TERI MIKROBIOTASI VA SURUNKALI DERMATOLOGIK KASALLIKLARNI DAVOLASHDA UNING AHAMIYATI

Yunusova Guzal Fayzullayevna

Samarqand Davlat Tibbiyot Universiteti. Samarqand, O'zbekiston.

Annotatsiya. Teri mikrobiotasi inson organizmining tabiiy himoya tizimining muhim tarkibiy qismi bo‘lib, terining immunologik muvozanatini saqlash, patogen mikroorganizmlarning ko‘payishini cheklash va teri to‘sig‘i funksiyasini qo‘llab-quvvatlashda muhim rol o‘ynaydi. Teri mikrobiotasining tarkibiy o‘zgarishlari (disbioz) atopik dermatit, psoriaz, akne, rozatsea va boshqa surunkali dermatologik kasalliklarning rivojlanishi hamda qaytalanishida muhim omil hisoblanadi. Ushbu maqolada teri mikrobiotasining surunkali dermatologik kasalliklar patogenezidagi o‘rni, zamonaviy diagnostika usullari va mikrobiotani tiklashga qaratilgan innovatsion davolash yondashuvlari tahlil qilingan. Mikrobiotaga yo‘naltirilgan terapiya kasalliklarning klinik kechishini yaxshilash va bemorlarning hayot sifatini oshirishda istiqbolli yo‘nalish sifatida baholanadi. [5,6]

Kalit so‘zlar: teri mikrobiotasi, disbioz, atopik dermatit, psoriaz, akne, rozatsea, mikrobiom, probiotiklar, dermatologiya, mikrobiotaga yo‘naltirilgan terapiya.

THE ROLE OF SKIN MICROBIOTA IN THE TREATMENT OF CHRONIC DERMATOLOGICAL DISEASES

Yunusova Guzal Fayzullayevna

Samarkand State Medical University. Samarkand, Uzbekistan.

Abstract. The skin microbiota is an essential component of the body's natural defense system, playing a critical role in maintaining immune homeostasis, protecting against pathogenic microorganisms, and preserving skin barrier function. Alterations in the composition of the skin microbiota (dysbiosis) have been closely associated with the development and progression of chronic dermatological diseases, including atopic dermatitis, psoriasis, acne, and rosacea.

This article reviews the role of the skin microbiota in the pathogenesis of chronic skin disorders, current diagnostic approaches, and innovative microbiota-targeted therapeutic strategies. Restoration of the normal skin microbiome has emerged as a promising approach for improving clinical outcomes, reducing disease recurrence, and enhancing patients' quality of life.[5,6]

Keywords: skin microbiota, dysbiosis, atopic dermatitis, psoriasis, acne, rosacea, skin microbiome, probiotics, dermatology, microbiota-targeted therapy.

РОЛЬ МИКРОБИОТЫ КОЖИ В ЛЕЧЕНИИ ХРОНИЧЕСКИХ ДЕРМАТОЛОГИЧЕСКИХ ЗАБОЛЕВАНИЙ

Юнусова Гузаль Файзуллаевна
Самаркандский государственный медицинский университет, г. Самарканд, Узбекистан.

Аннотация.Микробиота кожи является важной частью естественной защитной системы организма, обеспечивая поддержание иммунного гомеостаза, барьерной функции кожи и защиту от патогенных микроорганизмов. Нарушение состава микробиоты кожи (дисбиоз) тесно связано с развитием и прогрессированием хронических дерматологических заболеваний, таких как атопический дерматит, псориаз, акне и розацеа. В статье рассмотрены роль микробиоты кожи в патогенезе хронических заболеваний кожи, современные методы диагностики и инновационные подходы к лечению, направленные на восстановление нормального микробиома кожи. Терапия, ориентированная на восстановление микробиоты, рассматривается как перспективное направление для улучшения клинических результатов лечения и повышения качества жизни пациентов.[5,6]

Ключевые слова: микробиота кожи, дисбиоз, атопический дерматит, псориаз, акне, розацеа, микробиом кожи, пробиотики, дерматология, терапия, направленная на микробиоту.

Relevance of the Topic. Chronic dermatological diseases, including atopic dermatitis, psoriasis, acne vulgaris, and rosacea, affect millions of people

worldwide and represent a major public health concern due to their high prevalence, recurrent nature, and significant impact on patients' quality of life. Although genetic, environmental, and immunological factors contribute to the development of these disorders, recent scientific evidence has demonstrated that alterations in the skin microbiota play a crucial role in their pathogenesis and progression.

The skin microbiota consists of diverse communities of bacteria, fungi, viruses, and other microorganisms that maintain skin homeostasis, regulate immune responses, and protect against pathogenic microorganisms. Disruption of this balanced microbial ecosystem, known as dysbiosis, can impair the skin barrier, promote chronic inflammation, and increase susceptibility to persistent dermatological diseases. Advances in metagenomic sequencing and molecular diagnostic techniques have significantly improved the understanding of the relationship between the skin microbiome and inflammatory skin disorders.

Current therapeutic strategies are shifting from conventional symptomatic treatment toward microbiota-targeted approaches, including probiotics, prebiotics, postbiotics, bacteriophage therapy, microbiome transplantation, and personalized dermatological care. These innovative interventions aim to restore microbial balance, reduce inflammation, prevent disease recurrence, and improve long-term clinical outcomes.[1,2]

Therefore, investigating the role of the skin microbiota in chronic dermatological diseases and evaluating modern microbiome-based therapeutic approaches is highly relevant for contemporary dermatology. A deeper understanding of host–microbiota interactions may contribute to the development of more effective, personalized, and evidence-based treatment strategies, ultimately improving patient care and quality of life.

Main Part. The skin is the largest organ of the human body and serves as the first line of defense against environmental pathogens. Its surface is inhabited by a diverse community of microorganisms, collectively known as the skin

microbiota, which includes bacteria, fungi, viruses, and mites. Under normal physiological conditions, these microorganisms exist in a balanced relationship with the host, contributing to immune regulation, maintenance of the skin barrier, and protection against pathogenic microbes.

The composition of the skin microbiota varies according to anatomical location, age, sex, environmental conditions, hygiene practices, and host immune status. The dominant bacterial genera include *Staphylococcus*, *Cutibacterium*, *Corynebacterium*, and *Micrococcus*. These microorganisms produce antimicrobial peptides, regulate local immune responses, and prevent colonization by opportunistic pathogens.

Disruption of the normal microbial balance, referred to as dysbiosis, has been recognized as a key factor in the development of chronic dermatological diseases. In atopic dermatitis, decreased microbial diversity and excessive colonization by *Staphylococcus aureus* contribute to skin barrier dysfunction and persistent inflammation. In psoriasis, alterations in bacterial populations influence immune activation through the IL-23/IL-17 inflammatory pathway, resulting in excessive keratinocyte proliferation. Acne vulgaris is associated with changes in the balance of *Cutibacterium acnes* strains, sebaceous gland activity, and inflammatory responses. Similarly, rosacea has been linked to alterations in skin microorganisms and dysregulated innate immunity.

Modern diagnostic methods have significantly improved the understanding of skin microbiota. Conventional microbial culture techniques are increasingly complemented by molecular approaches such as polymerase chain reaction (PCR), next-generation sequencing (NGS), 16S rRNA gene sequencing, metagenomic analysis, and bioinformatics tools. These technologies enable comprehensive characterization of microbial communities and identification of disease-associated microbial patterns.[3,5]

Recent therapeutic strategies focus on restoring the normal skin microbiome rather than solely suppressing inflammation. Microbiota-targeted therapies include

topical and oral probiotics, prebiotics, postbiotics, bacteriophage therapy, antimicrobial peptides, microbiome transplantation, and personalized dermatological treatment. These approaches aim to restore microbial diversity, strengthen the skin barrier, regulate immune responses, and reduce disease recurrence while minimizing the excessive use of antibiotics.

In addition, advances in artificial intelligence and precision medicine have facilitated the analysis of complex microbiome data, enabling individualized diagnosis and treatment planning. Personalized microbiome-based interventions are expected to become an important component of future dermatological practice. Overall, maintaining the balance of the skin microbiota is essential for preserving skin health and preventing chronic inflammatory diseases. Integrating advanced microbiological diagnostics with microbiome-targeted therapeutic strategies offers promising opportunities for improving treatment efficacy, reducing relapse rates, and enhancing patients' quality of life.[6,8]

Materials and Methods. This study was conducted through a comprehensive review and analysis of recent scientific literature on the role of the skin microbiota in chronic dermatological diseases and its therapeutic significance. Scientific articles published between 2020 and 2026 were retrieved from international databases, including PubMed, Scopus, Web of Science, and Google Scholar. Current clinical guidelines and evidence-based recommendations from international dermatological organizations were also reviewed.

The study materials included published clinical trials, systematic reviews, meta-analyses, and observational studies investigating the relationship between skin microbiota and chronic dermatological disorders such as atopic dermatitis, psoriasis, acne vulgaris, and rosacea.

The analyzed diagnostic methods included conventional microbiological culture techniques, polymerase chain reaction (PCR), 16S rRNA gene sequencing, next-generation sequencing (NGS), metagenomic analysis, and bioinformatics-based microbiome profiling. The effectiveness of microbiota-targeted therapeutic

approaches, including probiotics, prebiotics, postbiotics, bacteriophage therapy, topical microbiome-based preparations, and personalized dermatological treatment, was also evaluated.[4]

The collected data were analyzed using comparative, descriptive, and evidence-based analytical methods. Particular attention was given to changes in microbial diversity, alterations in dominant microbial species, clinical treatment outcomes, recurrence rates, and improvements in skin barrier function. The findings were synthesized to evaluate the role of skin microbiota in disease pathogenesis and to determine the effectiveness of modern microbiome-based therapeutic strategies for chronic dermatological diseases.

Conclusion. The skin microbiota plays a fundamental role in maintaining skin homeostasis, regulating immune responses, and protecting the host against pathogenic microorganisms. Current evidence indicates that disturbances in the composition and diversity of the skin microbiome are closely associated with the development and progression of chronic dermatological diseases, including atopic dermatitis, psoriasis, acne vulgaris, and rosacea.[7]

Advances in molecular diagnostic technologies, such as next-generation sequencing and metagenomic analysis, have significantly improved the understanding of host–microbiota interactions and enabled more accurate characterization of disease-associated microbial changes. These developments have created new opportunities for the early diagnosis and personalized management of chronic skin disorders.

Microbiota-targeted therapeutic approaches, including probiotics, prebiotics, postbiotics, bacteriophage therapy, and microbiome-based topical formulations, have shown promising results in restoring microbial balance, reducing inflammation, strengthening the skin barrier, and decreasing disease recurrence. Combining these innovative strategies with conventional dermatological treatments may improve long-term clinical outcomes and patients' quality of life. [10]

Further clinical studies are required to establish standardized diagnostic protocols, evaluate the long-term safety and efficacy of microbiome-based therapies, and develop personalized treatment strategies based on individual microbial profiles. Such advances will contribute to more effective prevention and management of chronic dermatological diseases in modern clinical practice.

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