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Expert opinion on the use of amoxicillin and clavulanic acid for the management of dental infections in Indian settings

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ABSTRACT:
Objective: The current survey-based study was intended to gather expert opinions regarding the clinical use of anti-infectives with a special focus on amoxicillin + clavulanic acid for the management of dental-related problems in Indian settings.**Methodology:** The questionnaire-based survey involving 25 questions collected perspectives of experts across India regarding the prescription practice of anti-infectives for various dental infections.
Results: According to the expert opinions provided by 175 clinicians, around 53% and 33% of respondents identified poor oral hygiene and a diet high in sugar as the root causes of dental-related infections. Additionally, 65% of experts stated that anaerobic Streptococci spp. were the most often pathogenic microorganisms responsible for tooth infections. Regarding therapeutic options, 35% and 32% of respondents cited antibiotics as the initial treatment for dental caries and root canal therapy, respectively. In comparison to other anti-infectives like cefixime + clavulanic acid, doxycycline, and others, the majority of specialists (94.28%) preferred prescribing amoxicillin + clavulanic acid. For the treatment of dental infections, the experts (75.42%) preferred using a 625 mg tablet containing amoxicillin + clavulanic acid combination. More than half of those surveyed (54.28%) reported that taking amoxicillin + clavulanic acid resulted in dental improvements within 5 days. However, respondents listed abdominal discomfort as the most common side effect of the amoxicillin + clavulanic acid medicine combination, followed by nausea, vomiting, and diarrhea, mentioned by 42% and 51% of respondents, respectively.
Conclusion: Experts recommended the combination of amoxicillin + clavulanic acid for the treatment of dental-related disorders among the numerous anti-infective medications. The majority of the specialists preferred a dosage of 625 mg for adults and 457 mg of dry syrup for children when using this drug combination to treat oral infections.

KEYWORDS: Amoxicillin, Clavulanic acid, Dental infections, Oral diseases, Dental caries.

I. INTRODUCTION

Oral diseases impose a significant overall health burden globally with a lifetime impact on individuals, causing pain, discomfort, disfigurement, and even death, despite being entirely preventable. According to the Global Burden of Disease 2019, untreated dental caries (tooth decay) in permanent teeth is the most prevalent illness.[1] Periodontal diseases, if left untreated, can result in gum recession, tooth loss, and even impact overall health, as studies have shown associations between periodontal diseases and certain systemic conditions like heart disease and diabetes.[2] Numerous non-communicable diseases share various modifiable risk factors with oral disorders such as sugar consumption, smoke exposure, alcohol use, poor hygiene, and their underlying social and economic conditions.[1]

It is essential to seek prompt and efficient treatment to reduce symptoms, prevent the spread of the infection, protect oral health, and maintain overall well-being. Antibiotics are commonly prescribed by dentists for therapeutic or preventive purposes for the management of oral and dental infections.[3] The amoxicillin/clavulanate combination was first introduced to the market in 1981. It is a potent antibiotic medication that combines amoxicillin, a penicillin-class antibiotic, with clavulanate, a β-lactamase inhibitor. The inclusion of clavulanate in the formulation serves as a crucial component in combating antimicrobial resistance.[4]

The polymicrobial nature of dental infections requires a comprehensive approach, and amoxicillin and clavulanic acid's broad coverage of bacterial species serves as an efficient therapeutic option.[5] The combination of amoxicillin and clavulanic acid offers an extended spectrum of activity, encompassing both aerobic and anaerobic bacteria commonly associated with dental infections. It efficiently eliminates widespread

infections like Prevotella, Fusobacterium, and Porphyromonas as well as Streptococcus species, including Streptococcus mutans and Streptococcus viridans.[5]

The antibiotic combination of amoxicillin and clavulanic acid in the dosage of 625 mg, 3 times per day, was recommended for treating surgical and oral interventions.[5] In the case of purulent ontogenic inflammations caused due to bacteria, amoxicillin with clavulanic acid and clindamycin were proven to be effective for antibacterial treatment.[6] As a result of its effectiveness, better absorption, and lower risk of adverse effects, amoxicillin is the most commonly used antibiotic in preoperative protocols, according to surveys conducted in Europe.[7] To prevent clavulanic acid-related toxicity, which includes diarrhea and gastrointestinal side effects, the amoxicillin-clavulanic acid combination was frequently used in a 7:1 ratio (875 mg amoxicillin/125 mg clavulanic acid).[8,9] Therefore, the objective of the current study was to evaluate the experts' opinion on the effectiveness of the amoxicillin and clavulanic acid combination and the preference for the dosage of 625 mg for adults with various dental ailments.

II. MATERIALS AND METHODS

We carried out a cross sectional, multiple-response questionnaire based survey among dentists specialized in managing dental infections in the major Indian cities from June 2022 to December 2022.

Questionnaire: The questionnaire booklet titled IDENTITY (Indian DENtists PerspecTives on Co-AmoxIclav in Oral care and DenTistrY) study was sent to the dentists who were interested to participate. This 20-item survey was primarily concerned with the utilization of amoxicillin + clavulanic acid as a treatment for dental infections. The study was conducted after receiving approval from Bangalore Ethics, an Independent Ethics Committee which was recognized by the Indian Regulatory Authority, Drug Controller General of India.

Participants: An invitation was sent to leading dentists in managing dental infections in the month of March 2022 for participation in this Indian survey. 175 dentists from major cities of all Indian states representing the geographical distribution shared their willingness to participate and provide necessary data. Dentists were asked to complete the questionnaire without discussing with peers. A written informed consent was obtained from each dentist's prior initiation of the study.

Statistical Methods: Descriptive statistics were utilized to analyse the data, with percentages representing categorical variables. The distribution of each variable was illustrated using both frequency and percentage distributions. Furthermore, to visually the present data, pie and bar charts were generated using Excel 2013 (version 16.0.13901.20400).

III. RESULTS

Based on the data provided by 175 experts, about 53% of respondents reported that unhygienic oral habits as the major factor affecting oral health. Approximately 33% indicated that sugar-based diet consumption is another major contributor to dental-related problems. Anaerobic Streptococci spp. was the most common pathogenic microorganism causing dental infections, as reported by 65% of experts. Besides Prophyromonas gingivalis, Prevotella spp, and Prophyromonas endodontalis were the other microorganisms responsible for dental-related infections.

More than half of the clinicians (56%) reported that nearly 25-50% of patients present with dental infections in routine clinical practice. In such patients, antibiotics were reported as the primary choice of treatment for dental caries and root canal treatment by 35% and 32% of respondents respectively. In addition to antibiotic therapy, proton pump inhibitors were preferred by 71% of responders as adjuvant therapy. However, 22% of the participants preferred non-steroidal anti-inflammatory drugs as adjuvant therapy to antibiotics.

For managing dental infections, the majority of the experts (94.28%) preferred amoxicillin + clavulanic acid medication over the other anti-infectives such as cefixime + clavulanic acid, doxycycline, and others (Figure 1). Moreover, this drug combination was preferred in tablet form by 95.42% of the respondents (Table 1).

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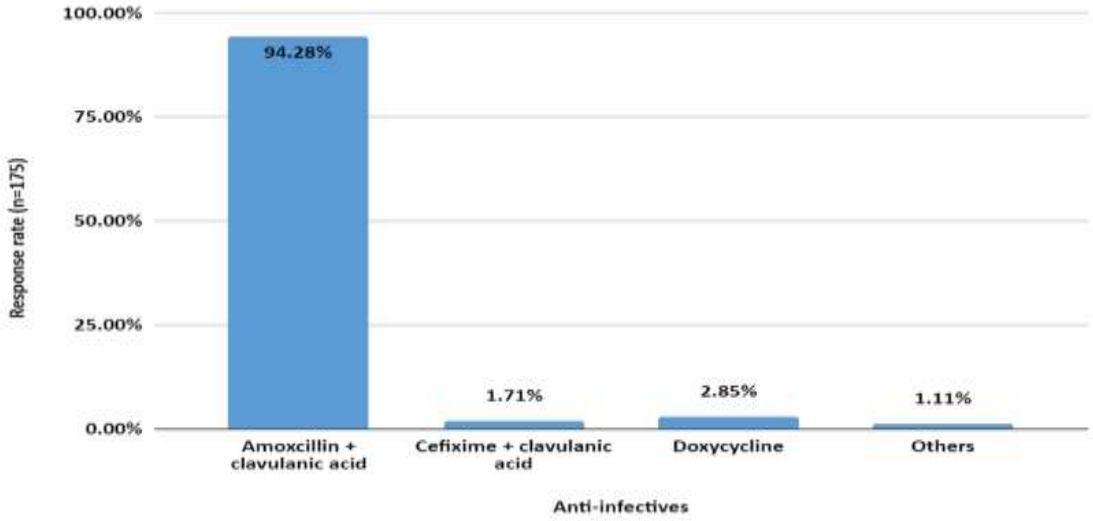

Figure 1: Preference of anti-infectives in case of dental infections

Table 1: Preferred dosage form of amoxicillin + clavulanate for better patient compliance in dental practices

Preferred dosage form of amoxicillin + clavulanate	Response rate (n=175)
Tablet	167 (95.42%)
Syrup	3 (1.71%)
Injection	5 (2.85%)
Buccal patch	0

Approximately 75% of the participants recommended a 625 mg dosage oral tablet comprising amoxicillin + clavulanic acid combination for treating dental infections. However, nearly half of the respondents (49%) preferred prescribing 457 mg dry syrup (ds) dosage of the same combination to pediatric patients suffering from dental infections (Figure 2a). About 30% of responders favoured the dosage of 228.5 mg ds combination of amoxicillin + clavulanic acid for pediatric patients with dental-related infections (Figure 2b).

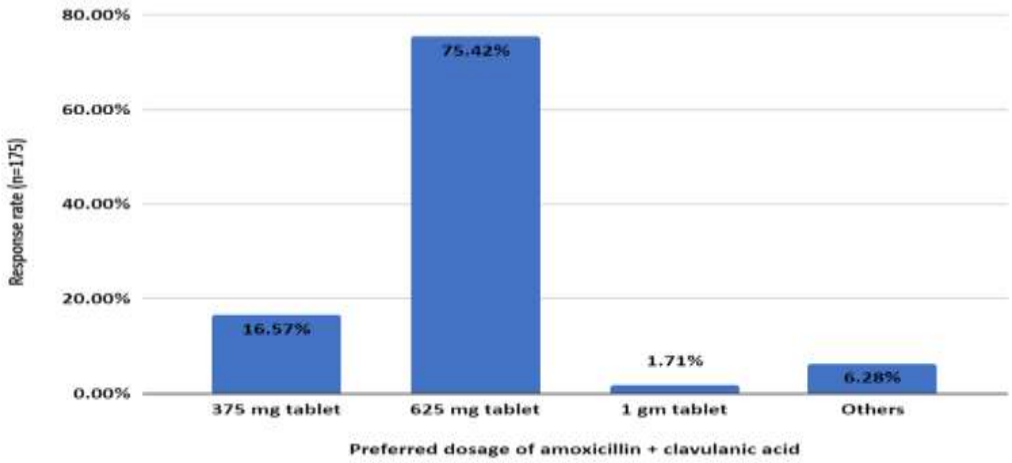

Figure 2a: Response on the preferred dosage of amoxicillin + clavulanic acid for the treatment of dental infections

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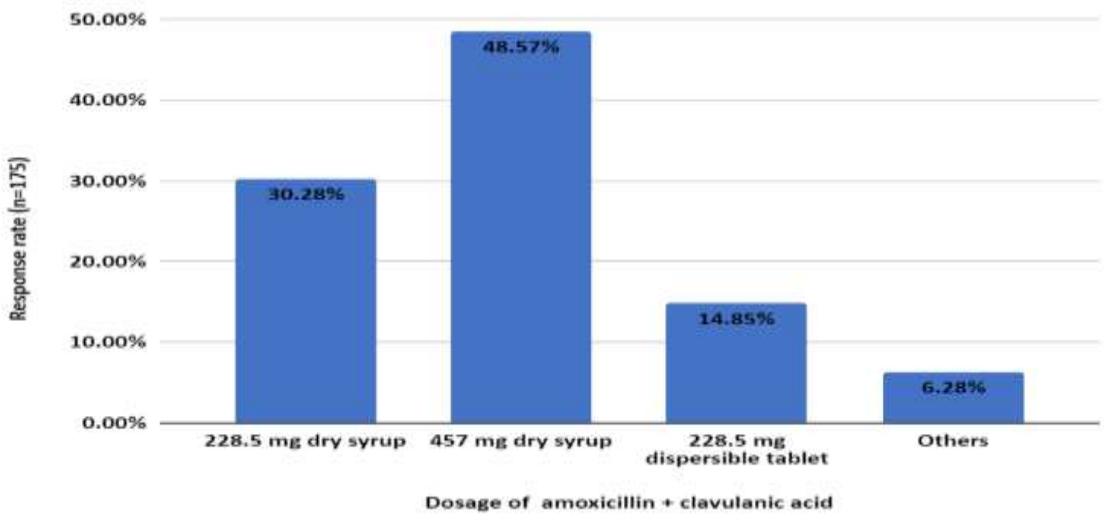

Figure 2b: Response to the preferred dosage of amoxicillin + clavulanic acid for the treatment of dental infections in paediatrics

More than half of the respondents (54.28%) reported noticing dental improvements within 5 days after receiving amoxicillin + clavulanic acid (Table 2). Approximately 54% of the responders reported the combination to be excellent for the management of dental infections (Figure 3). The majority of the participants reported abdominal discomfort as the most common adverse effect observed for drug combination followed by nausea, vomiting, and diarrhea.

Table 2: Response on the time period required for dental improvements after using amoxicillin + clavulanic acid

Number of days	Response rate (n=175)
2 days	23 (13.14%)
3 days	55 (31.42%)
5 days	95 (54.28%)
Others	2 (1.14%)

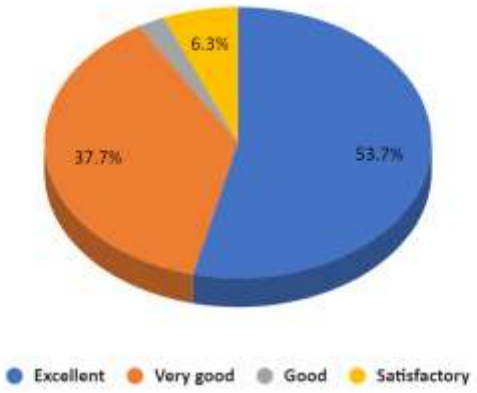

Figure 3: Response to the clinical efficacy of amoxicillin + clavulanic acid for the management of dental infections

IV. DISCUSSION

According to the findings of the current study, amoxicillin + clavulanic acid was highly effective in treating dental-related diseases. Unhygienic oral habits and sugar-based diet consumption were the major factors affecting oral health. Antibiotics are the preferred first-line treatment for dental cavities and root canal therapy in subjects with poor oral health. Anaerobic Streptococci spp, Prophyromonas gingivalis, Prevotella spp, and Prophyromonas endodontalis were the common causative microorganisms for dental-related infections. Amoxicillin, penicillin, metronidazole, and erythromycin were the most frequently prescribed antibiotics for dental infections, with clindamycin being an option for those who are allergic to beta-lactam antibiotics.[11] The current study participants also preferred the use of proton pump inhibitors and non-steroidal anti-inflammatory drugs as adjuvant therapy to antibiotics for treating dental infections.

The majority of the experts preferred amoxicillin + clavulanic acid medication in tablet form over other anti-infectives such as cefixime + clavulanic acid, doxycycline, and others for dental-related infections. A randomized study has also signified that amoxicillin and the clavulanic acid combination have achieved clinical success in managing odontogenic infections caused by odontopathogens such as Streptococci spp. when compared to clindamycin (88.2% vs. 89.7%).11 An in vitro study conducted in India has corroborated the efficacy of the amoxicillin-clavulanic acid combination against E. faecalis for endodontic treatment over zinc oxide-eugenol (ZOE) cement, ZOE with amoxicillin, and ZOE with ofloxacin-ornidazole combinations.[12]

A significant proportion of current study respondents preferred the use of 457 mg dry syrup dosage of the same combination to pediatric patients for the management of dental infections. Similarly, the majority of the experts favored the dosage of 228.5 mg ds combination of amoxicillin + clavulanic acid for pediatric patients with dental-related infections. A clinical study conducted at 15 centers across four countries namely Malaysia, Philippines, Vietnam, and Thailand has noted an overall clinical success rate of 88% for the amoxicillin/clavulanic acid combination in subjects with acute odontogenic infections).[11] Some studies have indicated success rates of 87% with amoxicillin/clavulanic acid 1 g twice daily and 96% with amoxicillin/clavulanic acid 625 mg three times daily for treating odontogenic infections.[13,14] Thus, the use of amoxicillin and clavulanic acid 625 mg was proved to be effective in treating odontogenic and dental-related infections.

The majority of the current study participants corroborated the clinical effectiveness of the drug combination and reported that the treatment yielded dental improvements within 5 days. However, stomach pain was reported as the common side effect of the amoxicillin + clavulanic acid medication combination, followed by nausea, vomiting, and diarrhea.

The survey findings provide valuable insights into the use of amoxicillin/clavulanic acid in dental practice. However, it is important to acknowledge certain limitations of the study. One notable limitation is the relatively smaller sample size, consisting of only 175 dental specialists. While the study involved specialized opinions from knowledgeable dental practitioners, a larger sample size could have provided more robust and generalizable results. Relying solely on self-reported data could result in recollection bias and possible response bias, which could affect the sample's representativeness. Collecting the opinions of experts from dental specialties and the validation of the therapeutic effectiveness of amoxicillin + clavulanic acid are the major strengths of the study. The study findings provide meaningful evidence to guide dental practitioners in their treatment decisions.

V. CONCLUSION

Among the various anti-infective drugs, experts favored the combination of amoxicillin + clavulanic acid for the treatment of dental-related infections. The majority of the specialists preferred a dosage of 625 mg for adults and 457 mg of dry syrup for children when using this drug combination to treat oral infections.

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DECLARATIONS

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Ethical approval: This study was approved by the Independent Ethics Committee.

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