Knowledge, Attitude and Practice on Antibiotics and Its Usage in Pediatric Dentistry

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Abstract

Background: The main aim of dentistry is in the management of dental infections or restoring the tooth into its proper form and function resulting from microbial action. As an aid to this, antibiotics have been routinely used in dental clinics in cases of microbial infection and during dental procedures. The injudicious use of antibiotics has resulted in the increased incidences of antibiotic resistance. The extensive consumption of antibiotics has resulted in WHO claiming it as a worldwide problem. Antibiotic resistance is ever evolving and affects even children but there has not been enough literature or studies done on the awareness of usage of antibiotics in children among dental practitioners in India. Aim of the study: To determine the awareness on the usage of antibiotics in Pediatric dentistry among dentists. Materials and method: A total of 132 participants who belonged to the dental fraternity participated in this survey. Results: A total of 132 practitioners participated in the study and it was observed that 69.8% of the dentists preferred prescribing antibiotics to children with Endocarditis followed by intra (or) extra oral swelling/ sinus tract. Most practitioners (68.3%) preferred prescribing Amoxicillin to children and 66.2% prescribed 20-40mg of amoxicillin/kg/day in divided doses every 8 hours. 89.9% of the dentists prescribed Metronidazole only in the caseōf dentoalveolar abscess and 64.7% of them prescribed it in a dosage of 20-30mg/kg/day. 65.5% of the dentists were aware that the widespread use of antibiotics can cause drug resistance. Conclusion: Most practitioners were not aware of the usage of antibiotics in cases of traumas. All dentists should be kept up to date on the various scenarios and doses of antibiotics prescribed to children to reduce the incidences of antibiotic resistance.

1. Introduction

A large number of microorganisms are present in the oral cavity, forming a complex biological ecosystem. There is a continuous interaction between the microbes, resulting in a shift from aerobic to anaerobic which often results in pulpal and periodontal disease(1). The main aim of dentistry is in the management of dental infections or restoring the tooth into its proper form and function resulting from microbial action. As an aid to this, antibiotics have been routinely used in dental clinics in cases of microbial infection and for during dental procedures(2). The injudicious use of antibiotics leads to an increase in the cost of treatment, increased resistance to bacterial biological species. WHO has claimed antibiotic abuse as a pandemic worldwide problem due to their extensive consumption.

The odontogenic infections that patients often report with are managed by three steps. The first step is diagnosing the type of infection after which the spread of the infection is to be controlled. The final step is to restore the affected tooth into its proper form and function. Antibiotics are often promptly used to control the infection and the most commonly prescribed drugs by dentists are Amoxicillin, Metronidazole and Penicillin (3) (4). Contrary to this practice, literature states that most dental infections that are encountered in the operatory have been found to reduce once the source of infection was removed. In spite of this knowledge, practitioners prefer prescribing antibiotics to speed up the process of healing and provide immediate results (5,6). This may be fuelled by the patient's expectation for a rapid relief from swelling. Hence dentists end up over prescribing antibiotics, even in cases where it is not necessary.

The therapeutic use of antibiotics as prophylaxis can be justified in the case of patients with systemic conditions like bacterial endocarditis in which antibiotics are administered prior to the treatment thus preventing any life-threatening risk to the patient. In case of treating patients with infective

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endocarditis, the American Heart Association recommends prophylaxis in dental procedures which induce a significant amount of bleeding. This includes various dental procedures such as oral prophylaxis, extractions and periodontal surgeries.

The duration of antibiotic courses should be sufficient in order to eliminate the pathogens. A recent trend in literature states that a short-duration antibiotic therapy is the most effective method to prevent the development of resistance (7). The choice of antibiotic for treatment must be based either on the likely pathogens and their probable susceptibility, or the susceptibility of pathogens to the antimicrobial agent cultured from.

A retrospective study conducted in 1987 showed that 80% of the patients were prescribed antibiotics due to an oral or odontogenic infection. The most common drug that was favoured by the practitioners was Penicillin V (6). The other two antibiotics often prescribed were Erythromycin and Amoxicillin. Metronidazole was found to be used less frequently. However, recently the mostly commonly prescribed antibiotic worldwide is amoxicillin (8).

The antibiotics often used in dentistry employ the usage of a broad-spectrum antimicrobial therapy due to the presence of various microbial flora present in the oral cavity. This results in ineffective action against the microbial agent. To identify the causative agent, culture and sensitivity tests should be carried out to provide a relevant prescription required to act on the particular infection (8,9). As this practice is not in notion, antibiotics are being prescribed in cases when they are not required. This inappropriate prescribing leads to frequent exposure of the patients to broad spectrum antibiotics leading to antibiotic resistance. The American Dental Association has stated that dentists responsibly prescribe antibiotics and henceforth are unlikely to play a major role in the global problem of antibiotic resistance (10). Contradicting to that, the UK Department of health lists dentists as contributors to the problem including medical practitioners and veterinarians (11).

Antibiotic resistance is ever evolving and affects even children. There has not been enough literature or studies done on the awareness of usage of antibiotics in children among dental practitioners in India. Therefore, the aim of the study was to determine the awareness on the usage of antibiotics in Pediatric dentistry among dentists.

2. Materials and Methods

The knowledge, attitude and practice of the dentists on the usage of antibiotics in pediatric dentistry was assessed via an online platform. The questionnaire was 19-itemed, with 9 questions assessing the knowledge, 4 assessing the attitude and 5 questions on their practices on using antibiotics in children visiting for dental treatment.

The prepared questionnaire was initially validated by administering it to 15 dentists, who were asked to mark their responses for the same questionnaire twice, once on the first day and for the second time after a period of one week.

The study design and protocol was approved by the Institutional ethics board prior to the start of the study. The survey was conducted from September 2020 to January 2021 in India.

The questionnaire was not limited to a particular geographic locality and was circulated among various dental colleges and private practitioners in India. This would assess the usage of antibiotics among the different parts of India. Care was taken to verify the responses on the same day to ensure that all entries are verified, and no entry goes unchecked. The questionnaire was administered through Google forms. The forms also collected demographic details, therefore verifying the responses. Informed consent was obtained from the participants.

A total of 132 participants through convenience sampling who belonged to the dental fraternity were included in this study out of which 73% were from South India and the remaining spread across North and East India. Any other responses were eliminated as a part of a review process by non-biased examiners.

3. Results

A total of 132 practitioners participated in the study and their qualification, speciality and years of experience is tabulated in Table 1. 69.8% of the dentists preferred prescribing antibiotics to children with Endocarditis followed by intra (or) extra oral swelling/ sinus tract.

Amoxicillin (68.3%) was the most preferred antibiotic that was prescribed to children and 66.2% of the dentists prescribed 20-40mg of amoxicillin/kg/day in divided doses every 8 hours. [Table 2 and Fig 3]

89.9% of the dentists prescribed Metronidazole only in the case of dentoalveolar abscess and 64.7% of them prescribed it in 20-30mg/kg/day [Fig 4 and 5], contrary to this only 33.8% of the dentists checked the weight of the child before prescribing antibiotics.

80.6% of the dentists did not prescribe Tetracycline for children less than 8 years of age. However, In the case of trauma in children above 13 years of age, 25.2% of the practitioners preferred prescribing Tetracycline. [Table 2 and 3].

45.3% of the dentists preferred prescribing antibiotics to children in cases of luxation injuries while 45.3% preferred no medications. However, 52.5% of the dentists preferred Topical antibiotics over systemic antibiotics in the cases of facial lacerations and about 30.9% of dentists did not prescribe antibiotics in cases of facial lacerations. [Table 2 and 3]

47.5% of the dentists also prescribed antibiotics for dental infections contained in pulpal tissues. 34.5% of the respondents thought antibiotics could only decrease the facial swellings and 29.5% of the dentists' prescribed antibiotics and waited for the swelling to subside before pursuing treatment. [Table 2,3]

4. Discussion

In pediatric dental practice, antibiotics are prescribed both for prophylactic and therapeutic purposes. Therapeutically antibiotics are prescribed for any endodontics, surgical or periodontal infections. The inappropriate use of antibiotics in children with orofacial manifestations can result in antibiotic resistance which is a global health concern. Awareness on definite prescription of antibiotics among dentists is mandatory. Hence the present study was divided towards assessing the awareness, attitude and practice of prescribing antibiotics in pediatric dentistry.

With regards to drug resistance, 65.5% of the dentists were aware that the widespread use of antibiotics can cause drug resistance. All the responses obtained are tabulated in Table 2 and 3.

In the present study, it was observed that the majority of instances among cardiovascular disorders where practitioners prescribe antibiotics in children are in cases of Endocarditis (69.8%), Intra oral swelling swelling/ sinus tract and Extra oral swellings (66.2%). In cases of traumatic injuries, a meager number of practitioners (25.2%) prescribe antibiotics. Only 46.8% practitioners prescribed antibiotics to children and often failed to weigh the child to calculate the correct dose required. While prescribing antibiotics to children, dental care professionals have to take proper care to calculate the weight. In this survey, 59% of the dentists check the weight of the child. The usage of weight is important for the prescription of antibiotics in pediatric patients to avoid over dosage (12).

A majority of dentists (80.6%) did not prescribe tetracycline in children of less than 8 years, this is due to the fact that they chelate the calcium ions which leads to the discoloration of the developing teeth in the permanent dentition(13). 66.5% of dentists believe that the widespread use of antibiotics causes drug resistance. A significant number of dentists (47.5%) prescribe antibiotics unnecessarily, in cases of endodontic infections contained within the pulp. This is similar to the findings in a study where dentists were seen to over prescribe antibiotics incases of endodontic infections (14)

It was observed that the majority of the practitioners had no awareness on how to manage and treat traumatic injuries. In cases of luxation injuries where antibiotics are required, only 45.3% of the dentists would administer antibiotics. Scenarios where patients report with facial lacerations, systemic antibiotics are vital in reducing infection. 16.5% of the participants would prescribe antibiotics. In cases of dental traumas in children above 13 years, tetracycline is recommended but, in this study, only 25.2% of the respondents preferred it.

The most preferred antibiotic is Amoxicillin (68.3%) followed by Augmentin (28.1%). Odontogenic Infections which lie within the tooth itself, have a rapid onset of action. The infection resolves within a short duration of time if the cause is treated or eliminated. Prolonged courses of antibiotics seem unnecessary. The injudicious use in a healthy individual may contribute to antibiotic resistance worldwide. The results are similar to previous studies conducted where Amoxicillin was found to be the most prescribed antibiotics followed by penicillin derivatives (7,15,16). Amoxicillin, despite being the most commonly prescribed drug, 33.8% practitioners were not aware of the correct dosage required in children, which could lead to over prescription and over usage of the drug. This lack of knowledge results in the misuse of the drug which needs to be addressed.

The participants selected emergency treatment (62.1%) as the most common method of decreasing facial swelling followed by antibiotics (37.9%). The protocol for management of facial swellings has not been standardized (17). since there is no consensus over the gold standard treatment in the management of endodontic infections, surgery and in prescribing antibiotics (18). Various studies have been done to support one treatment regimen over the others but has often failed due to flaws in the design, lack of evidence, no blinding. Most studies do not follow a proper protocol, nor do they have a proper inclusion criterion. This has often led to patients having multiple surgical and medical interventions making it difficult to conclude the best viable treatment option.

A similar survey was conducted in North Carolina (15), and found that dentists that had completed their postgraduate education were more likely to adhere to the proper guidelines of prescribing antibiotics to children. The overall results showed that the overall adherence to the proper protocols for prescribing antibiotics in cases of odontogenic infections in children was low.

There is no strong evidence in literature that states the ideal treatment of extra oral swellings. There are a number of recommendations that can be followed based on the current evidence. Antibiotics should be prescribed in cases where there are signs of local spread or systemic involvement.

Metronidazole is an adjunctive antimicrobial drug prescribed in cases of anaerobic bacterial involvement(19). The result of the present study shows that the majority of the practitioners (89.9%) prescribed metronidazole only in cases of dentoalveolar abscesses. Since anaerobes constitute a major proportion of the microflora of the dentoalveolar abscess, metronidazole is usually the drug of choice used(20). Regardless of this, a considerable number of dentists prescribed Metronidazole to patients with traumatic and endodontic infections. Infact, the AAPD guidelines do not support the usage of any antibiotics following endodontic procedures(21).

However, in the present study, it was noted that 56% of the participants believe that antibiotics are required in children with endodontic infection, which clearly indicates the lack of knowledge on the guidelines for the consumption of the drug

injudiciously. The AAPD guidelines also do not give a definite conclusion regarding the use of antibiotics in trauma cases.

In the present study it was noted that in traumatic conditions almost half of the participants (45.3%) supported the use of antibiotics, whereas the other half (45.3%) did not prescribe any medication. About 52.5% of practitioners preferred the usage of topical antibiotics over systemic drugs.

Tetracycline is yet another drug, which was prescribed by around 25.2% of dentists in the event of dental trauma in the present study. However, about 80.6% of the respondents did not prescribe it in children of less than 8 years. The systemic use of tetracycline should not be considered due to its increased risk of causing discolouration in permanent teeth. There is not enough evidence in literature favouring the usage of systemic antibiotics in the management of dental trauma.

The present study shows that 84.5% of the practitioners thought that only antibiotics reduce facial swelling and 29.5% of them waited for the swelling to subside with antibiotics without initiating treatment. From the results, it can be inferred that the dentists think that prescribing antibiotics is the correct way to treat symptomatic conditions such as pain and inflammation rather than actually treating the infection despite the guidelines reinforcing that antibiotics should be avoided in cases of localized infection and swelling.

Another neglected factor that was noted in the present study was that only 33.8% of the dentists' prescribed antibiotics based on the weight of the children. This is again an alarming finding as this prescription trend can result in unjustified usage of antibiotics, leading to antibiotic resistance.

Antibiotic resistance, despite extensively being published in various reports and studies, it is surprising to know that 22.3% of the dentists were not aware of it. The overuse of antibiotics is also associated with hypersensitivity reactions and super infections (22). Also, an indirect association with the risk of allergic asthma has been documented in children (23) .

The limitations of the study are that the study was conducted using convenience sampling. The sample size is small. However, the results of the study can be used as a baseline data for the knowledge, attitude and practice of dental practitioners in India.

Within the limits of this cross-sectional study, our study sheds light on the lack of awareness of prescribing antibiotics to children. The unrestrained habit of prescribing antibiotics where it is unnecessary should be curbed and the dental community should be more aware of the AAPD guidelines for the usage of antibiotics in children.

5. Conclusion

Usage of antibiotics in pediatric dentistry is the most common as well as neglected practice. A trend of inappropriate and over-prescription of antibiotics to the pediatric dental population is noticed. There is a need for an educational intervention to increase the knowledge and awareness among the practitioners. Practitioners should adhere to the AAPD guidelines when prescribing antibiotics to the pediatric population.

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Table 1: General characteristics of the participants

Question	Responses		
Years of experience	1-5 years (29.9%)	5-10 years (48.9%)	>10 years 21.6%
Qualification	Undergraduate 43.2%	Postgraduate 54%	PHD 21.6%

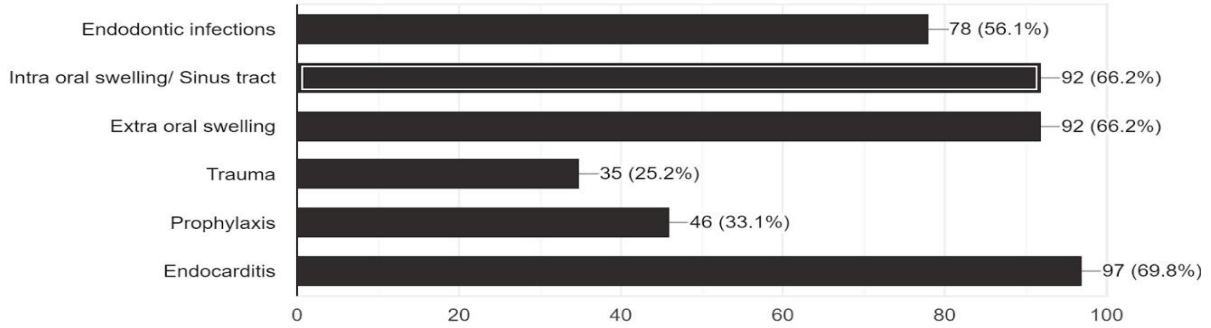

Figure 1: In which cases do you think children require antibiotics?

Table 2: Practice and Attitude of participants with regards to usage of antibiotics				
Question	Response1	Response 2	Response 3	Response 4
What is the most preferred antibiotic you would prescribe children	Amoxicillin (68.3%)	Augmentin (28.1%)	Metronidazole (0%)	Non-Penicillin (00%)
What do you think decreases facial swelling	Emergency treatment (62.6%)	Antibiotics (34.5%)	Don't Know (2.9%)	
If a patient reports with facial lacerations, what would you prefer?	Topical antibiotics (52.5%)	Systemic antibiotics (16.5%)	No Treatment (30.9%)	
What is the drug of choice in case of dental trauma for a patient above 13 years of age	Amoxicillin (62.6%)	Tetracycline (25.2%)	No antibiotics (8.6%)	Metronidazole (3.6%)
If a child comes with an extra oral swelling, what treatment would you prefer	Emergency drainage of the abscess (60.4%)	Prescribing antibiotics and waiting for it to subside (29.5%)	Refer the child to a specialist (10.1%)	

Table 3: Knowledge and Attitude of the participants with regards to usage of antibiotics			
Question	Yes	No	Maybe
Would you prescribe Tetracycline in children less than 8 years?	19.4%	80.6%	0%
Does the widespread use of antibiotics cause drug resistance?	65.5%	22.3%	12.2%
Are antibiotics required for dental infections contained in pulpal tissue?	47.5%	33.8%	18.7%
Do you prescribe antibiotics often in children?	46.8%	32.5%	20.9%
If patients report with a luxation injury, would you prescribe antibiotics?	45.3%	45.3%	9.4%
Do you check the weight of the child before prescribing antibiotics?	33.8%	24.5%	41.7%

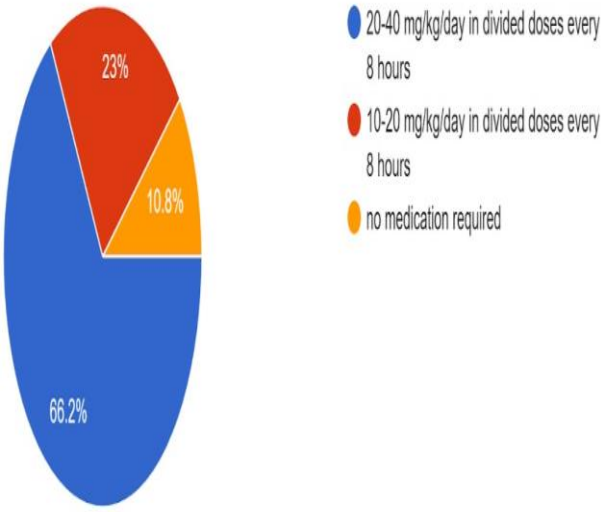

Figure 2: How many mg of amoxicillin do you prescribe to a child of more than 3 months with a weight below 40 kg?

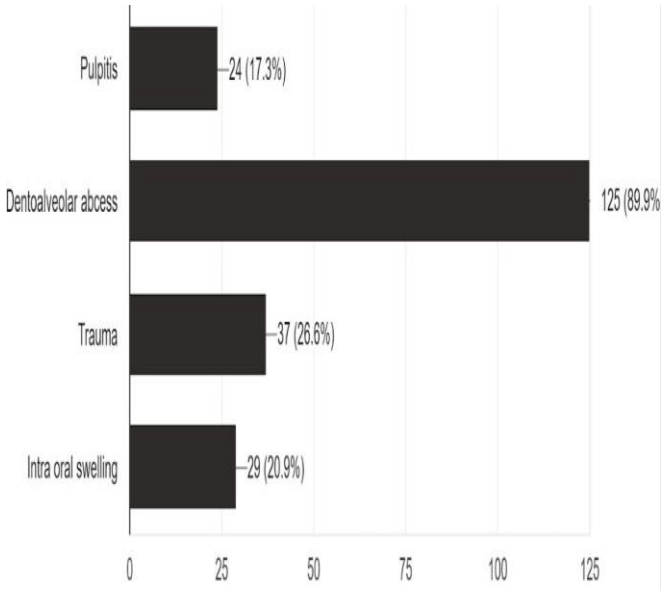

Figure 3: In which cases would you prescribe Metronidazole?

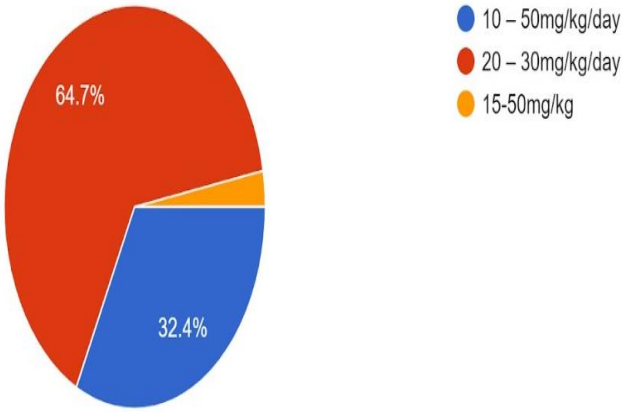

Figure 4: What is the dosage of metronidazole in children till 12 years of age?

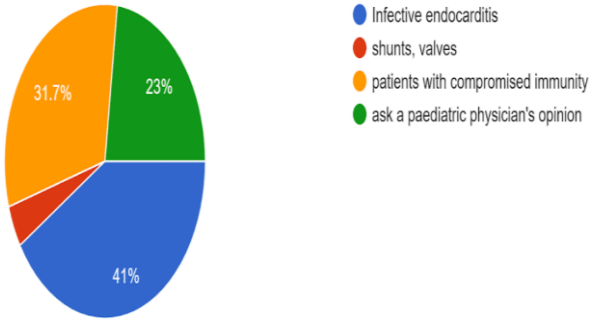

Figure 5: When would you administer antibiotic prophylaxis?