



Is Amoxicillin the Drug of Choice in Dentoalveolar Abscess - A Hospital based study

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ABSTRACT

The aim of the study was to identify if amoxicillin is the drug of choice for dentoalveolar abscess. The retrospective evaluation was conducted using data provided by a private hospital. 86000 patients had reported to the outpatient department, a private hospital between June 2019 and March 2020, and the data was collected and analyzed. Patients diagnosed with dentoalveolar abscess were selected for the study. The antibiotic prescribed for treatment was recorded. A retrospective analysis was done based on the collected data. The retrospective study consisted of 27 subjects infected with Dentoalveolar Abscess. In this study we observed that 100% of the patients affected with dentoalveolar abscess were prescribed Amoxicillin and the most affected individuals among the study population belonged to the young adult population (age group 18-35 years) [51.85%], followed by patients aged 36-55 years [33.33%] and least affected belonging to age group 56-75 years [14.81%]. Around 74.07% of the population were prescribed Amoxicillin alone, 18.51% have prescribed a combination of Amoxicillin and Metronidazole, followed by 7.4% of the study population were prescribed the combination of Amoxicillin and Clavulanic acid. Within the limits of this study, we find that the drug prescribed for Dentoalveolar abscess in a private dental hospital is predominantly Amoxicillin. Hence, we conclude that amoxicillin is the drug of choice for dentoalveolar abscesses.



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INTRODUCTION

The dentoalveolar abscess is infections of dental origin, the majority with an endodontic or a periodontal pocket origin. It is treated predominantly by extraction of the involved tooth. Ideal tooth extraction is defined as painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues so that the wound heals uneventfully (Kumar, 2017a; Abhinav *et al.*, 2019). Management of post-extraction pain and suffering leads to earlier mobilization, shortened hospital stay, reduced hospital costs and increased patient satisfaction (Rao and Kumar, 2018; Christabel *et al.*,

2016).

An antibiotic plays a major role in limiting the spread of infection. It is found that variety of dosage, frequency, and duration for antibiotics used in the treatment of dental infection. A dentoalveolar abscess is an abscess around the root of a tooth in the alveolar cavity. It is usually the result of necrosis and infection of dental pulp following dental caries. The formation and accumulation of pus in a tooth socket or the jawbone form around the apex of a tooth (Dhanvanth *et al.*, 2018; Jesudasan *et al.*, 2015). The acute dentoalveolar abscess is frequently underestimated in terms of its morbidity and mortality. The acute dentoalveolar abscess usually occurs secondary to dental caries, trauma or failed root treatment. After the intact pulp chamber is breached, colonization of the root canals occurs with a diverse mixture of anaerobic bacteria. The walls of the necrotic root canals become colonized by a specialized mixed anaerobic biofilm (de Paz, 2007; Kumar and Skena, 2016).

The main signs and symptoms of the acute dental abscess (often referred to as a periapical abscess or infection) are pain, swelling, erythema and supuration usually localized to the affected tooth, although the abscess can frequently spread causing a spreading odontogenic infection which can be accompanied by sepsis syndrome. The dentoalveolar abscess is polymicrobial comprising various facultative anaerobes, such as the viridans group streptococci and the Streptococcus anginosus group, and strict anaerobes, especially anaerobic cocci, Prevotella and Fusobacterium species. The presence of anaerobes both cultivable and uncultivable tends to predominate. The vast majority of dental abscesses respond to surgical treatment, such as drainage of pus and elimination of the source of infection, with antibiotic use limited to severe spreading infections (Robertson and Smith, 2009).

The word "antibiotic" was derived from "antibiosis." Penicillin was the first antibiotic accidentally discovered by Alexander Fleming, who obtained the antibiotic from the fungus *Penicillium notatum* (Srinath *et al.*, 2019). During most dental therapeutic procedures, blood and saliva are often involved, which may contain infectious pathogens and microorganisms (Rahman and Kumar, 2017). Antibiotics are chemical substances that are capable of destroying and inhibiting the growth of specific microorganisms, such as infectious bacteria and fungi. There are different antibiotics, which are broadly classified based on their mechanism of action (i.e. if on the cell membrane, cell wall, or metabolism), chemical structure, the spectrum of activity (i.e. if target-

ing gram-negative or gram-positive bacteria), or by mode of administration (e.g. oral, intravenous, or topical) (Tripathi, 2008).

In dentistry, limited indications are available for the use of systemic antibiotics. Most of the oral conditions are mainly inflammatory associated with pain due to infection originating from dental pulp. This requires operative intervention rather than antibiotics (Dar-Odeh *et al.*, 2010; Patturaja and Pradeep, 2016). Dentists are highly knowledgeable regarding oral and facial anatomy, which seems reasonable for them to be at the forefront in providing these services, understanding limitations of treatment and having the ability to recognize and manage complications (Kumar, 2017b; Patil *et al.*, 2017).

The problem of resistance development in recent years might be due to dentist practice toward the prescription of broad-spectrum regimen instead into selective antibiotics even though the orofacial infections can be effectively managed through operative intervention and oral hygiene measures, antibiotic prescription practices for the treatment of several orofacial infections (Kumar and Rahman, 2017). There is no consensus over standard gold treatment as evidenced by the wide variety in endodontic and surgical protocols and antibiotic prescribing (Kuriyama *et al.*, 2000; Kumar, 2017a,b).

Not treated in the early stage, these abscesses spread through anatomic structures resulting in septicemia, cavernous sinus thrombosis, brain abscess, shock and ultimately death (Packiri and Gurunathan, 2017). Dentists are modern medicine practitioners. But, very limited studies have been conducted on the drug utilization pattern by dentists (Datta and Datta, 2015; Marimuthu *et al.*, 2018).

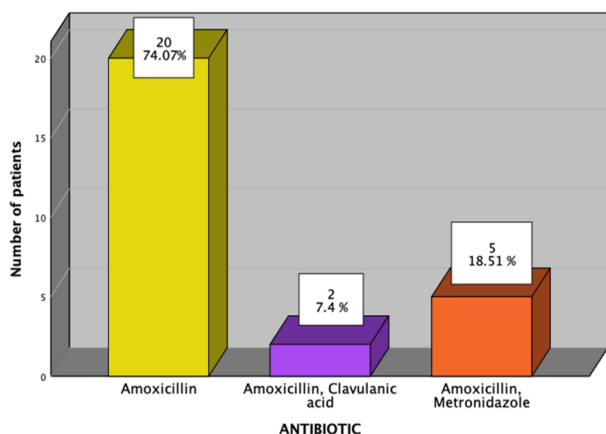
The institution has performed a number of research in in-vitro (Rahman and Kumar, 2017; Rao and Kumar, 2018) and in-vivo settings (Sweta *et al.*, 2019). Inspired by the large patient record with appropriate documentation, a retrospective analysis was planned. Thus, the aim of the study to find if amoxicillin is the drug of choice for a dentoalveolar abscess is amoxicillin.

MATERIALS AND METHODS

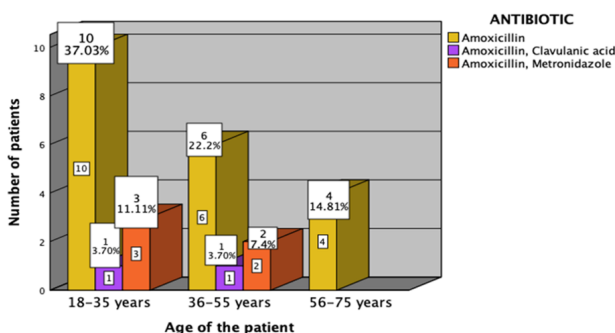
The retrospective evaluation was conducted using data provided by a private hospital. 86000 patients had reported to the outpatient department, a private hospital between June 2019 and March 2020. The data was collected and analyzed. All patients diagnosed with dental alveolar abscess were included in the study and the antibiotics prescribed by the

dentist was recorded. To minimize sampling bias, the inclusion of all available Data with the exclusion of incomplete data was done. The internal and external validity of data is present. The data was entered in a methodical manner [serial number, name, age, gender, tooth number. The data were entered into Microsoft Excel and tabulated. Following which data was imported into the SPSS software by IBM. The data validation was reviewed by the reviewer who was involved in the study and all possibility of bias was excluded from the study. Data analysis was performed in the statistical software SPSS and data were analyzed by descriptive analysis and chi-square tests.

RESULTS AND DISCUSSION

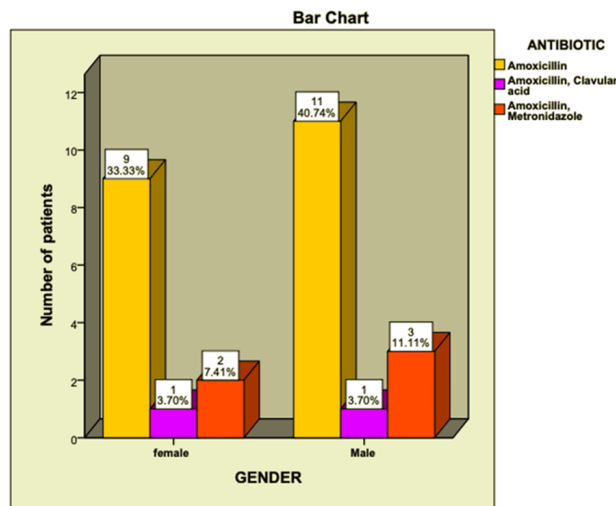


Graph 1: Bar graph showing the comparison of antibiotic combinations prescribed among patients with Dentoalveolar abscess



Graph 2: Bar graph showing the association between age of the patient and the antibiotic prescribed to the patient.

The study consisted of 27 subjects infected with Dentoalveolar Abscess. In this study we observed that 100% of the patients affected with dentoalveolar abscess were prescribed Amoxicillin and the most affected individuals among the study population belonged to the young adult population (age



Graph 3: Bar graph showing the association between the gender of the patient and the antibiotic prescribed to the patient

group 18-35 years) [51.85%], followed by patients aged 36-55 years [33.33%] and least affected belonging to age group 56-75 years [14.81%] (Graph 2). Around 74.07% of the population were prescribed Amoxicillin alone, 18.5% have prescribed a combination of Amoxicillin and Metronidazole, followed by 7.4% of the study population were prescribed the combination of Amoxicillin and Clavulanic acid (Graph 1). The most affected individuals among the study population belonged to the male population. Amoxicillin alone was prescribed more among the males (40.74%), compared to females (33.33%) (Graph 3).

In this study, we observed that 100% of the patients affected with dentoalveolar abscess were prescribed Amoxicillin. Amoxicillin is found to be the most preferred antibiotic in dentoalveolar abscess for patients without any known allergy. The amoxicillin was most prescribed among the age group 18 to 35 years affected by dentoalveolar abscess. This is in agreement to the study by Palmer et al. who stated that the antibiotics most commonly prescribed in the management of acute dentoalveolar abscesses in the UK are amoxicillin, penicillin, metronidazole and erythromycin (Palmer et al., 2000).

According to a study by Mokhbat et al., acute or chronic dentoalveolar abscess, the mainly prescribed antibiotic was amoxicillin (Asmar et al., 2018). Amoxicillin is the treatment of choice for odontogenic infection considered as the appropriate treatment option (Tancawan et al., 2015). Amoxicillin produces similar good results for dental abscess (Gilmore et al., 1988). Amoxicillin /clavulanic acid for the treatment of odontogenic infec-

tions: a randomised study by Tancawan et al. (Tancawan et al., 2015). According to a study by George et al., Amoxicillin was found to be the most commonly prescribed antibiotic by the students, followed by metronidazole (George et al., 2016).

Antibiotic resistance in microbes recovered from the acute dental abscess has been reported to be increasing (with the exception of metronidazole) in some populations studied over the last few decades (Kuriyama et al., 2000). Incidence of recurrence is high in certain types of management (Packiri and Gurunathan, 2017). Compared with other parts of the world, dental practitioners in England and Australia also prescribe amoxicillin, but there was a trend toward a lesser dosage over a longer duration (Palmer et al., 2000). If local patterns of antimicrobial resistance indicate a high prevalence of resistance to amoxicillin then the use of either metronidazole (Roche, 1997) or amoxicillin in combination with clavulanic acid (Lewis et al., 1993) should be considered as alternatives. Clindamycin remains an alternative in individuals who are allergic to the penicillin group of antibiotics (Lewis et al., 1993). General hypersensitivity reactions (e.g. rashes) to penicillin occur in between 1 and 10% of exposed patients, but true anaphylactic reactions (which can be fatal) occur in less than 0.05% of treated patients. Tetracyclines (e.g. doxycycline), quinolones (e.g. ciprofloxacin), macrolides (e.g. clarithromycin), aminoglycosides (e.g. gentamicin) and glycopeptides (e.g. vancomycin) are all unrelated to penicillins and are safe to use in the penicillin-allergic patient (Pegler and Healy, 2007). According to Dr Sudharsana Anandakumar and Dr R. Sankari, there is a need for educational programs targeting antibiotic use and its protocol among dental students even though there is clarity about drugs and their indication. There is a lack of awareness about their protocol among dental practitioners (Anandakumar and Sankari, 2018). Recommendation of antibiotics by dentists can be improved by increasing awareness among dental practitioners of the recommended guidelines (Lokhasudhan and Nasim, 2017). Knowledge of dental students about the newest guidelines for antibiotic prophylaxis for high-risk patients in dentistry and the correct application of these guidelines in different aspects are very important for a safe dental practice (Kumar and Skena, 2016). Creating awareness among dentists is of utmost importance and educational initiatives to promote rational use of antibiotics in dentistry can be organised at the local, national and at international level.

CONCLUSION

Within the limits of this study, we find that the drug prescribed for Dentoalveolar abscess in a private dental hospital is predominantly Amoxicillin. However, more clinical trials are required with sufficient size and scientific rigour to answer the question about the ideal treatment of the acute dentoalveolar abscess. Nonetheless, there are a number of recommendations which can be suggested based on the current evidence. Antibiotics should only be prescribed in patients exhibiting signs of local spread or systemic involvement, but amoxicillin remains the antimicrobial of the first choice. Hence, we conclude that amoxicillin is the drug of choice for dentoalveolar abscesses.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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