USO INADEQUADO DE ANTIBIÓTICOS COMO FATOR ASSOCIADO AO DESENVOLVIMENTO DA RESISTÊNCIA BACTERIANA

INAPPROPRIATE USE OF ANTIBIOTICS AS A FACTOR ASSOCIATED WITH THE DEVELOPMENT OF BACTERIAL RESISTANCE

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RESUMO

Introdução: A resistência bacteriana constitui um importante problema de saúde pública e está relacionada, entre outros fatores, ao uso inadequado de antibióticos, incluindo automedicação, utilização sem indicação clínica e prescrição desnecessária. **Objetivo:** Analisar as evidências acerca do uso inadequado de antibióticos e sua relação com a resistência bacteriana. **Método:** Trata-se de uma revisão integrativa da literatura, realizada nas bases PubMed/MEDLINE, Scientific Electronic Library Online (SciELO) e Biblioteca Virtual em Saúde (BVS), considerando artigos publicados entre 2016 e 2026, em português, inglês ou espanhol. Foram utilizados descritores relacionados a antibacterianos, farmacorresistência bacteriana e automedicação, associados a termos livres referentes ao uso inadequado de antibióticos. **Resultados:** Os estudos analisados evidenciaram elevada ocorrência de automedicação em diferentes populações, além de fatores associados, como reutilização de medicamentos, facilidade de acesso, conhecimento insuficiente sobre resistência antimicrobiana e limitações no suporte diagnóstico. Também foram identificadas evidências microbiológicas que apontam associação entre automedicação e resistência, além de resultados indicando que estratégias de suporte diagnóstico e programas de gerenciamento do uso de antimicrobianos podem contribuir para reduzir prescrições inadequadas. **Conclusão:** O uso inadequado de antibióticos está associado à resistência bacteriana, destacando-se a importância da educação em saúde, da qualificação da prescrição, do suporte diagnóstico e de estratégias voltadas ao uso racional desses medicamentos.

Palavras-chave: Antibacterianos. Farmacorresistência Bacteriana. Automedicação. Uso de Medicamentos.

ABSTRACT

Introduction: Bacterial resistance is an important public health problem and is associated, among other factors, with the inappropriate use of antibiotics, including self-medication, use without clinical indication, and unnecessary prescribing. **Objective:** To analyze the evidence regarding inappropriate antibiotic use and its relationship with bacterial resistance. **Methods:** This is an integrative literature review conducted in the PubMed/MEDLINE, Scientific Electronic Library Online (SciELO), and Virtual Health Library (VHL) databases, considering articles published between 2016 and 2026 in Portuguese, English, or Spanish. Controlled descriptors related to anti-bacterial agents, bacterial drug resistance, and self-medication were used in combination with free-text terms referring to inappropriate antibiotic use. **Results:** The analyzed studies revealed a high occurrence of

self-medication across different populations, as well as associated factors such as medication reuse, ease of access, insufficient knowledge about antimicrobial resistance, and limitations in diagnostic support. Microbiological evidence suggesting an association between self-medication and resistance was also identified, along with findings indicating that diagnostic support strategies and antimicrobial stewardship programs may contribute to reducing inappropriate prescribing. **Conclusion:** Inappropriate antibiotic use is associated with bacterial resistance, highlighting the importance of health education, improved prescribing practices, diagnostic support, and strategies aimed at the rational use of these medications. **Keywords:** Anti-Bacterial Agents. Drug Resistance, Bacterial. Self Medication. Drug Utilization.

INTRODUCTION

Antibiotics are among the main therapeutic tools used for the treatment of bacterial infections and play a fundamental role in reducing the morbidity and mortality associated with these diseases. However, their inappropriate use, whether through use without clinical indication, self-medication, inappropriate drug selection, or unnecessary use, represents an important public health problem. Exposure to antibiotics exerts selective pressure on bacterial populations, favoring the survival and spread of resistant strains. Evidence demonstrates a positive association between antibiotic consumption and increased bacterial resistance, reinforcing the need for strategies aimed at the rational use of these medications. [1]

Inappropriate antibiotic use occurs both through unnecessary prescribing and practices related to self-medication. In Brazil, a study conducted among adults living in Manaus identified an increase in the prevalence of antibiotic use from 3.7% in 2015 to 8.0% in 2019, while selfmedication among antibiotic users increased from 19.2% to 30.7% over the same period.[2] A study conducted in Pakistan also identified a high occurrence of self-medication, including the use of antibiotics for conditions such as cough, common cold, influenza, and sore throat.[3] These findings demonstrate the persistence of inappropriate antibiotic use practices across different population settings.

In addition to self-medication, factors related to population knowledge and access to medications may contribute to inappropriate antibiotic use. In rural communities in Malawi, a high prevalence of self-medication was observed among individuals who had used antibiotics in the previous six months, along with limited knowledge regarding antimicrobial resistance.[4] Although different studies have investigated self-medication, inappropriate prescribing, and other patterns of irrational antibiotic use, these practices have been examined across diverse

population and healthcare settings, highlighting the relevance of integrating the available evidence on factors associated with inappropriate use and its relationship with bacterial resistance. Synthesizing this knowledge may contribute to the development of health education strategies, responsible prescribing practices, and the promotion of rational antibiotic use.

Therefore, this study aims to analyze, through an integrative literature review, the evidence regarding inappropriate antibiotic use and its relationship with bacterial resistance.

METHODS

This is an integrative literature review conducted according to the methodological principles proposed by Whittemore and Knafl,[5] with the aim of gathering and synthesizing scientific evidence regarding inappropriate antibiotic use and its relationship with bacterial resistance. The review was guided by the following research question: "What evidence available in the literature demonstrates the relationship between inappropriate antibiotic use and bacterial resistance?"

The search for studies was conducted in the PubMed/MEDLINE, Scientific Electronic Library Online (SciELO), and Virtual Health Library (VHL) databases, considering publications from 2016 to 2026. Controlled descriptors from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) were used, including "Antibacterials" ("Anti-Bacterial Agents"), "Bacterial Drug Resistance" ("Drug Resistance, Bacterial"), and "SelfMedication" ("Self Medication"). To increase search sensitivity, the free-text terms **"antibiotic misuse," "inappropriate antibiotic use," "antibiotic overuse," and "antimicrobial resistance"** were also employed and combined using the Boolean operators **AND** and **OR**.

Original articles published in Portuguese, English, or Spanish, available in full text, and addressing inappropriate antibiotic use—including self-medication, use without appropriate indication, inappropriate prescribing, or overuse—as well as its relationship with bacterial resistance were considered eligible. Review articles, editorials, letters to the editor, duplicate studies, exclusively veterinary or agricultural studies, and studies addressing bacterial resistance without a relationship to inappropriate antibiotic use or consumption were excluded.

Study selection was initially performed by screening the titles and abstracts identified in the databases, followed by full-text reading of potentially eligible articles. Subsequently, the selected studies were analyzed and organized according to their methodological characteristics

and main findings, allowing for the synthesis of evidence related to patterns of inappropriate antibiotic use, associated factors, and their implications for bacterial resistance.

RESULTS

The studies analyzed demonstrated a high occurrence of inappropriate antibiotic use practices across different populations. In Brazil, Tiguman, Silva, and Galvao[2] identified an increase in the prevalence of antibiotic use among adults living in Manaus, from 3.7% in 2015 to 8.0% in 2019. During the same period, self-medication among antibiotic users increased from 19.2% to 30.7%, with beta-lactams being the most commonly used class. In a study conducted in Pakistan, Aslam et al.[3] found a 32.5% prevalence of self-medication, including the use of antibiotics for conditions such as cough, common cold, influenza, sore throat, diarrhea, and fever.

Similar findings were reported by Limwado et al.[4] in rural communities in Malawi. Among the 531 participants evaluated, 71.1% reported antibiotic use and 69.5% reported selfmedication within the previous six months. Factors associated with this practice included convenience and confidence in one's own knowledge. In addition, 53.1% reported reusing leftover antibiotics previously obtained from healthcare facilities, while only 16.1% demonstrated awareness of antimicrobial resistance. These findings indicate that factors related to medication access, household storage, and insufficient knowledge may be associated with inappropriate antibiotic use.

The relationship between self-medication and antimicrobial resistance was directly investigated by Sikder et al.[6], who evaluated 456 participants and performed microbiological analyses of bacterial isolates. The study identified higher levels of phenotypic resistance and genetic determinants of resistance among participants who practiced antibiotic selfmedication, providing microbiological evidence of an association between this practice and antimicrobial resistance.

Inappropriate antibiotic use was also identified in the context of professional prescribing. Tang et al.[7] analyzed 12,489 prescriptions for upper respiratory tract infections from 30 primary healthcare facilities in China and found that 61.7% contained at least one antibiotic. The availability of C-reactive protein testing at healthcare facilities was associated with lower odds of antibiotic prescribing, indicating that greater diagnostic support may contribute to more appropriate therapeutic decision-making.

Finally, interventions aimed at promoting rational antibiotic use demonstrated the potential to modify prescribing practices. Wei et al.[8] evaluated a comprehensive antibiotic stewardship program in 34 rural Chinese hospitals involving 97,239 consultations for acute respiratory infections. The intervention integrated professional training and clinical guidelines, electronic clinical decision support, periodic prescription review, and patient education, demonstrating that multifaceted antimicrobial stewardship strategies may contribute to reducing inappropriate antibiotic prescribing.

CONCLUSION

The analysis of the studies demonstrated that inappropriate antibiotic use remains a relevant problem across different population and healthcare settings, mainly occurring through selfmedication, use without appropriate indication, reuse of medications left over from previous treatments, and unnecessary prescribing. The evidence analyzed indicates that factors such as easy access to antibiotics, insufficient knowledge about antimicrobial resistance, and limitations in diagnostic support contribute to these practices. In addition, microbiological evidence was identified that reinforces the association between antibiotic self-medication and the presence of bacterial resistance.

Therefore, this review contributes to an integrated understanding of the main factors related to inappropriate antibiotic use and its implications for bacterial resistance, reinforcing the importance of promoting rational antibiotic use through health education, improved prescribing practices, strengthened diagnostic support, and the implementation of antimicrobial stewardship programs. Such measures may contribute to reducing unnecessary antibiotic use and help address bacterial resistance. However, considering the methodological and population diversity of the studies analyzed, further research is needed to directly assess, across different settings, the relationship between patterns of inappropriate antibiotic use and the development of bacterial resistance, as well as the effectiveness of interventions aimed at reducing this problem.

REFERENCES

1. Abejew AA, Wubetu GY, Fenta TG. Relationship between antibiotic consumption and resistance: a systematic review. *Can J Infect Dis Med Microbiol.* 2024;2024:9958678. doi:10.1155/2024/9958678.
2. Tiguman GMB, Silva MT, Galvao TF. Use and self-medication with antibiotics among adults in the Brazilian Amazon: a panel of two cross-sectional studies, 2015 and 2019. *Expert Rev Anti Infect Ther.* 2020;18(12):1263-1270. doi:10.1080/14787210.2020.1798228.
3. Aslam A, Zin CS, Jamshed S, Ab Rahman NS, Ahmed SI, Pallós P, Gajdács M. Selfmedication with antibiotics: prevalence, practices and related factors among the Pakistani public. *Antibiotics (Basel).* 2022;11(6):795. doi:10.3390/antibiotics11060795.
4. Limwado GD, Aron MB, Mpinga K, Phiri H, Chibvunde S, Banda C, et al. Prevalence of antibiotic self-medication and knowledge of antimicrobial resistance among community members in Neno District rural Malawi: a cross-sectional study. *IJID Reg.* 2024;13:100444. doi:10.1016/j.ijregi.2024.100444.
5. Whittemore R, Knafl K. The integrative review: updated methodology. *J Adv Nurs.* 2005;52(5):546-553. doi:10.1111/j.1365-2648.2005.03621.x.
6. Sikder C, Halder DK, Khanam R, Pathan R, Ahammed T, Majumder S, et al. Evaluation of factors influencing self-medication practices with antibiotics and their impact on antimicrobial resistance among rural populations in Bangladesh. *Microb Pathog.* 2025;207:107848. doi:10.1016/j.micpath.2025.107848.
7. Tang C, Zhang Y, Kadirhaz M, Xu S, Lu Y, Hussain I, et al. Role of diagnostic testing in reducing unnecessary antibiotic use for upper respiratory tract infections in Chinese primary healthcare: a mixed-methods study. *BMC Prim Care.* 2026;27(1):284. doi:10.1186/s12875-026-03398-z.
8. Wei X, Zhuo C, Hicks JP, Zhang Z, Wu S, Walley JD, et al. Effects of a comprehensive antibiotic stewardship program on antibiotic prescribing for acute respiratory infections in rural facilities: a cluster randomized trial. *Nat Med.* 2026;32(3):841-848. doi:10.1038/s41591-026-04222-y.