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INAPPROPRIATE USE OF ANTIBIOTICS AS A FACTOR CONTRIBUTING TO THE DEVELOPMENT OF ANTIBIOTIC RESISTANCE

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Abstract

This article examines inappropriate antibiotic use as one of the principal factors contributing to the development of antibiotic resistance. Uncontrolled consumption of antibacterial agents without medical prescription, together with errors in clinical prescribing practice, reduces therapeutic effectiveness and promotes the emergence and spread of resistant microorganisms. Particular attention is paid to self-medication, non-prescription access to antibiotics, and insufficient public awareness of the distinction between viral and bacterial infections. On the basis of a questionnaire survey, the study demonstrates that inappropriate antibiotic use remains common in everyday practice. The article also discusses clinically relevant consequences, including complications of infectious diseases, and outlines preventive measures aimed at reducing the risk of further dissemination of antibiotic resistance.

Keywords

antibiotic resistance; antibiotics; self-medication; inappropriate antibiotic use; microbial resistance; prevention; dysbiosis.

Antibiotic resistance refers to the ability of bacteria to remain viable and withstand the effects of antibiotics. As a consequence, drugs that were previously effective in the treatment of infectious diseases gradually lose their therapeutic efficacy. According to the World Health Organization, between 2018 and 2023, resistance increased in more than 40% of monitored pathogen-antibiotic combinations, with average annual increases in resistance rates ranging from 5% to 15%. At present, approximately 700,000 people worldwide die each year from infections caused by antibiotic-resistant microorganisms [1,6,10,13,24,29,32]. Expert projections indicate that by 2050 this number may rise to 10 million deaths annually. Accordingly, antibiotic resistance is now regarded as one of the most serious global public-health challenges.

During the spring and autumn seasons, the incidence of acute respiratory diseases increases, which often leads to a rise in self-medication. In such situations, some patients purchase antibiotics without a prescription and without a clear understanding of the nature of the illness. This practice is particularly dangerous because antibiotics are effective only against bacterial infections, whereas their use in viral diseases does not produce a therapeutic benefit and contributes to the development of antibiotic resistance. The inappropriate use of antibacterial agents without medical consultation may also disrupt the normal human microbiota and thereby aggravate the course of disease [3,5,12,14,28,31,33]. For this reason, public education on the differences between viral and bacterial infections, as well as on the clinical indications for antibiotic therapy, is of substantial importance.

The problem of antibiotic resistance is not limited to self-medication among the general population; it is also associated with prescribing practices in medical institutions. Physicians may incorrectly determine the nature of an infection or prescribe a broad-spectrum and costly antibiotic when a more accessible drug could provide an equivalent therapeutic effect. Ineffective treatment and insufficient clinical competence may reduce patients' trust in the healthcare system, increase the frequency of self-medication, encourage the use of traditional remedies, or lead patients to avoid seeking medical assistance on the assumption that the disease will resolve spontaneously. In some cases, this delay allows the disease to progress, and the patient seeks care only after the condition has become more severe. Therefore, the growth of antibiotic resistance is linked not only to insufficient public knowledge but also to systemic problems in medication-prescribing practice [2,11,15,22,27].

To assess the prevalence of antibiotic self-medication, an anonymous questionnaire survey was conducted among 100 respondents aged 18 to 65 years, including both men and women. The questionnaire included items on the use of antibiotics without physician prescription, reasons for antibiotic use, and the level of respondents' awareness of differences between bacterial and viral infections.

The survey results showed that 63% of respondents had taken antibiotics at least once without an official visit to a physician. In addition, 34% of respondents reported using antibiotics for symptoms of the common cold or acute respiratory viral infections, while 45% indicated insufficient awareness of the differences between bacteria and viruses. The main reasons given for such behavior were the belief that antibiotics accelerate recovery and the availability of antibiotics in pharmacies. These findings indicate that antibiotic self-medication is widespread and confirm the need to improve public health literacy and strengthen control over the use of antibacterial agents [7,9,16,19,26,30,34,35].

The clinical consequences of inappropriate treatment and antibiotic resistance may manifest as various complications. For example, an acute viral upper respiratory infection may be complicated by bacterial sinusitis; a viral infection of the upper respiratory tract may progress to pneumonia; inadequately treated tonsillopharyngitis may be complicated by rheumatic heart disease; acute otitis media may lead to mastoiditis, an inflammation of the mastoid bone; a urinary tract infection such as cystitis may ascend to the kidneys and cause pyelonephritis; and a minor skin infection may develop into cellulitis or even sepsis. In addition, inappropriate antibiotic use can destroy components of the normal microbiota and cause dysbiosis. These examples demonstrate that even apparently mild diseases may become life-threatening when treatment is inappropriate or when bacterial pathogens are resistant to antimicrobial therapy.

Combating antibiotic resistance requires reducing the influence of commercial factors in healthcare. Continuing professional development programmes for physicians, particularly in public healthcare institutions, play an important role. Equally important are measures to improve access to high-quality primary healthcare, which can increase public trust and facilitate timely and appropriate treatment. Medical institutions should also be provided with modern equipment and adequate conditions for diagnosis and treatment. Infection prevention is of particular significance and includes hygiene, vaccination, and control of sterility. Public awareness activities on the proper use of antibiotics should be conducted systematically, including through informational materials in public places and healthcare facilities [18,20,25,35].

Furthermore, scientific research and specialist training should be strengthened to support the development of new antibacterial drugs, since the risk of resistant healthcare-associated infections persists even when antibiotics are used rationally. Only a comprehensive approach can reduce the spread of antibiotic resistance.

Despite the relevance of the problem under consideration, this study has several limitations. First, bacterial resistance to antibiotics is constantly changing because microorganisms adapt rapidly to new conditions. Consequently, research findings in this field may become outdated over time and require regular updating. Second, investigation of the mechanisms of antibiotic resistance often requires complex laboratory methods, including molecular genetic analysis. The need for specialized equipment and laboratory infrastructure may limit the feasibility of such research in some healthcare institutions [4,17,21,23].

Antibiotic resistance is a serious and growing public-health problem closely associated with the inappropriate use of antibiotics. This study combines theoretical analysis with the results of an original survey, thereby demonstrating

the prevalence of antibiotic self-medication and its relationship with potential clinical risks. The analysis allows several key conclusions to be drawn. First, self-medication and the availability of antibiotics without prescription remain among the main factors contributing to the formation of microbial resistance. Second, insufficient public awareness and certain deficiencies in treatment-prescribing practice contribute to the inappropriate use of antibacterial drugs. Third, even mild infectious diseases may lead to serious complications when treatment is inadequate.

The practical significance of this work lies in substantiating the need for specific measures aimed at reducing inappropriate antibiotic use. In light of the survey findings, particular attention should be paid to strengthening control over the dispensing of antibiotics, increasing public awareness, and improving the training of medical personnel. Only an integrated approach that combines educational, organizational, and medical measures can improve the effectiveness of infection treatment and slow the growth of antibiotic resistance.

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