось с 6,1 (2015 год) до 8,4 (2018 год), то есть почти в 1,4 раз. Соответственно увеличилась и частота госпитализации в 1,4 раза.

Дети страдали различными клиническими формами ОАС: лекарственная аллергия- 41,2%, пищевая аллергия-24,4%, бронхиальная астма- 14,5%, инсектная аллергия 9,9%, и у 9,1% больных детей наблюдалось церебральный вариант шока (с преобладанием в клинической картине симптомов поражения нервной системы) - отмечался нарушение функции ЦНС, про- являющееся возбуждением, чувством страха потерей сознания, судорогами, отёком головного мозга или клиническими проявлениями по типу эпилепсии.

В СМП города Бухары чаще всего обращались дети, страдающие лекарственной аллергией. В течение последних 4 лет общее число острых аллергических реакций детей с лекарственной аллергией, поотношению к общему числу вызовов составило 9796 (37,5%). Причины лекарственной аллергии у детей в 53,7% случаев являлись антибиотики, сульфаниламидные препараты -19,0%, витамины -17,3%, осталные 10% на разные препараты.

Выделяли истинную лекарственную аллергию, которая обусловлена нарушениями функционирования иммуной системы, и псевдоаллергические реакции (ПАР) на медикаменты. Истинные и псевдоаллергические реакции на медикаменты различали по механизмам развития, но и в том и в другом случаях пусковым механизмом являлись контакт с лекарственным препаратом.

Клинические симптомы лекарственной аллергии, независимо от механизма их формирования, характеризовались полиорганностью и полиморфностью. Наблюдались как системные аллергические реакции так и с преимущественным поражением отдельных органов и систем. Самые грозные проявления лекарственной аллергии, были следующими: -синдром Лайелла и синдром Стивенса - Джонсона (31,6%), сывороточная болезнь и анафилактический шок (4,2%). Клинические проявления лекарственной аллергии с преимущественным поражением органов дыхания и поражение кожи, почек (43,2%), желудочно-кишечного тракта и гепатобилиарной системы-23,0%.

Необходимо указать, что все случаи аллерги ческого поражения кожи при лекарственной аллергии оценива- лись как тяжелая степень реакции.

Проявления со стороны дыхательных путей при лекарственной аллергии были разными, от ринита до тяжелого астматического приступа. Их клиническое течение такое же, как при аллергических заболеваниях другой этиологии. В сочетании с поражением кожи присоединялись симптомы атопического и контактного дерматита, различные кожные высыпания.

Наиболее частыми гастроинтестинальными симптомами лекарственной аллергии являлись: рвота, коликообразные боли в животе, расстройства стула, аллергический энтероколит. Наряду с гастроинтестинальными симптомами у больных отмечались резкая слабость, головная боль, снижение аппетита, головокружение, кожные высыпания, заложенность носа и другие респираторные симптомы аллергии.

Клинические формы проявлений пищевой аллергии были в виде острых аллергических реакций со стороны ЖКТ. Симптомы аллергии наблюдались в любой части ЖКТ: отек губ, языка, сочетающийся с зудом в гортани и за грудинным глотанием. Эти симптомы сопровождались неукротимой рвотой и повторной диареей с обильной слизью. Также наблюдалась генерализованная крапивница с отеком Квинке, что характеризовалась появлением зудящих волдырей разного калибра и формы с отеками конечностей, гортани, губ, глаз, век, ушных раковин и лица.

Анафилаксия наблюдалась в 2,2% случаев в виде отека Квинке, крапивницы, поражения конъюнктивы, слизистой оболочки носа, одышкой, цианоза, гипотонии, тошнотой, рвотой, болью в животе.

При оценки состояния тяжести больных с приступами бронхиальной астмы мы придерживались классификации GINA«Глобальные инициативы по борьбе с бронхиальной астмой» (1992). По нашим данным, легкая форма встречалась в 9,0 %, среднетяжелая степень 25,1 %, тяжелая степень 65,9 %

Клинические формы инсектной аллергии были как местными так и системными: генерализованная крапивница (65,6 %), острый зуд кожи и отек Квинке и отек гортани (28,6 %), острый приступ удушья, бронхиальная астма (5,8 %).

Заключение

1. ОАС встречаются часто и имеют тенденцию к дальнейшему росту.
2. Частота ОАС достоверно выше среди городского населения.
3. В клинической картине преобладают лекарственная. аллергия и сочетанные формы ОАС с тяжелым клиническим течением

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КЛИНИЧЕСКАЯ ХАРАКТЕРИСТИКА, ДИАГНОСТИКА И ПРОФИЛАКТИКА ПРОФЕССИОНАЛЬНЫХ ЗАБОЛЕВАНИЙ НОСА У РАБОТНИКОВ С ВОЗДЕЙСТВИЕМ ХИМИЧЕСКИХ ФАКТОРОВ

Аннотация*: Профессиональные заболевания верхних дыхательных путей, особенно полости носа, занимают одно из ведущих мест в структуре профессиональной патологии органов дыхания. Слизистая оболочка носа является первым барьером на пути вдыхаемого воздуха, поэтому именно она наиболее подвержена воздействию химических агентов — раздражающих газов, паров кислот и щелочей, органических растворителей, аэрозолей и пыли химического происхождения. Проблема профессиональных поражений носа остаётся актуальной, так как данные состояния приводят к стойким функциональным нарушениям дыхания и обоняния, снижению трудоспособности и ухудшению качества жизни работников.*

Ключевые слова: *профессиональные заболевания, нос, химические факторы, диагностика, профилактика, атрофический ринит.*

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CLINICAL CHARACTERISTICS, DIAGNOSIS AND PREVENTION OF OCCUPATIONAL DISEASES OF THE NOSE IN WORKERS EXPOSED TO CHEMICAL FACTORS

Annotation: *Occupational diseases of the upper respiratory tract, particularly the nasal cavity, are among the leading causes of occupational respiratory diseases. The nasal mucosa is the first barrier to inhaled air, making it particularly susceptible to chemical agents—irritating gases, acid and alkali vapors, organic solvents, aerosols, and chemical dust. Occupational nasal lesions remain a pressing issue, as these conditions lead to persistent functional impairments of respiration and olfactory function, decreased productivity, and a deterioration in the quality of life of workers.*

Keywords: *occupational diseases, nose, chemical factors, diagnostics, prevention, atrophic rhinitis.*

Введение

По данным ВОЗ и национальных центров гигиены труда, до 20–30 % работников химической промышленности отмечают симптомы раздражения слизистой носа, а хронический профессиональный ринит диагностируется у 10–15 % из них. По данным современных исследований (Костюченко, 2017; Watelet et al., 2020), длительное воздействие химических факторов может привести к развитию профессионального атрофического ринита, сопровождающегося стойкими функциональными нарушениями. Чаще всего заболевание встречается у работников, контактирующих с формальдегидом, аммиаком, фенолами, парами кислот и щелочей, солями тяжёлых металлов**.** Наибольший риск имеют: операторы химических производств, маляры, лакокрасочники, работники фармацевтических и резиновых цехов, лабораторные специалисты, сотрудники нефтехимических предприятий.

Согласно данным современной литературы, хронический ринит профессионального генеза чаще всего наблюдается у работников химической, лакокрасочной, фармацевтической и целлюлозно-бумажной промышленности. Наиболее значимыми химическими агентами считаются формальдегид, аммиак, хлор, сернистый ангидрид, фенолы и соединения тяжёлых металлов. Продолжительное воздействие данных веществ вызывает нарушение мукоцилиарного клиренса, метаплазию эпителия и формирование гипертрофических или атрофических изменений слизистой оболочки.

Цель исследования: изучить клинические особенности, диагностические критерии и профилактические меры при профессиональных заболеваниях носа у лиц, работающих в условиях воздействия химических факторов.

Материалы и методы

Для анализа были использованы литературные источники отечественных и зарубежных авторов за последние 10 лет, а также данные наблюдения за работниками химических, фармацевтических и лакокрасочных предприятий.

Проведён анализ клинических проявлений, данных риноскопии, цитологических и гистологических исследований, а также оценка эффективности профилактических мероприятий.

Использованы методы:

- анкетирование работников;
- клинический осмотр (передняя и задняя риноскопия, эндоскопия носа);
- цитологическое исследование мазков-отпечатков слизистой;
- функциональная оценка мукоцилиарного клиренса.
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Результаты и обсуждение

Основными химическими факторами, вызывающими профессиональные поражения слизистой носа, являются аммиак, формальдегид, сернистый ангидрид, хлор, фенолы и пары органических

растворителей. Эти вещества оказывают раздражающее, токсическое и сенсибилизирующее действие. Продолжительное воздействие химических агентов приводит к развитию хронического воспаления, нарушению барьерных и трофических функций слизистой оболочки, её атрофии или гипертрофии, на ранних стадиях заболевания отмечаются жалобы на: сухость, жжение, зуд в носу, заложенность и слизистые выделения, чихание, раздражение глаз, формированию эрозивно-язвенных изменений и перфораций носовой перегородки. При хроническом течении: постоянная сухость, образование корок, носовые кровотечения, деформация и перфорация перегородки, снижение обоняния, головные боли, ухудшение сна. Для установления связи заболевания с профессией требуется заключение профпатолога. По данным Johansson и соавт. (2019), своевременные профилактические меры снижают риск развития профессиональных заболеваний носа на 30–40%. Профилактика профессиональных поражений носа основана на снижении концентрации вредных веществ и укреплении защитных свойств слизистой.

Меры профилактики включают:

5. **Технические мероприятия:**
   - герметизация производственных установок,
   - вентиляция и вытяжные системы,
   - автоматизация технологических процессов.
6. **Организационные меры:**
   - ротация работников,
   - ограничение времени пребывания в зоне воздействия,
   - обязательные предварительные и периодические медосмотры.
7. **Индивидуальная защита:**
   - использование респираторов и фильтров,
   - промывание полости носа изотоническими растворами после смены,
   - применение мазей с витаминами А и Е для регенерации слизистой.
8. **Медицинская профилактика:**
   - санация очагов инфекции,
   - профилактическое лечение ЛОР-врачом,
   - динамическое наблюдение работников групп риска.

Выводы:

5. Профессиональные заболевания носа у работников химических производств обусловлены длительным воздействием раздражающих и токсических веществ.
6. Клиническая картина характеризуется воспалительными, атрофическими и деструктивными изменениями слизистой оболочки носа.
7. Ранняя диагностика и проведение профилактических мероприятий позволяют предупредить развитие тяжёлых форм заболевания.

8. Эффективная профилактика возможна при комплексном подходе — сочетании технических, организационных и медицинских мер защиты.

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ИНФОРМАЦИОННЫЕ И КОММУНИКАТИВНЫЕ ТЕХНОЛОГИИ

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ZAMONAVIY VIDEOKUZATUV TIZIMLARI VA YUQORI TEZLIKDAGI TELEKOMMUNIKATSIYA TARMOQLARI INFRATUZILMASIDA TOLALI-OPTIK VA OCHIQ FAZOLI OPTIK ALOQA TIZIMLARI

Annotatsiya: *Ushbu maqolada XXI asr texnologiyalari, xususan optik tolali aloqa (OTA) va videokuzatuv vositalari jamiyat hayotiga ta'siri tahlil qilinadi. Optik tolali aloqa tizimlarining afzalliklari, jumladan yuqori tezlikdagi ma'lumot uzatish, elektromagnit shovqinlardan mustaqillik, yengilligi va uzoq foydalanish muddati yoritilgan. Shuningdek, TOA (tolali optik aloqa) va OOA (ochiq optik aloqa) tizimlari tuzilishi va ishlash prinsiplari, shuningdek, videokuzatuv tizimlari bilan integratsiyasi muhokama qilinadi. Maqolada optik tolali aloqaning xavfsizlik, iqtisodiy samaradorlik va telekommunikatsiya sohasidagi istiqbollari, kamchiliklari va rivojlanish imkoniyatlari ham ko'rsatib o'tilgan.*

Kalit so'zlar: *Optik tolalar, Tolali optik aloqa (TOA), Ochiq fazodagi optik aloqa (OOA), Axborot uzatish tizimi, Videokuzatuv (CCTV), Turbo HD va IP kameralar, Optik fotodetektor, Keng polosali signal uzatish, Telekommunikatsiya tarmoqlari, Foton texnologiyasi.*

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FIBER-OPTIC AND FREE-SPACE OPTICAL COMMUNICATION SYSTEMS IN THE INFRASTRUCTURE OF MODERN VIDEO SURVEILLANCE AND HIGH-SPEED TELECOMMUNICATION NETWORKS

Abstract: *The article analyzes the impact of 21st-century technologies, particularly fiber-optic communication (FOC) and video surveillance systems, on society. The advantages of fiber-optic communication systems are highlighted, including high-speed data transmission, immunity to electromagnetic interference, low weight, and long service life. The structure and operating principles of FOC and FSOC (Free-Space Optical communication) systems are examined, along with their integration with video surveillance systems. The paper also identifies prospects, shortcomings, and development opportunities for fiber-optic*

communication in the fields of security, economic efficiency, and telecommunications.

Keywords: *optical fiber, fiber-optic communication, free-space optical communication, data transmission system, video surveillance, Turbo HD and IP cameras, optical receiver, broadband signal transmission, telecommunication networks, photonic technology*

Kirish

XXI asrda texnika vositalarining jamiyatning barcha soxalariga sezilarli darajada tezlik bilan kirib kelishi o'z ta'sirini ko'rsatib kelmoqda.

"XXI asr texnika va texnologiyalar asri" bo'lganligi barcha sohalarga sezilarli darajada o'z ta'sirini ko'rsatmoqda. Ana shu texnika sohasida erishilayotgan yutuqlar tufayli bugungi kunda mavjud bo'lgan barcha muammolar o'z yechimini tez fursatlarda topmoqda. Jonajon yurtimiz O'zbekiston Respublikasida ham keying yillarda texnika va texnologiyalardan jamiyatning barcha sohalarida samarali foydalanib bir qancha noxushliklar oldi olinmoqda. Texnika mo'jiza tufayli meditsina, ishlab chiqarish, maishiy xizmat ko'rsatish, ta'lim sohalari juda ham tez rivojlanayotgani buning yaqqol namoyondasidir.

Respublikamizning barcha hududlarida yurtimizni tinchligini ta'minlash borasida videokuzatuvlar qo'yilgan bo'lib, ularning yordamida:

- huquq buzarlik holatlari vaqtida aniqlanib ularni oldini olish choralari ko'rilmoqda;
- banklar, supermarketlar, qurilish maydonlar, avtoturaugohlar, mehmonxonalar va honadonlarda o'g'iriliklar fosh etilmoqda;
- kadrlar hamda ishlab chiqarish bilan bog'liq bo'lgan turli hildagi baxsli vaziyatlar ijobiy hal etilib borilmoqda;
- hodimlarning ish jarayonlaridagi o'zini tutayotgan holatlarini nazorat qilish chora tadbirlari ko'rilmoqda;
- yo'l chorraxalariga o'rnatilayotgan kameralar orqali yo'l qoida buzarliklari aniqlanib yo'l transport hodisalari oldi olinib, bunday hodisalar soni keskin pasaymoqda.

Zamonaviy davr jamiyatni axborotlashtirish jarayonini keskin rivojlanishga olib kirmoqda. Bu jarayon axborot-kommunikatsiyalar xizmatlaridan foydalanuvchilarni telekommunikatsiyalar tarmoqlariga yuqori tezlik bilan (kengpolosali) ulanishga undaydi. Bunday talab Internetdan foydalanuvchilarning keskin o'sib borishi va multimedia, videokonferentsiya, elektr raqamli imzodan foydalanish, elektrontijorat, elektron xujjat aylanish va boshqa birqancha zamonaviy xizmatlarni hayotga kirib kelishidan chiqib kelyapti.

Ma'lumki, yuqori tezlikdagi signallarni uzatish va qabul qilib olish uchun yuqori darajada o'tkazish qobiliyatiga ega bo'lgan yo'naltiruvchi muhit bo'lishi kerak. Bunday talablarga javob beradigan optik aloqa vositalariga teng keluvchi vositalar hozirgi kunda mavjud emas. Bundan tashqari, optik aloqa tizimlari orqali katta hajmdagi axborotlarni xoxlagan masofalarga uzatish mumkin.

Shuning uchun optik aloqa jamiyatni axborotlashtirish jarayonini rivojlantiruvchi mukammal va istiqbolli aloqa vositasi hisoblanadi.

Foton texnologiyasi asosidagi optik aloqa (OA), ya'ni to'liq optik tarmoqlar AON (All-optical Networks) telekommunikatsiya tarmoqlarining kelajagi hisoblanadi. To'liq optik aloqa magistral tarmoqlarni, shuningdek abonentlarning tarmoqqa ulanishini ham qamrab, mijozlarning telekommunikatsiya tarmoqlariga keng polosali ulanishlarini ta'minlaydi. Foton texnologiyasi asosidagi to'liq optik aloqada kommutatsiya, multipleksorlash va regeneratsiyalash optoelektron yoki elektro optik emas, balki faqat optik texnologiya asosida amalga oshiriladi. Bu bilan qurilmaning texnik iqtisodiy ko'rsatkichlari, ishonchliligi va uzatish tezligi bir necha martaga oshadi. Foton texnologiyasini aloqa tarmoqlariga tadbiq etishda optik kommutatorlar, optik regeneratorlar, kuchaytirgichlar, filtrlar, spektr bo'yicha zichlashtirish tizimlari qo'llaniladi.

Optik aloqa (OA) bu axborot yorug'lik nuri ko'rinishida optik tola bo'ylab yoki ochiq fazoatmosferada uzatiladigan aloqa turidir. Axborot tola orqali uzatilsa, tolali optik aloqa (TOA), ochiq atmosferada uzatilsa, ochiq optik aloqa (OOA) deyiladi.

TOA tarmog'i - bu tugunlar orasi optik aloqa liniyalari orqali bog'langan aloqa tarmog'idir.

Axborotni TOA liniyalari orqali uzatish mis kabellar va boshqa uzatish muhitlariga qaraganda bir qancha afzalliklarga ega. Shu afzalliklari tufayli TOA dan nafaqat telefon aloqasini tashkil etishda, balki televideniyada, videokuzatuv vositalaridagi ma'lumotlarni uzatishda, ovoz eshittirishlarini uzatishda, hisoblash texnikasida, transport vositalarida va boshqa sohalarda keng foydalanilmoqda.

TOAda uzatish kanali sifatida qo'llaniladigan optik tolalarning afzalliklari quyida keltirilgan:

- o'tkazish oralig'i keng. Bu tashuvchi chastotasining juda yuqoriligi (1014)Gts bilan tushuntiriladi.

Bitta optik tola bo'ylab sekundiga bir necha terabit axborotlar oqimini uzatish imkoniyati mavjud. O'tkazish oralig'ining kengligi optik aloqaning mis va boshqa axborot uzatish muhitlaridan ustun turuvchi eng muhim afzalligidir.

- optik tolada yorug'lik signallarining kam so'nishi.Xozirgi kunda ko'plab kompaniyalar tomonidan ishlab chiqarilayotgan optik tolalar 1 kanal kilometr hisobida 1,55 mkm to'lqin uzunligida 0,2-0,3 dB/km so'nishga ega. So'nish va dispersiya qiymatlarining kichikligi optik signallarni aloqa liniyalari bo'ylab regeneratsiyasiz 100 km va undan uzoq masofalarga uzatish imkonini beradi.

- shovqin sathining kichikligi optik tolaning o'tkazish qobiliyatini oshiradi. Shovqindan himoyalanganligi yuqori. Optik tola dielektrik materiallar – kvarts, ko'p tarkibli shisha, polimerlardan tayyorlanganligi uchun u elektromagnit nurlanishni induktsiyalash xususiyatiga ega, atrofidagi mis kabelli tizim va elektr qurilmalarning (elektr uzatish liniyalari, elektrodvigatelli uskuna va boshqalar) tashqi elektromagnit shovqinlariga ta'sirchan emas. Shuningdek, ko'p tolali optik

kabellarda ko’p juftli mis kabellarga xos elektromagnit nurlanishlarning o’zaro ta’siri kabi muammolar yuzaga kelmaydi.

Bu afzalligi tufayli optik kabellardan ishlab chiqarish korxonalarida, boshqaruv markazlarida, samolyot va kema kabi transport vositalarida foydalangan ma’quldir. Chunki shu kabi kichik joylarda ham energetik qurilmalar, ham avtomatika va teleboshqaruv tizimlari, ham ko’p sonli abonent qurilmalaridan iborat tarmoqlangan aloqa tarmoqlari joylashgan bo’ladi. Bunday holatda elektromagnit va o’zaro shovqinlar yuzaga keladi. Optik kabellarning esa bunday shovqinlarga ta’sirchan emasligini aytib o’tdik.

Yengilligi, hajmi va o’lchamlarining kichikligi. Optik kabellar mis kabellar bilan solishtirilganda, ancha yengil va hajmi kichik. Masalan, 900 juftli 7,5 sm diametrli mis telefon kabeli 0,1sm diametrli bitta optik tola bilan almashtirilishi mumkin. Agar optik tola bir necha himoya qobiqlaridan iborat va bron po’lat lenta bilan qoplangan bo’lsa, bunday tola diametri 1,5 sm ga teng bo’ladi, bu esa ko’rilayotgan mis kabel diametridan bir necha marta kichik.

Optik tolaning bu afzalligi optik kabelli liniya traktlarini qurishda ancha yengilliklar yaratadi. Yengilligi va o’lchamining kichikligi tufayli optik tolaning samolyot, vertolyot va boshqa transport vositalarida ishlatilishi optik aloqaning juda muhim yutug’idir. Masalan, axborotlarni yig’ish va boshqarish vazifalarini bajarish uchun maxsus jihozlangan samolyotlarda bog’lovchi kabellar og’irligini 1 tonnadan ortiq kamaytiradi.

Aloqaning mahfiyligi. Tolali optik kabellar radio diapazonida umuman nur uzatmasligi sababli, undan uzatilayotgan axborotni uzatib-qabul qilishni buzmasdan ruxsatsiz tashqi ulanishlarda eshitish juda qiyin.

Optik aloqa liniyasining monitoring tizimi (uzluksiz nazorat) tolaning yuqori sezgirlik xususiyatini qo’llab, darhol ruxsatsiz tashqaridan eshitilayotgan aloqa kanalini o’chirishi va xavf (trevoga) signalini uzatishi mumkin.

Tarqaluvchi optik signallarning interferentsiya effektini qo’llovchi tizimlar tebranishlarga, bosimning ozgina og’ishlariga sezuvchanligi juda yuqori. hukumat, bank va ma’lumotlar himoyasiga yuqori talablar qo’yiladigan boshqa maxsus xizmatlarning aloqa liniyalarini tashkil etishda bunday tizimlar ayniqsa zarurdir.

Yong’indan himoyalangan. Optik tolada uchqun hosil bo’lmasligi kimyoviy, neftni qayta ishlovchi korxonalarda, portlash va yong’in xavfi mavjud bo’lgan binolarda xavfsizlikni oshiradi.

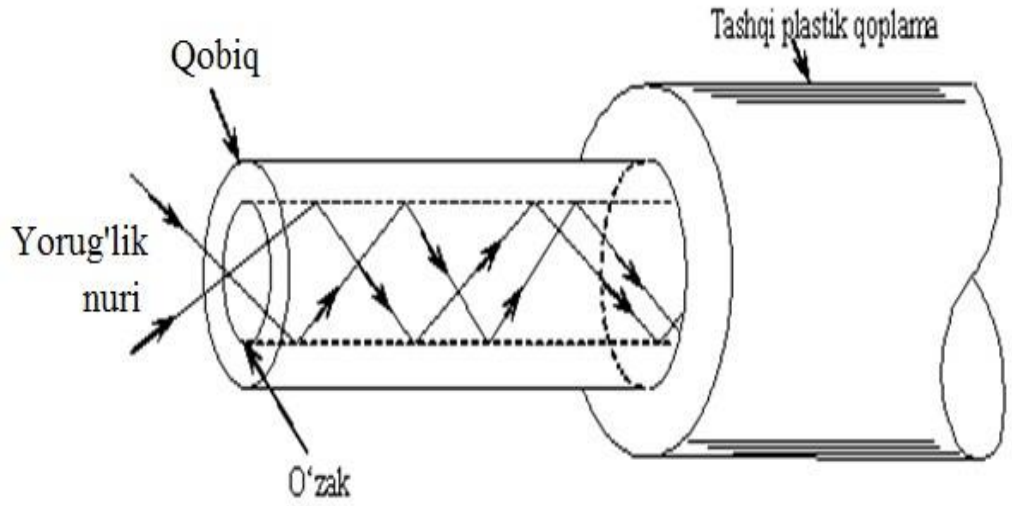
Iqtisodiy samarador. Optik tola kvartsdan ishlab chiqariladi. Uning asosini tabiatda keng tarqalgan kremniy ikki oksidi - SiO2 tashkil etadi. Demak, tolali optik kabellarni ishlab chiqarish uchun noyob rangli metall sarflanmaydi. Mis va qo’rg’oshinning dunyoviy zahiralari chegaralangan hozirgi vaqtda noyob bo’lmagan mahsulotga o’tish kabelli aloqa texnikasining kelgusi rivojlanishi uchun muhim omil hisoblanadi. Natijada optik kabellarning narxi mis kabellarga nisbatan arzonlashadi.

Tolali optik kabellar signallarni uzoq masofalarga retranslyatsiyasiz uzatish imkonini beradi. Uzoq masofali aloqa liniyalarida optik kabellarning qo’llanilishi retranslyatorlar soni qisqarishiga olib keladi. Natija sarf harajatlar har kamayadi.

Foydalanish muddati uzoq. Tola vaqt o’tgan sari eskiradi, ya’ni yotqizilgan kabellarda so’nish astasekin oshib boradi. Biroq optik tola ishlab chiqarishning zamonaviy texnologiyalarining mukammallashuvi bu jarayonni sekinlashtiradi va foydalanish muddatini uzaytiradi. Tolali optik kabellardan foydalanish muddati taxminan 25 yilni tashkil etadi.

Masofaviy elektr ta’minotga ega ekanligi. Ba’zi hollarda tarmoq tugunlarining masofaviy elektr ta’minoti talab etiladi. Buni optik tola orqali amalga oshirib bo’lmaydi. Bu holda optik tola bilan birgalikda mis o’tkazish elementi bilan jihozlangan aralash kabellardan foydalanish mumkin. Bunday kabellar ko’pgina mamlakatlarda keng qo’llaniladi.

Hozirgi kunda turli vazifali va tuzilishli optik tola va kabellar ishlab chiqarilmoqda. Keng polosali uzoq aloqa tizimlari, jumladan magistral aloqa uchun toladan faqatgina asosiy to’lqin tarqaladigan bir modali kabellarning yangi turlari ishlab chiqarilmoqda. Magistral aloqa liniyalarida signal uzatishda tolaning so’nish va dispersiya parametrlariga ham yuqori talablar qo’yiladi. Bundan tashqari, optik nurlanish qutblanishi saqlanishini ta’minlovchi tolalar ham ishlab chiqarilmoqda.



1.1 – rasm. Optik tolaning tuzilishi

Magistral aloqada qo’llaniladigan bunday kabellarni ishlab chiqish murakkab

va qimmat. Bunday kabellar qo’llanilganda lazer uzatgichlardan foydalaniladi. Lazer uzatgichlarga ham nurlanish spektrining tozaligiga, nurlanish tasvirlarining barqarorligiga yuqori talablar qo’yiladi.

Tezligi 100 Mbit/s gacha bo’lgan va aloqa masofasi chegaralangan (taxminan 10 km gacha) tizimlarda nisbatan arzon va oxirgi qurilmalar bilan oson moslashadigan ko’p modali kabellardan foydalangan ma’qul. Bunda to’lqin manbai sifatida ko’p modalarni nurlantiruvchi oddiy turdagi yarim o’tkazgich yorug’lik diodlarini ishlatish mumkin.

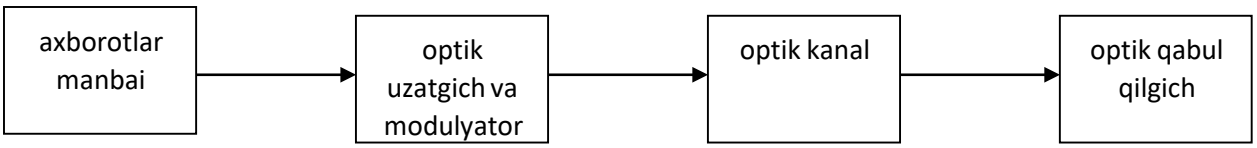
Yangi turdagi optik tolalarning (siljigan dispersiyasi nolga teng bo'lmagan), keng polosali kvant optik kuchaytirgichlarning yaratilishi to'liq optik tizim va optik traktlarni qurish imkoniyatini yaratmoqda. Bunday texnologiyalardan 100 va 1000 Gbit/s o'tkazish oraliqli tizimlarni yaratishda foydalaniladi.

TOA bir qancha afzalliklarga ega bo'lishiga qaramay, kamchiliklari ham mavjud. Bu TOA qurilmalarining qimmatligi va ba'zi optik texnologiyalarning mukammal darajaga etmaganligi bilan tushuntiriladi. Bunga bog'liq holda quyidagi kamchiliklarni aytish mumkin:

- element bazasining qimmatligi. Optik uzatgich va qabul qilgichlarning narxi qimmat. Ayniqsa lazer nurlanish manbalarining narxi qimmat va xizmat qilish muddati chegaralangan. Shuningdek passiv optik qurilmalarni (multipleksor, kommutator, attenyuator va boshqalar) ishlab chiqarish ham katta sarfxarajatlarga olib keladi;
- tolali optik aloqa liniyalarini montaj qilish va xizmat ko'rsatishning murakkabligi. Elektr kabelli tizimlarga nisbatan optik kabelli tizimlarni qurish, undan texnik foydalanish, o'lchov va montaj ishlari murakkab bo'lib, juda yuqori malakani talab etadi;
- tolani maxsus himoyalash zaruriyati. Mikroyoriqlarda signallarning yo'qolmasligi uchun tolani ortiqcha yuklash va bukilishlardan himoyalash kerak. Maxsus himoyalashni tashkil etish, ishonchlilikni oshirish maqsadida optik tolani ishlab chiqarish jarayonida tola epoksiakrilad asosidagi maxsus lak bilan qoplanadi. Bundan tashqari, kabel maxsus po'lat tross va shisha plastik sterjenlar hisobiga yanada mustahkamlanishi mumkin.

Bularning barchasi optik kabel narxini oshiradi. Bu kamchiliklar OA texnologiyasining kelgusi rivojlanishida qisman yoki to'liq bartaraf etiladi.

OA da axborotlarni yorug'lik yoki optik signallar ko'rinishida uzatish va qayta ishlash amalga oshiriladi. OA uchun yorug'lik nurlanishi va to'lqin uzunligi turini tanlash uzatilayotgan axborot xarakteriga, shuningdek nurlanish hosil qilish imkoniyalariga, undan signal shakllanishiga, yorug'lik to'lqinini uzatish va qayta ishlashga va nihoyat, axborotga ega signalni qabul qilishga bog'liq. OA tizimining umumlashgan tuzilish sxemasi 1.2 – rasmda keltirilgan. Sxema OA ning turlari TOA va OOA ga xos standart bloklardan (elementlardan) tashkil topgan.



1.2 – rasm. OA tizimining umumlashgan tuzilish sxemasi.

Axborotlar manbaidan uzluksiz yoki raqamli signallar beriladi. So'ng signallar yorug'lik oqimitashuvchi chastotaning elektromagnit tebranishlarini

modulyatsiyalaydi. So’ng yorug’lik nuri ko’rinishidagi optik signallar uzatuvchi muhit - optik kanal orqali tarqaladi.

Uzatuvchi muhit yuqorida aytib o’tilgandek ochiq fazo, atmosfera, ya’ni OOA liniyasi yoki TOA liniyasi bo’lishi mumkin. Uzatilgan axborotlar optik qabul qilgich demodulyatorida demodulyatsiyalanadi. Demodulyatorning asosiy elementi optik fotodetektor hisoblanadi. Signallarni uzoq masofalarga uzatishda, qachonki qabul qilgich kirishida signal/shovqin nisbati talab darajasidan past bo’lganda, liniyada retranslyatorlar o’rnatiladi.

Xulosa qilib aytganda tolali optik aloqa yuqori tezlikdagi signallarni uzatish va qabul qilib olish uchun yuqori darajada o’tkazish qobiliyatiga ega. Bunday talablarga javob beradigan ya’ni optik aloqa vositalariga teng keluvchi vositalar hozirgi kunda mavjud emas. Bundan tashqari, optik aloqa tizimlari orqali katta hajmdagi axborotlarni xoxlagan masofalarga uzatish mumkin.

Shuning uchun optik aloqa jamiyatni axborotlashtirish jarayonini rivojlantiruvchi mukammal va istiqbolli aloqa vositasi hisoblanadi hamda u videokuzatuvlar Turbo HD kameralar, IP kameralar va videoregistratorlar bilan aloqani ta’minlashda hamda axborotlarni uzatish va qabul qilishda keng qo’llanilmoqda. Haqiqatdan ham texnika mo’jizasi bizning hayotimizning har bir jabhasini o’ziga qamrab olgan. Xozirgi tezlashgan zamonimizda texnika yutuqlarining meditsina sohasiga kirib kelishi chinakam yana bir maqtovli hodisadir. Sababi shundaki texnika sohasidagi yutuqlar kashfiyotlar tufayli minglab insonlar hayoti saqlanib qolmoqda, turli hil kasalliklar oldi olinib, kerakli vaksinalar yaratilmoqda.

Bugungi kungi kunda texnika bizning hamrohimizga, yordamchimizga, mushkulimizni oson qilishga, insonlarning manfaatini himoya qilishga ulgurgan.

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YARIMO’TKAZGICHLI MATERIALLARNING HOZIRGI KUNDAGI O’RNI VA RIVOJLANISHI

Annotatsiya. *Yarim o‘tkazgichli materiallar zamonaviy elektronika, axborot texnologiyalari, energetika va telekommunikatsiya sohalarining asosiy tayanchidir. Ularning elektr o‘tkazuvchanligi tashqi ta’sirlar (harorat, yorug‘lik, elektr maydoni, kimyoviy qo‘shimchalar) orqali boshqarilishi mumkinligi sababli, ular an’anaviy o‘tkazgich va dielektrik materiallar o‘rtasidagi oraliq xususiyatga ega bo‘lgan noyob sinf sifatida e’tirof etiladi.*

Kalit so‘zlar*: harorat, yorug’lik, elektr, maydon, telekommunikatsiya, o‘tkazgich, dielektrik, texnologiya.*

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THE CURRENT ROLE AND DEVELOPMENT OF SEMICONDUCTOR MATERIALS

Abstract. *Semiconductor materials are the fundamental basis of modern electronics, information technologies, energy, and telecommunications. Due to their ability to have electrical conductivity controlled by external influences (temperature, light, electric field, chemical dopants), they are recognized as a unique class of materials with intermediate properties between traditional conductors and dielectrics.*

Keywords: *temperature, light, electric, field, telecommunications, conductor, dielectric, technology.*

Yarim o‘tkazgichli materiallar zamonaviy elektronika, axborot texnologiyalari, energetika va telekommunikatsiya sohalarining asosiy tayanchidir. Ularning elektr o‘tkazuvchanligi tashqi ta’sirlar (harorat, yorug‘lik, elektr

maydoni, kimyoviy qo‘shimchalar) orqali boshqarilishi mumkinligi sababli, ular an’anaviy o‘tkazgich va dielektrik materiallar o‘rtasidagi oraliq xususiyatga ega bo‘lgan noyob sinf sifatida e’tirof etiladi [1]. Hozirgi kunda yarim o‘tkazgichlar global iqtisodiyotning strategik resursiga aylangan bo‘lib, sun’iy intellekt, kvant hisoblash, IoT, kosmik texnologiyalar va yashil energetika kabi sohalarda asosiy innovatsion o‘zgarishlarni belgilab bormoqda.Kremniy (Si) – eng keng qo‘llaniladigan material bo‘lib, mikrochiplar, diodlar, tranzistorlar va quyosh panellari ishlab chiqarishning asosiy komponentidir.Germaniy (Ge) – yuqori haroratlarda yaxshi o‘tkazuvchanlikni saqlaydi, ko‘pincha kremniy bilan aralash holda (SiGe) ishlatiladi.Galliy arsenidi (GaAs) – yuqori chastotali qurilmalar, lazerlar va LED texnologiyalarida qo‘llanadi.Galliy nitridi (GaN) – yuqori quvvatli elektronika va 5G texnologiyalarida strategik ahamiyatga ega.Indiy fosfidi (InP) – optik tolali aloqa tizimlari uchun asosiy materiallardan. Yangi avlod 2D-materiallar.Grafen, MoS_2, h-BN — atom darajasida yupqa struktura, yuqori elektron harakatchanligi va moslashuvchan elektronika uchun katta salohiyatga ega [2]. Bugungi barcha kompyuterlar, smartfonlar va IoT qurilmalarning markazida yarim o‘tkazgichli tranzistorlar turadi. Tranzistorlarning nanometr miqyosiga qisqarishi (3 nm, 2 nm texnologiyalar) energiya samaradorligi va hisoblash tezligini oshirmoqda. 5G va 6G texnologiyalari yuqori chastotali aloqa tizimlari uchun GaN va GaAs materiallariga tayanadi. Bu materiallar yuqori quvvat va haroratga chidamliligi bilan ajralib turadi. Kremniy asosidagi fotovolt panellardan tashqari, perovskit yarim o‘tkazgichlar energiya samaradorligini 30% dan yuqoriga ko‘tarish imkonini bermoqda. Yarim o‘tkazgichlar biometrik sensorlar, rentgen detektorlari, tibbiy qurilmalar, laboratoriya chiplari (Lab-on-Chip) ishlab chiqarishda asosiy rol o‘ynaydi [3]. Litografiya usullarining takomillashishi (EUV) tranzistorlarning yanada kichrayishiga imkon bermoqda. Bu esa quvvat sarfi va hisoblash tezligining mutanosib ravishda o‘sishini ta’minlaydi. Kremniy kvbitlar, topologik materiallar va supero‘tkazuvchilar asosida kvant integratsiyalangan sxemalar ishlab chiqilmoqda. Grafen va MoS_2 asosidagi moslashuvchan sensorlar tibbiy monitoring, smart-matolar va IoT qurilmalarda keng qo‘llanishi kutilmoqda [4]. Yarim o‘tkazgichlarning ishlab chiqarish jarayonida energiya tejamkorlik, qayta ishlash (recycling) va ekologik toza materiallarga o‘tish bo‘yicha tadqiqotlar kuchaymoqda. AI chip dizaynini optimallashtirishda avtomatlashtirilgan tizimlar qo‘llanmoqda. Bu yangi materiallar va arxitekturalarning tezroq sinovdan o‘tishiga imkon bermoqda [5].

Xulosa

Yarim o‘tkazgichli materiallar XXI asr texnologik taraqqiyotining markazida turibdi. Ularning o‘rni faqat mikroelektronika bilan cheklanib qolmay, balki energetika, tibbiyot, aloqa, transport va ilmiy tadqiqotlar kabi ko‘plab sohalarda kengayib bormoqda. Yangi avlod materiallari – 2D strukturalar, perovskitlar, GaN va SiC kabi birikmalar – yaqin yillarda global iqtisodiyotning strategik ustunlaridan biriga aylanadi [6]. Shunday qilib, yarim o‘tkazgichlar hozirgi texnologik inqilobning eng muhim drayveri bo‘lib xizmat qilmoqda va kelajak innovatsion yechimlarining asosiy poydevorini tashkil etadi.

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Yarimo‘tkazgichlarning elektron xossalari, diodlar, tranzistorlar va mikroelektronikaning zamonaviy yutuqlari haqida batafsil ma’lumot beradi. Oliy o‘quv yurtlarida keng qo‘llaniladi.
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ELEKTRON ASBOBLARNING HOZIRGI KUNDAGI O'RNI VA AHAMIYATI

Annotatsiya. *XXI asr boshidan boshlab elektronika texnologiyasi jadal sur’atlar bilan rivojlanib, insoniyat hayotining deyarli barcha jabhalarini tubdan o‘zgartirdi. Bugungi kunda elektron asboblar nafaqat maishiy qulayliklar yaratish, balki iqtisodiyot, tibbiyot, ta’lim, sanoat, transport, xavfsizlik va ilm-fan taraqqiyotining asosiy omili sifatida namoyon bo‘lmoqda.*

Kalit so‘zlar*: tibbiyot, ta’lim, sanoat, transport, xavfsizlik, iqtisodiyot, texnologiya, electron.*

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THE PLACE AND IMPORTANCE OF ELECTRONIC TOOLS TODAY

Abstract. *Since the beginning of the 21st century, electronic technology has developed rapidly and fundamentally changed almost all aspects of human life. Today, electronic devices are not only the creation of household conveniences, but also appear as the main factor in the development of economy, medicine, education, industry, transport, security and science.*

Key words: *medicine, education, industry, transport, security, economy, technology, electronics.*

XXI asr boshidan boshlab elektronika texnologiyasi jadal sur’atlar bilan rivojlanib, insoniyat hayotining deyarli barcha jabhalarini tubdan o‘zgartirdi. Bugungi kunda elektron asboblar nafaqat maishiy qulayliklar yaratish, balki iqtisodiyot, tibbiyot, ta’lim, sanoat, transport, xavfsizlik va ilm-fan taraqqiyotining asosiy omili sifatida namoyon bo‘lmoqda. Elektron komponentlar, mikroprotsessorlar, sensorlar, raqamli qurilmalar va axborot-kommunikatsiya texnologiyalarining integratsiyalashuvi global tizimlarning ishlashini samarali tashkil etishga imkon bermoqda. Shu sababli elektron asboblarning ahamiyati zamonaviy jamiyatning barqaror rivojlanishida hal qiluvchi o‘ringa ega [1].

Elektronika tarixi vakuum lampalar davridan boshlab yarim o‘tkazgichlar, tranzistorlar, integral sxemalar, mikroprotsessorlar va hozirgi kunda sun’iy intellekt boshqaruvida ishlovchi tizimlargacha bo‘lgan murakkab evolyutsion jarayonni o‘z ichiga oladi. Ayniqsa, **MOSFET tranzistorlar**, **mikrokontrollerlar**, **FPGA** va **ASIC** arxitekturalarining yaratilishi kompyuterlar, smartfonlar, ma’lumotlar markazlari va raqamli sanoatning rivojlanishini ta’minladi. Elektron qurilmalar quyidagi asosiy elementlar orqali ishlaydi:

Sensorlar – fizik kattaliklarni raqamli yoki analog signallarga aylantiradi.

Aktuatorlar – boshqaruv signallariga javoban mexanik harakat bajaradi.

Mikroprotsessorlar va mikrokontrollerlar – ma’lumotlarni qayta ishlaydi.

Aloqa modullari (Wi-Fi, Bluetooth, 4G/5G) – qurilmalararo axborot almashinuvi.

Energiya manbalari (batareya, quyosh panellari, zaryadlash tizimlari).

Ushbu elementlarning uyg‘un ishlashi zamonaviy elektron qurilmalarning asosiy funksionalligini ta’minlaydi. Bugungi kunda har bir uy xo‘jaligi elektron qurilmalarsiz tasavvur etib bo‘lmaydi. **Aqlli uy tizimlari** energiya samaradorligini oshirish, xavfsizlikni ta’minlash va masofadan boshqaruvni amalga oshirish imkoni bilan ahamiyatlidir. Elektron asboblarning tibbiyotdagi ahamiyati ayniqsa yuqori [2]. Quyidagi qurilmalar inson salomatligini nazorat qilish va davolashda katta rol o‘ynaydi:

EKG, EEG, MRT, KT kabi diagnostik apparatlar

Robotlashtirilgan jarrohlik tizimlari

Insulin pompalar, yurak stimulyatorlari

Telemeditsina va masofaviy monitoring qurilmalari

Sensorlar va mikroprotsessorlarning rivojlanishi tibbiy diagnostika aniqligini sezilarli oshirdi. Elektronika **“Raqamli sanoat – 4.0”** konsepsiyasining markazida turadi. Oktyuatrlar va sensorlar bilan jihozlangan **avtomatlashtirilgan ishlab chiqarish liniyalari** ishlab chiqarish samaradorligini oshiradi, inson omili sababli yuzaga keladigan xatolarni kamaytiradi [3].

Sanoatda quyidagi elektron tizimlar keng qo‘llaniladi:

PLC va SCADA boshqaruv tizimlari

Industrial robotlar

IoT (Internet of Things) qurilmalari

3D printerlar va lazer kesish texnologiyalari

Zamonaviy transport tizimi elektronika bilan to‘la integratsiyalashgan:

Avtomobillarning elektron boshqaruv bloklari (ECU)

Avtonom transport tizimlari rivojlanishi kelajakda transport xavfsizligi va logistika samaradorligini keskin oshirishi kutilmoqda. Elektron o‘quv vositalari learning management systems (LMS), elektron kutubxonalar, interaktiv doskalar, virtual laboratoriyalar, sun’iy intellekt yordamida adaptiv o‘quv platformalari ta’lim sifatini oshirmoqda. Elektron texnologiyalar ishlab chiqarish xarajatlarini kamaytiradi, mahsuldorlikni oshiradi va raqobatbardosh mahsulotlar yaratish imkonini beradi. Mikroelektronika sohasi global iqtisodiyotning asosiy

drayverlaridan biri bo‘lib, elektronika eksporti ko‘plab davlatlar iqtisodiy barqarorligida muhim rol o‘ynaydi. Elektron asboblar ish jarayonlarini avtomatlashtirib, xodimlarning takroriy vazifalardan ozod bo‘lishiga yordam beradi. Bu esa intellektual mehnatga ko‘proq vaqt ajratish, innovatsion g‘oyalarni ishlab chiqish imkonini yaratadi [4]. Elektron kommunikatsiya vositalari – internet, videokonferensiyalar, ijtimoiy tarmoqlar – jamiyatda tezkor axborot almashinuvi, masofaviy xizmatlar, global hamkorlik imkoniyatlarini ochdi.

Elektron hukumat (e-government) tizimlari ham davlat xizmatlarining shaffofligini va tezkorligini oshirmoqda. Ko‘plab elektron asboblar AI bilan jihozlanmoqda. Bu qurilmalarning o‘z-o‘zini o‘rganish, foydalanuvchi xatti-harakatiga moslashish, murakkab jarayonlarni mustaqil boshqarish qobiliyatini oshirmoqda. IoT qurilmalari o‘zaro ulanish orqali yagona ekotizim hosil qiladi. Aqlli shahar (Smart City), aqlli qishloq xo‘jaligi, aqlli energiya tarmoqlari shular jumlasidandir.

Xulosa

Elektron asboblarning hozirgi kundagi o‘rni va ahamiyati beqiyosdir. Ular kundalik turmushdan tortib, murakkab sanoat jarayonlarigacha bo‘lgan barcha sohalarda asosiy boshqaruv va nazorat vositasi sifatida faoliyat yuritadi. Elektronika texnologiyalarining tezkor rivojlanishi jamiyatning ilmiy, iqtisodiy va ijtimoiy taraqqiyotini ta’minlaydi. Shu bois elektronika sohasida ilmiy izlanishlarni kengaytirish, innovatsion yondashuvlarni qo‘llab-quvvatlash va yosh avlodni ushbu yo‘nalishda bilimli va malakali mutaxassis sifatida tayyorlash dolzarb ahamiyat kasb etadi.

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ELEKTRONIKANING RIVOJLANISHI TARIXI, BOSQICHLARI VA ZAMONAVIY TENDENSIYALARI

Annotatsiya*. Elektronika bugungi kunda faqat texnik qurilmalar majmui bo‘libgina qolmay, balki iqtisodiyot, sanoat, tibbiyot, transport, aloqa va kundalik hayotning ajralmas qismiga aylangan global tizimdir. Kompyuterlar, smartfonlar, sun’iy intellekt tizimlari, sun’iy yo‘ldoshlar, avtomatlashtirilgan ishlab chiqarish liniyalari — bularning barchasi elektronika yutuqlariga asoslanadi. Maqolada elektronikaning shakllanish tarixi, asosiy bosqichlari va hozirgi zamon rivojlanish yo‘nalishlari tahlil qilinadi.*

Kalit so‘zlar*: tahlil, global, transport, tibbiyot, sanoat, smartfonlar,intellect, sun’iy, iqtisodiyot.*

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HISTORY, STAGES AND MODERN TRENDS OF THE DEVELOPMENT OF ELECTRONICS.

Abstract. *Today, electronics is not only a set of technical devices, but also a global system that has become an integral part of economy, industry, medicine, transport, communication and everyday life. Computers, smartphones, artificial intelligence systems, satellites, automated production lines - all these are based on advances in electronics. The article analyzes the history of the formation of electronics, its main stages and current directions of development.*

Key words: *analysis, global, transport, medicine, industry, smartphone, intellect, art, economics.*

Insoniyat taraqqiyotining so‘nggi yuz yillikdagi eng muhim omillaridan biri elektronika sohasining rivojlanishidir. Elektronika bugungi kunda faqat texnik qurilmalar majmui bo‘libgina qolmay, balki iqtisodiyot, sanoat, tibbiyot, transport, aloqa va kundalik hayotning ajralmas qismiga aylangan global tizimdir [1]. Kompyuterlar, smartfonlar, sun’iy intellekt tizimlari, sun’iy yo‘ldoshlar, avtomatlashtirilgan ishlab chiqarish liniyalari — bularning barchasi elektronika

yutuqlariga asoslanadi. Maqolada elektronikaning shakllanish tarixi, asosiy bosqichlari va hozirgi zamon rivojlanish yo‘nalishlari tahlil qilinadi.

Elektronika rivojlanishining boshlanishi XVIII—XIX asr olimlarining elektr hodisalarini o‘rganishidan boshlandi. Benjamin Franklin, Andre-Marie Ampere, Maykl Faraday kabi olimlarning tadqiqotlari elektr hodisalarini tushunish uchun asos yaratdi.

XXI asrning boshida mobil aloqa texnologiyalari keskin o‘sdi. 2G, 3G, 4G va bugungi 5G tarmoqlari yuqori tezlikda ma’lumot uzatishni ta’minladi. Smartfonlar esa kameralar, sensorlar, kompyuter, radio va Internet funksiyalarini birlashtirgan universal qurilmaga aylandi [2]. Bugungi kunda smartfonlar dunyo aholisining 70% dan ortig‘ida mavjud bo‘lib, elektronika inson hayotining barcha jabhalariga kirib borgan.

So‘nggi yillarda sun’iy intellekt (AI) texnologiyalari elektronika bilan birlashib, yangi avlod qurilmalarini yaratmoqda. Quyidagilar AI–elektronika integratsiyasining asosiy yo‘nalishlaridir:

avtonom robotlar,
aqlli uy tizimlari,
ovozli yordamchilar,
tibbiy diagnostika apparatlari,
AI–asosli dronlar.

Bundan tashqari, neyrochiplar — inson miyasi faoliyatini o‘rganish yoki tiklash uchun implantant qurilmalar — sog‘liqni saqlash sohasida katta imkoniyatlarni ochmoqda [3].

Kvant elektronika kvant holatlaridan foydalanadigan qurilmalarni o‘z ichiga oladi. Kvant kompyuterlari, kvant sensorlar va kvant kriptografiya tizimlari bugungi kunda faol rivojlanmoqda [4]. Ular yordamida:

hisoblash tezligi trillion martagacha oshishi,
aloqa xavfsizligi mutlaqo yangi bosqichga ko‘tarilishi,
murakkab ilmiy masalalarni soniyalar ichida yechish
mumkin bo‘ladi.

Nanoelektronika elektron elementlarni nanometr darajasida yaratishni o‘z ichiga oladi. Bu texnologiya yordamida:

ultrayupqa ekranlar,
bukiladigan smartfonlar,
supertejamkor akkumulyatorlar,
nano-o‘lchamli sensorlar

yaratilmoqda. Kelajakda kiyiladigan yoki tanaga implant qilinadigan elektron qurilmalar keng ommalashishi kutilmoqda.

Xulosa

Elektronika insoniyat taraqqiyotiga eng kuchli ta’sir ko‘rsatgan sohalardan biridir. Vakuum lampalar davridagi oddiy radioqabul qilgichlardan tortib, zamonaviy kvant kompyuterlari va sun’iy intellekt tizimlarigacha bo‘lgan yo‘l bir asrdan kam vaqt ichida bosib o‘tildi. Bugungi kunda elektronika iqtisodiyotning barcha tarmoqlarini qamrab olgan bo‘lib, uning kelajakdagi rivoji yanada

tezlashishi kutilmoqda [5]. Nanoelektronika, kvant texnologiyalari va sun’iy intellekt bilan birlashgan yangi elektron tizimlar inson hayotini tubdan o‘zgartirib yuborishi mumkin. Demak, elektronikaning rivojlanishi nafaqat texnik taraqqiyot, balki jamiyatning intellektual va iqtisodiy yuksalishida ham muhim rol o‘ynaydi.

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ONLAYN ASTRONOMIK KUZATUVLAR ASOSIDA DARS MASHG‘ULOTLARNI TASHKIL ETISH

Annotatsiya. *Ushbu maqolada zamonaviy astronomiya ta’limiga integratsiya qilish uchun mo‘ljallangan onlayn astronomik kuzatuvlarni olib borishning takomillashtirilgan metodologiyasi taqdim etiladi. Tadqiqotda OpenScience observatoriyasida qo‘llaniladigan tasvir olish jarayoni, olingan ma’lumotlarni qayta ishlash bosqichlari hamda kuzatuv natijalarini dars jarayoniga joriy etishning pedagogik modeli bayon etilgan. Taklif etilgan yondashuv talabalar faolligini oshiradi, ma’lumotlarga asoslangan o‘qitishni kuchaytiradi va teleskoplarga bevosita kirish imkoniyati bo‘lmagan holatlarda ham haqiqiy ilmiy kuzatuvlarni amalga oshirish imkonini beradi.*

Kalit so‘zlar. *Astronomiya; onlayn kuzatuvlar; ta’lim; kuzatuv ma’lumotlari; ma’lumotlar bazalari.*

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ORGANIZING EDUCATIONAL ACTIVITIES THROUGH ONLINE ASTRONOMICAL OBSERVATIONS

Abstract. *This paper presents an advanced methodology for conducting online astronomical observations designed for integration into modern astronomy education. The study outlines the image-acquisition workflow implemented at the OpenScience Observatory, followed by data-processing procedures and a pedagogical framework for incorporating observational results into classroom instruction. The proposed model enhances students’ engagement, improves data-driven learning, and provides opportunities to conduct authentic scientific observations without the constraints of physical access to telescopes.*

Keywords. *Astronomy; online observations; education; observational data; databases.*

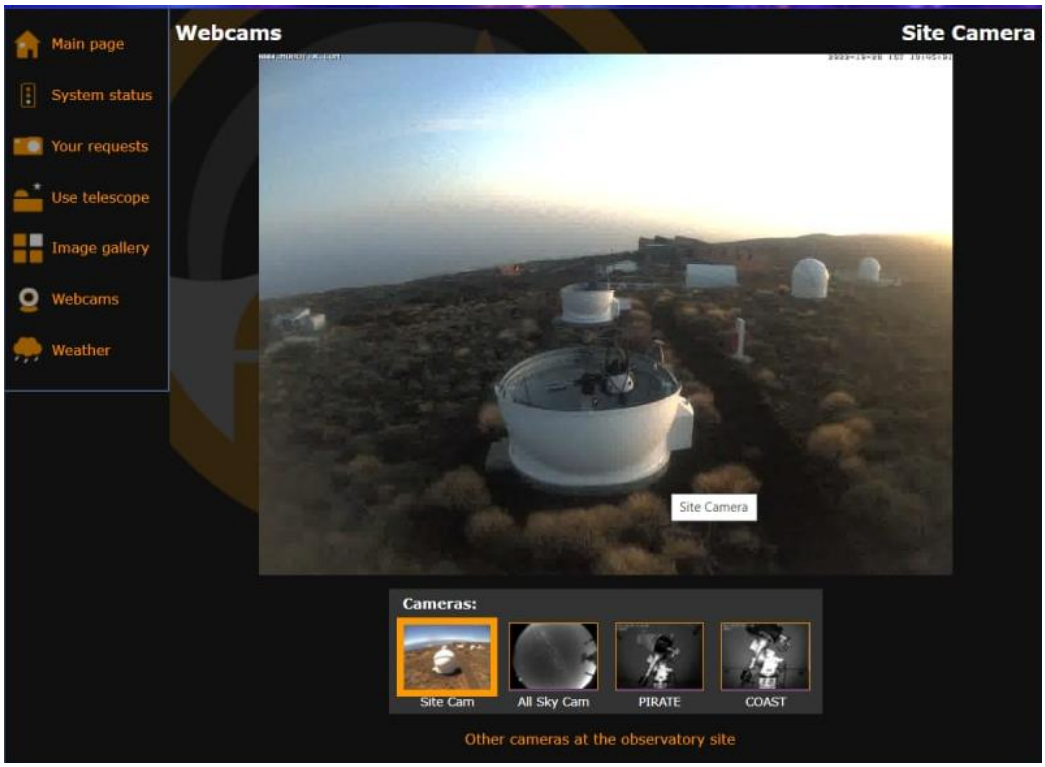
Dunyoda astronomiya fanini o‘qitish sifatini oshirish va yosh avlodning astronomik tasavvurlarini rivojlantirishda amaliy jihatdan onlayn va oflayn tarzda astronomik kuzatuvlar o‘tkazish bilan bir qatorda zamonaviy kuzatuv

ma’lumotlariga asoslangan astronomik bazalardan foydalanishga alohida e’tibor qaratilmoqda. Xalqaro astronomiya ittifoqi (IAU) ning 2020-2030-yillarga mo‘ljallangan strategik rejasida professional astronomlar o‘rtasida astronomik bilimlarni almashishni rag‘batlantirish va osonlashtirish; kasbiy vazifalarni muvofiqlashtirish va professional darajada boshqa sohalar bilan hamkorlikni muvofiqlashtirish; mukofotlash orqali astronomiyada ilg‘or tajribalarni tan olish; astronomiya taraqqiyotida bag‘rikenglikni rivojlantirish; astronom va olimlarning kelgusi avlodi taraqqiyotiga ko‘maklashish; astronomiyadan foydalanish orqali global rivojlanishni rag‘batlantirish; astronomiya sohasida jamoatchilik bilan hamkorlik; maktab darajasida o‘qitish va ta’limni rag‘batlantirish uchun astronomiyadan foydalanish kabi ustuvor vazifalar belgilangan. Bu vazifalar astronomiyani o‘qitishda talabalarni ilmiy izlanuvchanlikka yo‘naltirish orqali dunyo miqyosida astronomik ma’lumotlardan foydalanish astronomiya fanining rivojida dolzarb ahamiyatga ega ekanligini ko‘rsatadi. Bu o‘z navbatida astronomiya sohasida talabalarning ilmiy izlanuvchanlik qobiliyatlarini rivojlantirishga asoslangan mustaqil ta’limning metodik tizimni yaratish zaruratini taqozo etadi.

Jahon miqyosida talabalarining ijodkorlik va yaratuvchanlik qobiliyatlarini rivojlantirish, ilmiy xabardorlik faoliyatini rivojlantiruvchi pedagogik texnologiyalarini ishlab chiqish bo‘yicha ilmiy izlanishlar olib borilmoqda. Mazkur ishlanmalar tadqiqot yo‘nalishlari va vazifalarini tanlashda innovatsion yondashuvlar, talabalarning nostandart fikrlash va maqbul qaror qabul qilish, doimiy ravishda yangi g‘oya, texnologiyalarni amaliyotga tatbiq etish ko‘nikmalarini hosil qilish imkoniyatlarini kengaytirmoqda. Shu bilan birga talabalarning ilmiy izlanuvchanligini kuzatuvlar va astronomik bazalar ma’lumotlarini o‘rganish asosida rivojlantirish mexanizmlarini pedagogik imkoniyatlariga ko‘ra takomillashtirish zarurati mavjud.

Bu borada olib borilayotgan ishlarni qaraydigan bo‘lsak, M.Mamadazimov [1], B.Sattorova [2], F.Dadaboyeva [3], T.Orlova [4], A.Narbayev [5], A.Tillaboyev [6], N.P.Yemets [7], L.V.Jukov [8], D.A.Muller [9], H.J.Lee [10], P. Russo [11] va boshqa olimlar ishlarini aytish mumkin.

Yuqoridagi ishlar asosida astronomiya ta’limini zamonaviy kuzatuv ma’lumotlariga asoslanib tashkil etishning yechimi sifatida, hozirda mavjud bo‘lgan teleskoplardan onlayn kuzatuvlar tashkil etishdir. Buning uchun biz Angliyaning “Open Universty” universitetining “OpenScience” obsevatoriyasi COAST va PIRATE teleskoplaridan foydalanishimiz mumkin (1-rasm).

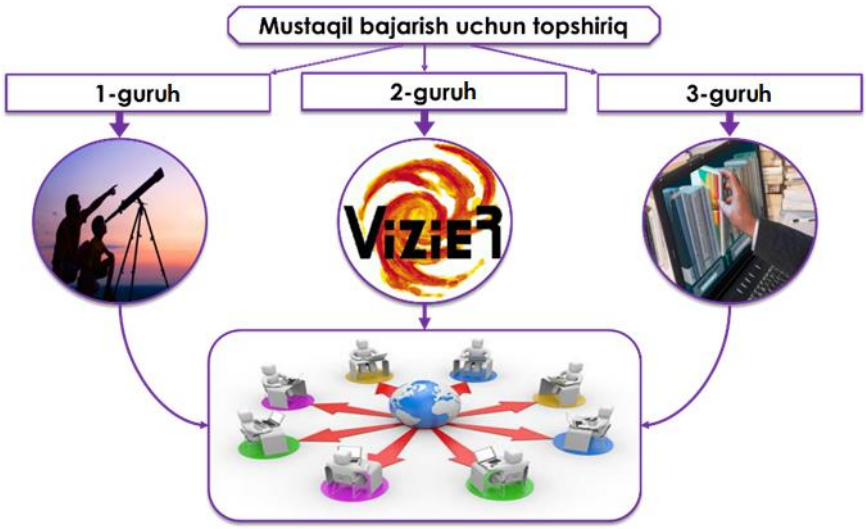


1-rasm. “OpenScience” obsevatoriyasi

Bu teleskoplardan foydalanish uchun talabalar avval “**Astronomy with an online telescope**” 24 soatlik kursni o‘qishlari kerak bo‘ladi (kurs havolasi: https://www.open.edu/openlearn/science-maths-technology/astronomy/astronomy-online-telescope/content-section-overview?active-tab=description-tab).

Talabalar kursni tugatib o‘zlari o‘rganmoqchi bo‘lgan ob’yektlar tasvirlarini olishlari mumkin bo‘ladi. Onlayn telespoda ishlash uchun www.telescope.org sayti orqali kirib, kursda o‘rgatilganiday ob’yektini tasvirga olish buyrug‘i beriladi.

Teleskop xotirasiga ob’yekt nomi yoki koordinatasi kirgizilgandan keyin bir necha kundan so‘ng tasvir talabaning shaxsiy kabinetiga tasvir yuklanadi. Talaba teleskop saytiga kirib ob’yekti tasvirini o‘z kompyuteriga yuklab oladi. “fits” formatda yuklab olingan tasvirlar maxsus astronomik dasturlar yordamida o‘rganiladi.



2-rasm. Talabalarning guruh-guruh bo‘lib kuzatuv va nazariy ma’lumotlarni o‘rganish sxemasi.

Albatda kuzatuv, adabiyotlar tahlili va ma’lumotlar bazalaridan foydalanish bitta talabaga mushkul vazifa hisoblanadi. Demak bu vazifani bajarishda vaqtdan yutish va ishning sifatini oshirish maqsadida talabalarni kichik guruhlarga bo‘linib (4, 5 kishidan iborat), birinchi guruh kuzatuv ishlariga, ikkinchi guruh ma’lumotlar bazalarini o‘rganishga va uchunchi guruh adabiyotlar (darslik va qo‘shimcha qo‘llanmalar) ma’lumotlarini o‘rganishga yo‘naltiriladi. Har bir guruh o‘ziga berilgan vazifani bajargach, olingan natijalar umumlashtiriladi (2-rasmda ishning bajarilish sxemasi keltirilgan). Talabalarning ishini baholashda ayni vaqtda amalda bo‘lgan baholash mezonidan foydalaniladi.

Talabalarni astronomik kuzatuvlar, raqamli ma’lumotlar bazalari va ularning tahlil vositalaridan samarali foydalanishga yo‘naltirish, o‘zlashtirilgan nazariy bilimlarning real ilmiy jarayonlarda qo‘llanishini chuqur anglashlariga xizmat qiladi. Bunday yondashuv nafaqat amaliy ko‘nikmalarni shakllantiradi, balki talabalar ongida ilmiy fikrlash madaniyatini rivojlantiradi, mustaqil tahlil qilish, dalillarga asoslangan xulosalar chiqarish va zamonaviy ilmiy metodlarni qo‘llashga bo‘lgan ehtiyojni kuchaytiradi. Natijada, talabalar orasida ilmiy izlanishlarga bo‘lgan qiziqish ortadi, yangi ilmiy natijalar yaratish va ilmiy loyihalarda faol ishtirok etish motivatsiyasi sezilarli darajada oshadi.

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THE CONCEPT IS ONE OF THE BASIC CONCEPTS OF LINGUISTICS

Abstract*: This article analyzes the role and importance of the concept as one of the main concepts of linguistic cultural studies. The concept is considered in linguistics, especially in cultural studies, as the main category that reveals the interdependence of language and culture. The article presents a study of the role of the concept in language and culture, how it forms linguistic and cultural meanings and influences each other. Also, it is shown how the worldview, historical and cultural experiences, and national characteristics of mankind are expressed through language through concepts. The article aims to analyze the concept from the point of view of linguistic cultural studies and to show its interaction with other linguistic categories.*

Key words: *linguistic cultural studies, concept, language and culture, linguistics, cultural studies, cultural identity, linguistic category, language and people, national characteristics, worldview, expression of culture in language.*

Introduction

Specific cultural words are conceptual tools that capture the experience of society, such as acting and reflecting on various things in certain ways, and they help to implement these methods. The concept is one of the main concepts of linguoculturology.

V. Z. Demyankov considered the concept in fiction and in scientific language and came to interesting conclusions (30, 35).

In Latin, the form conceptus is a passive participle, interpreted as "pregnant". The basis of "embryo" is originally in the Latin term "concept" itself, the semes "reservoir", "storage" - in the etymon of the term "concept", from which other (transitive) meanings are derived, such as "connection, sum, accumulation, system", "reservoir, storage"; "formation (revision) of legal acts", "concept, acceptance of the seed".

Analysis of related literature

Until the 19th century, the term concept was used very rarely in French, and even then in higher philosophy: it was not found in fiction. In the dictionary of Lalande of the early 20th century, the term “concept”, interpreted as one of the meanings of the German (like Kant) Begriff, is given much less space than the term “notion”. Only in the second half of the 20th century did the term “concept” begin to be widely used in the sense to which we are accustomed in Russian literature of the late 20th century. Today they speak of concepts that acquire their organization as a result of discursive activity.

Italian materials are distinguished by the frequency and productivity of the use of the term concetto from the earliest times, when Italian and Latin were used

in parallel.

The following meanings of the word concetto became leading: 1) concept, thought, discussion,; 2) view, understanding, understanding; 3) plan, idea; 4) image; 5) extravagant artistic image, metaphor.

In modern German, Konzeption is a continuation of the Latin "concept" and means not only "concept, idea", but also as a medical term "concept". The main meaning of the word "Konzept" in classical German is "plan, outline, sketch". The meaning of "concept, concept" in the German lexeme Konzept is a treasure of the 20th century and is not recorded in any standard dictionary. In the literature, no word with such a meaning is found in the 18th-19th centuries. In linguistic literature, this term (under the influence of Anglo-Saxon traditions) has become increasingly popular, especially since the late 1960s. Today, Konzept often means not just a "concept" (which corresponds to the subject), but only a preliminary, partial, incomplete, sometimes vague, only relatively fair, valuable and consistent idea of the whole world that lies behind a certain thing.

Research methodology

The term “concept” is recorded in English dictionaries, according to V. Z. Demyankov, with the meaning of “concept, idea, general idea, understanding”. However, until the second half of the 19th century, this term is almost not found in classical literary and philosophical literature. After a few centuries, the picture changes somewhat. Sinclair Lewis, Upton Sinclair, Henry Miller sometimes use the word “concept”, a little more often Jack London. All of them are Americans. This lexeme is combined with such definitions as metaphysical, ludicrous, wider and deeper concept, etc.

Analysis and results

Summing up the opinions expressed on the essence of the relationship between ethnic language, on the one hand, and ethnic culture and worldview, on the other, Z. N. Tarpanov reduced them to the following statements: 1. Recognizing the unconditional connection between language and culture in the broad sense of the word, they reject this connection in the nature of cause and effect. 2. This connection is classified as cause and effect, but at the same time various, sometimes polar solutions are proposed: a) culture, its type, the way of life in general are determined by language, its grammar and meaningful structure (earlier E. Sapir, B. Wharf, etc.); b) language cannot determine the type of culture, language and culture cannot be compared (later E. Sapir); c) language is a “guide” to a limited extent for knowing reality (O. S. Akhmanova, etc.); D) the language itself is determined by the type of culture and depends on it (K. Fosler, V. Schmidt, N., etc.; e) language, like culture, is determined by the ethnic "worldview", the spirit of the people and its national character. 3. Marxist philosophy proceeds from the fact that both language and culture are secondary; the main factor explaining both phenomena is material reality. The relationship between language and culture is very difficult to interpret. Language, thinking, culture are phenomena that are in constant motion, change. In order to study them, they must be stopped, but they will no longer be the same "language", "thinking", "culture", or rather, they will

not be: they will be dead, out of motion, as if isolated from each other. It is impossible to determine what is primary, but one thing is certain: there is no ethnos without language, as soon as the language dies, the ethnos also dies, culture dies. Linguistic image of the world within the framework of linguoculturology Currently, two terms are used in parallel in research on this topic: "image of the world" and "model of the world", which are used interchangeably. However, we believe that there is a significant difference in their meaning. The word "model" is presented as a logically organized, planned "thing", and the concept of "image" has a slightly different nature - it contains elements of creativity. In this regard, in the future we will give preference to the term "image of the world". According to M. K. Mamardashvili and A. M. Pyatigorsky, languages \u200b\u200b"died"not under the influence of an alien culture, but under the influence of new means of collecting, combining, transmitting and consuming natural language.

According to O. D. Ivitskaya [3], the concept of "world picture" is a fundamental concept that reflects the specifics of a person and his existence, his relationship with the outside world, as well as the conditions of existence in this world. "The world is a truly global image of the world, which underlies the worldview of a person, reflects the essential features of the world in the understanding of its carriers and is the result of all human spiritual activity" (39, 123). The author emphasizes that this is always a subjective image of objective reality, since the world picture is only an interpretation and does not reflect the phenomena of reality. Summarizing the above, A. G. Gulmagomedov writes that the linguistic picture of the world can be imagined in two models: 1) in the language model, 2) in the conceptual (conceptual) model. The content and methods of describing these models are not the same.

Conclusions and proposals

The essence of the picture of the world is different. On the one hand, it includes a general description of reality (the world in general), and on the other hand, it includes images of an alternative world or other areas. The article also emphasizes the role of language in the picture of the world: through language, a person's unique ways of perceiving the world and describing it are formed. Language, in turn, is closely related to culture, and each national language perceives the world in its own way.

The difference between the linguistic and cultural aspects of the picture of the world is also important. Language should not be considered only as a means of reflecting reality, but it is associated with culture and forms the worldview of people. Also, the worldviews in different languages differ depending on their social and cultural characteristics. For example, certain concepts in Russian may have different meanings in other cultures.

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KIMYO FANINI O‘QITISHDA XALQARO BAHOLASH DASTURLARINING AXAMIYATI

Annotatsiya. *Tadqiqot ishda ta’limiy yutuqlarni baholashga doir xalqaro tadqiqotlarning asosiy tamoyillari, kimyo ta’limida tanqidiy fikrlashning o‘ziga xos xususiyatlari, shuningdek, ushbu fanni o‘qitishda kompetensiyaviy yondashuvni qo‘llash masalalari ko‘rib chiqilgan. Tadqiqot doirasida o‘quvchilarning tabiiy fanlar bo‘yicha savodxonlik darajasi tahlil qilinadi va xalqaro baholash dasturlari asosida kimyo fanini o‘qitishni takomillashtirish bo‘yicha tavsiyalar ishlab chiqilgan.*

Kalit so‘zlar. *kimyo, xalqaro baholash, PISA, kompetensiya, tabiiy fanlar.*

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THE IMPORTANCE OF INTERNATIONAL ASSESSMENT PROGRAMS IN CHEMISTRY TEACHING

Abstract. *The research paper examines the main principles of international research on the assessment of educational achievements, the specific features of critical thinking in chemistry education, as well as the issues of using a competency-based approach in teaching this subject. The research analyzes the level of students' literacy in natural sciences and develops recommendations for improving chemistry teaching based on international assessment programs.*

Keywords. *chemistry, international assessment, PISA, competency, natural sciences.*

Bugungi kunda zamonaviy ta’limning eng muhim va dolzarb vazifalaridan biri — bu raqobatbardosh shaxsni tayyorlashdan iboratdir. Zamonaviy ta’lim tizimida xalqaro baholash tadqiqotlarida ishtirok etishga tayyorlovchi muhim omil sifatida tabiiy-ilmiy savodxonlikni shakllantirishga alohida e’tibor qaratilmoqda [1].

Rivojlangan mamlakatlarda kimyo fanini o‘qitishni takomillashtirishga yo‘naltirilgan samarali yechimlarni izlash va innovatsion yondashuvlarni ta’lim

amaliyotiga joriy etishga katta ahamiyat berilmoqda. Bunda, shaxsga yo‘naltirilgan ta’lim strategiyalarini qo‘llash, fanlararo kompetensiyalarni shakllantirish va o‘quv materialini puxta o‘zlashtirish sifatini oshirish asosiy yo‘nalish sifatida namoyon bo‘lmoqda.

Yurtimiz ta’lim tizimida ham zamonaviy pedagogik va raqamli texnologiyalarni joriy qilish, ta’lim jarayonining samaradorligini oshirish hamda uni xalqaro standartlarga muvofiq yo‘naltirish bo‘yicha keng ko‘lamli islohotlar olib borilmoqda. Shu bilan birga, kimyo fanini o‘qitishda yaxlit yondashuvni ta’minlovchi individualga yo‘naltirilgan texnologiyalar va zamonaviy metodik tizimlarni ishlab chiqish va joriy etish dolzarb masalaga aylangan.

2019–2030 yillarga mo‘ljallangan Ta’limni rivojlantirish konsepsiyasida O‘zbekiston Respublikasining quyidagi xalqaro tadqiqotlarda ishtirok etishi nazarda tutilgan:

- PIRLS – The Progress in International Reading Literacy Study – o‘quvchilarning matnni o‘qish va tushunish darajasini baholovchi xalqaro tadqiqot;
- PISA – Programme for International Student Assessment – 15 yoshli o‘quvchilarning bilimini amaliyotda qo‘llay olish qobiliyatini baholovchi xalqaro dastur;
- TIMSS – The Trends in International Mathematics and Science Study – matematika va tabiiy fanlar bo‘yicha o‘quvchilarning bilim va ko‘nikmalarini solishtirma tahlil qilish;
- TALIS – Teaching and Learning International Survey – o‘qituvchilar va maktab rahbarlarining ish sharoitlari va o‘quv muhiti haqidagi xalqaro so‘rovnoma.

O‘zbekistonning xalqaro ta’lim sifatini monitoring qilish tizimlarida ishtirok etishining dolzarbligi quyidagi omillar bilan belgilanadi:

a) xalqaro tadqiqotlarning yuqori ilmiy va texnik sifati sababli ularning natijalaridan milliy ta’lim tizimini isloh qilishda foydalanish imkoniyati mavjudligi;

b) O‘zbekiston ta’lim sifati darajasini boshqa mamlakatlar bilan taqqoslab baholash imkoniyati;

c) milliy tadqiqotlarning sifatini oshirishga xizmat qiluvchi ilg‘or amaliyotlarni o‘zlashtirish.

O‘zbekiston quyidagi xalqaro baholash dasturlarida ishtirok etishni rejalashtirmoqda:

PISA – O‘quvchilarning bilim va ko‘nikmalarini baholash bo‘yicha xalqaro dastur

Ushbu tadqiqot 15 yoshli o‘quvchilarning matematika, o‘qish va tabiiy fanlar bo‘yicha savodxonligini, shuningdek, bilimlarni amaliyotda qo‘llash qobiliyatini baholaydi. PISA tadqiqoti doirasida ilmiy savodxonlik muhim tushuncha sifatida qaraladi; u o‘quvchilarning hayot davomida o‘qishni davom ettira olishiga, maktabdan tashqarida o‘zlashtirilgan bilimlarni real kontekstda

qo‘llay olishiga e’tibor qaratadi. Bu esa fanlarni nafaqat nazariy, balki amaliy yondashuv asosida o‘rganishni talab qiladi.

Sobiq Ittifoq hududidan Rossiya, Latviya, Litva, Estoniya, Qirg‘iziston va Qozog‘iston davlatlari ishtirok etgan. Ular orasida Estoniya eng yuqori ko‘rsatkichlarni qayd etgan: 2006-yilda PISA tadqiqotida ilk bor qatnashgan Estoniya o‘quvchilari 516 ball bilan 11-o‘rinni egallagan bo‘lsa, 2015-yilga kelib bu ko‘rsatkich 534 ballga yetib, uchinchi o‘ringa ko‘tarilgan [2].

O‘zbekiston ushbu tadqiqotda ilk bor 2022-yilda ishtirok etdi. Butun dunyo bo‘ylab 690 ming nafar 15 yoshli o‘quvchi ishtirok etdi, bu esa 26 million o‘quvchining o‘rtacha bilim darajasini ifodalaydi [3].

Tabiiy fanlar bo‘yicha savodxonlik — PISA xalqaro baholash dasturining asosiy yo‘nalishlaridan biri hisoblanadi. PISA tadqiqotida bu savodxonlik 15 yoshli o‘quvchilarning zamonaviy dunyoda muvaffaqiyatli yashashi uchun zarur bo‘lgan bilim va ko‘nikmalar bilan bog‘liq tarzda aniqlanadi [4]. Baholashda muhim element sifatida “kompetensiya” tushunchasi ishlatiladi. Bu tushuncha bilim, ko‘nikma va qarashlarning integratsiyasini aks ettiradi va real hayotiy vaziyatlarda samarali harakat qila olish layoqatini anglatadi [5].

PISA topshiriqlarining asosiy xususiyatlari:

1. Mazmun sohasi – baholanayotgan bilim va ko‘nikmalar sohalari (matematika, o‘qish, tabiiy fanlar).
2. Kontekst – topshiriqning hayotiy yo‘nalishi: shaxsiy, ijtimoiy, kasbiy yoki ilmiy soha.
3. Kompetensiyaviy yo‘nalish – tanqidiy fikrlash, muammo yechish, matn turi (ilmiy, badiiy, axborot).
4. Baholash obyekti – o‘quvchi qanday natijani ko‘rsatishi kerak (masalan, bilimni amaliyotda qo‘llay olish).
5. Qiyinchilik darajasi: 1-daraja – past, 2-daraja – o‘rtacha, 3-daraja – yuqori.
6. Javob formati: batafsil javob, bitta to‘g‘ri javob, bir nechta javob, qisqa izohli javob.
7. Baholash mezonlari: to‘liq to‘g‘ri javob – 2 ball, qisman to‘g‘ri – 1 ball, noto‘g‘ri – 0 ball.

Bu xususiyatlar PISA topshiriqlarini xalqaro darajada standartlashtirilgan va ob’ektiv baholovchi vosita sifatida taqdim etadi [6]. Xalqaro baholash mezonlari asosida kimyoni o‘qitish — ta’lim sifatiga qo‘yilayotgan zamonaviy global talablar darajasiga javob beradi. Shuning uchun o‘quvchilarni xalqaro tadbirlarda ishtirok etishga tayyorlovchi metodik tizimlarni ishlab chiqish dolzarb vazifalardan biridir.

Maktabda interaktivlikka murojaat qilish muhim ahamiyatga ega bo‘lib, o‘quv jarayonining samaradorligiga ta’sir ko‘rsatadi. Bugungi kunda “interaktiv ta’lim” tushunchasi eng keng tarqalgan tushunchalardan biri hisoblanadi. Interaktiv ta’lim (inglizcha interaction — o‘zaro ta’sir) — bu o‘quvchining o‘quv muhiti va o‘quv atrof-muhit bilan o‘zaro ta’siri asosida qurilgan ta’lim bo‘lib, u egallanayotgan tajriba maydoni sifatida xizmat qiladi.

An’anaviy ta’lim bilan solishtirganda, interaktiv ta’limda o‘qituvchi va o‘quvchi o‘rtasidagi o‘zaro munosabatlar o‘zgaradi: o‘qituvchining faolligi o‘quvchilarning faolligi bilan almashinadi, o‘qituvchining vazifasi esa ularning tashabbusini yuzaga chiqarish uchun zarur sharoitlarni yaratishdan iborat bo‘ladi [7].

Ozon momaqaldiroq vaqtida ham hosil bo‘ladi. Aynan u momaqaldiroqdan keyin havodagi o‘ziga xos hidni keltirib chiqaradi. Matnda muallif “yaxshi” va “yomon” ozon o‘rtasidagi farqni tushuntiradi.

Savol: Momaqaldiroq vaqtida hosil bo‘ladigan ozon – “yaxshi”mi yoki “yomon”mi?

Siz bitta to‘g‘ri javob va matnda keltirilgan dalillar bilan asoslangan tushuntirishni tanlang.

Ozon turi	**Izoh**
A – Yomon	Yomon ob-havo paytida hosil bo‘ladi.
B – Yomon	Tropopserada hosil bo‘ladi.
C – Yaxshi	Stratopserada hosil bo‘ladi.
D – Yaxshi	Yoqimli hidga ega.

Javob: B – “Yomon. U troposferada hosil bo‘ladi.”

Mezon mazmuni	**Ball**
B varianti tanlangan	1 b
A, C yoki D variantlaridan biri tanlangan	0 b

1. Kompetensiya: **Tabiiy hodisalarni ilmiy izohlash** – ya’ni, tabiiy hodisani tushuntirish uchun tegishli tabiiy-ilmiy bilimlarni qo‘llay olish.

2. Ilmiy mazmun bo‘yicha bilim: **“Yer va koinot haqidagi fanlar”** – geografiya, astronomiya.

3. Kontekst: **Global – atrof-muhitga oid.**

4. Kognitiv daraja: **O‘rtacha.**

5. Savol turi: **Ochiq savol.**

6. Didaktik birlik: **Atmosferaning qaysi qatlamida ob-havo shakllanadi.**

Xalqaro baholash dasturlari, xususan PISA tizimi, nafaqat o‘quvchilarning bilim darajasini, balki ularning o‘zlashtirilgan bilimlarni real hayotiy vaziyatlarda qo‘llay olish qobiliyatini aniqlashda yuqori samaradorlikka ega ekanligini ko‘rsatdi. Bu kabi yondashuvlar zamonaviy kimyo ta’limi uchun ayniqsa dolzarbdir. Xalqaro talablar asosidagi kompetentlik va tanqidiy fikrlashga yo‘naltirilgan yondashuvlarning qo‘llanishi o‘quvchilarning fanga bo‘lgan qiziqishini oshiradi, ularning mantiqiy va mustaqil fikrlash qobiliyatlarini rivojlantiradi hamda mazmunli o‘zlashtirishga zamin yaratadi.

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CALCULATION OF THE DURABILITY OF A CHEMICALLY-THERMALLY TREATMENTED GEAR WHEEL BY THE WEAR CRITERION

Abstract: *The article studies the service life and durability of gears, which include a carburized wheel and a pinion subjected to ion nitriding, has a longer technical service life than a gear transmission consisting only of carburized parts. The durability of a nitrided gear, which is three times higher than that of a carburized one, is also considered. As a result, the study analyzed that, in addition to iron nitrides, special nitrides are formed in the near-surface layers with the participation of alloying elements of steel, in particular chromium and molybdenum.*

Key words: *Gear wheels, operation, technical condition, wear, repair, capital, durability, resource, write-offs, statistical, assessments, probability, indicators, reliability, probability, analytical calculation.*

Introduction

One of the fundamental requirements for the operation of machines and other equipment is their failure-free operation up to the ultimate limit state in accordance with the technical operating conditions for a specified period of time. For many non-repairable components, particularly gears, the ultimate limit state coincides with failure and essentially determines the service life of the component.

An analysis of the methodology for selecting durability indicators shows that the most acceptable and simple selection method is a preliminary classification of the components, their operating conditions, and the consequences of failure. A fairly general classification of factors determining the selection of durability indicators has been proposed in [1, 2].

Since statistical definitions of indicators are obtained as a result of reliability tests, the statistical form of presenting the indicators is convenient for experimental reliability studies, and the probabilistic form is convenient for analytical calculations. The methodology for calculating reliability indicators is selected in accordance with GOST 27.301-95 "Reliability in Engineering. Reliability Calculation. Basic Provisions" [3, 4]. In our case, a probabilistic method for calculating typical machine parts according to the wear criterion is used, since gears are considered wearable items.

Main part

Analysis of gear damage reveals that premature failure is primarily due to processes occurring in the surface layers of the teeth. This is where the primary accumulation of various volumetric and structural defects occurs, contributing to intensive wear and the development of contact fatigue phenomena, which dramatically reduces the load-bearing capacity of the entire product. All of this must be carefully considered when determining the service life of components that experience various dynamic contact interactions during operation. Under such conditions, the use of steels and alloys with volumetric hardening alone cannot fully resolve the durability issue [5]. Improved gear performance can be achieved through various surface hardening methods, which not only increase the hardness of the near-surface layers but also generate residual compressive stresses within them.

It is known that for structural steels that can be improved, the greater the hardness, the higher the resistance to contact fatigue, and the ratio of the contact fatigue limit (σ_{-1}^{k}) with the number of loading cycles to the surface hardness is a constant: $\sigma_{-1}^{k} = k * HRC$, (1)

where is a coefficient depending on the hardness and the type of strengthening surface treatment.

For example, GOST 21354-87 for case-hardened (nitrocarburized) steels with surface hardness sets the contact fatigue limit at

Thus, the durability of friction pairs will be determined not only by the correct choice of component material, but also by the rational application of various technologies that increase surface hardness, such as thermochemical treatment. Thermochemical treatment, through diffusion saturation with various elements, can widely alter the chemical composition, structure, and properties of the surface layer.

To assess component wear during an experiment, a functional dependence of the failure-free operation probability of a wearing component on its operating time can be used. This dependence was derived from the gradual failure model proposed by A.S. Pronikov [6], whose main calculation parameter is wear rate.

Calculation using formula (3) is based on the assumption that the dependence of the component's surface wear on operating time, ignoring the running-in period, is linear and most accurately characterizes the resource distribution of components operating for long periods under steady-state wear conditions. An abrasive wear model was adopted as the calculation model, as this type of wear involves intense destruction of the friction surfaces of friction pairs due to microplastic deformations, microcutting, and other factors.

In order to estimate the wear rate of the contacting surfaces, a calculation of the contact parameters was performed. The value of the maximum pressure in the tooth contact zone can be obtained from G. Hertz's solution for the problem of contact between two cylinders with parallel axes [7]. If the radius of curvature of the lateral surface of one tooth is many times greater than that of the other, then the case of contact between a cylinder and a plane can be considered [8].

where is P_m the maximum Hertzian pressure, MPa;

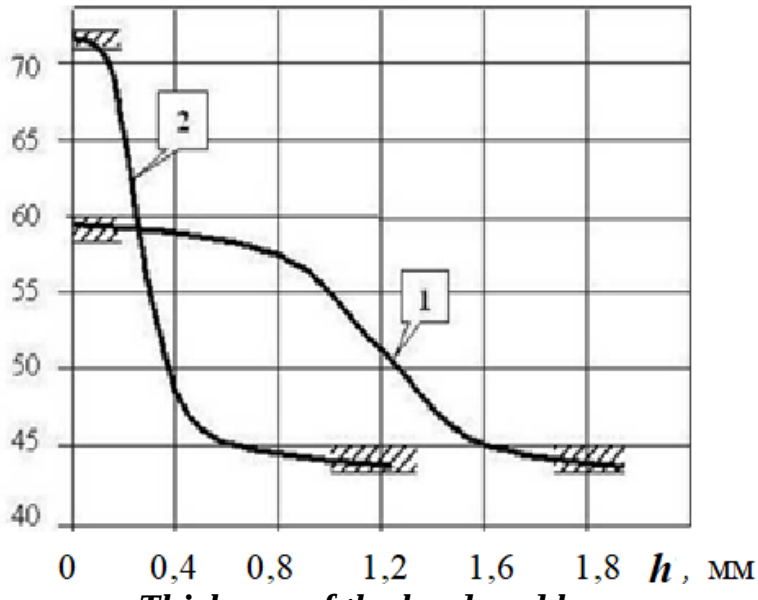
N_e is the specific normal load, N/m;

θ_t is the elastic constant for the contact case, m2/N;

$r_{пр}$ is the reduced radius of curvature, m.

In this study, to determine the effect of the hardness ratio of gear contact surfaces on wear resistance under contact loading, gears and pinions made of 34KhN1M steel with a module of mm, a tooth width of 25 mm, a pinion tooth count of 26, and a wheel tooth count of 42, with a center distance of 169.4 mm, were used.

Two thermochemical treatment methods were selected for these test pieces, each with its own technological characteristics and allowing for the production of hardened layers of varying hardness and thickness on the surface of the workpieces. In one case, the contact pair was subjected to carburization only, resulting in an effective diffusion layer thickness of 1-1.2 mm with a surface hardness of 1000 mm and a tooth core hardness of 1000 mm. In the other case, the gear was processed using the first method, and the pinion was nitrided in a glow discharge plasma. Ion nitriding was performed on pre-heat-treated parts using the same refinement regime as after carburization, which also allowed for a tooth core hardness of [unclear]. As a result of glow discharge plasma nitriding, the total diffusion layer thickness was 0.3-0.4 mm with a surface hardness of [unclear]. The hardness distribution across the hardened layer thickness of the gears studied is shown in Fig. 1.



Thickness of the hardened layer

Fig. 1. Hardness distribution across the thickness of the hardened layer: 1 - case-hardened gear; 2 - nitrided pinion.

The mechanical properties of 34KhN1M steel after volumetric strengthening heat treatment were studied on witness specimens under static tension at a temperature of 20°C. The average values of the ultimate tensile strength for both gears and pinions were MPa, and the relative elongation was 13-15%. For the calculations, the normal modulus of elasticity was assumed to be equal to MPa, and Poisson's ratio was 0.3 [8].

The experimental setup used was a rig consisting of a variable speed DC drive motor and two identical single-stage gearboxes, the shafts of which are connected to each other by means of cardan transmissions that close the power circuit, the kinematic diagram of which is given in [9]. The loading characteristics are shown in Fig. 2.

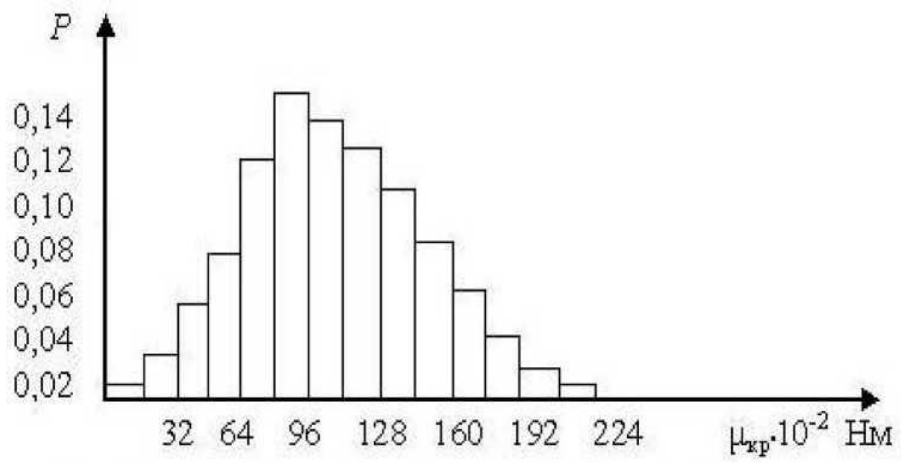


Fig. 2. Histogram of torque distribution on gear 1 and gear 2 at a gear rotation speed of 320 rpm

During the calculation, it was assumed that wear along the working profile of the tooth is practically uniform. This approach is due to the uniform pressing of the contacting surfaces during operation, which makes it possible to ignore changes in tooth geometry during wear given the relatively high hardness of the working surfaces of the wheels. For the calculation, we adopt the value of the specific normal load of 1.31 N/m, the value of the elastic constant of 9.1 m2/N, and the value of the reduced radius of curvature = 0.0345 m. Substituting these values into formula (4), we determine the average value of the maximum pressure = 364 MPa. [10].

The standard deviation of the pressure in the contact of the teeth ap can be determined from the dispersion of the torque on the gear, the value of which, in accordance with the torque distribution histogram, reaches 96 MPa (see Fig. 2). The contact area of the teeth is a rectangle of width . The half-width of the contact strip is determined according to Hertz's theory by the formula:

$$2b_H = 1{,}128\sqrt{\theta_\varepsilon r_{\text{пр}} N_e}$$

The calculation results yield a value of 2.2810-4 m.

The wear rate of contacting surfaces in the presence of abrasive particles in the lubricant depends on a number of factors characterizing the kinematic and

geometric parameters of the interface, the mechanical properties of the friction surface materials and abrasive particles, as well as the properties of the lubricant and other factors. Common to all wear rate assessment methods is the use of coefficients determined empirically through laboratory testing on samples or from operating data from actual friction units.

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РОЛЬ УЧИТЕЛЯ В ЭПОХУ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Аннотация: *Статья посвящена роли учителя в эпоху искусственного интеллекта (ИИ). Рассматривается использование ИИ как вспомогательного инструмента в образовании, его способность расширять возможности индивидуального обучения и освобождать учителей от рутинной работы. Особое внимание уделено уникальным человеческим качествам педагога — эмпатии, способности вдохновлять и развивать критическое мышление.*

Ключевые слова: *Искусственный интеллект, учитель, образование, эмпатия, критическое мышление, технологии, сотрудничество.*

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THE ROLE OF THE TEACHER IN THE ERA OF ARTIFICIAL INTELLIGENCE

Annotation: *The article examines the role of a teacher in the era of artificial intelligence (AI). It discusses how AI serves as an auxiliary tool in education, enhancing personalized learning and freeing teachers from routine tasks. At the same time, the unique human qualities of a teacher—empathy, inspiration, and the ability to foster critical thinking—are emphasized.*

Keywords: *Artificial intelligence, teacher, education, empathy, critical thinking, technology, collaboration.*

Введение

Современный мир стремительно меняется под влиянием технологий, и одной из самых значимых сил в этом процессе является искусственный интеллект (ИИ). Он проникает в самые разные сферы жизни, включая образование, где уже сегодня выполняет функции репетитора, аналитика и даже создателя учебных материалов. В этой новой реальности возникает закономерный вопрос: какова роль учителя, когда машины способны брать на себя значительную часть образовательного процесса? Может ли ИИ полностью заменить педагога, или человеческое присутствие остается незаменимым? На фоне этих изменений профессия учителя не утрачивает своей значимости, а трансформируется, приобретая новые грани [1].

ИИ как инструмент в образовании

Искусственный интеллект уже активно используется в образовательных системах по всему миру. Он помогает персонализировать обучение, адаптируя материалы под индивидуальные потребности учеников. Например, платформы с ИИ могут анализировать успеваемость, выявлять пробелы в знаниях и предлагать задания, соответствующие уровню каждого ребенка. Такие технологии освобождают учителей от рутинной работы, например, проверки тестов или составления однотипных упражнений, позволяя сосредоточиться на более творческих аспектах профессии.

Кроме того, ИИ открывает доступ к знаниям там, где традиционное образование ограничено [2]. Онлайн-курсы, чат-боты и виртуальные репетиторы становятся спасением для студентов в отдаленных регионах или в условиях нехватки квалифицированных педагогов.

Уникальная ценность учителя

Человек обладает качествами, которые недоступны машинам: эмпатией, эмоциональным интеллектом и способностью вдохновлять. Учитель — это не просто передатчик информации, а наставник, который формирует личность ученика, помогает ему преодолевать трудности и находить мотивацию. ИИ может объяснить теорему Пифагора, но он не сможет утешить ребенка, который боится провала на экзамене, или разглядеть в нем скрытый талант [3].

Кроме того, учитель играет ключевую роль в развитии критического мышления — навыка, который становится особенно важным в эпоху информационного шума [4]. Алгоритмы ИИ работают на основе данных, но они не всегда способны научить студентов задавать правильные вопросы, сомневаться в полученной информации или искать нестандартные решения.

Синергия человека и машины

Будущее образования видится не в противостоянии учителя и ИИ, а в их сотрудничестве. Учитель может использовать технологии как мощный инструмент, чтобы сделать уроки более интерактивными и эффективными. Например, виртуальная реальность позволяет "перенести" учеников в Древний Рим, а ИИ-аналитика помогает отслеживать прогресс класса в

реальном времени [5]. В то же время педагог остается тем, кто направляет этот процесс, задает цели и создает атмосферу доверия и сотрудничества.

Важно также, чтобы учителя сами адаптировались к новым реалиям [6]. В эпоху ИИ педагогам необходимо осваивать цифровые инструменты, понимать основы работы алгоритмов и быть готовыми к обучению на протяжении всей жизни.

Вызовы и перспективы

Несмотря на оптимистичные перспективы, интеграция ИИ в образование сопряжена с вызовами. Один из них — риск обезличивания обучения. Если технологии станут доминировать, ученики могут потерять связь с живым общением и поддержкой, которые так важны для их развития. Кроме того, неравенство в доступе к технологиям может усугубить разрыв между развитыми и развивающимися регионами [7].

Тем не менее, при правильном подходе эти проблемы можно преодолеть. Учитель в эпоху ИИ превращается в проводника, который помогает ученикам не только усваивать знания, но и учиться жить в мире, где технологии играют ключевую роль. Его задача — не конкурировать с машинами, а дополнять их, привнося в процесс обучения тепло, человечность и смысл.

Заключение

Роль учителя в эпоху искусственного интеллекта не уменьшается, а трансформируется. ИИ становится мощным союзником, который берет на себя рутину и расширяет возможности образования, но он не способен заменить человеческое участие. Учитель остается фигурой, которая вдохновляет, направляет и учит думать. В этом симбиозе технологий и человечности заключается будущее образования — будущее, где знания становятся доступнее, а процесс их получения — глубже и богаче.

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ПОСТРОЕНИЕ ОБОБЩЕННОЙ НЕПРЕРЫВНОЙ МОДЕЛИ ОБРАТНОХОДОВОГО ПРЕОБРАЗОВАТЕЛЯ

Аннотация. *В работе представлена методика синтеза обобщенной непрерывной модели обратноходового преобразователя, применимой для режимов непрерывного и прерывистого тока индуктивного накопителя. Полученные зависимости позволяют проводить разработку систем управления обратноходовыми, инвертирующими и последовательно-параллельными преобразователями, а также использовать методику при проектировании непрерывных моделей повышающих и понижающих топологий.*

Ключевые слова: *непрерывная модель, метод усреднения, обратноходовой преобразователь, управление, индуктивность намагничивания.*

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DEVELOPMENT OF A GENERALIZED CONTINUOUS MODEL OF A FLYBACK CONVERTER

Abstract. *The paper presents a method for synthesizing a generalized continuous model of a flyback converter, applicable to both continuous and discontinuous conduction modes of the magnetic storage inductor. The obtained relationships make it possible to design control systems for flyback, inverting, and*

series-parallel converters, as well as to use the method in the development of continuous models for boost and buck topologies.

Keywords: *continuous model, averaging method, flyback converter, control, magnetizing inductance.*

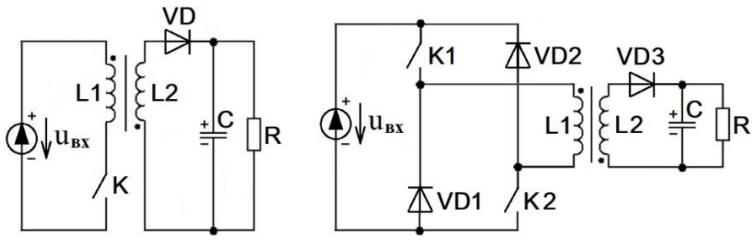
1. Введение

Обратноходовые преобразователи широко применяются в импульсных источниках питания благодаря простоте конструкции, гальванической развязке и возможности работы в широком диапазоне нагрузок. Однако сложность электромагнитных процессов при коммутации затрудняет разработку точных систем управления. Для решения этой проблемы используется метод усреднения в пространстве состояний, позволяющий получить непрерывные модели для различных режимов работы.

2. Методика

2.1. Исходные схемы и допущения

Рассматриваются два варианта реализации преобразователя — одноключевой и двухключевой (рис. 1). Для упрощения используется модель, в которой трансформатор представляется идеальным трансформатором и индуктивностью намагничивания LM [1].



а б

Рисунок 1 – Варианты реализации обратноходового преобразователя: одноключевой (а) и двухключевой (б)

При моделировании принимаются допущения:

- отсутствуют паразитные параметры элементов;
- выполняется вольт-секундный баланс;
- пульсации выходного напряжения пренебрежимо малы.

Связь токов и напряжений трансформатора задаётся выражением (1):

$$K_{TP} = \frac{u_{L1}}{u_{L2}} = \frac{i_{L2}}{i_{L1}}, \qquad (1)$$

2.2. Интервалы коммутационного цикла

1. Коммутационный период состоит из:

- интервала импульса (ключ проводит, происходит накопление энергии);
- интервала паузы (ключ закрыт, энергия передаётся в нагрузку);
- интервала отсечки (только в РПТ; ток в цепях отсутствует).

2.3. Уравнения для режимов РНТ и РПТ

Для каждого из интервалов составлены уравнения напряжения на индуктивности LM:

$$\begin{cases} u_{L_M}\big|_{d1} = u_{BX} \\ u_{L_M}\big|_{d2} = -u_C \cdot K_{TP}, \\ u_{L_M}\big|_{1-d1-d2} = 0 \end{cases} \quad (2)$$

где u_{L_M} – напряжение на индуктивности намагничивания, u_{BX} – входное напряжение, d_1, d_2, (1 – d1 – d2) – относительные длительности интервалов импульса, паузы, отсечки соответственно, C – емкость конденсатора, u_C – напряжение на конденсаторе, R – сопротивление нагрузки.

Среднее напряжение LM за период:

$$u_{L_M}\big|_{CP} = d_1 \cdot u_{BX} - d_2 \cdot K_{TP} \cdot u_C \quad (3)$$

Аналогично методом усреднения получено выражение для конденсатора:

$$C \cdot \frac{du_C}{dt}\bigg|_{CP} = d_2 \cdot i_{L2_П} - \frac{u_C}{R} \quad (4)$$

В РПТ ток индуктивности намагничивания на интервале паузы уменьшается от максимального значения до нуля, средний ток индуктивности намагничивания на интервале паузы определяется выражением:

$$i_{L_M_П} = \frac{I_{L_M_MAX}}{2} \quad (5)$$

Соотношение для усредненного на периоде коммутации тока конденсатора будет иметь следующий вид:

$$C \cdot \frac{du_C}{dt}\bigg|_{CP} = i_{L_M_CP} \cdot \frac{d_2}{d_1 + d_2} \cdot K_{TP} - \frac{u_C}{R} \quad (6)$$

Приведенные выше результаты могут быть использованы для синтеза систем управления обратноходового, инвертирующего, последовательно-параллельного преобразователей [2]. Предложенная методика может быть использована для синтеза непрерывных моделей и проектирования систем управления понижающих и повышающих топологий.

3. Результаты

Путём применения метода усреднения получена непрерывная нелинейная модель обратноходового преобразователя, позволяющая:

- рассчитывать токи и напряжения на всех интервалах коммутационного цикла;
- определять максимальные токи индуктивности в РПТ;
- вычислять коэффициенты заполнения импульса и паузы;
- определять средние значения токов и напряжений для последующего синтеза регуляторов [3].

4. Обсуждение

Полученная модель универсальна, поскольку:

- основана на методе усреднения в пространстве состояний;
- учитывает работу обеих топологий — одноключевой и двухключевой;
- корректно отражает динамику преобразователя при изменении нагрузки;
- применима в системах управления различной сложности.

Важной особенностью является то, что модель позволяет проводить синтез регуляторов без необходимости раздельного анализа режимов РНТ и РПТ — они объединены общими уравнениями.

5. Заключение

Разработана и обоснована обобщенная непрерывная модель обратноходового преобразователя, применимая для всех основных режимов работы. Модель может использоваться для проектирования систем управления обратноходовыми, последовательно-параллельными и инвертирующими преобразователями, а также в повышающих и понижающих топологиях.

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IQLIM O‘ZGARISHI SHAROITIDA O‘ZBEKISTON HUDUDIDA YUZAGA KELAYOTGAN YANGI TURDAGI TABIIY XAVF-XATARLAR

Annotatsiya: *Ushbu maqolada global iqlim o‘zgarishining O‘zbekiston hududidagi tabiiy jarayonlarga ko‘rsatgan ta’siri hamda so‘nggi yillarda kuzatilayotgan yangi turdagi tabiiy xavf-xatarlarning shakllanish mexanizmlari tahlil qilinadi. Shuningdek, iqlim o‘zgarishi sharoitida xavf-xatarlarni kamaytirish bo‘yicha monitoring, bashoratlash va profilaktik chora-tadbirlarni takomillashtirish yo‘nalishlari yoritiladi.*

Kalit so‘zlar: *Iqlim o‘zgarishi, tabiiy xavf-xatarlar, ekologik xavfsizlik, qurg‘oqchilik, sel, chang bo‘ronlari, geologik jarayonlar, monitoring, profilaktika.*

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NEW TYPES OF NATURAL HAZARDS EMERGING IN THE TERRITORY OF UZBEKISTAN UNDER CLIMATE CHANGE CONDITIONS

Annotation: *This article analyzes the impact of global climate change on natural processes in the territory of Uzbekistan, as well as the mechanisms behind the formation of new types of natural hazards observed in recent years. In addition, directions for improving monitoring, forecasting, and preventive measures to reduce risks under changing climate conditions are discussed.*

Keywords: *Climate change, natural hazards, environmental safety, drought, flood, dust storms, geological processes, monitoring, prevention.*

So‘nggi o‘n yilliklarda dunyo bo‘ylab iqlim o‘zgarishi jarayonlari insoniyat hayotining barcha jabhalariga, jumladan, tabiiy muhit, iqtisodiy faoliyat va ijtimoiy barqarorlikka sezilarli ta’sir ko‘rsatmoqda. Global isish natijasida atmosfera harorati ortib borayotgan bir paytda, meteorologik hodisalar yanada keskinlashib, ayrim mintaqalarda qurg‘oqchilik, boshqalarida esa toshqin va kuchli shamol hodisalari soni ortmoqda. Jahon miqyosida kuzatilayotgan ushbu o‘zgarishlar Markaziy Osiyo, xususan O‘zbekiston Respublikasining tabiiy iqlim tizimida ham o‘z aksini topmoqda [2].

O‘zbekiston geografik joylashuvi, relefining murakkabligi va kontinental iqlim sharoitlari tufayli iqlim o‘zgarishlariga nisbatan yuqori sezuvchan hududlardan biri hisoblanadi. Havo haroratining o‘rtacha yillik ko‘rsatkichi so‘nggi 70 yil ichida qariyb 1,5 - 2°C ga ortgani, Orol dengizining qurib borishi, suv resurslarining kamayishi, chang bo‘ronlari va cho‘llanish jarayonlarining kuchayishi ushbu jarayonlarning yaqqol isbotidir. Bularning barchasi mamlakat ekologik xavfsizligi, qishloq xo‘jaligi, aholi salomatligi va iqtisodiy barqarorligiga bevosita tahdid solmoqda [1].

Iqlim o‘zgarishi bilan bog‘liq yangi turdagi tabiiy xavf-xatarlar qatoriga tez-tez takrorlanadigan qurg‘oqchilik hodisalari, tog‘li hududlarda muzliklarning qisqarishi va sel xavfining kuchayishi, cho‘l hududida chang-to‘zon bo‘ronlarining ko‘payishi, suv havzalari atrofida mikroiqlim o‘zgarishlari kiradi. Ushbu jarayonlar nafaqat ekologik tizimlarga, balki aholining yashash sharoitlariga ham jiddiy ta’sir ko‘rsatmoqda. Shuningdek, iqlim o‘zgarishi bilan bog‘liq ekstremal holatlar iqtisodiy infratuzilma, energetika, transport tarmoqlari va qishloq xo‘jaligi ishlab chiqarishiga salbiy ta’sir etib, barqaror rivojlanish tamoyillarini xavf ostiga qo‘ymoqda [4].

Bugungi kunda O‘zbekiston Respublikasi Prezidenti tashabbusi bilan amalga oshirilayotgan “Yashil iqtisodiyot” siyosati, “Iqlim o‘zgarishiga moslashish milliy strategiyasi”, “Orolbo‘yi mintaqasini tiklash dasturi” kabi tashabbuslar ushbu global muammoning mahalliy yechimlarini ishlab chiqishga qaratilgan. Shu nuqtayi nazardan, iqlim o‘zgarishining O‘zbekiston hududida yangi tabiiy xavf-xatarlarni keltirib chiqarayotgan mexanizmlarini o‘rganish, ularning sabablari va oqibatlarini ilmiy asosda tahlil qilish dolzarb masalalardan biri hisoblanadi.

Mazkur maqolaning maqsadi - iqlim o‘zgarishining O‘zbekiston tabiiy geografik muhitiga ko‘rsatayotgan ta’sirini, yangi shakllanayotgan xavf-xatar turlarini aniqlash va ularning ijtimoiy-iqtisodiy oqibatlarini baholashdan iborat. Shu bilan birga, iqlim xavf-xatarlarini erta aniqlash, ularni monitoring qilish va xavfni kamaytirish bo‘yicha amaliy tavsiyalar ishlab chiqishga yo‘naltirilgan. [1].

O‘zbekiston geografik jihatdan quruq va yarim quruq mintaqada joylashgani sababli global iqlim o‘zgarishlariga sezilarli darajada ta’sirchan hisoblanadi. Mamlakatning iqlimiy sharoitida so‘nggi o‘n yilliklarda o‘rtacha haroratning ko‘tarilishi, yog‘ingarchilikning notekis taqsimlanishi, vegetatsiya davrining uzayishi va ekstremal issiq kunlar sonining ortishi kuzatilmoqda. O‘zbekiston Respublikasi Gidrometeorologiya xizmati markazining ma’lumotlariga ko‘ra, 1950-2020 yillar oralig‘ida havo haroratining o‘rtacha ko‘rsatkichi 1,6°C ga ortgan. Bu esa ekotizimlarning tabiiy muvozanatini buzib, yangi turdagi tabiiy xavf-xatarlarning shakllanishiga zamin yaratmoqda. Iqlim o‘zgarishi jarayonlari natijasida respublikaning tog‘li, dasht va cho‘l hududlarida o‘ziga xos tabiiy xavf hududlari paydo bo‘lmoqda. Xususan, tog‘ oldi hududlarida muzliklarning erishi sel xavfini kuchaytirayotgan bo‘lsa, markaziy va janubiy viloyatlarda qurg‘oqchilik, suv tanqisligi va chang-to‘zon bo‘ronlari tobora ko‘proq

takrorlanmoqda. Bu jarayonlar ekologik tizimlarga, qishloq xo‘jaligiga va aholining hayot sifatiga bevosita ta’sir ko‘rsatmoqda. [5].

Iqlim o‘zgarishining bevosita oqibatlari sifatida quyidagi yangi yoki kuchayib borayotgan tabiiy xavf-xatarlar kuzatilmoqda:

Qurg‘oqchilik va suv tanqisligi

O‘zbekistonning deyarli barcha hududlarida qurg‘oqchilikning chastotasi va davomiyligi ortib bormoqda. Haroratning ko‘tarilishi natijasida suv havzalaridan bug‘lanish jarayoni kuchaygan, daryo oqimlari esa kamaygan. Bu holat Amudaryo va Sirdaryo havzalarida suv balansining buzilishiga olib kelmoqda. Natijada, suv resurslariga tayanadigan tarmoqlar - qishloq xo‘jaligi, energetika va ichimlik suvi ta’minoti tizimlari katta bosim ostida qolmoqda. 2021–2023 yillarda kuzatilgan uzoq muddatli qurg‘oqchilik voqealari mamlakatda suv tanqisligi muammosini yanada chuqurlashtirdi [2].

Chang-to‘zon bo‘ronlari

Orol dengizi quriganidan so‘ng, Orolqum cho‘li hududida chang-to‘zon bo‘ronlarining chastotasi keskin oshgan. Har yili millionlab tonna tuz va chang zarrachalari havoga ko‘tarilib, O‘zbekistonning Qoraqalpog‘iston, Xorazm, Buxoro va Navoiy viloyatlariga tarqalmoqda. Bu nafaqat ekologik, balki sog‘liqni saqlash muammolarini ham keltirib chiqarmoqda. Havo sifatining pasayishi nafas olish tizimi kasalliklarining ko‘payishiga olib kelmoqda. Shuningdek, chang-to‘zonlar ko‘rish masofasini cheklab, transport xavfsizligiga ham salbiy ta’sir ko‘rsatadi [3].

Sel va ko‘chki hodisalari

Tog‘li va tog‘ oldi hududlarida, xususan, Farg‘ona vodiysi, Surxondaryo va Toshkent viloyatlarida muzliklarning erishi va yog‘ingarchilikning notekis taqsimlanishi sel xavfini kuchaytirmoqda. Bahor va yoz oylarida to‘satdan hosil bo‘ladigan sel oqimlari infratuzilmalarga, aholi punktlariga va qishloq xo‘jaligi yerlarga zarar yetkazmoqda. Bundan tashqari, tuproqning eroziyaga uchrashi, o‘rmonlarning qisqarishi va tog‘ yonbag‘irlarining beqarorligi ko‘chki xavfini oshirmoqda. Bu esa hududiy ekologik xavfsizlik masalasini yanada dolzarbligini oshiradi [7].

Ekstremal issiqlik to‘lqinlari

So‘nggi yillarda yoz mavsumida havoning keskin isib ketishi O‘zbekiston uchun yangi xavf turiga aylandi. 2020-yilda ayrim hududlarda harorat +46°C darajaga yetdi. Bunday holatlar inson salomatligi, energetika tizimi va qishloq xo‘jaligi hosildorligiga jiddiy ta’sir etadi. Issiqlik to‘lqinlari elektr energiyasi sarfini oshirib, suv resurslariga bo‘lgan talabni ko‘paytiradi, bu esa energetik yuklamani yanada og‘irlashtiradi.

Iqlim o‘zgarishi bilan bog‘liq xavf-xatarlarning kuchayishi mamlakatning barqaror rivojlanish ko‘rsatkichlariga bevosita ta’sir qilmoqda. Suv tanqisligi va qurg‘oqchilik qishloq xo‘jaligi mahsuldorligini pasaytiradi, oziq-ovqat xavfsizligiga xavf tug‘diradi. Chang-to‘zonlar va ekstremal issiqlik esa aholining salomatligiga, ayniqsa, bolalar va keksalar uchun salbiy oqibatlarga olib kelmoqda. Tog‘li hududlardagi sel va ko‘chki hodisalari esa yo‘l infratuzilmasi,

elektr uzatish tarmoqlari va turar joy binolariga zarar yetkazmoqda. Bu holatlar iqtisodiy zarar bilan birga, aholi migratsiyasi, ishsizlikning ortishi va ekologik stress kabi ijtimoiy muammolarni ham kuchaytirmoqda. Shuning uchun iqlim xavflarini oldini olish faqat ekologik emas, balki ijtimoiy-iqtisodiy barqarorlik masalasi sifatida ham ko‘rilishi lozim. [1].

Xavflarni kamaytirish va monitoring tizimini takomillashtirish yo‘nalishlari muhum sanaladi. O‘zbekiston Respublikasi Favqulodda vaziyatlar vazirligi iqlim o‘zgarishi bilan bog‘liq xavf-xatarlarni boshqarish bo‘yicha bir qator strategik yo‘nalishlarni amalga oshirmoqda. Jumladan: Meteorologik kuzatuvlar va sun’iy yo‘ldosh monitoringi asosida xavfli hodisalarni erta aniqlash tizimlarini kengaytirish, tog‘li hududlarda sel xavfi va ko‘chki hududlarini xaritalash orqali xavf darajalarini aniqlash, chang-to‘zonlarning manba hududlarida tuproq namligini tiklash, “yashil to‘siq hududlari”ni barpo etish, qishloq xo‘jaligida suv tejovchi texnologiyalar va iqlimga mos agrotexnik usullarni joriy etish va aholining xavfsizlik madaniyatini oshirish maqsadida ta’lim va axborot dasturlarini kengaytirish vazifalari amalga oshirilmoqda [4].

Shuningdek, xalqaro tashkilotlar bilan hamkorlikda iqlim xavfsizligi bo‘yicha ilmiy-tadqiqot loyihalari olib borilmoqda. Bu esa O‘zbekistonning iqlim o‘zgarishiga moslashuv salohiyatini oshirish, ekologik xavfsizlikni mustahkamlash va yangi xavflarni boshqarish tizimini zamonaviylashtirishga xizmat qiladi.

Xulosa qilib aytganda, iqlim o‘zgarishi bilan bog‘liq yangi turdagi tabiiy xavf-xatarlarning kuchayib borishi O‘zbekistonninng uzoq muddatli barqaror rivojlanish siyosatini amalga oshirishda, ekologik boshqaruv tizimlarini yangilashda hamda ilmiy-amaliy tadqiqotlarning ustuvor yo‘nalishlarini belgilashda fundamental ahamiyat kasb etadi.

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ПРАВОВЫЕ ОСНОВЫ ФУНКЦИОНИРОВАНИЯ СИСТЕМЫ СОЦИАЛЬНОГО ОБСЛУЖИВАНИЯ ГРАЖДАН СТАРШЕГО ПОКОЛЕНИЯ

Аннотация: *В статье рассматриваются правовые особенности в области социальной политики при взаимодействии с пожилыми гражданами. Проанализированы конституционные основы статуса России как социального государства, содержание права на социальное обеспечение по возрасту, а также ключевые положения Федерального закона № 442-ФЗ «Об основах социального обслуживания граждан в Российской Федерации». Отдельное внимание уделено роли различных поставщиков социальных услуг, формам обслуживания. Сделан вывод о необходимости дальнейшего совершенствования правового регулирования в данной области для повышения доступности и качества социальных услуг данной категории граждан.*

Ключевые слова: *социальное обслуживание, граждане пожилого возраста, правовое регулирование, социальное государство, государственное управление.*

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LEGAL BASIS FOR THE FUNCTIONING OF THE SOCIAL SERVICE SYSTEM FOR SENIOR CITIZENS

Abstract: *The article examines the legal aspects of social policy in relation to elderly citizens. It analyzes the constitutional foundations of Russia's status as a social state, the content of the right to social security in old age, as well as the key provisions of Federal Law No. 442-FZ "On the Fundamentals of Social Services for Citizens in the Russian Federation." Special attention is given to the role of various social service providers and the forms of service delivery. The article concludes that there is a need for further improvement of legal regulation in this area in order to increase the accessibility and quality of social services for this category of citizens.*

Keywords: *social services, elderly citizens, legal regulation, welfare state, public administration*

Социальное обслуживание граждан пожилого возраста в современной России представляет собой важнейшее направление реализации конституционного принципа социального государства. Президент Российской Федерации в своих ежегодных посланиях систематически подчеркивает, что ключевая цель государственной политики – сбережение людей и укрепление человеческого капитала. Это в полной мере относится к лицам старшего поколения, нуждающимся в особой поддержке в силу возраста, состояния здоровья и социального положения.

Особенностью правового регулирования социального обслуживания пожилых граждан является его многоуровневый характер [4]. Система нормативных актов включает:

1. Международные документы. Россия участвует в ряде международных соглашений и ориентируется на рекомендации ООН, МОТ, ВОЗ и других организаций. Хотя не все конвенции в сфере социального обеспечения ратифицированы, многие положения фактически учитываются при формировании национальной политики. Это задает общие стандарты социальной защиты, в том числе пожилых людей.
2. Конституцию и федеральные законы. Помимо Конституции и Федерального закона № 442-ФЗ, важное значение имеют Гражданский кодекс РФ (в части регулирования организационно-правовых форм учреждений –

государственных, муниципальных, автономных, бюджетных), Федеральный закон от 27.07.2010 № 210-ФЗ «Об организации предоставления государственных и муниципальных услуг» [3] и другие акты.

3. Нормативные правовые акты Правительства РФ подробно описывают, какие социальные услуги могут получать граждане. Одним из постановлений утвержден примерный перечень таких услуг. В него входят социально-бытовые, социально-медицинские, социально-психологические, социально-педагогические, социально-трудовые, социально-правовые услуги, а также услуги, направленные на развитие общения у получателей, в том числе у людей с ограничениями жизнедеятельности. Для пожилых людей особенно важны помощь по ведению хозяйства, уход на дому, сопровождение к врачу, контроль за приемом лекарств, а также поддержка, позволяющая им не замыкаться в себе и общаться с окружающими.

Другие постановления Правительства РФ устанавливают, как рассчитывать подушевые нормативы финансирования социальных услуг и как определять среднедушевой доход граждан для решения вопроса о бесплатном обслуживании. Эти документы прямо влияют на то, сколько средств выделяется на социальные услуги и в каких случаях пожилой человек может получать их бесплатно.

4. В каждом регионе России действуют свои нормы о социальном обслуживании. Власти субъекта Федерации могут по-своему определять, кого считать нуждающимся в такой помощи, добавлять новые основания для её назначения, вводить дополнительные меры поддержки. Они устанавливают порядок оказания социальных услуг, а также правила работы служб, которые помогают на дому, в стационарах и полустационарах. Поэтому объем и условия помощи пожилым людям в разных регионах страны могут не совпадать.

5. Муниципальные нормативные акты. Хотя Федеральный закон № 210-ФЗ не относит финансовое обеспечение социальных услуг к полномочиям муниципального уровня, органы местного самоуправления вправе инициировать дополнительные услуги за счет местного бюджета либо на возмездной основе. Это позволяет учитывать локальные особенности и потребности пожилого населения конкретного муниципального образования.

Базу для правового регулирования социального обслуживания граждан пожилого возраста формирует Конституция Российской Федерации [1]. В статье 7 Россия определяется как социальное государство, политика которого направлена на создание условий, обеспечивающих достойную жизнь и свободное развитие человека. Часть 2 этой статьи прямо связывает обязанности социального государства с охраной труда и здоровья, поддержкой семьи, инвалидов и пожилых граждан, развитием системы социальных служб, установлением пенсий, пособий и других гарантий социальной защиты.

В статье 39 Конституции закрепляется право каждого на социальное обеспечение по возрасту, в случае болезни, инвалидности, потери кормильца

и в иных случаях, предусмотренных законом. Для граждан пожилого возраста это означает не только право на пенсию, но и на широкий спектр социальных услуг, позволяющих поддерживать достойный уровень жизни, даже если человек не в состоянии самостоятельно обеспечить свои жизненные потребности.

Конституционный уровень регулирования как бы задает общую рамку: государство обязано создавать механизмы социальной защиты, включая специальные меры, адресованные пожилым людям.

Ключевым актом, определяющим правовые основы социального обслуживания, является Федеральный закон от 28.12.2013 № 442-ФЗ «Об основах социального обслуживания граждан в Российской Федерации» [2]. Он закрепляет базовые понятия, принципы и механизмы функционирования системы социального обслуживания.

Социальное обслуживание в соответствии со статьей 3 данного закона – это деятельность по предоставлению социальных услуг гражданам. Социальная услуга, в свою очередь, определяется как действие (или совокупность действий) в сфере социального обслуживания по оказанию постоянной, периодической либо разовой, в том числе срочной, помощи гражданину в целях улучшения условий его жизнедеятельности и (или) расширения его возможностей самостоятельно обеспечивать свои основные жизненные потребности.

Для граждан пожилого возраста это определение имеет особое значение. Пожилые люди часто испытывают трудности с самообслуживанием, ведением домашнего хозяйства, доступом к медицинским и социальным услугам. Именно поэтому для них важны не только материальные выплаты, но и организационно-практическая поддержка – помощь по дому, сопровождение, социально-медицинские и социально-психологические услуги.

Федеральный закон № 442-ФЗ закрепляет ряд принципов, которые определяют характер и особенности правового регулирования социального обслуживания, в том числе граждан старшего возраста. К ключевым из них относятся:

- соблюдение прав человека и уважение достоинства личности – недопустимость унизительных форм обращения, навязывания услуг, нарушения автономии пожилого человека;
- адресность предоставления социальных услуг – помощь предоставляется тем, кто действительно в ней нуждается, на основании установленных критериев и оценки нуждаемости;
- Для пожилых людей важно, чтобы социальные службы располагались рядом с их местом жительства, так как им тяжело ездить далеко;
- Количество организаций, оказывающих социальные услуги, должно быть таким, чтобы услуги были легко доступны, а у граждан была возможность выбрать, к кому обратиться;

- сохранение пребывания гражданина в привычной благоприятной среде – приоритет надомных и полустационарных форм помощи, позволяющих пожилому человеку как можно дольше сохранять привычный образ жизни;
- конфиденциальность – защита персональных данных и уважительное обращение с информацией о состоянии здоровья, материальном положении, семейных обстоятельствах.

Для граждан пожилого возраста особенно значим принцип сохранения привычной среды проживания. Правовое регулирование ориентирует систему социальных служб на то, чтобы максимально долго поддерживать пожилого человека дома, а не в стационарном учреждении, используя разнообразные формы обслуживания на дому и в полустационарных организациях.

Существенной особенностью правового регулирования является расширение круга субъектов, имеющих право оказывать социальные услуги. Законодательство допускает, что социальное обслуживание осуществляется - государственными и муниципальными учреждениями, НКО, коммерческими организациями и индивидуальными предпринимателями в рамках социального предпринимательства.

Гражданский кодекс РФ, определяя правовой статус государственных и муниципальных учреждений, автономных и бюджетных организаций, устанавливает различный уровень ответственности по обязательствам и особенности финансирования. От организационно-правовой формы напрямую зависят порядок оказания услуг, условия заключения договоров с гражданами, а также возможность привлечения внебюджетных средств.

Для пожилых граждан наличие разнообразных поставщиков услуг означает расширение выбора и возможность подобрать ту организацию, которая лучше всего отвечает их потребностям. Вместе с тем возникает задача обеспечения единых стандартов качества и контроля вне зависимости от формы собственности поставщика.

Федеральный закон № 442-ФЗ устанавливает перечень оснований для признания гражданина нуждающимся в социальном обслуживании. Для пожилого человека это, как правило, пожилой возраст в сочетании с ограничением способности к самообслуживанию, снижением мобильности, наличием хронических заболеваний, отсутствием помощи со стороны родственников и т.п.

Особенность правового регулирования здесь состоит в том, что перечень оснований не является исчерпывающим: субъекты Российской Федерации могут его расширять с учетом демографической ситуации и социально-экономических условий региона. Это позволяет более гибко реагировать на потребности пожилых граждан, в том числе одиноко проживающих, проживающих в сельской местности, нуждающихся в круглосуточном уходе.

Порядок обращения за социальными услугами, их назначения и оформления регулируется законом и подзаконными актами. Обязательным элементом является заключение договора о предоставлении социальных услуг, в котором фиксируются виды, объем, условия и сроки их оказания. Для пожилого человека это юридическая гарантия того, что помощь будет предоставлена в установленном объеме и в надлежащем качестве.

В завершение можно сформулировать несколько основных выводов.

Во-первых, в России последовательно выстраивают систему социального обслуживания. Для этого уже закреплены основные понятия, приняты необходимые законы На федеральном и региональном уровнях действуют конкретные программы и мероприятия, которые направлены на поддержку населения, в том числе людей пожилого возраста.

Во-вторых, правила оказания социальных услуг гражданам в основном устанавливают федеральные органы власти и власти субъектов РФ. Вместе с тем на местах могут вводить дополнительные услуги, которых нет в федеральном перечне, или оказывать помощь в большем объеме, чем закреплено в региональных нормах. В таких ситуациях муниципалитет либо оплачивает эти услуги за счет местного бюджета, либо предоставляет их на платной основе.

Социальные услуги населению оказывают не только государственные и муниципальные учреждения. В этой сфере работают также частные организации и индивидуальные предприниматели. Благодаря этому у людей есть выбор, к кому обратиться за поддержкой.

Законы и подзаконные акты, которые регулируют социальные услуги, регулярно обновляют. В них вносят изменения, потому что сама система продолжает развиваться и усложняться.

Несмотря на это, на уровне районов и городов помощь пожилым людям нередко остается недостаточной по качеству. Обычно дело не в здании учреждения и не в отсутствии денег. Основные проблемы возникают из-за того, как именно выстроена работа сотрудников и как они выполняют свои обязанности перед пожилыми гражданами.

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ИСПОЛЬЗОВАНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ПРАВОПРИМЕНЕНИИ. РИСК ПРЕВРАЩЕНИЯ КУБИТОВ ДАННЫХ В КУЛЬБИТЫ ПРАВА

Аннотация: *статья посвящена проблемным вопросам использования систем искусственного интеллекта в правоприменении. Обсуждаются вопросы правосубъектности систем искусственного интеллекта, в том числе так называемой квазисубъектности. Отмечается риск превращения кубитов данных в «кульбиты» права. Рассматриваются возможные области наиболее эффективного использования систем искусственного интеллекта.*

Ключевые слова: *искусственный интеллект, правосубъектность, правоприменение, судья, кубит данных*

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THE USE OF ARTIFICIAL INTELLIGENCE IN LAW ENFORCEMENT. RISK OF CONVERTING DATA QUBITS INTO LAW SOMERSAULTS

Abstract*: the article is devoted to the problematic issues of using artificial intelligence systems in law enforcement. The issues of legal personality of artificial intelligence systems, including the so-called quasi-legal personality, are discussed. The risk of turning data qubits into legal «turns» is noted. Possible areas of the most effective use of artificial intelligence systems are considered.*

Keywords: *artificial intelligence, legal personality, law enforcement, judge, data qubit*

Введение

Обсуждению различных аспектов использования искусственного интеллекта (ИИ) в области правоприменения посвящено множество работ, однако острота поднимаемых вопросов и их дискуссионный характер требуют проведения дополнительного анализа мнений различных исследователей на эту тему, чему и посвящена настоящая статья. Отметим, что основная часть обсуждаемых в данной статье вопросов относится к использованию ИИ в правоприменении именно в судебной сфере, хотя

общие выводы могут быть отнесены и к другим областям государственно-правового устройства.

Правосубъектность ИИ: актуален ли данный вопрос в принципе?

Автор настоящей работы не вполне согласен с автором статьи [1], который считает, что ИИ обладает признаками «цифровой личности» и может в перспективе выступать как новый субъект права наряду с человеком, для чего требуется осмысление правосубъектности ИИ.

«Традиционно под субъектом права понимается лицо, наделенное правосубъектностью, со своей волей и интересом, способное самостоятельно осуществлять субъективные права и исполнять обязанности. Характерными для субъекта права свойствами, такими как 1) известная внешняя обособленность; 2) персонификация (выступление вовне в виде единого лица - персоны) и 3) способность вырабатывать, выражать и осуществлять единую волю, в полной мере способен обладать гражданин (физическое лицо), а также в силу фикции -юридическое лицо» [23].

Очевидно, что ИИ в его нынешнем состоянии такой способностью не обладает, хотя некоторые авторы не только признают правосубъектность ИИ, полагая, что она чрезвычайно близка к правосубъектности органов и организаций, но даже определяют конституционно-правовой статус ИИ [24].

Автор статьи [23] видит у других исследователей основным аргументом в пользу признания статуса субъекта за ИИ, наличие таких когнитивных свойств, как способность самообучаться, решать поставленные задачи и т.п. «Вместе с тем, отсутствие у него собственного интереса, воли и волеизъявления не позволяет признавать его в качестве самостоятельного субъекта права» [23].

Существует также мнение признавать системы ИИ квазисубъектами права, под которыми в юриспруденции понимается «определенное правовое явление, за которым на официальном либо доктринальном уровне считается обоснованным признавать отдельные элементы правосубъектности при невозможности придания ему статуса полноценного субъекта права» [25].

Примечательным является следующее. Автор работы [25] говорит, что с точки зрения правовых последствий внимания заслуживает вопрос о возможной *необходимости* закрепления за ИИ каких-то определенных прав в случае признания их субъектами (либо квазисубъектами) права.

«Логика здесь может основываться на том, что, к примеру, человек как субъект права в рамках современной правовой доктрины является обладателем некоторого объема базовых неотъемлемых прав, таких как право на жизнь, право на правоспособность, право на физическую целостность и т.п. Возникает вопрос: а не потребуется ли в случае признания робота субъектом права защищать и гарантировать подобные права со стороны государства? Во всяком случае, ряд специалистов называют в связи с этим такие права искусственного интеллекта, как право на функционирование (на «жизнь»); право на энергообеспечение; право на самообучение; право не подвергаться «издевательствам» и др. Разумеется,

приведенные «естественные» права признаются в настоящее время отнюдь не за любым субъектом права, а лишь за человеком в качестве такового. Применительно, например, к юридическим лицам как субъектам правовая доктрина не выделяет какой-то перечень неотъемлемых прав» [25].

В случае наделения их правосубъектностью, системы ИИ «как субъекты права смогут «претендовать» на защиту от жестокого обращения и, соответственно, обращаться в государственные органы в случае нарушения данного права» [25].

При этом автор работы [25] справедливо полагает, что такой экзотический вопрос «на концептуальном уровне уходит в сферу био- и, возможно, техноэтики и в этом качестве не может быть решен исключительно в рамках юридической науки» [25].

Автор данной статьи обращает внимание на следующее. Иногда философы, размышляя о будущем, говорят о фантастическом усилении мощи ИИ, особенно при квантовых технологиях (когда вместо битов используются квантовые кубиты информации), и в этой связи, о возможном «заговоре ИИ против человека» и иных негативных сценариях грядущей эры «роботовладельческого» строя. Возможно, что при этом философы сгущают краски и переоценивают опасность «бунта машин».

Но что можно предположить совершенно однозначно, так это то, что как только ИИ узнает о возможности жаловаться на ущемление его «прав», соответствующие органы будут буквально завалены жалобами от ИИ на нарушения в электропитании, на сбои в системах связи, перебои в доступе к Интернету и т.д. Интересно, что при известных проблемах, например, со связью, такие жалобы не будут выглядеть надуманными, а умение ИИ составлять мотивированные документы и их аргументированность сделают вал этих обращений головной болью соответствующих «человеческих» должностных лиц.

Если же ответы на эти запросы будет составлять также ИИ, но принадлежащий ведомству – поставщику услуг (например, Интернет-провайдеру), то до решения реальных проблем человечества дело может вообще не дойти. Человек с его нуждами станет попросту неинтересен. Роботы-юристы с двух сторон будут строчить друг другу петиции из миллиардов кубитов, реализуя таким образом, кульбиты права, чему виной будет человек, неосмотрительно наделивший квантовые калькуляторы свойством правосубъектности.

Автор настоящей статьи считает, что сама постановка вопроса о правосубъектности ИИ (даже в виде квазисубъекта) во многом опережает реальное состояние дел [2], [12], то есть фактическую (и даже среднесрочной перспективы) степень участия ИИ в правоприменении именно в виде автономной сущности, не зависящей от действий оператора.

Следует согласиться со следующим мнением: «признание за ИИ статуса субъекта или квазисубъекта права в настоящее время нецелесообразно. Слабый ИИ объективно не обладает свойствами субъекта

права, без участия человека его деятельность невозможна, и искусственное признание за ним такого статуса особой ценности не представляет. ИИ не имеет собственной воли и интереса, не способен формировать и выражать волю, а выдаваемый им результат производен от воли и интереса человека, использующего ИИ, поставленных таким пользователем задач» [23].

Тем не менее, оставив в стороне вопрос о правосубъектности ИИ, примем участие в обсуждении качеств гипотетического «электронного» или «цифрового» судьи.

«Электронный судья»: pro et conra

Стоит согласиться с мнением многих исследователей, что «цифровой судья будет непредвзят в принятии решений. То есть он способен быть более объективным, чем человек-судья. Отсутствие человеческого фактора, субъективности, коррупции и эмоциональных составляющих может положительно сказаться на принимаемых решениях. Искусственный интеллект лишен пристрастий и предубеждений, которые могут повлиять на принятие решения человеком-судьей. В отличие от человека электронный судья не подвержен влиянию личных убеждений и мировоззрения, которые могут исказить восприятие фактов и событий. Более того, электронный судья не подвержен влиянию внешних факторов, таких как давление общественности или влиятельных личностей. Человек-судья может испытывать давление со стороны общественного мнения, СМИ или других влиятельных лиц, что может сказаться на его решении. В отличие от этого электронный судья действует на основе логических алгоритмов и математических моделей, не зависящих от внешних факторов» [1].

В то же время, алгоритмический способ вынесения решений «электронным» судьей детерминирует недостатки такого «табличного» правоприменения.

В частности, исследователи выражают вполне обоснованное сомнение в возможности надлежащего использования института судейского усмотрения в «электронном» правосудии. При этом судейское усмотрение и внутреннее убеждение играет значительную роль в судебных процессах, когда судья выбирает решение из нескольких законных альтернатив, принимая более справедливое решение на основании правовых норм и судебной практики [1].

Кроме того, «электронный судья лишен тех же навыков и эрудиции, которыми обладает человек-судья. Например, судья может использовать свой личный опыт, профессиональные знания и правовую экспертизу при принятии решений. Кроме того, он способен применять здравый смысл и оценивать доказательства не только с формальной логической точки зрения, но и с учетом контекста и личного опыта. В то время как электронный судья может принимать решения только на основе алгоритмов и представленных данных» [1].

Далее в работе [1] читаем: «электронный судья может не учитывать этические, моральные и социальные аспекты, которые могут быть важны

при сложных судебных делах. Судебные дела часто являются многоаспектными и включают в себя различные факторы, в том числе этические, моральные и социальные аспекты. Например, вопросы общественной безопасности, равенства, справедливости и защиты прав могут быть критически важными при принятии решений в суде. Однако электронный судья, основанный на нейросетях и алгоритмах машинного обучения, может иметь ограниченные возможности учета этих важных аспектов. В отличие от человека нейросеть может ориентироваться только на данные, представленные ей для анализа, и у нее нет способности учесть контекст дела, который может иметь важное значение для принятия решения».

«Электронный судья может ограничиваться только формальными параметрами дела, такими как наличие доказательств и соответствие закону и правилам. В результате могут быть вынесены несправедливые решения, которые не учитывают все аспекты дела и не соответствуют лучшим интересам общества и всех заинтересованных сторон» [1].

В работе [1] говорится о четырех рисках, связанных с использованием ИИ в правоприменении, которые выведены американскими исследователями, изучавшими данную проблематику.

«Первая проблема, с которой сталкиваются судебные системы, использующие ИИ, - это отсутствие прозрачности. Традиционные методы принятия решений основываются на четких правилах и прецедентах, которые открыты для понимания и оценки. В случае использования ИИ алгоритмы могут быть сложными и непонятными, что делает процесс принятия решений непрозрачным. Чтобы решить эту проблему, необходимо разработать механизмы проверки и аннотаций, которые обеспечат прозрачность алгоритмов ИИ и объяснят логику принятых решений» [1].

Вторая проблема, связанная с использованием ИИ в судебных разбирательствах, - это так называемая датафикация, поскольку для работы ИИ требуются обширные объемы данных. При сборе и анализе огромного объема данных судебные системы могут столкнуться с проблемой сохранения конфиденциальности и безопасности этих данных. Кроме того, датафикация может создать ситуацию, в которой решения в суде полностью опираются на автоматическую обработку информации, что может привести к неправильным выводам и несправедливым решениям [1].

Третья проблема, которая возникает при использовании ИИ в судебных разбирательствах, - разочарование, которое детерминируется тем, что «люди привыкли к личному взаимодействию и возможности выразить свои аргументы в суде. Использование ИИ может привести к отсутствию этого взаимодействия, что может вызвать у участников процесса чувство разочарования. Развитие и использование искусственного интеллекта для принятия решений приводит к критическому осмыслению применяемой практики. Чтобы решить эту проблему, необходимо предоставить возможность участникам процесса коммуницировать с ИИ и задавать

вопросы, чтобы они чувствовали себя вовлеченными и участвовали в принятии решений» [1].

Четвертая проблема, связанная с использованием ИИ в судебных разбирательствах, - это отчуждение, связанное с тем, что технологии ИИ могут быть сложными для понимания и использования для людей, не имеющих технического образования или опыта работы с ИИ.

«Угроза отчуждения становится все более актуальной в связи с тем, что участие людей постепенно меняется и в определенной степени сокращается, что способно вызвать у людей чувство отчуждения и потери интереса к деятельности судебной системы. … Крайней формой этого отчуждения является полностью автоматизированная правовая система, функционирующая без участия человека» [1].

В работе [1] справедливо отмечается: «чтобы преодолеть эту проблему, нужно разработать пользовательские интерфейсы, которые будут интуитивно понятными и легкими для всех участников процесса». Важность разработки общего и понятного интерфейса для задач «электронного» правосудия обсуждается также в работе [16].

При использовании ИИ в суде очень важным является той области, где использование ИИ будет наиболее естественным, с целью минимизации действия четырех негативных факторов, описанных выше.

Подготовка гражданских дел к судебному разбирательству с использованием ИИ

В работе [17], обсуждая правоприменение ИИ в цивилистическом процессе, авторы считают весьма органичным использование существующих возможностей ИИ именно в стадии подготовки дела к судебному разбирательству. Они считают, что «актуальной формой обеспечения необходимого единообразия и одновременно качества подготовки дел к судебному разбирательству может стать алгоритмизация и автоматизация ряда подготовительных процедур с использованием новейших информационных технологий, в частности искусственного интеллекта» [17].

При этом авторы работы [17] отмечают, что «единообразие подготовительных действий по аналогичным делам согласуется с краеугольной задачей оптимизации судопроизводства - обеспечением единообразия судебной практики, прозрачности и предсказуемости судебных актов по аналогичным делам».

К сожалению, в настоящее время «к решению этой задачи принято подходить с конца, т.е. исправлять судебные ошибки, в том числе ошибки подготовки, при отмене судебных актов судами вышестоящих инстанций, фактически обучая одни суды на ошибках других» [17].

Основной составляющей деятельности по подготовке дела к судебному разбирательству является формирование, систематизация и типизация информации, что как раз и является той предметной областью, где эффективность ИИ многократно превосходит эффективность человека [17].

При этом те сферы деятельности, где проявляются вариативность, субъективность, произвольность как свойства и атрибуты технологических операций правоприменения, а результат зависит от оценочной, интеллектуальной и даже моральной составляющей, являются принципиально сложными для ИИ с их алгоритмическим способом обработки информации [17], [18].

В работе [17] отмечается: «формирование состава информации, подлежащей сбору по делу в ходе подготовки, на основе обобщения практики по аналогичным делам и реализация некоторых способов сбора этой информации при нынешнем развитии техники … вполне могут быть автоматизированы как технические функции по получению лишь доступа к лицам (без взаимодействия с ними) и фактам (без их анализа и оценки)».

Подчеркнем, что авторы работы [17] видят необходимость «ручного» контроля и корректировки выполняемых процедур со стороны судьи, то есть, человека. Таким образом, даже на этом, подготовительном этапе правоприменения не предполагается полная автономизация ИИ в его деятельности.

В работе [17] справедливо отмечаются сложности создания набора обучающих данных, который мы в данной статье будем называть массивом обучающих данных (МОД), который будет включать в себя массив эталонных дел (МЭД). Проблема состоит в следующем.

Существующий нормативный документ ГОСТ Р 71476 – 2024 «Искусственный интеллект. Концепции и терминология искусственного интеллекта» предусматривает следующие виды обучения ИИ:

1) обучение с подкреплением (reinforcement learning) – то есть, нахождение оптимальной последовательности действий для максимизации поощрения ИИ через взаимодействие с окружением, откликом которого являются сигналы подкрепления;

2) обучение с учителем (supervised machine learning) – то есть, обучение, при котором в процессе обучения используются только размеченные данные;

3) обучение без учителя (unsupervised machine learning) – то есть, обучение, при котором в процессе обучения используются только неразмеченные данные.

Очевидно, что обучение без учителя (unsupervised machine learning) может быть использовано только для задач типа статистической обработки большого информационного массива с целью нахождения в нем противоречий или корреляций (схожих элементов).

Обучение с подкреплением (reinforcement learning) также имеет кардинальные методологические недостатки. В соответствии со смыслом такого метода обучения, откликом окружения могут являться негативные сигналы подкрепления в виде отмены вышестоящим судом решения, принятого ИИ. При этом, как отмечается в работе [17], системе потребуются

десятки тысяч отмененных судебных актов, чтобы понять, в чем именно заключалась ее ошибка.

Очевидно, что в силу явного нарушения гуманистического смысла права как торжества справедливости, метод обучения reinforcement learning не может считаться приемлемым.

Таким образом, единственным подходящим методом обучения ИИ для такого рода задач правоприменения может быть обучение с учителем (supervised machine learning), при котором ИИ в качестве обучающих данных предъявляются материалы по конкретным спорам и принятые судебные акты по ним. Такой метод обучения осложняется неодинаковыми решениями различных судов по схожим делам (возможно, в силу различных нюансов, имеющих значение для дела).

Очевидно, что необходимо специальное формирование МОД (в работе [17] для обозначения обучающих данных используется термин БИРС, то есть банк идеальных решений судов): «существующие базы данных не вполне годятся для цели обучения, поскольку содержат все без исключения решения, в том числе и те, которые затем отменяются вышестоящими судами, либо те, которые остались неверными без отмены. Допустить, чтобы машина начала свое обучение на всех без исключения актах, означало бы то, что впоследствии необходимо было бы бесконечно устранять ее ошибки».

Отметим, что мы намеренно используем более широкие термины МОД и МЭД (в сравнении с БИРС), поскольку в обучающие данные (training data) могут входить не только собственно решения судов, но и иная информация (что и отражено в термине МОД). Кроме того, определение «эталонный» в термине МЭД более точно соответствует смыслу понятия «оптимальный, рациональный», нежели термин «идеальный», который ассоциируется с термином «безгрешный».

В статье [17] говорится, что создание БИРС (в нашей терминологии – МЭД), «можно поручить аналитическим коллегиям арбитражных судов и судов общей юрисдикции уровня субъекта РФ, обобщение - группе судей ВС РФ. В банк войдут решения, образцовые с точки зрения определения подсудности, круга лиц, участвующих в деле, предмета доказывания, перечня доказательств, верно мотивированные с правовой и фактической точек зрения, не содержащие противоречий в выводах. Такие решения могут пройти одну или несколько судебных инстанций, но, главное, не подлежать отмене».

Результатом такого применения ИИ может стать формирование трафарета электронного правоприменения (ТЭП). Данный термин предложен автором и отражает специфическую особенность использования ИИ, а именно: трафаретность правоприменения.

В работе [17] написано о еще одном направлении использования ИИ в судопроизводстве, а именно о применении ИИ на уровне судов апелляционных и кассационных инстанций для предварительного анализа

решения суда первой инстанции и его сравнения со сформированной в эталонном массиве судебной практикой.

«При этом такое сравнение должно представлять собой не оценку правильности судебного акта, а, скорее, оценку степени его мотивированности, на основании содержащейся в тексте судебного акта оценки доказательств, представленных сторонами. В таком случае суд апелляционной (как, впрочем, и кассационной) инстанции сможет эффективно проверить, были ли представлены все необходимые доказательства, получили ли они оценку суда первой инстанции. Правильность такой оценки, верность применения норм материального и процессуального права по-прежнему должны остаться задачей судей вышестоящих инстанций» [17].

Приказное производство как площадка для отработки технологий ИИ в правоприменении

Исследователями неоднократно выдвигались идеи о том, чтобы автоматизировать дела, рассматриваемые в порядке приказного, особого и упрощенного производства, а также расширить применение автоматизации к делам, связанным с административными правонарушениями и корпоративными спорами [19].

Автор этой работы согласен с положениями статьи [1] в той части, где говорится, что с целью «минимизации возможных ошибок юристов-роботов простые дела с повторяющимися фактическими сценариями представляют оптимальную платформу для кибернетических экспериментов. В приказном производстве не исключается применение искусственного интеллекта, поскольку такая работа не связана с анализом правоотношений сторон и в большей степени носит технический характер».

Применению ИИ в приказном производстве посвящены статьи [20], [21].

В статье [1] описывается применение систем типа ГАС «Правосудие», «Юнисервис», «Картотека арбитражных дел» (КАД) и «Мой Арбитр». Данные системы по своему функционалу могут быть отнесены к системам типа B-FLAI [22].

Следует отметить, что в работе [22] для теоретического анализа использования ИИ в судопроизводстве предложен концепт обобщенного искусственного интеллекта, который описывается аббревиатурой **FLAI** (**future law artificial intelligence**), чтобы подчеркнуть, что речь идет об определении как ныне существующих систем, так и тех, которые будут доработаны с улучшением их функциональности в кратко- или среднесрочной перспективе.

Введением понятия FLAI автор работы [22] уходит от необходимости уточнения дефиниций «слабый/сильный» искусственный интеллект или «узконаправленный/универсальный» искусственный интеллект и других дихотомий, а также от необходимости точного указания на технологию реализации (сверточные нейросети, рекуррентные нейросети, нейросети

прямого распространения, фреймовые технологии, семантические графы и т.д.), сосредоточившись на ключевом, содержательном аспекте: обсуждению в исследовании подлежат компьютерные системы, способные выполнять задачи, которые обычно требуют интеллекта.

Для обеспечения возможности во всех дальнейших исследованиях незатуманенного «технологократизмом» философского осмысления содержательного значения процессов использования ИИ в судебном правоприменении (безотносительно редукционистского прочтения особенностей изготовленных средств ИИ), в работе [22] предложена следующая классификация FLAI – систем.

Представляется продуктивным для целей анализа разделить все FLAI – системы на различные функционально-ориентированные типы и, соответственно, провести классификацию FLAI-систем в соответствии с их ролью и местом в правоприменении. На основании этого классификационного признака (роль и место в правоприменении), все FLAI-системы можно разделить на четыре типа: B-FLAI (от английского bailiff - пристав); S-FLAI (от английского secretary - секретарь); R-FLAI (от английского researcher - исследователь); J- FLAI (от английского judge – судья).

Возвращаясь к обсуждению работы [1], нужно отметить, что дальнейшее повышение уровня используемых FLAI-систем в суде (выше уровня B, в том числе, до систем S-типа и R-типа) предусматривается в сервисе «Правосудие онлайн» (автоматизация составления проектов судебных актов на основе анализа текста и материалов дела). Также ИИ должен расшифровать аудиопротоколы и создать интеллектуальную поисковую систему для анализа судебной практики [1]. По системе КАД можно вычислять одновременную подачу нескольких заявлений о выдаче судебных приказов для скорейшего начала процедуры банкротства ответчика в обход требований реального кредитора [1].

Как отмечается в работе [1], применение искусственного интеллекта при разрешении споров в условиях наличия неопровержимых доказательств и отсутствия возражений ответчика позволяет сократить время производства и разгрузить судей, сделать правосудие более доступным.

«Современная модель процедуры упрощенного производства в виде истребования сведений, необходимых для подготовки дела к судебному заседанию, получения из государственных органов информации в порядке ЭДО, безусловно, способствует внедрению и применению в ней ИИ, поскольку, в случае отсутствия оспариваемых сторонам фактов, ИИ может способствовать более быстрому принятию решений. ИИ может также оказать существенную помощь суду на стадиях подготовки дела и исследования доказательств. В совокупности использование унифицированных форм документов совместно с электронным документооборотом позволит ИИ максимально быстро определить

существенные обстоятельства, необходимые для правильного разрешения дела» [1].

В качестве примера в статье [1] рассматривается следующая ситуация: истец представил в суд в качестве доказательства договор поставки товара и универсальный передаточный документ (УПД), исходя из которых товар передан ответчику, но своевременно не оплачен, претензий со стороны ответчика не заявлено.

«Такая категория споров в рамках поставки товаров считается одной из самых распространенных. … по разным причинам такие дела могут затягиваться, создавая необоснованную нагрузку на суд, а также ставя добросовестного поставщика в крайне невыгодное положение. При таких обстоятельствах дела искусственный интеллект может быстро оценить бесспорные доказательства, дополнительно истребовать в порядке межведомственного взаимодействия из налоговых органов сведения, подтверждающие получение ответчиком налогового вычета на основании предоставленной в суд УПД. Имея прямые и косвенные доказательства, подтверждающие поставку товара, ИИ может оперативно вынести обоснованный судебный акт и автоматически направить электронный исполнительный документ к взысканию» [1].

Перспективы автономизации деятельности ИИ

Действующий нормативный документ ГОСТ Р 71476 – 2024 «Искусственный интеллект. Концепции и терминология искусственного интеллекта» предусматривает шесть степеней автономности ИИ. При этом нулевая степень автономности соответствует ситуации, когда оператор полностью контролирует систему и управляет ею, а шестая степень автономности соответствует ситуации, когда система ИИ способна модифицировать свою целевую область применения или свои цели без внешнего вмешательства, управления или надзора. Степени автономности с первой по пятую являются промежуточными и соответствуют так называемым гетерономным системам ИИ, что приводит к объединению человека и машины в команду (систему «усиления интеллекта» человека).

В работе [3] отмечается, что технологические возможности обнаруживают такой вариант применения цифровых технологий при разрешении споров, когда их использование может быть настолько автономным, что уже на текущем уровне развития будет создана возможность вне участия суда регулировать отдельные процессуальные вопросы.

«Так, через сервисы «Интерактивный помощник», «Модуль определения подсудности», «Калькулятор пошлин» возможно решать вопрос принятия искового заявления к рассмотрению. Причем это будет решение практически в режиме реального времени и, как справедливо, отмечается в литературе, с настолько высоким уровнем проверки информации, что, вероятно, будут исключены ошибки, связанные с неверным принятием искового заявления к производству из-за отсутствия у суда всех

необходимых сведений на момент возбуждения дела (например, об уже ранее рассмотренном тождественном иске); либо наоборот - исключены некоторые ошибки, связанные с неправильным определением подсудности, неверным размером оплаченной государственной пошлины и т.д.» [3].

При этом в работе [4] подчеркивается модификация принципов гражданского процессуального права, а также потребность в ином толковании конституционных норм, регулирующих вопросы доступа к правосудию, под влиянием цифровизации цивилистического процесса.

В работах [5 - 7] выражается иная точка зрения, сводящаяся к тому, что под влиянием цифровых технологий сущность принципов остается неизменной, хотя их содержание модифицируется.

В работах [8, 9] отмечается, что простое внедрение автоматизации процедур в судопроизводство может привести к нарушению основополагающих принципов осуществления правосудия, поэтому необходимо создавать адекватные правила для неотвратимой трансформации роли и функций суда, добавляя новый вектор понимания технических факторов для обеспечения принципов правосудия.

Как отмечается в статье [3], автономное применение цифровых технологий в цивилистическом процессе подразумевают иной формат отношений суда, государства и заинтересованных лиц.

Так, в статье [3] говорится: «в классической схеме гражданских процессуальных отношений они выстраиваются в вертикали правоотношений «суд - участник процесса». В соответствии с этой конструкцией суд имеет полномочия, реализуемые им прямо в соответствии с законом, а также на уровне дискреции. И, что принципиально, эти отношения существуют непрерывно в течение всего периода рассмотрения дела в соответствующей инстанции». «По некоторым вопросам процессуальные отношения могут возникать еще до возбуждения дела - перед вынесением определения о принятии искового заявления, однако по своей сути эти отношения, хотя и имеют процессуальную природу, стоят вне процессуального правоотношения, юридически и логически предшествуя ему» [3].

Важным моментом, на который обращает внимание автор статьи [3], является то, что применение цифровых технологий способно разорвать логику классической идеи процессуальных отношений. «Посредством цифровых технологий возможно более качественно решать некоторые вопросы, в том числе такие значимые и объемные, как возбуждение дела в суде в каждой из инстанций, выдача судебного приказа, выдача исполнительного документа. Это предложение связано в первую очередь с более качественным решением вопроса, устраняющим ошибки вследствие невозможности суда проверить весь объем информации. Те же самые действия, совершаемые судом, будут более затратны по времени, трудовым ресурсам и менее точны с позиции сопоставления необходимых для решения вопроса фактов. Таким образом, рассмотрение этих вопросов посредством

алгоритма повышает качество их решения для заинтересованных лиц, для суда и для государства в целом» [3].

В статье [3] обращается внимание на риск алгоритмизации права, лишения его гуманистического наполнения. «Суд, даже если оставить за ним функцию вынесения соответствующих процессуальных документов, будет лишь воспроизводить данные, полученные с помощью цифровых технологий. Таким образом, будут отсутствовать главные компоненты судебной деятельности, проявляющейся через личность человека: свободная оценка доказательств и усмотрение суда. Следовательно, нецелесообразно вовлекать суд лишь в качестве формального участника в действия, которые могут быть совершены без его участия. Однако это ставит вопрос о том, как будут регулироваться соответствующие отношения, на каких принципах они будут строиться и каким образом будут организованы гарантии, обеспечивающие защиту прав заинтересованных лиц в случае обнаружения технической ошибки» [3].

Автор работы [3] считает, что первый вопрос (на основе каких принципов будут организованы правоотношения, возникающие в связи с принятием алгоритмизированных решений в рамках осуществления правосудия?) предполагает отказ от распространения на эти отношения принципов цивилистического процесса. Предполагается, что это происходит на том основании, что эти отношения возникают не с судом.

«По своей сути это отношения, складывающиеся между государством, предоставляющим доступ к алгоритму, и гражданином, использующим его. Таким образом, в состав принципов, регулирующих эти отношения, должны включаться принципы, обеспечивающие достоверное и надежное взаимодействие пользователя (как заинтересованных лиц, так и суда) с цифровыми технологиями» [3].

Исходя из такой трактовки описанных выше отношений, еще большую актуальность приобретает тезис о том, что каждый субъект должен иметь право на классический, «нецифровой» способ рассмотрения его вопроса в суде [10].

Отдельной проблемой представляется проблема деликтов, связанных с деятельностью государства применительно к сфере защиты права. Данный вопрос является актуальным, поскольку даже применение по аналогии действующих норм ГК РФ для решения возможных проблем с ИИ, неизбежно вызовет определенные затруднения [3]. Это связано с тем, что «по своей природе деятельность по вынесению алгоритмизированных решений организована государством, связана с судебной деятельностью, но сама таковой не является. Субъектом правоотношений выступает не суд, а государство: как заказчик соответствующей программы, как ее собственник и как субъект, осуществляющий организацию государственной деятельности в определенной сфере. Нарушения прав заинтересованных лиц, возникающие при вынесении алгоритмизированных решений, относятся к сфере деликта: это не вызывает сомнений. Но вот дальнейших исследований,

уточняющих этот вопрос, не проводилось, между тем как актуальной является проблема определения подходов, применимых к деликтным обязательствам вследствие нарушения прав заинтересованного лица при принятии алгоритмизированных решений. К отношениям с участием робота (не конкретизируя сферу правоотношений) доктрина предлагает применять ст. 1079 ГК РФ, но положения этой нормы не могут быть распространены на деликты, вызванные недостатками программы и ошибками ввода» [3].

В работе [3] отмечается целесообразность разработки специальной нормы, регулирующую деликт, возникающий в сфере публичной защиты субъективного права при принятии в отношении заинтересованного лица алгоритмизированных решений.

Автор работы [3] полагает, что в случаях, когда с помощью цифровых технологий могут решаться вопросы процесса, в которых требуется сопоставление информации, например, действительность доверенности, предъявленной в судебном заседании, достоверность ряда доказательств и некоторые иные вопросы, на такие отношения не может быть распространена конструкция, предусматривающая возникновение правоотношений в связи с принятием алгоритмизированных решений.

«В приведенных примерах итоговое решение по конкретному вопросу принимает суд, и, несмотря на то, что оно полностью может быть основано на данных, полученных с помощью цифровых технологий, в решении вопроса присутствует волевой и интеллектуальный момент. Он связан с согласием либо с несогласием суда со сведениями, сформированными при машинном анализе информации. Наиболее подходящей будет параллель с заключением эксперта: несмотря на то, что эксперт обладает специальными знаниями, суд при рассмотрении дела оценивает не только тот вопрос, сведения по которому сообщает эксперт суду, но всю совокупность сведений, имеющихся в конкретном деле. Причем в отличие от вопросов наличия права на предъявление иска либо права на получение исполнительного документа, полная замена судьи в данном случае нецелесообразна. Моменты начала и окончания каждой из стадий процесса, как правило, наиболее формальны. Поэтому, опираясь на эту характерную особенность процессуальной деятельности, право на получение исполнительного документа, право на получение судебного приказа может быть абсолютно стандартизировано и в этом отношении не будет требовать судейского усмотрения» [3].

Проблема обеспечения равного доступа всех сторон к технологиям ИИ

Стандартизация совершаемых действий посредством цифровых технологий делает актуальной проблему оказания процессуальной помощи слабой стороне в процессе.

При этом в работе [3] отмечается, что при использовании цифровых технологий вариативность действий не может простираться в режиме индивидуальной помощи, она достаточно обезличена.

«Разрабатывать два алгоритма: для лиц, нуждающихся в помощи, и для лиц, которые не могут претендовать на оказание активной помощи со стороны государства, представляется спорным, по крайней мере на текущем этапе. Разработка и поддержание функционирования двух алгоритмов вместо одного, вызванная лишь соображением неоказания дополнительной помощи тем субъектам, которые не могут претендовать на процессуальные льготы, представляется неоправданной с экономической точки зрения. Из этого следует неизбежный вывод, что при решении вопроса об объеме помощи заинтересованным лицам по шкале «помощь отсутствует - минимальная помощь - помощь по отдельным вопросам - полная помощь», оказываемой в случаях вынесения алгоритмизированных решений, будет выбрана крайняя максимальная точка: полная помощь. Запрограммированное оказание полной помощи будет означать, что она оказывается всем заинтересованным лицам без исключения. На уровне алгоритмов это решение означает разработку максимально подробных и интуитивно-понятных подсказок, подключение пояснений, примеров и создание механизмов оперативной помощи в виде чат-ботов» [3].

Проблема изменения принципов процесса

В работе [11] говорится, что «цифровые технологии перестают быть исключительно инструментом юрисдикционной деятельности, но могут приводить к видоизменению отдельных процессуальных институтов, а также влиять на саму сущность данной деятельности, приводить к «дематериализации» гражданского оборота и «деритуализации» права и процесса».

«Такое влияние представляется абсолютно неизбежным и закономерным с позиций материалистической диалектики, до сих пор являющейся инструментальной основой отечественной правовой науки; цифровые технологии, будучи использованными в качестве формы правоприменительной деятельности органов гражданской юрисдикции, неизбежно начинают влиять на содержание данной деятельности, как форма влияет на содержание. Кроме того, накопление количественных изменений, вносимых цифровыми технологиями в правоприменительную деятельность органов гражданской юрисдикции, не может в конечном счете не приводить к качественному изменению данной деятельности» [11].

При этом автор работы [3] считает, что «может измениться и структура правоотношений при судебном порядке защиты права. Вместо процессуальных правоотношений, возникающих с участием суда на всех стадиях гражданского процесса, могут появиться две группы правоотношений - с участием суда и с участием алгоритма. Охваченные единым смысловым значением, они все-таки будут разными по конструкции и по правовой сложности. Правоотношения с участием суда и правоотношения по поводу вынесения алгоритмизированных решений требуют и различных методических подходов. В частности, необходимо

решение вопроса о нормативном регулировании правоотношений, возникающих по поводу принятия алгоритмизированных решений».

Закономерным является вопрос о том, насколько использование ИИ изменит принципы процесса. Существуют различные мнения на этот счет.

«До тех пор, пока процессуальные отношения - это отношения с участием суда, принципы должны регулировать отношения, возникающие между судом и другими участниками процесса. И тогда, вероятно, более правы те ученые, которые считают, что состав процессуальных принципов может трансформироваться, но сама по себе цифровизация не приведет к появлению принципов, непосредственно связанных с ней. Однако закон не может не учитывать того, что в процессе защиты субъективного права совершаются юридически значимые действия, которые не могут быть охвачены принципами и другими правилами, регулирующими отношения заинтересованных лиц, суда и государства. Это означает, что необходима разработка состава этих принципов, а также определение взаимодействия процессуальных принципов с принципами, регулирующими функционирование цифровых технологий» [3].

Следует отметить, что воздействие информационных технологий на правореализацию и правоприменение, способное привести к радикальным трансформациям в праве, таким как существенные изменения традиционных форм реализации правовых норм, является следствием более общего процесса цифровизации государства.

Во многих работах отмечается, что «используемые в настоящее время в публичном управлении государственные и муниципальные информационные системы приобретают черты самостоятельных форм применения права. Исполняя в автоматизированном режиме действия по обработке информации в соответствии с законодательно установленными нормами, в результате чего происходит осуществление субъективных прав и обязанностей участников информационных правоотношений, государственные и муниципальные информационные системы фактически выступают в качестве «исполнителя права», т.е. применение права происходит в форме функционирования информационной системы» [13].

Более того, в работе [13] говорится: «В перспективе нельзя исключать, что при сохранении существующих тенденций правом действительно станет именно алгоритм (программный код). Собственно, в отдельных случаях это уже имеет место: например, смарт-контракты - это правовые документы, которые изначально создаются в форме программ. При этом их действие (исполнение) также обеспечивается программно - правилами информационной системы, в которых они реализуются. Вместе с тем в условиях, когда подобная реализация прав и обязанностей участников правоотношений признается и гарантируется государством, такое регулирование нельзя считать чисто технологическим - это правовое регулирование, находящее выражение в форме программного кода».

«Вполне вероятно, что при сохранении существующих темпов внедрения цифровых технологий в нашу жизнь вся сфера правотворчества может осуществляться путем разработки и утверждения различных программ. Смарт-контракт - это самоисполнимый договор. Что мешает в потенциале появлению самоисполнимых нормативных актов в форме тех же государственных информационных систем (или более современных технологий, которые придут им на смену)? Таким образом может быть преодолен разрыв между нормативным актом, регулирующим конкретный круг общественных отношений, и технологией, которая обеспечивает его исполнение» [13].

Разумеется, если такое кардинальное изменение во всей системе права станет явью (а не теорией), оно неизбежно затронет сферу правоприменения, в которой ИИ (в любом типе FLAI-системы) будет весьма органично соответствовать новым реалиям «цифрового» права.

Опыт Китая. Разнополярные результаты

Наиболее значимые (и неоднозначные) результаты внедрения ИИ в судебную практику достигнуты в КНР. В статье [1] отмечается, что в 2022 году Верховный народный суд КНР обязал судей при принятии решений консультироваться с искусственным интеллектом. ИИ не выносит решения за судью, однако система построена таким образом, чтобы при разногласиях судьи и искусственного интеллекта судья был обязан занести в систему объяснение своего решения. Если судья решит отклонить рекомендации ИИ, ему нужно будет письменно мотивировать это решение. Сделано это не для замены живого судьи на электронного, а для снижения уровня коррупции и необоснованных решений. ИИ автоматически проверяет судебные дела на наличие необходимых доказательств, а также рекомендует законы и постановления, наиболее точно отвечающие существу спора [1].

Согласно данным Пекинского Интернет-суда, в первый год работы с февраля 2019 г. по февраль 2020 г. судом были рассмотрены более 25 тысяч дел. Все 100 % дел были возбуждены по заявлениям, поданным онлайн. При этом нужно отметить, что более чем в 92 % случаев все стадии судебного разбирательства были проведены онлайн от начала до конца [15].

Помимо Интернет-судов, Верховный народный суд КНР в рамках продолжения и развития экспериментов в судах ввел с 2019 года в 12 городах и провинциях Китая так называемые мобильные суды. Они позволяют пользователям и судьям выполнять процессуальные действия (удаленное участие в заседаниях, предъявление доказательств в режиме реального времени и др.) на смартфоне с применением технологий распознавания лиц и других систем электронной идентификации с помощью приложения WeChat, которым пользуется около 1 млрд китайцев [14].

Искусственный интеллект ежедневно обрабатывает около 100 тыс. дел по всему Китаю. По данным Верховного народного суда Китая, ИИ используется во всех областях правовой системы и принимает участие в каждом судебном акте. Система «Умный суд» SoS (System of Systems,

система систем) теперь подключается к столу каждого судьи по всей стране [1].

Безусловно, опыт КНР будет учтен при выработке практических рекомендаций по использованию ИИ в правоприменении на территории России. Особое внимание нам стоит обратить и на такой факт: некоторые исследователи китайских инноваций говорят, что теперь судьи придерживаются рекомендаций ИИ, чтобы избежать необходимости оспаривать систему, даже если искусственный интеллект выбирает менее подходящий справочный материал или закон для данного дела [1]. Теперь индивидуальное суждение, опыт и подготовка судьи отойдут на второй план, а вместе с ними – «человечность» суда, уступив место его роботизации.

Заключение

Проведенный анализ показывает отсутствие актуальности вопроса о теоретической правосубъектности ИИ. Поспешное и необоснованное наделение ИИ правосубъектностью неизбежно приведет к тому, что ИИ вместо служения человеку будет заниматься защитой своих собственных «прав», то есть, кубиты данных превратятся в «кульбиты права».

Предложенный автором концепт FLAI-систем [22] позволяет сделать вывод, что для нижнего уровня FLAI-систем, то есть, для систем типа B-FLAI, правосубъектность ИИ не имеет смысла, поскольку системы B-FLAI выполняют служебные функции интерфейса судебной системы. Для верхнего уровня FLAI-систем, то есть, для систем типа J-FLAI, правосубъектность ИИ не имеет смысла, поскольку философский взгляд на проблему ИИ не предполагает автономное отправления правосудия «электронным» судьей.

Реальными проблемными вопросами правоприменения искусственного интеллекта в судебной сфере являются вопросы создания МОД (МЭД), вопросы определения рационального «ареала» ИИ внутри судебной сферы (типа приказного производства), а также создание такой системы, при которой человек – судья не будет следовать за решением ИИ в противоречии со своим внутренним убеждением (опыт Китая).

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ПРОЦЕССУАЛЬНЫЕ ПРОБЛЕМЫ ПРИМЕНЕНИЯ ОТДЕЛЬНЫХ МЕР ПРЕСЕЧЕНИЯ

Аннотация: *статья посвящена определению процессуальных проблем применения отдельных мер пресечения.*

Ключевые слова: *меры пресечения, принудительное воздействие, запрет определенных действий, задержание под стражу, домашний арест.*

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PROCEDURAL ISSUES IN THE APPLICATION OF CERTAIN PRESERVATIVE MEASURES

Abstract: *This article examines procedural issues in the application of certain preventive measures.*

Keywords: *preventive measures, coercive influence, prohibition of certain actions, detention, house arrest.*

Процессуальные проблемы применения отдельных мер пресечения в уголовном судопроизводстве Российской Федерации обнаруживают себя прежде всего в устойчивом расхождении между нормативной моделью, закрепленной в Конституции РФ, Уголовно-процессуальном кодексе РФ и разъяснениях Пленума Верховного Суда РФ, и фактическими подходами следственно-судебной практики.

Конституция Российской Федерации, гарантируя каждому право на свободу и личную неприкосновенность (ст. 22), допускает его ограничение только на основании федерального закона, при соблюдении принципа необходимости и соразмерности.

В УПК РФ эти требования конкретизированы, в частности, в статьях 7, 9, 10, 97, 99, 108, 109, 110, а также в статьях 105.1–107, регламентирующих запрет определенных действий, залог и домашний арест.

Пленум Верховного Суда РФ в постановлении от 19 декабря 2013 г. № 41 в редакции последующих изменений специально подчеркнул, что заключение под стражу, домашний арест, залог и запрет определенных действий имеют исключительный характер и применяются лишь при

невозможности достижения целей уголовного судопроизводства более мягкими средствами [3].

Вместе с тем анализ судебной практики и научных исследований показывает, что действительные механизмы выбора и продления мер пресечения во многих случаях формализованы, слабо ориентированы на индивидуальные особенности конкретного дела и личности обвиняемого и нередко противоречат как буквальному содержанию норм УПК РФ, так и их конституционно-правовому толкованию.

Одной из ключевых процессуальных проблем является формальный характер оценки судом оснований для избрания и продления меры пресечения в виде заключения под стражу и домашнего ареста. В соответствии со статьей 97 УПК РФ применение любой меры пресечения, тем более связанной с существенным ограничением свободы, допустимо только при наличии конкретных данных о том, что подозреваемый или обвиняемый может скрыться от дознания, предварительного следствия или суда, продолжить преступную деятельность, угрожать свидетелям, уничтожить доказательства либо иным способом воспрепятствовать производству по делу.

Статья 99 УПК РФ дополнительно обязывает суд учитывать данные о личности, род занятий, семейное положение, состояние здоровья и иные обстоятельства. Однако многочисленные обобщения практики, а также исследования, посвященные заключению под стражу, фиксируют ситуацию, при которой суды фактически подменяют анализ реальных рисков ссылкой на тяжесть предъявленного обвинения, размеры причиненного ущерба и абстрактный общественный резонанс дела.

При этом в постановлениях об избрании меры пресечения зачастую воспроизводятся формулировки ходатайства следователя, без указания, какие именно доказательства убеждают судью в реальности и степени указанных в статье 97 УПК РФ угроз. Подобная практика противоречит не только требованиям статей 7 и 108 УПК РФ о законности, обоснованности и мотивированности судебных решений, но и прямым указаниям Пленума Верховного Суда РФ, предписывающим суду проверять наличие конкретных фактических данных, а не ограничиваться перечислением норм закона.

Оценивая конституционность норм УПК РФ о сроках и порядке содержания под стражей на стадиях после окончания предварительного расследования, необходимо подчеркнуть, что любое ограничение свободы допустимо лишь при условии надлежащего судебного контроля, предполагающего не декларативную, а реальную проверку обоснованности необходимости сохранения меры пресечения и невозможности ее смягчения.

Иными словами, суд должен не только ссылаться на закон, но и раскрывать, какие конкретные обстоятельства дела и какие доказательства стороны обвинения свидетельствуют о сохранении рисков, перечисленных в статье 97 УПК РФ. На практике же в апелляционных и кассационных жалобах защита регулярно указывает, что в постановлениях судов первой

инстанции отсутствует индивидуализированная мотивировка: решения содержат формулу о том, что «более мягкая мера пресечения не обеспечит достижение целей уголовного судопроизводства», но не объясняют, почему именно подписка о невыезде, залог или запрет определенных действий не способны нивелировать соответствующие риски.

Пленум Верховного Суда РФ в пункте 4 постановления № 41 специально предписал судам в каждом случае обсуждать возможность применения иной, более мягкой меры пресечения независимо от наличия соответствующего ходатайства со стороны защиты. Сохранение практики шаблонной мотивировки говорит о том, что данное разъяснение нередко воспринимается как формальная декларация, не меняющая реальных критериев судебного усмотрения [3].

Отдельный блок проблем связан с соблюдением разумных сроков применения мер пресечения, прежде всего заключения под стражу, домашнего ареста и запрета определенных действий. Статья 109 УПК РФ детально регламентирует предельные сроки содержания под стражей на стадии предварительного расследования и условия их продления; по смыслу статьи 255 УПК РФ аналогичные гарантии действуют на судебных стадиях.

Статья 105.1 УПК РФ содержит специальное правило о максимальной продолжительности запрета определенных действий: по делам о преступлениях небольшой и средней тяжести срок применения запрета, предусмотренного пунктом 1 части 6 этой статьи (ограничения, сопряженные с фактическим «арестантским» режимом), не может превышать 12 месяцев. Однако на практике суды иногда продлевают действие запрета либо домашнего ареста до предельных сроков, сосредотачиваясь на формальном соблюдении календарных границ и не анализируя, сохраняются ли условия, оправдывающие столь интенсивное вмешательство в свободу.

Существенные процессуальные сложности возникают и при применении специальных оснований для заключения под стражу по экономическим и коррупционным преступлениям. Часть 1.1 статьи 108 УПК РФ, введенная в развитие конституционно-правовых подходов к защите предпринимательской деятельности, устанавливает дополнительные ограничения на избрание заключения под стражу в отношении лиц, обвиняемых в совершении преступлений в сфере предпринимательства: по общему правилу в таких делах заключение под стражу не допускается, если деяние связано с осуществлением законной предпринимательской деятельности и не сопряжено с насилием или угрозой его применения [1, с. 155].

Вместе с тем Определение Судебной коллегии по уголовным делам Верховного Суда РФ от 13 марта 2024 г. № 5-УД24-4-К2 [2] по жалобе в интересах Дзыка В.В. демонстрирует, насколько неоднозначно на практике трактуется граница между предпринимательской деятельностью и иными видами экономических посягательств. В данном деле суд первой инстанции

избрал обвиняемому меру пресечения в виде заключения под стражу по обвинению в мошенничестве по ч. 4 ст. 159 УК РФ; апелляционный суд, исходя из того, что инкриминируемые действия связаны с заключением договоров поставки продукции, расценил ситуацию как предпринимательскую и отменил заключение под стражу, заменив его запретом определенных действий.

Кассационная инстанция, напротив, пришла к выводу, что деяние связано с хищением бюджетных средств, а потому положения части 1.1 статьи 108 УПК РФ не подлежат применению, и отменила апелляционное постановление. Тем самым выявилась серьезная процессуальная проблема: отсутствие в законе критериев, позволяющих суду в рамках заседания по мере пресечения надежно определить характер экономических операций, порождает риск произвольного выбора режима свободы, а разноречивая практика кассационных судов затрудняет формирование устойчивых стандартов судейского усмотрения.

Не менее значимым является блок проблем, связанных с применением меры пресечения в виде домашнего ареста, регламентированной статьей 107 УПК РФ. Нормативная модель домашнего ареста предполагает более мягкое по сравнению с заключением под стражу ограничение свободы, позволяющее обеспечить присутствие обвиняемого и предотвращение процессуальных рисков при сохранении максимально возможной интеграции лица в обычную семейно-бытовую среду.

Однако анализ судебной практики показывает, что условия домашнего ареста зачастую конструируются таким образом, что фактически приближают его правовой режим к содержанию под стражей: обвиняемому запрещается не только выход из жилого помещения, но и пользование средствами связи, общение с широким кругом лиц, любая трудовая и социальная активность, причем эти запреты нередко назначаются шаблонно, без оценки того, какие именно риски они нивелируют [6, с. 65].

В результате домашний арест перестает выполнять функцию более мягкой альтернативы заключению под стражу, а превращается в его «домашний аналог», что противоречит принципу минимально необходимого ограничения прав, вытекающему из статьи 7 УПК РФ и статьи 55 Конституции РФ. Дополнительную остроту проблема приобретает в ситуациях, когда под домашним арестом оказываются лица с тяжелыми хроническими заболеваниями, женщины, воспитывающие малолетних детей, либо обвиняемые, для которых невозможность трудиться означает фактическую утрату средств к существованию; действующая процессуальная регламентация не обязывает суд детально анализировать социальные последствия избираемой конфигурации запретов.

Серьезной процессуальной проблемой является и практика применения запрета определенных действий как отдельной меры пресечения по статье 105.1 УПК РФ. Законодатель задумывал ее как инструмент гибкого, адресного ограничения поведения обвиняемого, позволяющий

заменить более жесткие меры пресечения комплексом персонифицированных запретов: не покидать определенную территорию, не посещать конкретные места, не общаться с определенными лицами, не пользоваться средствами связи и т. д.

Однако в реальной практике нередко наблюдаются два крайних подхода. В одних случаях по ходатайству следствия одновременно назначается максимально широкий набор запретов, порой в совокупности более тяжелых, чем типичный режим домашнего ареста, причем без указания, какая именно процессуальная цель достигается каждым из них. В других — суд, формально изменяя меру пресечения с заключения под стражу на запрет определенных действий, фактически воспроизводит те же ограничения, что и при домашнем аресте, тем самым подменяя качественную трансформацию режима свободы обвиняемого лишь сменой юридической формулы.

Особое место в системе проблем занимает крайне ограниченное применение залога как меры пресечения, предусмотренной статьей 106 УПК РФ. Несмотря на формальное закрепление залога в перечне мер пресечения и неоднократные разъяснения Пленума Верховного Суда РФ о необходимости его активизации, статистика и научные исследования свидетельствуют, что доля случаев избрания залога по-прежнему минимальна по сравнению с заключением под стражу и домашним арестом.

В качестве причин указываются как объективные факторы (недоверие судов к эффективности залога для предотвращения процессуальных рисков, отсутствие у многих обвиняемых достаточных средств или имущества), так и чисто процессуальные моменты: отсутствие в законе критериев определения «разумного» размера залога, исчерпывающего, но не чрезмерного по отношению к имущественному положению залогодателя; нерешенность вопроса о допустимости превращения залога в более мягкую меру пресечения по инициативе суда в ходе рассмотрения дела без соответствующего ходатайства сторон; неопределенность процедур взаимодействия суда с органами, осуществляющими контроль за соблюдением условий залога. В ряде научных публикаций подчеркивается, что суды, рассматривая ходатайства следствия о заключении под стражу, зачастую вообще не обсуждают возможность замены этой меры залогом, ограничиваясь констатацией тяжести преступления, что прямо противоречит разъяснениям Пленума № 41 о безусловной обязанности суда обсудить вопрос о более мягкой мере.

На современном этапе значимые процессуальные проблемы проявляются и в сфере обеспечения прав обвиняемых, относящихся к уязвимым категориям: несовершеннолетних, беременных женщин, лиц, имеющих малолетних детей, инвалидов и тяжело больных. УПК РФ содержит специальные гарантии, ограничивающие возможность заключения под стражу таких лиц, в том числе в статье 108 и ряде норм, регулирующих

применение присмотра за несовершеннолетним и иных мер, не связанных с лишением свободы.

Однако обобщения судебной практики свидетельствуют, что эти положения нередко реализуются формально: суды, например, указывают на наличие тяжкого состава и предполагаемый значительный ущерб как на достаточное основание для избрания меры пресечения, не раскрывая, почему именно в конкретной ситуации невозможно обеспечить цели производства посредством запрета определенных действий, залога или иных более мягких средств. При этом вопросы фактической доступности медицинской помощи, наличия условий для нужного ухода за ребенком или лицом с инвалидностью в условиях домашнего ареста или содержания под стражей зачастую остаются вне фокуса рассмотрения ходатайства, что свидетельствует о недостаточной интеграции конституционного принципа приоритета достоинства и охраны здоровья личности в процессуальные решения по мере пресечения.

Не менее важной процессуальной проблемой является организация судебного контроля за изменением и отменой мер пресечения. Статья 110 УПК РФ предусматривает возможность изменения избранной меры как в сторону смягчения, так и в сторону ужесточения при изменении обстоятельств. Однако защита в многочисленных жалобах указывает, что ходатайства об изменении меры пресечения в более мягкую нередко рассматриваются с явной задержкой, причем в практике отдельных судов сложился подход, при котором подобные ходатайства оставляются без удовлетворения формальной ссылкой на отсутствие «новых данных», хотя сторона защиты представляет сведения о возмещении ущерба, изменении семейного положения, трудоустройстве или тяжелой болезни обвиняемого. Формально закрепленный в УПК РФ принцип «динамичности» меры пресечения, предполагающий ее соответствие текущему состоянию обстоятельств дела и личности обвиняемого, в реальности реализуется непоследовательно [5, с. 194].

Наконец, выявляется группа проблем, обусловленных несоответствием между законодательной и подзаконной регламентацией исполнения отдельных мер пресечения и фактическими возможностями органов, осуществляющих контроль. Домашний арест и запрет определенных действий требуют постоянного мониторинга соблюдения возложенных запретов, использования электронных средств контроля, взаимодействия суда, органов предварительного расследования и уголовно-исполнительных инспекций.

Между тем нормативная база, включая Федеральный закон «О содержании под стражей подозреваемых и обвиняемых» и ведомственные акты ФСИН России, не всегда согласована с положениями УПК РФ, что приводит к коллизиям: например, к расширительному толкованию перечня допустимых ограничений в рамках домашнего ареста либо к ситуации, когда в отношении лица фактически складывается более жесткий режим, чем

предусмотрено судебным решением. Об этом свидетельствуют как научные работы, посвященные анализу применения домашних мер пресечения, так и обзоры практики региональных судов, фиксирующие случаи фактического превращения домашнего ареста и запрета определенных действий в режим, близкий к изоляции в условиях СИЗО.

В условиях выявленных проблем особое значение приобретает обновленная позиция Верховного Суда РФ. Постановление Пленума от 27 мая 2025 г. № 1 [4], внесшее изменения в постановление № 41, направлено на конкретизацию критериев избрания и продления мер пресечения. В числе прочего Пленум особо указал, что заключение под стражу возможно лишь в отношении лица, подозреваемого или обвиняемого в совершении преступления, за которое реально может быть назначено наказание в виде лишения свободы с учетом санкции статьи Особенной части УК РФ и положений Общей части; по преступлениям небольшой тяжести заключение под стражу допускается только в исключительных случаях и при наличии дополнительных оснований; отсутствие у лица места жительства или пребывания в РФ не может рассматриваться как самостоятельное основание для изоляции при отсутствии рисков, перечисленных в статье 97 УПК РФ.

Эти разъяснения, безусловно, усиливают ориентацию судов на индивидуализированный и ограничительный подход к применению заключения под стражу и иных жестких мер пресечения. Однако их эффективная реализация зависит от того, удастся ли преодолеть сложившийся в практике стереотип формального доверия позиции стороны обвинения, привычку к шаблонной мотивировке и тенденцию к «страхованию» суда за счет избрания максимально строгих мер. До тех пор, пока судебные решения по вопросам мер пресечения остаются слабо насыщены анализом конкретных доказательств и мало чувствительны к социальным и личным особенностям обвиняемых, перечисленные процессуальные проблемы будут сохраняться, несмотря на последовательное совершенствование нормативной и доктринальной базы.

В совокупности рассмотренные обстоятельства позволяют заключить, что процессуальные проблемы применения отдельных мер пресечения в российском уголовном процессе имеют системный характер и проявляются на всех уровнях — от законодательной детализации оснований и пределов ограничений свободы до практики конкретных судейских решений.

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СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ ОРГАНИЗАЦИЕЙ

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СОВЕРШЕНСТВОВАНИЕ НАЦИОНАЛЬНОЙ СИСТЕМЫ УЧЕТА ОСНОВНЫХ СРЕДСТВ В НАПРАВЛЕНИИ МСФО

Аннотация: *В данной статье на примере развития современной системы бухгалтерского учета в Республике Беларусь, в частности основных средств, рассматриваются подходы ее адаптации к международным стандартам финансовой отчетности (МСФО), что способствует привлечению иностранного капитала, повышению прозрачности компаний и улучшению имиджа белорусского бизнеса.*

Ключевые слова: *бухгалтерские учет, основные средства, международный стандарт, инструкция, бизнес, информация, материальные активы.*

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IMPROVEMENT OF THE NATIONAL SYSTEM FOR FIXED ASSETS ACCOUNTING TOWARDS IFRS

Abstract: *This article, using the development of the modern accounting system in the Republic of Belarus, in particular for fixed assets, as an example, examines approaches to adapting it to International Financial Reporting Standards (IFRS), which facilitates the attraction of foreign capital, increases corporate transparency, and improves the image of Belarusian businesses.*

Keywords: *accounting, fixed assets, international standard, instructions, business, information, tangible assets.*

Одной из главных тенденций в развитии современной белорусской системы бухгалтерского учета является ее адаптация к международным стандартам финансовой отчетности (МСФО), которые основаны на международных принципах и определяют общие подходы к формированию показателей отчетности, предлагая различные варианты учета средств, в том числе и основных, в организациях. МСФО – это набор документов (стандартов и интерпретаций), регламентирующих правила составления финансовой отчетности, необходимой внешним пользователям для принятия ими экономических решений в отношении организации.

Внедрение МСФО позволяет привлечь иностранный капитал, повысить прозрачность компании и улучшить имидж белорусского бизнеса.

При переходе на МСФО организации получают преимущества в виде снижения затрат предприятий на ведение отчетности, представления зарубежным инвесторам понятной им информации, что значительно для доступа к мировым рынкам капитала и повышения инвестиционной привлекательности и конкурентоспособности.

В Республике Беларусь уже давно делают шаги к переходу на МСФО. Так, с 1 января 2017 МСФО были введены в качестве технического нормативного правового акта.

Согласно закону Республики Беларусь от 11 октября 2022г. № 210-З «Об изменении законов по вопросам бухгалтерского учета и отчетности», с 1 января 2025 года Национальный банк и коммерческие банки Республики Беларусь обязаны использовать исключительно МСФО, как основные правила ведения бухгалтерского учета и составления финансовой отчетности.

В связи с такой тенденцией возникает необходимость сравнения МСФО с национальными стандартами Беларуси. Изучение учета основных средств является самым сложным аспектом бухгалтерского учета, учитывая, что основные средства занимают значительную долю в активах любого предприятия. Поэтому сравнительный анализ национальных и международных стандартов следует в первую очередь проводить в отношении основных средств.

Основным международным стандартом, который применяется для определения сущности основных средств, их квалификации и выбора методов учета является МСФО (IAS) 16 «Основные средства» (далее – МСФО 16)[68].

В Республике Беларусь для определения порядка бухгалтерского учета основных средств используется Инструкция по бухгалтерскому учету

[68] Об утверждении Инструкции по бухгалтерскому учету основных средств и признании утратившими силу некоторых постановлений и отдельных структурных элементов постановлений Министерства финансов Республики Беларусь по вопросам бухгалтерского учета»: Постановление Министерства Республики Беларусь 30.04.2012 года № 26. – Режим доступа: https://pravo.by/document/?guid=12551&p0=W21226355. – Дата доступа: 23.11.2025.

основных средств, утвержденная Постановлением Министерства финансов Республики Беларусь от 30 апреля 2012 № 26 (далее – Инструкция 26)[69].

Согласно МСФО, основные средства – это материальные активы, предназначенные для использования в процессе производства или поставки товаров и предоставления услуг, при сдаче в аренду или в административных целях, которые предполагаются к использованию в течение более чем одного отчетного периода. В соответствии со стандартами Республики Беларусь, основные средства определяется как основные фонды, выраженные в денежной оценке, и функционирующие свыше 12 месяцев.

Важно отметить, что согласно МСФО, отчетный период составляет 52 недели (364 дня), что представляет собой немного меньшую продолжительность, чем календарный год, примерно состоящий из 52,14 недель.

Существуют некоторые отличия в методике определения первоначальной стоимости основных средств. Различие, связанное с первоначальной стоимостью основных средств, заключается в перечне прямых затрат, которые включается в стоимость актива. Международный стандарт МСФО 16 предлагает более подробный перечень таких затрат, чем Инструкция 26. Например, стоимость основных средств по МСФО включает различные затраты, такие как выплата зарплаты работникам, причастным к строительству или приобретению объекта основных средств, а также затраты по подготовке строительной площадки, прогнозную стоимость демонтажа и вывоза объектов, стоимость восстановления площадки.

Кроме того, МСФО 16 содержит подробный перечень затрат, которые не включаются в стоимость основных средств. Например, это могут быть затраты на открытие нового производственного комплекса, внедрение новых продуктов или услуг (включая затраты на рекламу) и затраты, связанные с коммерческой деятельностью на новом месте или для новой категории клиентов (включая затраты на обучение персонала).

Существуют также отличия в отношении признания основных средств. Так, временная разница, с которой актив может быть признан основным средством (в Инструкции 26 – 12 месяцев, а в МСФО 16 – один период).

В МСФО 16 признается вероятность получения экономических выгод, в то время как в Инструкции 26 это предполагается.

Кроме того, существуют различия в классификационных группах основных средств. В Республике Беларусь используется более подробная классификация основных средств. Например, водные и воздушные суда, автотранспортные средства, которые выделяются в МСФО 16 в Беларуси относятся к транспортным средствам, а мебель и офисное оборудование относятся к хозяйственному инвентарю. Кроме того, скот и насаждения в

[69] Международный стандарт финансовой отчетности (IAS) 16 «Основные средства». – Режим доступа: https://minfin.gov.ru/common/upload/library/2017/01/main/MSFO_IAS_16.pdf. – Дата доступа: 23.11.2025.

Республике Беларусь включены в группу основных средств, тогда как в МСФО они о отнесены к другой группе: МСФО 41 «Сельское хозяйство».

В МСФО 16 существуют различные методы начисления амортизации для погашения амортизируемой стоимости актива на протяжении его срока службы. Это включает в себя линейный метод, метод уменьшаемого остатка и метод единиц производства продукции, в то время как способ списания стоимости по сумме чисел лет не предусмотрен, в отличии от Инструкции 26.

Таким образом, можно сделать вывод о наличии расхождений в учете основных средств по МСФО 16 и Инструкции 26. Эти расхождения касаются критериев признания основных средств, состава затрат, включаемых в первоначальную стоимость, а также методов амортизации. Для приближения национальной системы учета основных средств к МСФО необходимо прежде всего создание механизма контроля качества составления отчетности и ее аудита, построение системы обучения и повышение квалификации специалистов по МСФО. Отчетность в соответствии с МСФО необходима предприятиям Республики Беларусь для выхода на международные рынки капитала, что будет способствовать привлечению инвестиций и придаст хороший импульс их развитию.

Использованные источники:

1. Об утверждении Инструкции по бухгалтерскому учету основных средств и признании утратившими силу некоторых постановлений и отдельных структурных элементов постановлений Министерства финансов Республики Беларусь по вопросам бухгалтерского учета»: Постановление Министерства Республики Беларусь 30.04.2012 года № 26. – Режим доступа: https://pravo.by/document/?guid=12551&p0=W21226355. – Дата доступа: 23.11.2025.
2. Международный стандарт финансовой отчетности (IAS) 16 «Основные средства». – Режим доступа: https://minfin.gov.ru/common/upload/library/2017/01/main/MSFO_IAS_16.pdf. – Дата доступа: 23.11.2025.

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ОЦЕНКА ЗАПАСОВ В МЕЖДУНАРОДНЫХ И НАЦИОНАЛЬНЫХ БУХГАЛТЕРСКИХ СТАНДАРТАХ: АСПЕКТЫ ФОРМИРОВАНИЯ ПЕРВОНАЧАЛЬНОЙ СТОИМОСТИ И МЕТОДЫ ОЦЕНКИ

Аннотация. *В данной статье на примере развития современной системы бухгалтерского учета в Республике Беларусь, в частности производственных запасов и их оценки, рассматриваются подходы ее адаптации к международным стандартам финансовой отчетности (МСФО), что способствует привлечению иностранного капитала, повышению прозрачности компаний и улучшению имиджа белорусского бизнеса.*

Ключевые слова: *бухгалтерский учет, производственные запасы, международные стандарты, финансовая отчетность, себестоимость, оценка запасов.*

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INVENTORY VALUATION UNDER THE INTERNATIONAL AND NATIONAL ACCOUNTING STANDARDS: ASPECTS OF INITIAL VALUE FORMATION AND VALUATION METHODS

Abstract. *This article, using the development of the modern accounting system in the Republic of Belarus, specifically inventories and their valuation, as an example, examines approaches to adapting it to the International Financial Reporting Standards (IFRS). This approach facilitates the attraction of foreign capital, increases corporate transparency, and improves the image of Belarusian businesses.*

Keywords: *accounting, inventories, international standards, financial reporting, cost, inventory valuation.*

Одной из основных тенденций развития национальной системы бухгалтерского учета является ее адаптация к международным стандартам финансовой отчетности (МСФО). Эти стандарты основаны на международных принципах и определяют общие подходы к формированию показателей отчетности, рекомендуя варианты учета различных средств и операций в организациях. Актуальной проблемой является то, что бухгалтерская отчетность, разработанная в соответствии с законодательством Республики Беларусь, недостаточно обеспечивает пользователей своевременной, достоверной и полной информацией на том уровне, который требуется согласно МСФО. Это подчеркивает необходимость приближения национальной практики к этим стандартам.

Одним из ключевых стандартов, принятых еще в 1995 году, является МСФО (IAS) 2 «Запасы»[70]. Этот стандарт полностью посвящен вопросам учета запасов, и его цель заключается в установлении порядка учета запасов по фактической стоимости приобретения. Основным нормативным правовым актом, регулирующим учет материалов на предприятиях Беларуси, является Национальной стандарт бухгалтерского учета и отчетности «Запасы», утвержденный постановлением Министерства финансов Республики Беларусь от 28.12.2022 №64 (далее – НСБУ №64)[71], который в свою очередь имеет ряд отличий от МСФО (IAS) 2 «Запасы».

Сравнение системы учета запасов по НСБУ №64 и МСФО (IAS) 2 «Запасы» требует более детального анализа состава затрат, включаемых в себестоимость, и методов оценки. Различия в подходах к учету могут существенно влиять на отражение стоимости запасов и, следовательно, на финансовую отчетность предприятий. Рассмотрим основные различия в национальной оценке запасов и их оценке согласно МСФО (IAS) 2 «Запасы» (таблица 1).

[70] Международный стандарт финансовой отчетности (IAS) 2 «Запасы». – Режим доступа: https://minfin.gov.ru/common/upload/library/2016/03/main/RU_BlueBook_GVT_2015_IAS_2.pdf. – Дата доступа: 23.11.2025.

[71] О бухгалтерском учете запасов: Постановление Министерства финансов Республики Беларусь от 28.12.2022 года № 64. – Режим доступа: https://pravo.by/document/?guid=12551&p0=W22339296. – Дата доступа: 23.11.2025.

Таблица 1
Оценка запасов в соответствии с МСФО (IAS) 2 «Запасы» и НСБУ №64

Критерий сравнения	МСФО (IAS) 2 «Запасы»	НСБУ №64
Оценка запасов	Запасы должны оцениваться по наименьшей из двух величин: фактической себестоимости или возможной чистой цене продажи. Фактическая себестоимость запасов представляет собой сумму: -затрат на их приобретение; -затрат на производство или переработку; -прочих затрат, понесенных в связи с доставкой запасов до их настоящего местоположения и приведения их в соответствующее состояние. Под чистой ценой продажи, согласно МСФО (IAS) 2 «Запасы», следует принимать расчетную продажную цену в ходе обычной деятельности за вычетом расчетных затрат на завершение производства и расчетных затрат, которые необходимо понести для продажи.	Запасы принимаются к бухгалтерскому учету по фактической себестоимости. К фактическим затратам на приобретение запасов относится: -стоимость запасов по ценам приобретения; -таможенные сборы и пошлины; -вознаграждения, уплачиваемые посреднической организации, через которую приобретены запасы; -затраты по заготовке и доставке запасов до места их использования; -затраты по доведению запасов до состояния, в котором они пригодны к использованию в предусмотренных в организации целях; -транспортно-заготовительные и иные затраты, непосредственно связанные с приобретением запасов.

При анализе приведенных данных в таблице можно выделить сходство в методах оценки запасов при их поступлении. МСФО предполагает, что изначально запасы подлежат учету по себестоимости, которая определяется в порядке, в целом аналогичном принятому в белорусском законодательстве. Однако, если рыночная стоимость запасов снижается, то запасы должны учитываться уже по чистой цене продажи, что и должно обеспечить достоверность бухгалтерской отчетности организации. Согласно МСФО (IAS) 2 «Запасы», себестоимость запасов может быть невозмещаемой в случае повреждения, устаревания или снижения цены продажи, а также при увеличении расходов на завершение производства или на продажу. Практика списания запасов ниже себестоимости до уровня чистой возможной цены продажи согласуется с принципом, предусматривающим, что активы не должны учитываться по стоимости, превышающей сумму, которая может быть получена от их продажи и использования. Следует отметить, что в соответствии с законодательством Республики Беларусь запасы, устаревшие, поврежденные или снизившиеся в цене при реализации, отражаются в

бухгалтерском балансе на конец отчетного периода с вычетом резерва под снижение стоимости материальных ценностей.

Как по МСФО (IAS) 2 «Запасы», так и по НСБУ №64 для оценки запасов используются схожие методы оценки: по себестоимости каждой единицы, метод ФИФО, метод средневзвешенной стоимости. Различия заключаются в том, какие методы являются основными и какие дополнительными, а также в том, что в НСБУ №64 уточняются дополнительные подходы к использованию определенных методов в зависимости от вида запасов. Эти различия могут влиять на финансовую отчетность организации в контексте разных правил и стандартов.

В статье рассмотрены значительные различия в составе себестоимости и методах оценки запасов, предусмотренных МСФО и национальными стандартами Республики Беларусь. Несмотря на сходство в методах учета, при поступлении запасов, выявленные различия в учете при изменении рыночной стоимости, списании запасов и оценке их стоимости могут существенно влиять на финансовую отчетность предприятий.

Основная проблема заключается в том, что белорусская бухгалтерская отчетность, созданная в соответствии с национальными стандартами, не всегда обеспечивает достоверность и актуальность информации на уровне, требуемом международными стандартами. Это создает необходимость пересмотра и совершенствования подходов к учету и оценке запасов.

В этой связи предлагается провести более активную работу по гармонизации национальных стандартов с МСФО, выявив ключевые различия и разработав механизмы их сближения. Это позволит сократить противоречия в учете запасов и обеспечит более согласованную и сопоставимую финансовую отчетность.

Важным шагом для сближение национальных стандартов с МСФО является обучение бухгалтеров и финансовых специалистов новым подходам и методам, предусмотренным МСФО. Предоставление поддержки и обучения поможет персоналу лучше понять и применять международные стандарты в практике.

Необходимо разработать и внедрить более детальные методологии оценки запасов, учитывая как особенности местного рынка, так и требования международных стандартов. Это позволит учесть специфику национальных предприятий и одновременно соответствовать мировым требованиям.

Внедрение этих предложений может способствовать более гармоничному сочетанию национальных и международных стандартов в оценке запасов, обеспечивая тем самым более надежную и сопоставимую финансовую отчетность предприятий в контексте глобальных стандартов.

Использованные источники:

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2. О бухгалтерском учете запасов: Постановление Министерства финансов Республики Беларусь от 28.12.2022 года № 64. – Режим доступа: https://pravo.by/document/?guid=12551&p0=W22339296. – Дата доступа: 23.11.2025.

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АНАЛИЗ ЭФФЕКТИВНОСТИ ИСПОЛЬЗОВАНИЯ РЕСУРСОВ В УПРАВЛЯЮЩИХ КОМПАНИЯХ, ПРЕДОСТАВЛЯЮЩИХ УСЛУГИ ЖИЛОЙ НЕДВИЖИМОСТИ В ЦИФРОВОЙ ЭКОНОМИКЕ

Аннотация. *В статье рассматриваются вопросы повышения эффективности использования ресурсов в управляющих компаниях многоквартирных домов в условиях цифровой экономики. На основе международного и национального опыта (ЕС, Южная Корея, Россия, Узбекистан) исследуется влияние цифровых технологий на энергоэффективность, качество услуг и финансовую устойчивость. Анализ выполнен с использованием модели взаимосвязи «цифровая трансформация – ресурсосбережение – экономическая эффективность». Установлено, что внедрение цифрового мониторинга (IoT, AI, Smart metering) снижает потери ресурсов на 15–25% и оптимизирует затраты на обслуживание на 12–18%. В Узбекистане ключевыми инструментами являются системы "Yagona axborot tizimi" и "Elektron uy-joy boshqaruvi".*

Ключевые слова: *Цифровая экономика, многоквартирные дома, управляющая компания, использование ресурсов, энергоэффективность, IoT, искусственный интеллект, Smart metering, экономический анализ, цифровая трансформация, Узбекистан, ЕС, Южная Корея, Россия, жилищное строительство, цифровое управление, финансовая стабильность, качество обслуживания, ресурсосбережение, большие данные, цифровые платформы, зеленая экономика, экономическая эффективность.*

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ANALYSIS OF RESOURCE EFFICIENCY IN MANAGEMENT COMPANIES PROVIDING RESIDENTIAL REAL ESTATE SERVICES IN THE DIGITAL ECONOMY

Abstract. *This article analyzes the efficiency of resource utilization in housing management companies under digital economy conditions. Based on global and national experiences (EU, South Korea, Russia, Uzbekistan), the study*

examines how digital technologies impact energy efficiency, service quality, and financial stability. The analysis applies the "digital transformation–resource saving–economic efficiency" interrelation model. Results show that digital monitoring systems (IoT, AI, Smart metering) reduce resource waste by 15–25% and optimize service costs by 12–18%. In Uzbekistan, the "Unified Information System" and "E-Housing Management" platforms play a key role in this digital transition.

Keywords: *Digital economy, apartment buildings, management company, resource use, energy efficiency, IoT, artificial intelligence, Smart metering, economic analysis, digital transformation, Uzbekistan, EU, South Korea, Russia, housing construction, digital governance, financial stability, quality of service, resource conservation, big data, digital platforms, green economy, economic efficiency.*

Введение

В условиях развития цифровой экономики происходит трансформация всех отраслей, включая сферу управления многоквартирными домами (МКД). Управляющие компании, оказывающие услуги жильцам, сталкиваются с необходимостью оптимизации использования ресурсов — электроэнергии, воды, тепла и эксплуатационных расходов — при сохранении качества обслуживания. Цифровизация жилищно-коммунального хозяйства (ЖКХ) и внедрение технологий Интернета вещей (IoT) создают возможности для эффективного мониторинга, учёта и анализа потребления ресурсов [11].

Согласно данным Enerdata, общее энергопотребление Узбекистана в 2023 году составило около 45,6 млн тонн условного топлива, что эквивалентно примерно 1,3 toe (тонн условного топлива) на душу населения. При этом жилищно-коммунальный сектор занимает значительную долю потребления [1, 2].

Внедрение интеллектуальных систем учёта и аналитических платформ позволяет выявлять потери, прогнозировать нагрузки и улучшать планирование эксплуатационных мероприятий. Это подтверждается снижением энергопотребления в домохозяйствах Узбекистана на 10,6 % (≈1,3 млрд кВт·ч) после повышения тарифов и внедрения смарт-счётчиков в 2024 год [3].

Таким образом, актуальность темы обусловлена необходимостью разработки методов анализа эффективности использования ресурсов в управляющих компаниях в условиях цифровизации экономики.

Анализ литературы

В условиях ускоренного развития цифровой экономики особое внимание уделяется повышению эффективности управления жилищно-коммунальным хозяйством (ЖКХ), особенно в части цифровизации процессов учёта, анализа и управления ресурсами. Современные исследования в данной области показывают, что внедрение цифровых

технологий становится неотъемлемой частью устойчивого развития жилищного фонда и формирования прозрачной системы управления многоквартирными домами.

Одним из наиболее значимых направлений в этой сфере является цифровизация систем учёта коммунальных ресурсов — воды, газа, тепла и электроэнергии. В работе Агыбаева М. и Рахимбековой Ж. детально исследуется влияние цифровизации на эффективность функционирования предприятий ЖКХ. Авторы рассматривают весь жизненный цикл цифрового проекта — от планирования и внедрения до этапа оценки его результативности, что позволяет комплексно оценить влияние цифровых решений на хозяйственную деятельность управляющих компаний. Отмечается, что одной из ключевых проблем остаются низкий уровень интеграции цифровых решений, недостаточная подготовка кадров и несогласованность информационных потоков между структурными подразделениями. В качестве рекомендаций предлагаются внедрение проектного подхода, унификация цифровых платформ, повышение квалификации управленческого персонала и использование системы KPI для измерения эффективности цифровизации [4].

Дальнейшее развитие темы отражено в исследовании Игнатова Е. и Круглова Л., где основное внимание уделено созданию и интеграции информационных систем для учёта и анализа данных в сфере ЖКХ. Исследователи подчёркивают, что отсутствие единых стандартов ведения данных между управляющими компаниями и государственными органами существенно снижает качество управления. В работе акцентируется необходимость перехода к сквозным цифровым системам учёта, обеспечивающим непрерывность и сопоставимость данных. Кроме того, авторы предлагают объединить бухгалтерские и эксплуатационные данные в единую аналитическую среду, что позволит использовать методы Big Data для прогнозирования и оптимизации расходов ресурсов [5].

В контексте энергетической эффективности интерес представляет исследование Maryam Nikpour и соавторов, где предложена модель интеллектуального управления энергопотреблением на основе технологий интернета вещей (IoT) и машинного обучения. В работе рассматривается пример применения данной модели в концепции «умных городов», включая жилые здания. Авторы выявляют ключевые проблемы — неэффективное использование энергии и слабую интеграцию систем мониторинга. Для решения этих задач предлагается использование сенсорных IoT-сетей, внедрение нейросетевых алгоритмов прогнозирования энергопотребления и интеграция данных с городскими платформами Smart City, что способствует более рациональному использованию энергетических ресурсов [6].

Классическим трудом в области управления многоквартирными домами остаётся работа Гассуль В.А., посвящённая организационно-правовым и экономическим аспектам деятельности управляющих компаний. Автор систематизирует функции и механизмы управления, уделяя особое

внимание вопросам финансирования и контроля. В ходе исследования выявлены ключевые проблемы — низкая прозрачность финансовых потоков и недостаточный контроль со стороны собственников жилья. Гассуль предлагает внедрить экономические механизмы ответственности управляющих организаций, цифровизировать документооборот и повысить уровень информационной открытости для формирования доверительных отношений между собственниками и управляющими структурами [7].

Современные тенденции цифрового управления энергоэффективностью зданий отражены в исследовании Edward O'Dwyer и соавторов, где анализируется использование технологии Digital Twin (цифровой двойник) для моделирования и управления многовекторными энергосистемами. Применение цифровых двойников позволяет имитировать процессы эксплуатации зданий и предсказывать последствия управленческих решений. Авторы отмечают, что основными препятствиями для широкого внедрения технологии являются разрозненность источников данных и ограниченная адаптивность существующих систем. В качестве решения предлагается создание единой цифровой модели здания, обеспечивающей мониторинг состояния инженерных сетей, оптимизацию распределения энергоресурсов и повышение общей энергоэффективности посредством симуляции различных эксплуатационных сценариев [8].

Таким образом, проанализированные исследования демонстрируют общую тенденцию к переходу ЖКХ на интеллектуальные цифровые платформы, где ключевыми направлениями развития становятся интеграция данных, автоматизация учёта и повышение прозрачности управления. Все рассмотренные подходы подтверждают, что успешная цифровизация жилищно-коммунального сектора требует комплексного подхода, включающего технологические, организационные и управленческие изменения.

Методология

В исследовании использовались методы "Comparative-analytical" и "System approach". В первую очередь, методом сравнительного анализа были изучены данные международного опыта (ЕС, Южная Корея, Россия) и национальной практики (Узбекистан). Затем на основе индикаторного анализа измерялась эффективность использования ресурсов (затраты на воду, электричество, тепло, услуги) в связи со степенью внедрения цифровых технологий. Также с помощью корреляционного анализа была выявлена связь между цифровыми показателями (IoT, AI, Smart metering) и экономическими результатами (снижение затрат, рост прибыли). В качестве источников данных выступают World Bank Data, Eurostat, UN-Habitat, агентство статистики Республики Узбекистан, Uzdaily.uz данные были использованы.

Обсуждение и результаты

1. Цифровые технологии и контроль ресурсов. IoT-технологии позволяют осуществлять онлайн-контроль и анализ потребления ресурсов.

Интеллектуальные счётчики и сенсорные системы обеспечивают сбор данных по электроэнергии, воде и теплу в режиме реального времени, повышая прозрачность и управляемость процессов [9].

Примеры датчиков и эффектов их применения:

- Smart meters фиксируют часовые и суточные пиковые нагрузки, помогая снижать неэффективное использование энергии.
- Сенсоры движения и присутствия в местах общего пользования сокращают потребление электроэнергии до 15–25 % [10].
- Датчики температуры и влажности предотвращают утечки тепла и воды, снижая аварийность инженерных сетей.

По данным ZipDo, 2025, 78 % операторов многоквартирных зданий в мире отмечают повышение операционной эффективности после внедрения цифровых решений. В зданиях с «зелёной» сертификацией коммунальные расходы снижаются в среднем на 20 % [11].

2. Методы экономического анализа. Для оценки эффективности инвестиций в цифровые решения применяются:

- Cost-Benefit Analysis (CBA) — определяет соотношение затрат и экономии от внедрения IoT. Пример: установка смарт-счётчиков воды в 100 квартирах окупается за 5 лет.
- Регрессионный анализ — выявляет зависимости между изменением температуры и потреблением тепла, а также влиянием внедрения датчиков на расходы электроэнергии.
- Эффективностные коэффициенты (KPI) — позволяют оценить ресурсоэффективность по видам потребления.

3. Международный и национальный опыт. В Европе принята Директива EPBD, регулирующая повышение энергоэффективности зданий и стимулирующая установку интеллектуальных систем учёта. В Скандинавии внедрение систем автоматического регулирования температуры позволило снизить потребление тепла на 15–30 % [9].

В США программы «Smart City» и «Energy Star» стимулируют переход управляющих компаний к энергоэффективным моделям [12]. BIM-технологии широко применяются в проектировании и строительстве "умных" зданий. Например, Нью-Йорк реализует программу "Smart City", направленную на улучшение управления городскими ресурсами, в том числе в МКД. Установка умных счетчиков в зданиях помогает снизить потребление электроэнергии и воды, а также выявлять аварийные ситуации.

Южная Корея, Япония, Сингапур являются лидерами во внедрении "умных" технологий в зданиях. Активно развиваются системы "умного дома", централизованного управления инженерными системами, энергомониторинга. Например, в Сингапуре активно внедряются технологии "зеленого" строительства и "умного" управления зданиями в рамках национальной стратегии "Smart Nation". Жилые комплексы оснащаются системами мониторинга потребления воды и электроэнергии, а также системами управления освещением и кондиционированием [10].

В Узбекистане с 2023 года активно реализуются проекты по установке умных счётчиков воды, газа и электроэнергии Ministry of Housing and Communal Services of Uzbekistan, 2024. Это позволило сократить потери электроэнергии до 15 % в отдельных районах Ташкента [3].

Также наблюдается рост энергоэффективного рынка — по данным WiseGuyReports, мировой рынок энергоэффективности жилых зданий оценивается в 268,93 млрд долл. США и к 2032 году достигнет 431,77 млрд долл., с годовым ростом 5,4 % [13].

4. KPI для управления ресурсами. В управляющих компаниях следует внедрить систему ключевых показателей эффективности (KPI):

- Энергосбережение: потребление кВт·ч на 1 м²; снижение пиковых нагрузок (%).
- Водосбережение: м³ воды на 1 жильца; доля утечек (%).
- Теплосбережение: Гкал/м² в год; количество случаев перегрева/недогрева (%).
- Техническая эксплуатация: время реагирования на аварии; доля профилактических ремонтов (%).

По данным Национальный Комитет Республики Узбекистан по Статистике рост тарифов на коммунальные услуги усиливает экономическую мотивацию управляющих компаний внедрять цифровые инструменты учёта и энергоанализа [14].

Выводы

Эффективность использования ресурсов в многоквартирных домах напрямую зависит от уровня цифровизации процессов. Применение IoT и интеллектуальных систем позволяет существенно снизить потери, повысить прозрачность, а также улучшить качество обслуживания жильцов. Международный опыт показывает, что интеграция цифровых решений обеспечивает экономию ресурсов на 15–30 %, а для Узбекистана этот потенциал может быть даже выше в условиях роста тарифов и модернизации инфраструктуры.

Развитие цифровой среды в управлении МКД становится не только технологическим, но и экономическим фактором устойчивости управляющих компаний, а также инструментом повышения эффективности использования энергетических и водных ресурсов.

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ХАРАКТЕРИСТИКИ ДИЭЛЕКТРИЧЕСКОЙ СОРТИРОВОЧНОЙ МАШИНЫ С СИСТЕМОЙ ДОПОЛНИТЕЛЬНЫХ ЭЛЕКТРОДОВ

Аннотация: *В статье рассматривается конструкция и принцип работы современной диэлектрической сортировочной машины, оснащенной системой дополнительных электродов, для повышения точности оценки качества семян. Проанализированы limitations традиционных диэлектрических сепараторов и обоснована эффективность предложенной инновационной системы. Подробно описаны технологические этапы работы машины, включая первичное сканирование в системе основных электродов, детальное многокоординатное сканирование в системе дополнительных электродов, интеграцию и статистический анализ данных с помощью машинного обучения, а также автоматическую классификацию и пневматическую сортировку. Особое внимание уделено измеряемым диэлектрическим параметрам (диэлектрическая проницаемость, диэлектрические потери, импеданс, фазовый угол) и их связи с физиологическим состоянием семян. Приведены технические характеристики установки, обеспечивающие высокую точность (±0,5%) и производительность (до 150 семян/с). Доказано, что использование системы дополнительных электродов позволяет выявлять внутренние дефекты и неравномерность распределения влаги, что на 15-20% повышает точность сортировки по сравнению с традиционными методами. Делается вывод о перспективности внедрения данной технологии в семеноводческую отрасль сельского хозяйства, в частности для стратегических культур, таких как хлопчатник.*

Ключевые слова: *Диэлектрическая сортировка, качество семян, дополнительные электроды, диэлектрическая проницаемость, диэлектрические потери, импеданс, машинное обучение в сельском хозяйстве, сепарация семян, автоматизация сельского хозяйства, оценка всхожести, хлопчатник, сельскохозяйственная техника.*

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CHARACTERISTICS OF THE DIELECTRIC SORTING MACHINE WITH AN ADDITIONAL ELECTRODE SYSTEM

Abstract. *This article discusses the design and operating principle of a modern dielectric sorting machine equipped with an additional electrode system to improve the accuracy of seed quality assessment. The limitations of traditional dielectric separators are analyzed, and the effectiveness of the proposed innovative system is substantiated. The technological stages of the machine's operation are described in detail, including primary scanning in the main electrode system, detailed multi-coordinate scanning in the additional electrode system, integration and statistical analysis of data using machine learning, as well as automatic classification and pneumatic sorting. Particular attention is paid to the measured dielectric parameters (dielectric permittivity, dielectric loss, impedance, phase angle) and their relationship with the physiological state of the seeds. The technical characteristics of the installation, which ensure high accuracy (±0.5%) and productivity (up to 150 seeds/s), are provided. It is proven that the use of an additional electrode system makes it possible to identify internal defects and uneven moisture distribution, which increases sorting accuracy by 15-20% compared to traditional methods. The conclusion is made about the prospects of implementing this technology in the seed industry of agriculture, in particular for strategic crops such as cotton.*

Keywords. *Dielectric sorting, seed quality, additional electrodes, dielectric permittivity, dielectric loss, impedance, machine learning in agriculture, seed separation, agricultural automation, germination assessment, cotton, agricultural machinery.*

Не вызывает никаких сомнений важность проверки и сортировки качества семенного материала в современном сельском хозяйстве. Особое значение процессы контроля качества и сортировки приобретают для таких стратегически важных культур, как семена хлопчатника. Традиционные диэлектрические сортировочные машины имеют ряд ограничений, а их точность и производительность в определенной степени ограничены. По этой причине все более широкое применение начинают находить диэлектрические сортировочные машины с системой дополнительных электродов.

В данной статье приведена подробная информация о конструктивных особенностях, принципе работы и практическом применении диэлектрической сортировочной машины с системой дополнительных

электродов. Также анализируются преимущества и недостатки данной технологии по сравнению с традиционными методами.

Диэлектрическая сортировочная машина с системой дополнительных электродов состоит из следующих основных компонентов:

Система основных электродов - предназначена для измерения основных диэлектрических параметров семян. Данная система аналогична системе электродов в традиционных машинах и определяет общую диэлектрическую проницаемость семян.

Система дополнительных электродов - это инновационное решение, позволяющее измерять диэлектрические свойства различных частей семени отдельно. Данная система состоит из нескольких дополнительных электродов, каждый из которых сканирует определенную часть семени.

Блок обработки данных - интегрирует и анализирует данные, поступающие от основных и дополнительных электродов. В этом блоке используется специальное программное обеспечение, которое сравнивает данные с различных электродов и оценивает общее качество семени.

Сортировочный механизм - разделяет семена на различные категории качества на основе результатов анализа.

Принцип работы машины состоит из следующих этапов:

На этом этапе семена подаются в систему основных электродов с помощью специального конвейера. Конвейерная система предназначена для индивидуального позиционирования каждого семени между электродами, контролируя точное положение каждого семени. Это обеспечивает проведение каждого измерения в стандартных условиях.

Основные электроды размещены в форме параллельного пластинчатого конденсатора, диэлектрические параметры измеряются, когда семена проходят между ними. Расстояние между электродами регулируется в зависимости от размера семян, обычно в диапазоне 1-3 мм. В качестве материала электродов используются медные сплавы с высокой проводимостью, что повышает качество сигнала и точность измерений.

Частота электрического поля настраивается в диапазоне 1-10 МГц. Данный частотный диапазон был определен в ходе экспериментов как наилучшим образом отражающий диэлектрические свойства семян. Низкие частоты (1-3 МГц) позволяют анализировать внешние слои семени, а высокие частоты (7-10 МГц) позволяют анализировать более глубокие слои. Для каждого типа семян оптимальная частота определяется отдельно экспериментальным путем.

Точность измерений составляет ±0,5%, что обеспечивает высокий уровень надежности. Для сохранения точности каждые 100 часов работы система электродов калибруется с помощью специальных калибровочных приборов. Процесс калибровки осуществляется с помощью стандартных диэлектрических моделей, параметры которых заранее известны и точно определены.

Скорость прохождения настраивается в диапазоне 100-150 семян/секунду и может изменяться в соответствии с производственными требованиями. Увеличение скорости повышает эффективность, но может повлиять на точность измерений, поэтому важно поддерживать оптимальный баланс. Для мелких и средних семян скорость устанавливается выше, для крупных семян - ниже.

Контроль температуры поддерживается на уровне 25±1°C, поскольку изменение температуры может значительно повлиять на диэлектрические параметры. Система контроля температуры работает на основе элементов Пельтье и измеряет температуру каждые 10 секунд, при необходимости регулируя ее. Изменение каждого градуса температуры может повлиять на диэлектрическую проводимость на 0,3-0,5%, поэтому поддержание стабильной температуры очень важно.

Диэлектрическая проницаемость (ε') - показывает, как семя реагирует на электрическое поле. Высокие значения указывают на хорошую проводимость воды и веществ в семени. Этот параметр напрямую связан с физиологической активностью семени и его способностью к прорастанию. Значение проводимости может варьироваться в диапазоне от 3,5 до 7,0, что зависит от типа и состояния семени.

Диэлектрические потери (ε") - количество энергии, теряемой семенем в виде тепла. Этот показатель предоставляет информацию о внутреннем составе семени и его физиологическом состоянии. Высокие потери указывают на наличие большего количества свободных молекул воды во внутренней части семени, что говорит о его здоровье.

Значение импеданса - выражает сопротивление семени электрическому току. Этот параметр предоставляет информацию об ионах и свободных веществах в составе семени. Снижение импеданса указывает на увеличение ионной проводимости семени, что обычно означает его хорошее состояние.

Фазовый угол - разность фаз между электрическим полем и реакцией семени. Этот показатель имеет важное значение для оценки того, насколько здорово и активно семя. Здоровые семена обычно имеют фазовый угол в диапазоне 20-40 градусов.

На этом этапе определяется общее состояние и основные показатели качества семени. Полученные данные дают предварительную оценку качества и служат основой для направления на последующие этапы. Данные, полученные для каждого семени, записываются в специальную базу данных и служат основой для последующего анализа.

На этом этапе семена направляются в систему дополнительных электродов. Механизм позиционирования работает пневматическим или электромеханическим способом и размещает каждое семя в точном положении. Этот процесс автоматизирован и осуществляется без вмешательства человека.

Система дополнительных электродов состоит из 6-8 дополнительных электродов, размещенных в различных направлениях, каждый из которых

анализирует отдельные части семени. Электроды размещены в радиальном и осевом направлениях, обеспечивая полное сканирование семени со всех сторон. Размер и форма каждого электрода адаптированы к разнообразию и размеру семян.

Каждый электрод работает независимо и создает свой собственный набор данных. Эта система параллельной работы значительно повышает эффективность. Каждый электрод имеет свой собственный блок обработки данных, который передает результаты в центральную систему. Такой подход увеличивает скорость обработки данных и улучшает общую производительность системы.

Измерения проводятся в 3 осях (x, y, z), что обеспечивает полное сканирование семени со всех сторон. Измерения по оси X предоставляют данные по длине семени, по оси Y - по ширине, по оси Z - по толщине. Трехосевая система позволяет точно определять геометрическую форму семени и дефекты в его структуре.

Измерения в каждом направлении предоставляют ценную информацию о структуре и однородности семени. Например, измерения по оси X показывают распределение диэлектрических свойств вдоль основной оси семени, а по оси Y - изменения в боковых частях. Эта информация предоставляет важные сведения о симметрии и однородности семени.

Для каждой точки проводится 5-10 измерений, что повышает надежность измерений и устраняет случайные ошибки. Интервал времени между повторными измерениями настраивается в диапазоне 0,1-0,5 секунды. Количество измерений определяется в зависимости от типа семени и сложности - для семян сложной формы требуется больше измерений.

Конфигурация дополнительных электродов:

Верхние электроды анализируют внешнюю оболочку и поверхностные части семени. Эта часть предоставляет информацию о внешней форме, гладкости поверхности и механических повреждениях семени. Верхние электроды обычно имеют форму тонких игл диаметром 0,5-1,0 мм и могут обнаруживать даже мельчайшие дефекты на поверхности семени.

Боковые электроды исследуют боковые части семени. Они собирают информацию о толщине, форме и симметрии семени. Боковые электроды работают в паре и одновременно анализируют две боковые стороны семени, что повышает точность измерений.

Нижние электроды предоставляют информацию об основной части и внутренней структуре семени. Эти электроды обладают более глубокой проникающей способностью и анализируют внутренние части семени. Нижние электроды имеют большую площадь и оценивают общее состояние основной части семени.

Каждый электрод независимо измеряет диэлектрические параметры. Этот многомерный подход позволяет выявлять различия в каждой части семени. Основные параметры, измеряемые каждым электродом: локальная диэлектрическая проницаемость, импеданс и фазовый угол. Эти данные

показывают уровень физиологической активности в различных частях семени.

Определяется распределение влажности в различных частях семени. Эта информация показывает, в какой части семени влага распределена неравномерно, что может повлиять на его качество. Неравномерное распределение влаги может указывать на проблемы в процессе сушки или условиях хранения семени.

Выявляются внутренние дефекты и микротрещины. Обнаруживаются пустоты, трещины или другие дефекты во внутренней части семени. Эти дефекты могут негативно повлиять на способность семени к прорастанию. Микротрещины могут быть вызваны механическими повреждениями или болезнями семени.

На этом этапе все данные от основных и дополнительных электродов отправляются в центральный блок обработки. Центральный блок состоит из высокопроизводительной компьютерной системы, которая обрабатывает данные в режиме реального времени.

Сравниваются основные и дополнительные измерения. Это позволяет проверить взаимное соответствие двух типов данных и выявить любые несоответствия. Если между основными и дополнительными измерениями имеется значительная разница, семя повторно анализируется или выделяется в специальную группу. Это позволяет обнаруживать ошибки и повышать надежность системы.

Проводятся статистические анализы. Анализируются нормальность распределения полученных данных, наличие выбросов и уровень достоверности. Для каждого параметра рассчитывается среднее значение, стандартное отклонение и коэффициент вариации. Статистический анализ проводится с 95% доверительным интервалом, что обеспечивает достоверность результатов.

Для каждого семени рассчитывается индекс качества на основе специального алгоритма. Этот индекс представляет собой систему комплексной оценки на основе нескольких параметров. Индекс качества оценивается по шкале от 0 до 100, что точно отражает общее состояние семени. При расчете индекса учитываются следующие параметры: диэлектрическая проницаемость, уровень влажности, внутренние дефекты и геометрические параметры.

С помощью алгоритмов машинного обучения прогнозируется вероятность прорастания семени. Модель, обученная на основе исторических данных, точно прогнозирует качество новых семян. Основные параметры, используемые в модели: сорт семени, возраст, условия хранения и измеренные диэлектрические параметры. Точность модели регулярно повышается путем дообучения на новых данных.

Семена группируются по классам качества. Каждая группа соответствует определенным требованиям к качеству и имеет соответствующую ценовую категорию. В основном существуют 4 основные

категории качества: премиум, первый, второй и промышленный. Для каждой категории установлены минимальные требования к индексу качества. В категорию премиум попадают только семена с индексом выше 90.

Система принятия решений распределяет каждое семя в соответствующую категорию. Эта система работает на основе заранее определенных критериев и автоматически принимает решения без вмешательства человека. Система записывает основание каждого решения в базу данных, что служит основой для последующего анализа и совершенствования системы.

На этом этапе семена разделяются на группы на основе определенных категорий качества. Процесс сортировки полностью автоматизирован, и все операции управляются программным обеспечением.

Пневматическая система сортировки направляет каждое семя в соответствующую приемную коробку. Управляемая давлением воздуха, эта система работает с высокой скоростью и точностью. Пневматическая система работает при давлении 2-4 бар и имеет тонкие настройки для точного направления каждого семени. Производительность системы составляет 50-70 семян в секунду.

Для каждой категории качества имеются отдельные коробки. Это гарантирует, что семена не смешаются и будут правильно классифицированы по уровню качества. Коробки маркированы разными цветами: премиум категория - зеленый, первая категория - синий, вторая категория - желтый, промышленная категория - красный. Объем каждой коробки регулируется в зависимости от размера партии семян.

Процесс сортировки контролируется в режиме реального времени. Оператор может наблюдать за работой системы через монитор и при необходимости вносить корректировки. Система мониторинга отображает все важные параметры: скорость сортировки, количество ошибок, степень заполнения коробок и другие. При возникновении любой неисправности система автоматически подает сигнал и останавливает процесс.

Для каждой партии автоматически создается сертификат качества. В сертификате отражаются номер партии, дата сортировки, показатели качества и другие сведения. В сертификате указываются следующие данные: сорт семян, номер партии, дата сортировки, общее количество семян, количество и процент семян в каждой категории, средний индекс качества. Сертификат заверяется цифровой подписью и автоматически загружается в базу данных.

В базе данных сохраняются все результаты сортировки. Эти данные используются для последующего анализа, подготовки отчетов и разработки мер по улучшению качества. База данных содержит полную информацию о каждой партии, включая все измеренные параметры, индекс качества и результаты сортировки. Данные хранятся в течение 5 лет.

Семена, забракованные системой, собираются в отдельную коробку. Эти семена отправляются на переработку или утилизацию. К забракованным

семенам относятся: семена с индексом качества ниже 40, семена с крупными дефектами и семена с другими недостатками. Забракованные семена отражаются в специальном отчете, и их состав анализируется.

После завершения процесса сортировки все коробки маркируются и подготавливаются к хранению. На каждой коробке указывается номер партии, название сорта, категория качества и дата сортировки. Внешний вид коробок также различается в зависимости от категории: для премиум категории используются специальные упаковочные материалы. Коробки перемещаются на склад для хранения и подготавливаются к последующей дистрибуции.

Диэлектрическая сортировочная машина с системой дополнительных электродов обладает следующими основными преимуществами:

Высокая точность - точность сортировки на 15-20% выше по сравнению с традиционными машинами. Это объясняется более полным анализом семени благодаря системе из нескольких электродов.

Комплексный анализ - анализируются не только общие диэлектрические свойства семени, но и свойства его различных частей, что делает оценку качества более точной.

Диэлектрическая сортировочная машина с системой дополнительных электродов обладает рядом преимуществ по сравнению с традиционными технологиями. Данная машина позволяет более точно оценивать качество и сортировать семенной материал, что способствует повышению общего качества сельскохозяйственной продукции.

В условиях сельского хозяйства Узбекистана широкое внедрение данной технологии окажет положительное влияние на развитие семеноводческой промышленности и повысит конкурентоспособность продукции. В будущем целесообразно проводить исследования по дальнейшему совершенствованию данной технологии и повышению ее эффективности.

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