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ANTIBIOTICS AND ANTI-INFLAMMATORIES IN DENTISTRY

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Abstract: Antibiotics and anti-inflammatories have their ways of reacting in the body and they are grouped together. Therefore, each drug has a different interaction in the body and it is important to know which ones to medicate in dentistry. Thus, this work aims to discuss which drugs can and cannot be used in dentistry. Thus, this article was prepared through literature reviews in Spanish and English, also by magazines, books with known bibliography. These searches were carried out in Scielo, Google Academico databases, in websites with publications. This way, it was verified with the researched articles that each drug has an intervention in the body in a different way, so it is necessary that the dental surgeon has knowledge to administer and prescribe medications in dentistry for the use of prevention or cure. Thus, it is extremely important to know the functions, interventions, action mechanisms of each drug group to prescribe correctly.
Keywords: Medicines; antibiotics; anti-inflammatories.

INTRODUCTION

The oral cavity is a favorable place for the growth of microorganisms with hundreds of bacterial species already identified with distinct morphological and biochemical characteristics (JORGE, 2007). The growth and metabolism of the microbiome are caused by several factors, such as diet, microenvironment, anatomy, presence of diseases and activities of the immune system (SAMARANAYAKE, 2012). These colonies of bacteria hosted in the oral cavity may lead to an infection. These infections are treated with antibiotics, chemical substances, obtained from live microorganisms or from semi-synthetic processes, which have the property of inhibiting the growth of pathogenic microorganisms or destroying them (ARANEGA et al., 2004).

In dentistry, antibiotics are used to prevent infections in surgeries, or to treat oral infections of different types, odontogenic and non-odontogenic, thus making the dentist responsible for having extensive knowledge about the drug to be used and its correct dosage, time administration, mechanism of action, indication and side effects (PEDROSO, 2012).

On the other hand, it is important to point out that the infectious process is quite different from the inflammatory process and, therefore, they are not synonymous. Inflammation is triggered by the release of chemical mediators originating in migrating cells and injured tissues, it can be a protective and normal response when caused by microbiological agents, chemical substances or physical trauma and can be beneficial. However, inflammation can also be improperly provoked by an innocuous agent or by an autoimmune disease, as in rheumatoid arthritis, being harmful or deleterious (POFFO, 2017).

Therefore, this article aims to present the groups of antibiotics and anti-inflammatory drugs, how they are grouped, their use in dentistry, as well as some drug interactions between them.

LITERATURE REVIEW

Antibiotics have different criteria regarding their classification, the most prominent being: biological action, according to this mode, they are bactericidal and capable of determining the death of sensitive microorganisms, or bacteriostatic when they inhibit the growth and proliferation of sensitive organisms without destroying them. them; its spectrum of action, narrow, broad and widened; and mechanisms of action (ANDRADE et.al., 2013).

DENTAL ANTIBIOTICS

Beta-lactams: the ß-lactams have in common in their structural nucleus the ß-lactam ring, which exerts bactericidal action. Its mechanism of action is related to its ability to interfere with peptidoglycan synthesis (responsible for the integrity of the bacterial wall). For this to occur, bacteria must be penetrated through the porins present in the outer membrane of the bacterial cell wall; must not be destroyed by ß-lactamases synthesized by bacteria; must bind to and inhibit the penicillin-binding proteins (PLP) responsible for the final step of bacterial wall synthesis.

ELEMENTS THAT BELONG TO THIS GROUP

Penicillins discovered in 1928 by Fleming, they remain to this day as an excellent class of antimicrobials and are divided into benzylpenicillins, aminopenicillins, penicillinase-resistant penicillins and broad-spectrum penicillins (RANGE; DALE, 2012).

Virtually all infections of odontogenic origin can be effectively treated with one of the penicillins. In infections resulting from pulp necrosis, the drug to be chosen first in these infections is penicillin V, traditionally, the antibiotic most frequently prescribed in the chemotherapy of infections of odontogenic origin. Penicillin G is largely reserved for serious infections (DUARTE et.al. 2003).

Benzylpenicillins

These two drugs can be administered orally, as they are not inactivated by gastric juice. They are used in dentistry to prevent bacteremia associated with procedures such as tooth extractions, in patients at risk of developing bacterial endocarditis, and are contraindicated for patients with hypersensitivity to penicillin and cephalosporin. Amoxicillin is well tolerated by the body and the appearance of adverse reactions such as gastrointestinal disorders: nausea, vomiting and diarrhea is common (DUARTE et.al. 2003).

PENICILLINASE RESISTANT PENICILLINS

Oxacillin: Available for intravenous use only. It has hepatic metabolism, renal excretion. It reaches satisfactory CSF concentrations when in the presence of inflammatory processes (ANVISA, accessed on: 19 Oct. 2019a).

BROAD SPECTRUM PENICILLINS

Amoxicillin - clavulanic acid: Both amoxicillin and clavulanic acid are rapidly absorbed from the digestive tract. It has a half-life of approximately one hour. Low protein binding (18 and 25%), with rapid penetration into most tissues and extravascular fluids, including pleural, peritoneal and pulmonary secretions (ANVISA, accessed on: 19 Oct. 2019b).

Cephalosporin: It has in common, in its chemical structure, 7-aminocephalosporinic acid (7-ACA) as its molecular nucleus. Therefore, they are bactericidal, with a slightly wider spectrum of action compared to penicillins. They are less sensitive to the action of beta-lactamases.

Cephalosporins are classified according to their chronological order of production (first, second, third and fourth generations) and also based on the spectrum of activity against gram-negative bacilli, which increases from the first to the fourth generation.

1st generation: cefadroxil, cephalexin, cephalothin, cefazolin.

2nd generation: cefaclor, cefuroxime, cefoxitin.

3rd generation: ceftriaxone, ceftazidime.

4th generation: cefepime, cefpirome.

Macrolides: Drugs of this group have in common a lactone ring of 15 atoms

in their molecular structure. They have excellent absorption and bioavailability when administered orally. They are distributed to most tissues, with peak plasma concentrations being reached 2-3 h after taking the drug. They are excreted through urine and bile. Macrolides have a spectrum of action similar to that of penicillins. The production of beta-lactamases has no effect on the antibacterial activity of azithromycin. They are bacteriostatic.

ELEMENTS THAT BELONG TO THIS GROUP

Erythromycin: It has a broad spectrum of action that includes gram-positive bacteria, as well as treponemas, mycoplasma and chlamydiae. The use of erythromycin in the treatment of odontogenic infections is the second most frequent, after penicillin derivatives, being reserved as an alternative for patients allergic to penicillin in infections of small or medium severity. It is effective against gram negative and aerobic microorganisms. This drug has limited application in periodontics because its level in the sulcular fluid is insufficient to inhibit most periodontal pathogens. Erythromycin is a remarkably safe antibiotic that produces a relatively small number of adverse effects, the most commonly encountered problems are: gastrointestinal disorders, cholestatic jaundice as a sign of liver toxicity; and adverse effects in the pregnant patient. Erythromycin potentiates the effects of several drugs including oral coagulants, such as vaferine.

Azithromycin: Its structure differs from erythromycin because the lactone ring contains a nitrogen atom. This rearrangement increased the drug's spectrum of activity, ensured a sustained tissue level, higher than the serum level, and provided a prolonged tissue half-life that allows for dose reduction during treatment. Azithromycin differs from erythromycin and clarithromycin in having greater activity against gram-negative bacteria, in particular H influenzae. However, most Enterobacteriaceae are intrinsically resistant because they cannot penetrate the outer membrane effectively.

Clarithromycin: Highly active against gram-positive bacteria, being 2 to 4 times more active than erythromycin against most oxacillin-sensitive streptococci and staphylococci. The activity of clarithromycin against gram-negative bacteria is similar to that of erythromycin, although slightly more active against M. catarrhalis. Activity against anaerobes is modest, similar to erythromycin.

Clindamycin: It belongs to the family of lincosamines, chemically derived from lincomycin (a standard substance of the group, but which has no indication for dental use). Clindamycin is very well absorbed orally and easily crosses tissue barriers, with the ability to penetrate macrophages and polymorphonuclear leukocytes, which explains its high concentration in abscesses. It is biotransformed by the liver and excreted in the bile. For this reason, the risk/benefit ratio of its use must be carefully evaluated in patients with alterations in liver and biliary function. It is bacteriostatic and its spectrum of action is similar to that of penicillins, with the difference that it affects Staphylococcus aureus and other penicillinase-producing bacteria.

Tetracycline: Of interest to the dental clinic, only doxycycline and minocycline have excellent oral absorption. Its spectrum of action is broader than that of penicillins and macrolides. They are bacteriostatic. Its widespread and frequent use has resulted in the emergence of several bacterial strains resistant to this drug, reducing its clinical utility.

The therapeutic use of this antibiotic in dentistry is limited in the treatment of acute

orodental infections; being more used in certain types of periodontal disease, such as localized juvenile periodontitis. However, the drug is only an adjunct in the treatment, since the periradicular mechanical instrumentation is essential to obtain the success of the treatment.

The most common adverse effects are: gastrointestinal irritation, prolongation of clotting time, as the drug acts on the microorganism that synthesize vitamin K; in a pregnant patient, it can affect the fetus in bone growth, cause dental pigmentation and promote enamel hypoplasia. It is important to note that this drug cannot be administered concomitantly with other antibiotics and oral contraceptives, as there will be pharmacological interactions.

Metronidazole: Metronidazole is a synthetic compound, derived from nitroimidazole. It is very well absorbed orally, crossing tissue barriers quickly and in high concentrations, being distributed in saliva and gingival sulcus fluid. After hepatic metabolism, it is eliminated via the kidneys. It is bactericidal and its spectrum of action reaches practically all gram-negative anaerobic bacilli. It does not act against aerobic and microaerophilic bacteria.

Quinolones: Quinolones are generally indicated for the treatment of urinary tract infections and some respiratory conditions. Of this group of antibiotics, the most cited for dental use are ciprofloxacin and levofloxacin.

Its mechanism of action inhibits the activity of DNA gyrase or topoisomerase II, an enzyme essential for bacterial survival. DNA gyrase makes the DNA molecule compact and biologically active. By inhibiting this enzyme, the DNA molecule starts to occupy a large space inside the bacterium and its free ends determine uncontrolled synthesis of messenger RNA and proteins, determining the death of the bacteria.

However, studies on the effectiveness of quinolones in the treatment of oral bacterial infections are still conflicting and the indication of these compounds seems to lack scientific support (ANVISA, accessed on: 19 Oct. 2019c).

Treatment of infections: Acute oral bacterial infections have a very rapid course and relatively short duration (2-7 days), particularly when the focus of infection is eliminated. However, some oral bacterial infections can last longer, becoming chronic, due to the difficulty of accessing infectious sites, as is the case of certain periodontal diseases or infections of endodontic origin.

Therefore, it is extremely important that the dentist knows how to make the right choice of treatment with antibiotics. The success of the treatment is essentially determined by the effectiveness of the antibiotic against the microorganisms responsible for the infection and by its pharmacokinetic parameters

DENTAL ANTI-INFLAMMATORIES

The inflammatory process is involved in different pathologies, such as bruises, tendinitis, respiratory infections, asthma and autoimmune diseases. It manifests itself as a defense apparatus of the organism, whose purpose is to eradicate the initial cause of cell injury, instigated by pathogens or by the action of physical agents. The inflamed region, in macroscopic properties, presents remarkable peculiarities. The affected area becomes red, swollen, hot and painful, with interference or alteration of its function. The result of the inflammatory process can be healing or chronic inflammation - if the response is not satisfactory, the pathogen or harmful substance persists and the process evolves.

Drugs for clinical use: Anti-inflammatory drugs are capable of interceding in the reactional action of the body's defense,

reducing damage and providing greater comfort to the patient. Currently, the main anti-inflammatory agents are represented by glucocorticoids and non-steroidal anti-inflammatory drugs. (AINEs).

Glucocorticoids: The anti-inflammatory manifestation of glucocorticoids is generally due to the inhibition of the transcription of the cyclooxygenase-2 enzyme gene and to the induction of the lipocortin protein, which inhibits the phospholipase A2 enzyme. Furthermore, they decimate the synthesis of proinflammatory cytokines, as well as TNF-α and IL-1.8. They are widely used in the treatment of autoimmune diseases and in the prevention and/or treatment of transplant rejection. As examples of glucocorticoids, hydrocortisone and dexamethasone can be mentioned. However, the toxicity combined with chronic therapy with glucocorticoids limits their use.

USE OF GLUCOCORTICOIDS IN THE DENTAL CLINIC:

Glucocorticoids are indicated to prevent hyperalgesia and control inflammatory edema, due to elective dental interventions, such as tooth extraction, periodontal surgery, placement of multiple implants, bone grafts, etc. For this purpose, dexamethasone or betamethasone are the drugs adopted, due to their greater anti-inflammatory potency and duration of action, which often grants their use in a single dose or for a very limited time (VIEIRA; DINIZ; CECCON, 2010).

HOW ANTI-INFLAMMATORIES ARE GROUPED

Anti-inflammatory drugs are classified into COX inhibitor drugs, phospholipase A2 enzyme inhibitor drugs, drugs that directly depress the nociceptor, and centrally acting drugs. These are specific drugs indicated to promote modulation of pain and the inflammatory process, grouped and delimited into classes. The conception of anti-inflammatory drugs is related to drugs that cure any type of illness without causing harmful effects (SAMARANAYAKE, 2010).

NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS) OR NONSTEROIDAL ANTI-INFLAMMATORY DRUGS

NSAIDs refer to groups of drugs that are chemically expressed differently, even differing in their antipyretic, analgesic and anti-inflammatory functions, inhibiting the enzymes of the cyclooxygenase pathway, being, therefore, exceptional drugs to treat the undesirable effects caused by the inflammatory response. These anti-inflammatories are used in various forms of inflammation, whether traumatic or caused by different pathologies (BATLOUNI, 2010).

MECHANISM AND EFFECTS OF NSAIDS

Non-steroidal anti-inflammatory drugs (NSAIDs) are used in inflammatory processes to treat causes such as pain and swelling. Thus, NSAIDs bind to enzymes and inhibit their function by inhibiting high prostaglandin production. This way, inappropriate or exaggerated use can have drastic consequences for the patient and even death. This way, NSAIDs have the mechanism of inhibiting cyclooxygenase and the excess of this inhibition can cause trauma to the tissues, including gastrointestinal irritation, platelet disorders and kidney dysfunction. Emphasizing that there is cox1 and it is related to the physiological one, which is present in almost all tissues and has a prostaglandin production function. Cox 2 is related to the pathological and is at the site of inflammation. In this sense, when using anti-inflammatory drugs, you are stimulating the cox 2.

Prostaglandins are modified fatty acids, have hormonal activity, regulate inflammatory processes. Thus, at the time of cox 2 activation, vasodilation will occur, thus activating leukocytes, which are the defense cells to fight invaders in the inflamed tissue. Thus, several types of medication used in dentistry to treat injuries or to prevent them, among them is AAS, which has analgesic and antipyretic action, however, its use in an unbalanced way can cause rey's syndrome. In addition, paracetamol acts as an analgesic and antipyretic and is extremely prescribed for pregnant women because it has fewer effects. Dipyrone also has action on antipyretic and analgesic, but the professional must be aware of Stevem Jonshom syndrome, also, he must be alert with thrombocytopenia and leukopenia. Ibuprofen/cytoprofen has analgesic, antipyretic and anti-inflammatory properties. Finally, one of the best known is also diclofenac, which has an anti-inflammatory function. Thus, here are the majority of the drugs prescribed in dentistry for children, adults, the elderly and people with special needs. Therefore, the high knowledge of the dentist is necessary to know how to successfully execute the drugs (COLMENARES et.al. 2014).

MATERIALS AND METHODS

The research to elaborate this work was carried out through bibliographic reviews in national and international articles, obtained from the scielo databases, academic Google, magazines and books. Therefore, in order to carry out an analysis of how antibiotics and anti-inflammatories are grouped and their use in dentistry, which groups of people can enjoy and the drug interaction.

DISCUSSION

CONTRAINDICATION OF ANTIBIOTICS AND ANTI-INFLAMMATORIES.

Antibiotics are used during pregnancy only when the benefits of treatment outweigh. Some antibiotics are safer than others. Penicillins, cephalosporins, and erythromycin are among the safest antibiotics to use during pregnancy. Tetracyclines are used during pregnancy. Most antibiotics pass into breast milk in amounts sufficient to affect the nursing baby and sometimes cannot be used in women who are breastfeeding. Sometimes it is necessary to decide whether to stop breastfeeding or not to use the drug.

If an infection develops during pregnancy or breastfeeding, women must talk to their doctor about the benefits and risks of treatment.

Anti-inflammatories must be used with great care in elderly people (ELDERLY) and individuals with allergies to NSAIDs. Therefore, people who have had an episode of asthma, angioedema, urticaria or rhinitis due to the use of these drugs must no longer take them.

Individuals who have a history of ulcers or gastrointestinal bleeding must be aware of the science before taking medication. So, like patients with hypertension problems and other blood pressure related problems.

The use must be controlled during pregnancy and lactation, and a specialist must be consulted before using the medication.

In addition, it is contraindicated for people such as:

-People with kidney failure;
-People with heart failure;
-People with cirrhosis;
-People who consume a lot of alcohol.
-People treated with warfarin;
- People at high risk of bleeding.

FINAL CONSIDERATIONS

In view of the work, it is clear that all the pharmacodynamics and pharmacokinetics of antibiotics and anti-inflammatories that are administered in dentistry were discussed. Thus, NSAIDs (Non-Steroidal Anti-Inflammatory Drugs) as they are reversible or irreversible antagonists act directly and indirectly on the human body, so it is of paramount importance that the dental professional is aware and with loads of knowledge to seek to intervene with medications. in the action of inflammation and in the prevention of some disease. This way, it explains all the mechanisms of action of each drug group, also highlighting the particularities of antibiotics and anti-inflammatory drugs in the article. This way, it is clear that the dentist needs to know all the groups of drugs to administer them wisely in dentistry, as it is necessary to medicate with these antibiotics and anti-inflammatories in various causes.

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