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Pattern of antibiotic prescription in the management of oral diseases among dentists in India

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Abstract
Objectives: The use and abuse of antibiotics have been of concern to the medical and the dental profession for some time now, due mainly to the emergence of antibiotic-resistant bacteria. The objective of this project was to determine the rationale and the pattern of antibiotic prescription for dental management in India.
Methods: A questionnaire was distributed to 200 dental practitioners working in India. The questionnaires sought answers to the clinical and non-clinical factors; signs, clinical conditions and dental treatment modalities for which the practitioners would prescribe antibiotics.
Results: Of the 200 questionnaires sent out, 168 (84%) respondents returned fully completed forms. A total of 107 (63.7%) of the respondents were males. Of respondents, 90% would prescribe antibiotics for patients with elevated body temperatures and evidence of systemic involvement, gross or diffuse facial swelling and closure of the eye due to inflammatory swelling. However, over 50% would prescribe antibiotics for cases with localized fluctuant swelling without any systemic involvement, while 59.6% would prescribe for patients with difficulty in swallowing as a result of an oral infection.
Conclusions: The results of this analysis suggest that there is lack of uniformity in the rationale for antibiotic use among dental practitioners. There is an urgent need for the formulation of evidence-based guidelines, which should take into account the peculiar behavioral characteristics of the community.

Keywords: antibiotics, dentists, India

Introduction

The two most common dental diseases-dental caries and periodontal diseases are infectious diseases, caused by microorganism, which are part of normal flora found in the mature dental plaque [1-3]. Complications of these diseases include The Spread of infections to the surrounding bony and soft tissues resulting in abscess formation and cellulitis. Therefore, antibiotics are frequently used either for prophylaxis and/or as part of the management of oro-facial infections. It is known however, that indiscriminate use of antibiotics often lead to development of resistance, which at times may involve other unrelated organisms [4]. The oral cavity may also harbor antibiotic-resistant organisms, which are incriminated in many extra-oral systemic infectious diseases [5]. The use and abuse of antibiotics is therefore receiving great deal of attention within the medical and dental literature [6-9]. In most dental clinics, dental infections are treated empirically with broad-spectrum antibiotics without recourse to determining the causative organism and the most appropriate antibiotic regimen required. This can lead to indiscriminate use of antibiotics and the possible development of many resistant strains of these oral bacteria to commonly used and effective antimicrobial agents required for life-threatening situations. Also, in many developing economies, self-medication is quite common as many antimicrobial agents are available 'over the counter' in the chemist and pharmacy shops without the need for a doctor's prescription. Access to a microbiology laboratory may also be difficult or not available in communities for many dental set-ups.

Some studies have reported the use and abuse of antibiotic therapy and their consequential impact on antibiotic resistance [10-13]. However, no such information is available on the use of antibiotics in the dental practices, as well as the prevalence of antibiotic resistance of oral microbial population in India dental child population. The objectives of this project therefore, were to determine the rationale and prescription pattern of antibiotics for dental management in India.

Material and methods

Questionnaires for this cross-sectional study were distributed to 200 dental practitioners working in India. The questionnaire was a modification of that described by Palmer *et al*. (2000) [14]. Dental practitioners were specifically asked to give unambiguous answers to relevant clinical and non-clinical parameters relating to their patients, such as signs, clinical conditions and dental treatment modalities for which the practitioners would prescribe antibiotics. The clinical signs chosen included: presence of gross diffuse swelling, localized fluctuant swelling, pyrexia, and difficulty in opening the mouth, swallowing and periorbital swelling. Participants were required to provide information on the preferred antibiotics, their doses, frequency and duration for the management of dento-alveolar infections. Information was also sought on their choice of alternative antibiotics for patients who are allergic to penicillin. Pertinent questions asked on non-

clinical parameters, which may influence their prescription pattern, included demand and expectation of antibiotic prescription by patients/parents, pressure of time and work, uncertainty of the correct diagnosis of presenting complaint by patients and the timing of definitive treatment. Additionally, the questionnaires also sought answers to the policy of practitioners in prescribing antibiotics for common dental clinical diseases and conditions. The dental conditions included acute and chronic pulpitis and periapical infections, periodontal abscesses, acute ulcerative gingivitis, cellulitis, acute and chronic gingivitis, sinusitis, acute and chronic periodontitis, trismus, open and closed extraction procedure and tooth reimplantation. Although, the questionnaire was anonymous, respondents were requested to provide information about their age, sex, place and year of qualification and whether they have attended any course(s) on the use of antibiotics within the last 2 years.

Statistical analysis

All variables were presented as frequencies and percentages for categorical ones, or with means and standard deviations (SD) for quantitative ones. A knowledge score was constructed by adding grades obtained on 22 questions which explored the indication for antibiotherapy with specific dental conditions. The knowledge of respondents was evaluated based on guidelines and standards in selected published literature [15-18]. Each correct answer obtained a grade of 1, versus 0 for the wrong answer. The total score thus had a theoretical range from 0 to 22. Bivariate associations between demographic and professional factors and the knowledge score were assessed by comparing means. Differences in means were tested using the Student's t-test for dichotomous variables, and ANOVA for multinomial ones. Differences with a p-value ≤0.05 were considered as statistically significant. All computations were conducted using SPSS.

Results

Of the 200 practitioners to whom the questionnaires were sent, 168 (84%) returned fully completed forms. Out of the 168 respondents, 107 (63.7%) were males and 61 (36.3%) were females. Demographic and professional characteristics of respondents are shown in Table 1. In all, 95 (56.5%) graduated as dentists after 1990.

Table 2 shows the clinical signs for which the respondents would prescribe antibiotics. Over 90% would prescribe for patients who presented with elevated body temperature (>37.8^{0}C) with evidence of systemic involvement, gross or diffuse facial swelling, and closure of the eye due to inflammatory swelling. For cases with localized fluctuant swelling and difficulty of swallowing, 55.4 and 59.6% of the respondents would prescribe antibiotics, respectively. However, only 36.9% would prescribe for patients with restricted mouth opening due to infection.

Table 2 also shows a list of other non-clinical criteria, which influence the prescription of antibiotics by respondents. Prevention of postoperative complications was the commonest reason (84.5%). About 42% would prescribe when specific treatment would be delayed and 20.2%, when the diagnosis was not certain. Only a few practitioners, 4 and 8% would prescribe antibiotics as a result of patients demand and for patient's convenience, respectively. The data also revealed that about 14% would prescribe based on their perception of the social status/ background of the patients. On the questions for prescribing antibiotics for specified clinical conditions, (Table 3) 72% would prescribe for acute ulcerative gingivitis and 46% for acute periapical infection before drainage. However, 25 and 22% would prescribe for chronic apical infection and chronic periodontitis, respectively, 19.6% for acute pulpitis and 10.1% for chronic marginal gingivitis.

Table 1: Demographic and professional characteristics of participating dental practitioners.

Variables	N (%)
Gender	
Male	107(63.7)
Female	61(36.3)
Age (years)	
21-30	50(29.8)
31-40	81(48.2)
41-60	37(22)
Year of Graduation	
1990 or before	73(43.5)
After 1990	95(56.5)

Table 2: Prescribing patterns of dental practitioners according to clinical symptoms and general considerations (n=168)

Should antibiotics be used in the following case?	n (% yes)
Elevated temperature þ evidence of systemic spread	150(89.3)
Localized fluctuant swelling	93 (55.4)
Gross or diffuse swelling	156 (92.9)
Unrestricted mouth opening	62 (36.9)
Difficulty in swallowing	100 (59.5)
Closure of the eye due to swelling	154 (91.7)
Patient's expectations for a prescription	7 (4.2)
Convenience	13 (7.7)
Patient's social background	24 (14.3)
Diagnosis not certain	34 (20.2)
Specific treatment has to be delayed	71 (42.3)
Prevention of postoperative complications	142 (84.5)

Table 3: Prescription of antibiotics for selected dental diagnoses.

Should antibiotics be prescribed for the following clinical diagnoses?	n (% yes)
Acute pulpitis	33 (19.6)
Acute periapical infection before drainage	78 (46.4)
Acute periapical infection with drainage	69 (41.1)
Acute periapical infection after drainage	49 (29.2)
Chronic apical infection	42 (25.0)
Periodontal abscess	121 (72.0)
Acute ulcerative gingivitis	110 (65.5)
Chronic marginal gingivitis	17 (10.1)
Chronic periodontitis	37 (22.0)
Pericoronitis	122 (72.6)
Cellulitis	143 (85.1)
Sinusitis	109 (64.9)
Dry socket	92 (54.8)
Trismus	60 (35.7)
Routine extraction	10 (6.0)
Surgical extraction	150 (89.3)
Apicectomy	135 (80.4)
Root canal surgery pre-operative	17 (10.1)
Root canal surgery postoperative	26 (15.5)
Scaling and polishing	7 (4.2)
Restorative treatment	2 (1.1)
Reimplantation of teeth	127 (75.6)

Discussion

This probably has a direct influence on compliance with strict guidelines on the rationale use of antibiotics in dental practice, which showed evidence of both overuse and underuse of antibiotics in this survey. It is of interest and equally gratifying to note that the majority of the respondents would not prescribe antibiotics for unscientific reasons like patient's expectation of an antibiotic prescription, convenience and demand necessitated by the social background of the patients. Only a very small fraction of the respondents would indulge in such practices, which effectively constitute an irrational, and abuse of antibiotic usage. Our data also showed that only a very low proportion of the practitioners would prescribe antibiotics when the diagnosis is uncertain; mainly in a life-threatening situation where a delay may lead to severe consequences.

A fairly large number believe in the use of empirical antibiotic therapy, especially when definitive treatment is to be delayed regardless of whether or not such medication is needed. The reason for this potential abuse of antibiotic usage may be partially due to the fact that there is a disproportionate heavy work load in the many of the dental centers around India and therefore, the decision to prescribe antibiotics is based more on personal convenience rather than patient's actual need. Despite abundant evidence in the literature, which suggests that antibiotics should not be used as a substitute for good surgical and aseptic operative techniques,[15-19] over four-fifth of the practitioners would give prophylactic antibiotic cover for the prevention of postoperative infection following surgical dental manipulations.

A large percentage of the respondents would prescribe antibiotics for cases in which oral infection is accompanied by elevated body temperature, evidence of systemic spread, facial cellulitis and/or dysphagia. So also would nearly half of them prescribe for a localized fluctuant swellings whereas the proper treatment is drainage of the swelling by extraction of the offending tooth and/or incision of the swelling.

The proportion of practitioners who would routinely prescribe antibiotics for specific conditions vary a great deal among the presenting diseases. For example, about half of the practitioners would consider prescribing antibiotics for acute periapical infection and dry socket. About one and half times that number would and correctly so give antibiotics for periodontal abscess, acute necrotizing ulcerative gingivitis, sinusitis, pericoronitis and cellulites, as these conditions are serious and require aggressive management. Surprisingly, however, about 20% would prescribe antibiotics for acute pulpitis and chronic marginal gingivitis and 22% for chronic periodontitis. This represents a 10% gross overuse of antibiotics, as there are conditions not indicated for such therapy. The management of periapical abscess by respondents also shows evidence for overuse of antibiotics. About 46.4% would prescribe antibiotics before drainage and 70.4% with drainage. Unless there is a systemic involvement, management of uncomplicated abscesses is effective drainage and removal of the cause. In the majority of localized or diffuse odontogenic infection, removal of the course and/or drainage would usually lead to a complete resolution of the problem. However, in some situations, drainage or removal of the cause may not be feasible immediately. In such situations, and especially when there is an evidence of systemic involvement, antibiotic use can be instituted to prevent or limit local and metastatic spread of infection [16].

Finally, the results of this study have demonstrated the lack of consistency in the rationale use of antibiotics as has been reported in many studies from different parts of the world. Attempts at providing an evidence-based protocol has led to many guidelines being produced by different countries thereby creating confusion on the use of antibiotics in dentistry. However, the clinical use of antibiotics in many specific clinical situations appears to follow existing guidelines although a new antibiotic policy or guideline is needed that would be strictly followed by every practitioner.

There is also a need for regular continuing dental education courses in the use of antibiotics in dental practice and regular update of knowledge in this area.

Conclusion

In conclusion, the results of the present study have demonstrated a lack of uniformity in the rational use of antibiotic use among dental practitioners in India and that amoxicillin is the most frequently prescribed antibiotic. In addition, the doses and frequency of use of different antibiotics vary greatly among the practitioners. Statistically, the only demographic and professional variable and correlated positively with knowledge on antibiotic use was the year of graduation of the practitioners. Evidence-based guidelines tailored to our local needs and peculiar behavioral characteristics of the community are in need of urgent formulation.

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