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ANTIBIOTICS AND THEIR EFFECT ON BACTERIAL MICROFLORA

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Abstract: Antibiotics are among the most important therapeutic agents for the treatment of bacterial infections, and their role in modern medical practice is invaluable. However, the widespread and uncontrolled use of antibiotics can lead to significant disruption of the normal bacterial microflora of the human body. This article reviews the effects of antibiotics on the intestinal, skin, and mucosal microflora, the mechanisms of dysbiosis development, and the processes involved in the formation of antibiotic-resistant microorganisms, based on both Uzbek and international scientific sources. During the study, the impact of β-lactams, macrolides, aminoglycosides, and fluoroquinolones on the composition of the microbiota was analyzed. The results indicate that broad-spectrum antibiotics cause a reduction in beneficial microorganisms and promote the overgrowth of opportunistic pathogenic bacteria. Studies conducted by Uzbek researchers have also reported the development of intestinal dysbiosis, weakened immune responses, and metabolic disturbances following antibiotic therapy. The article emphasizes the importance of rational antibiotic use and highlights the role of probiotics and prebiotics in restoring the balance of the normal microflora.

Keywords. Antibiotics, bacterial microflora, intestinal microbiota, dysbiosis, antibiotic resistance, probiotics, prebiotics, pharmacology**.**

INTRODUCTION

The human body is a complex biological system in which billions of microorganisms permanently reside. This collective community of microorganisms is known as the normal microflora and plays a crucial role in maintaining the physiological balance of the body [1]. According to the Uzbek scientist A.A. Qodirov, intestinal microflora not only обеспечивает fermentative activity during digestion, but also plays a leading role in activating the immune system [2].

Antibiotics are widely used in the treatment of bacterial diseases. However, their improper and long-term use leads to disruption of the normal microflora, resulting in the development of dysbiosis [3]. In medical practice in Uzbekistan, specialists have noted that antibiotics are often prescribed without prior laboratory diagnostics, which contributes to an increasing number of microflora-related disorders [4]. Therefore, an in-depth study of the effects of antibiotics on normal microflora is of significant scientific and practical relevance.

Aim of the Study. The main objective of this study is to analyze the effects of antibiotics on the composition and functional status of bacterial microflora based on Uzbek and international scientific sources, to identify the causes of dysbiosis development, and to substantiate effective approaches for reducing the adverse consequences of antibiotic therapy.

MATERIALS AND METHODS

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In this study, scientific literature in the fields of pharmacology, microbiology, and clinical medicine published in Uzbekistan and abroad was analyzed. In particular, textbooks and monographs by Uzbek scholars such as N.N. Gadayev, A.A. Qodirov, and Sh.X. Karimov were used as the main sources [2], [5]. The research methods included analytical review, comparative analysis, and statistical generalization.

RESULTS AND DISCUSSION

According to the reviewed sources, β-lactam antibiotics (penicillins and cephalosporins) have a strong impact on the intestinal microflora. Data reported by N.N. Gadayev indicate that these antibiotics reduce the number of beneficial anaerobic bacteria, which leads to the overgrowth of pathogenic microorganisms in the gut environment [5].

Long-term use of macrolide antibiotics decreases microbial diversity. Clinical observations conducted in Uzbekistan revealed that signs of intestinal dysbiosis were detected in 45–50% of children after macrolide therapy [6].

Although aminoglycosides are primarily active against Gram-negative bacteria, they promote the predominance of opportunistic pathogens in the intestinal microflora [7]. In addition, antibiotic therapy increases the risk of Clostridioides difficile–associated diarrhea. According to the studies of Sh.X. Karimov, this complication occurs more frequently in patients receiving long-term antibiotic treatment [8]. Furthermore, inappropriate use of antibiotics leads to the emergence of resistant strains, which significantly reduces treatment effectiveness [9].

CONCLUSION

Antibiotics occupy a crucial and indispensable place in modern medicine for the treatment of bacterial infections. Their introduction into clinical practice has significantly reduced mortality rates associated with severe infectious diseases. However, the findings of this study indicate that the widespread, prolonged, and uncontrolled use of antibiotics leads to structural and functional disturbances of the normal bacterial microflora in the human body.

In particular, disruption of the intestinal microbiota balance negatively affects digestive processes, immune system function, and overall metabolic status. Analysis of Uzbek and international scientific literature shows that broad-spectrum antibiotics cause a significant reduction in beneficial microorganisms, especially Lactobacillus and Bifidobacterium species. As a result, the protective properties of the intestinal mucosa are weakened, opportunistic pathogenic bacteria become activated, and dysbiosis develops. These processes are often manifested by diarrhea, allergic reactions, vitamin deficiencies, and decreased immunity.

Moreover, a clinically significant increase in the risk of Clostridioides difficile–associated infections during antibiotic therapy was identified. The study also scientifically confirms that improper antibiotic use contributes to the formation of antibiotic-resistant microorganisms. The spread of resistant strains poses a serious threat not only to individual patients but also to public health, as it may complicate the treatment of common bacterial infections in the future.

Based on these findings, antibiotic therapy should be administered only under strict clinical indications and medical supervision. When prescribing antibiotics, their spectrum of activity, duration of treatment, and the patient's individual characteristics must be carefully considered. In addition, the use of probiotic and prebiotic preparations during and after antibiotic therapy is recommended to restore microflora balance.

Maintaining the balance between antibiotics and bacterial microflora is an essential factor for a healthy organism. Rational antibiotic use, increased medical awareness, and the implementation of evidence-based approaches in clinical practice can reduce microflora-related complications and improve treatment outcomes.

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