LUMEN ET VIRTUS

RISK OF INDISCRIMINATE USE OF ANTIBIOTICS IN DENTISTRY: LITERATURE REVIEW

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ABSTRACT

Concern about bacterial resistance to antimicrobial drugs is a global problem and a direct threat to human health. Despite this, the continuous and indiscriminate use in Dentistry is increasing. The aim of this study is to conduct a literature review using PUBMED, GOOGLE SCHOLAR, LILACS, Electronic Library Online (Scielo) databases on the indiscriminate use in Periodontics, Endodontics, Implantology and Oral and Maxillofacial Surgery, the increase in antibiotic resistance represents a significant threat to public health worldwide, generating governmental concern about antibiotic resistance and antibiotic resistance. adjuvant therapy and tooth extractions: the use of antibiotics only when indicated and necessary.

Keywords: Antibiotics, Resistance, Dentistry.

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INTRODUCTION

Antibiotic resistance can be considered the "faceless pandemic" that has captivated the entire world. Almost all clinically used antibiotics have emerging resistance to them. It has become decisive in treatment options as an alternative to fight resistant pathogens. It is related to creating models that can predict early resistance so that treatment strategies can be developed in advance with evolving resistance[1].

The World Health Organization (WHO) has recognized the inappropriate, indiscriminate and irrational use of antibiotics, leading to antibiotic resistance, as a global problem due to the modernization of medicine driving a greater evolution of antimicrobial resistance due to the misuse, excessive and abuse of antibiotics having resistant bacteria, the biggest crises worldwide being antibiotic resistance[2].

Antimicrobial resistance and persistence are associated with a high risk of treatment failure and recurrent infections. They are therefore important drivers of increased morbidity and mortality rates, resulting in rising health care costs. The phenomenon of bacteria that survive exposure to antibiotics despite being fully susceptible, the so-called persistence to antibiotics, is still largely underestimated, leading to treatment failures[3].

The bacterial response to antibiotic "attack" is the prime example of bacterial adaptation and the pinnacle of evolution. "Survival of the fittest" is a consequence of an immense genetic plasticity of bacterial pathogens that trigger specific responses that result in mutational adaptations, acquisition of genetic material, or alteration of gene expression, producing resistance to virtually all antibiotics currently available in clinical practice[4].

Antimicrobial resistance and tolerance are urgent global health concerns, with alarming numbers of antimicrobial drugs failing and a corresponding increase in related deaths. Both persistence and antibiotic resistance characterize survival phenotypes in which a bacterial cell becomes insensitive to one (or even) more antibiotics[5].

Antimicrobial drugs are widely used in various areas of dentistry, with the aim of treating or preventing infections in the oral and maxillofacial complex, deciding on the prescription of drugs can be the result of lack of knowledge and inaccurate information about the properties and use of drugs causing antibiotic resistance.

LITERATURE REVIEW

As soon as stipulated by the current legislation, Law No. 5,081 of August 24, 1966, in article 6, which regulates the practice of Dentistry, the dental surgeon (DC) is legally authorized to indicate drugs for both internal and external application, for the purpose of dental treatment[6].

In dentistry, the effect of government strategies, constituting and publishing recommendations on the use of antibiotics, the consumption of antibiotics to reduce the use and the decline in antibiotic prescription[6].

The importance of DCs that prescribe antibiotics is to be aware of the essential parameters related to their use. Antimicrobials are used in several areas for the treatment and prevention of orofacial infections[6].

The oral bacterial community consists of more than 500 bacterial species have been identified, each with unique characteristics, saliva contains between 10^8 and 10^9 microorganisms per ml, and biofilm can harbor about 100 billion microorganisms in the gingival sulcus. Biofilm is a complex bacterial community that is highly resistant to antibiotics and human immunity. They are the causative agents of biological developments, such as dental caries, periodontitis, and peri-implantitis[7].

Biofilms are generally densely packed into microcolonies and protected in a matrix of biopolymers resistant to conventional antibiotics compared to planktonic biopolymers, with about 80% of all microbial infections in humans being a direct result of biofilms[8].

The use of antibiotics in dentistry is recommended in the type of treatment where the patient's immune system is not able to control the infectious process[9].

Antibiotic prophylaxis serves as a prevention and emergence of infections by the route of entry provided by the therapeutic action, therefore, it is indicated whenever there is a considerable risk of infection, either due to the characteristics of the operation itself or due to the local or general condition of the patient used to avoid infective endocarditis, dental implant failure and in some other clinical situations that have consequences for the patient himself and for the patient. general population reduced effectiveness, increased risk of adverse effects, and cost of therapy[11].

The European Society of Endodontics has described when to use antibiotics in the treatment of endodontic infections in traumatic tooth injuries, revascularization procedures in immature teeth with pulp necrosis, and in prophylaxis for clinically compromised patients. It also highlights the role that dentists and others can play in preventing antibiotic overuse[12].

In periodontal diseases, systemic antibiotics are an effective complement in the treatment of periodontitis, but their judicious use is necessary, as antimicrobial resistance is a growing global concern. Current understanding and insight related to antibiotic resistance in the subgingival microbiota of patients with periodontitis[13].

The use of antibiotics as an adjuvant in periodontal therapy results in statistically significant benefits in clinical outcomes, combining amoxicillin plus metronidazole[14].

However, global concerns regarding the overuse of antibiotics and the development of antibiotic resistance should be considered[15].

The European Association of Osseointegration has revealed a high rate of antibiotic prescribing in implant dentistry, despite awareness of antibiotic resistance. In the treatment of peri-implantitis, more than half reported the use of systemic antibiotics[16].

The effect of antibiotic prophylaxis on the prevention of postoperative infections after extraction of impacted mandibular third molars with the use of 2g of amoxicillin 1 hour before surgery was not effective in significantly reducing the risk of postoperative infections from mandibular third molar extractions, when compared to placebo[17].

Most orofacial infections are of odontogenic origin, in pediatric dentistry in case of pulpitis, treatment with antibiotics is generally not indicated if the infection affects only the pulp tissue or the tissues immediately adjacent. In the case of tooth avulsion, the local application of antibiotics is advisable, in addition to the supply of systemic antibiotics. The dental professional must know the severity of the infection and the general condition of the child in order to decide whether to refer the child to a medical center[18].

Antibiotics are prescribed in orthognathic surgery reducing the risk of postoperative infection. However, there is a lack of consensus on the appropriate drug, dose, and duration of administration. Thus, scientific uncertainty remains regarding the preferred antibiotic and the optimal duration of administration[19].

Prophylaxis for infective endocarditis in dental procedures is acceptable only for patients with cardiac conditions with a higher risk of adverse outcomes, dental procedures that involve manipulation of gingival tissue or the periapical region of the teeth or perforation of the oral mucosa[20].

Prophylactic antibiotic therapy is indicated in patients with cardiovascular problems, cardiac or joint prosthesis, streptococcal nephritis, and immunocompromised patients21.

However, antibiotic prophylaxis has been associated with a reduction in the risk of infective endocarditis after invasive dental procedures in high-risk individuals, while it has no proven association for those at low risk, thus supporting the current recommendations of the American Heart Association and the European Society of Cardiology. At present, there are insufficient data to support any benefit of antibiotic prophylaxis in moderate-risk individuals[22].

Maxillofacial surgery is a clean-contaminated surgery as there is no inflammation and contamination, but the risk of infection due to bacteria normally present in these tissues must be considered. Consequently, transoperative antibiotic prophylaxis has real efficacy in

preventing transient bacteremia, the category of clinically compromised patients (TABLE 1) includes histories related to medical risks[23].

TABLE 1
Categories of patients for whom antibiotic prophylaxis is recommended.
Patients at high risk of infective endocarditis
Immunocompromised patients with leukopenia <3,500 u/mm ^{3} or serum immunoglobulin levels <2 g/L
ASA patients 3,4,5
Patients undergoing high doses of irradiation to the jaws or the administration of amino-bisphosphonates/denosumab
Patients with joint prosthesis at high risk of adverse outcomes
Patients undergoing prolonged and extensive surgical interventions
Patients undergoing surgery at infected sites
Patients undergoing device and/or biomaterial insertion
Abbreviations: American Society of Anesthesiology (ASA)

Surgical therapy with antibiotics is recommended only in cases of immunosuppression, such as uncontrolled diabetes, infection due to poorly sterilized equipment, or when the patient demonstrates poor adherence to postoperative care[24].

DISCUSSION

The World Health Organization has listed this problem as one of the ten greatest threats to global health, the main reason is attributed to the excessive and misuse of antibiotics in human medicine, as well as in disease control in animal production and aquaculture systems[2].

Dentistry plays an important role in managing the problem of antibiotic resistance, clinical decisions about the use of antibiotics must be made based on scientific evidence, with knowledge of the most current guidelines and indications[12,16].

The oral bacterial community consists of more than 500 bacterial species that have been identified, the increased proliferation of antimicrobial resistance, the modern topography of the implant surface, and indiscriminate empirical antibiotic regimens can promote the escalation of periodontal and peri-implant diseases, and their adjuvant use in treatment[is 7,13,14,17.]

Adjuvant antibiotic treatment may be necessary to prevent the spread of infection, in acute apical abscesses with systemic involvement, and in progressive and persistent infections, greater errors in antibiotic prescribing occurred among general practitioners[12,18].

Surgical site infections including: treatment of dental abscesses, extractions, implants, trauma, temporomandibular joints, orthognathic, removal of malignant and benign tumors, and bone grafting are a complication of oral and maxillofacial procedures, with the potential for significant morbidity and mortality. The use of preoperative, transoperative, and

postoperative antibiotic prophylaxis to reduce the incidence of surgical site infections should be balanced with considerations about the risk of antibiotic-related adverse events for patients[15,16,17,23].

Antibiotics are recommended only in cases of high-risk individuals, immunosuppression, such as uncontrolled diabetes, infection due to poorly sterilized equipment, or when the patient demonstrates poor adherence to postoperative care22,24

Antibiotic prophylaxis in conjunction with implant placement is likely to have little benefit and should therefore be avoided in most cases, especially due to the uninterrupted growth of antibiotic-resistant bacteria[29].

CONCLUSION

The increase in antibiotic resistance represents a significant threat to public health worldwide, generating governmental concern about antibiotic resistance, it is worth mentioning that the knowledge of DCs about antibiotics is necessary for their prescription, knowing that in the practice of periodontal, peri-implant, endodontic diseases such as pulpitis the antibiotic is adjuvant to the treatment and the effect of antibiotic prophylaxis in the prevention of postoperative infections extractions use of antibiotics only when indicated and necessary.

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