

Prescription Pattern of Antibiotics among General Dental Practitioners in Karnataka—A Cross-Sectional Survey

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Abstract

Introduction There is a lack of clear guidelines for the use of antibiotics and analgesics in medically healthy patients as well as endodontic pain management strategies. Diseases of the dental pulp and periapical tissue are mainly caused by microorganisms; however, not all cases of dental infections require the administration of systemic antibiotics. The purpose of the present survey was to evaluate the prescription pattern of antibiotics among general practitioners and specialists practicing in Karnataka.

Methods This descriptive cross-sectional survey was based on a structured questionnaire in Google Form with 17 questions, including the demographic characteristics and the knowledge and practice of the dentists on the antibiotic prescription. Completed questionnaires were analyzed using the SPSS software to determine relationships between factors affecting the prescription patterns and educational qualification.

Results Of the 200 participants surveyed, 169 (84.9%) felt that the overuse of antibiotics can lead to resistance of bacteria. Amoxicillin 500 mg was the most prescribed antibiotic (97%) and cephalexin by only 3% of the participants. Majority of the dentists prescribed antibiotics on a weekly basis (51.8%) during their practice and the preferred duration was for 5 days (62.8%).

Conclusion The results of the present study indicated a lack of knowledge and uncertain diagnosis on prescribing antibiotics leading to overprescription and further antibiotic resistance. The majority of the dentist feels there is an overuse of antibiotics, but at the same time prescribes it on a daily basis.

Keywords

- ▶ antibiotics
- ▶ prescription
- ▶ antibiotic resistance
- ▶ amoxicillin

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Introduction

Prescribing drugs is the primary intervention that most medical professionals offer to influence their patients' health. Since the introduction of antibiotics in the late 1920s, they are one among the most commonly prescribed drugs by dentists for prophylactic and therapeutic management of orodental infections.¹ It has been estimated that 10% of all antibiotic prescriptions are related with dental infections.² It is in fact considered as a "panacea" for all infectious diseases.

However, the increasing use of these drugs has led to the occurrence of newer strains of microorganisms, which are quite resistant toward the action of antibiotics. The drug interactions caused by the prescription of these antibiotics has become even more severe because of its increased consumption by both the adult and the pediatric population. Furthermore, it is extremely essential to adjust the dosages according to the weight and body size in the pediatric patients.³

Prescribing antibiotics in dentistry for the most part is mainly empirical. The main reason for this could be because the culture tests are not followed mostly and as a consequence of which the clinician cannot identify the specific organism. As a result, it ends up in the usage of broad-spectrum antibiotics and thereby the emergence of the antibiotic resistance has increased. Besides the development of resistance, other concerns include adverse reactions (including gastrointestinal, allergic, and hematologic reactions). Moreover, antibiotic resistance not only affects the person consuming it but also everyone else as the genes that are resistant can easily pass via personal contacts, human or animal refuse.⁴

When it comes to dentists prescribing antibiotics, there is an increasing trend of prescribing them for nonindicated clinical scenarios, like pain relief, irreversible pulpitis, and localized dentoalveolar abscess. This further adds on to emergence of antibiotic resistance. Recently, the World Health Organization has recognized this as a growing global problem and announced the theme for the year 2011 as "Antibiotic resistance: No action today, No cure tomorrow" and has emphasized for an international action. For this reason, the sensible use of antibiotics in the dental practice is paramount for reducing the resistance and the adverse events at the same time increasing efficacy.

This emphasizes on the importance of knowing the prescription pattern of antibiotics among the dentists regarding the length, drug choice, frequency, and necessity of prescribing before, during, and after dental treatment. Therefore, the purpose of this study was to evaluate the prescription pattern of antibiotics among the general practitioners and specialists in Karnataka.

Materials and Methods

Questionnaire: To analyze the prescription pattern of antibiotics among the general practitioners and specialists in Karnataka, a cross-sectional survey was conducted based on

a structured questionnaire in Google Forms. By using standardized proportion for the most conservative estimate of the sample size 200 responses were required for this study.

Dentists who are fully engaged with academic and non-clinical work or retired from their services were excluded from this study. The questionnaire was unidentifiable for any dental surgeon's identity.

The questionnaire comprised of two sections; Section A: demographic and characteristic information (age, gender, years of experience, and graduation level). Section B: knowledge regarding antibiotics before prescribing them, most common antibiotic-prescribing pattern, awareness regarding antibiotics resistance, and choice of antibiotic prescription in specific clinical conditions.

Sample and data handling: The estimation of sample size was done by the below formula

$$n = \frac{Z^2 pq}{f^2} = 200$$

where $Z = 1.96$

$p = 0.39$

$q = 1 - p = 0.607$

$f = 18\% = 0.8$

To produce a homogeneous distribution, dentists were chosen from different parts of Karnataka. Prior to conducting the study, ethical approval was taken from the institutional authorities. The questionnaire was given in the form of Google Forms to all the dentists through the various online sources (WhatsApp, email, message, etc.) available.

Statistical analysis: Data from questionnaires received were entered into Statistical Package for Social Sciences (SPSS), version 25.0. From this database, the overall response rate was calculated, together with the percentage responses for each question. Frequency analysis was used for the determination of the demographic, analgesic, and antibiotic prescribing pattern. Chi-square test was performed to find out the association between the demographic and prescription pattern.

Results

Demographics and characteristics: Out of the 200 respondents, 89 (44.5%) were males and 111 (55.5%) were females. Demographic and professional characteristics of respondents are shown in ►Table 1. The number of respondents who had attended any postgraduate education is 105 (52.8%) with more than 5 years' experience (33.7%).

Antibiotic prescribing pattern: ►Table 2 shows that the majority of dentist preferred to write the generic name (37.2%) of the antibiotic while prescribing and the most commonly prescribed antibiotic was amoxicillin (97%). Majority of the dentists prescribed antibiotics on a weekly basis (51.8%) during their practice and the preferred duration was for 5 days (62.8%).

Factors affecting the prescription pattern: ►Table 3 shows that 95% of the dentists feel that antibiotic overuse is a serious problem and 97% of the dentists take the past

Table 1 Demographics and characteristics of respondents

Variable	Frequency	Percent
Gender		
Male	89	44.5
Female	111	55.5
Age		
20–30	134	67.0
30–40	45	22.5
Above 40	21	10.5
Qualification		
BDS	94	47.0
MDS	106	53.0
Years of practice		
Less than 5 years	132	66.0
More than 5 years	68	34.0

Abbreviations: BDS, Bachelor of Dental Surgery; MDS, Master of Dental Surgery.

Table 3 Factors affecting the prescription of antibiotics

Variable	Frequency	Percent
Do you think antibiotic overuse is a serious problem nowadays?	Yes: 190	95.5
	No: 2	0.5
	Maybe: 8	4
Do you take into consideration the past medical/ dental history before prescribing an antibiotic?	Yes: 191	97.5
	No: 1	0.5
	Maybe: 8	2
Do you feel the patient’s preference is important before prescribing an antibiotic?	Yes: 109	54.5
	No: 40	20
	Maybe: 51	22.6
Do you fear the loss of patients when you don’t prescribe an antibiotic?	Yes: 142	71.4
	No: 18	9.0
	Maybe: 40	19.6
Do you get influenced by advertisements when prescribing an antibiotic?	Yes: 141	70.4
	No: 21	10.6
	Maybe: 38	19.1
Do you advice sensitivity testing before prescribing antibiotic?	Yes: 18	9.0
	No: 142	71.4
	Maybe: 40	19.6
Are you aware of the latest AAPD guidelines on the antibiotic use in children?	Yes: 52	24.7
	No: 114	59.2
	Maybe: 34	17.1

Abbreviation: AAPD, American Academy of Pediatric Dentistry.

medical and dental history into consideration before prescribing. Note that 54% of the dentists feel that patient preference is important and 71% of the dentists fear the

Table 2 Prescription pattern of antibiotic among the dentists

Variable	Frequency	Percent
Antibiotic prescribed		
Amoxicillin	193	97.0
Cephalexin	7	3.0
Preferred writing		
Brand name	62	31.2
Generic name	74	37.2
Both	64	31.7
Frequency of prescribing		
Daily	75	37.7
Weekly	104	51.8
Monthly	13	6.5
Hardly ever	8	4
Duration of prescribing		
2 days	1	0.5
3 days	67	33.7
5 days	126	62.8
7 days	6	3.0

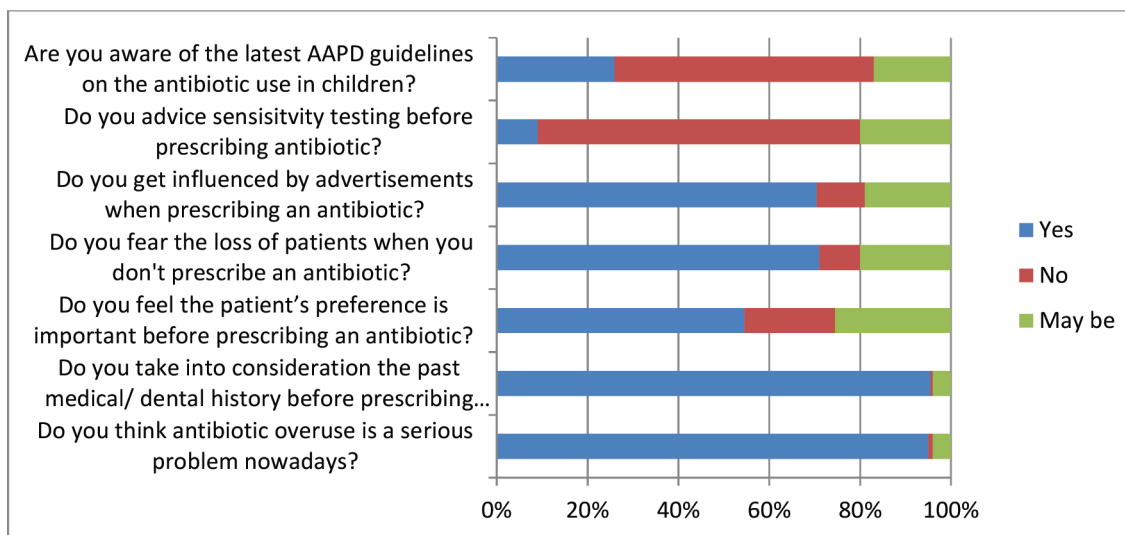
loss of patients if antibiotic is not prescribed, at the same time 70% of the dentists agreed to the statement that they get influenced by advertisements. One of the significant finding is that only 9% of the dentists advised sensitivity testing before antibiotic prescription to the patients.

Discussion

The use of antibiotics has transformed medical care by saving lives and inhibiting serious complications, yet their overuse is a major issue in the society that has serious effects on the overall health of the people. Antibiotic resistance has now been universally identified as a public health priority and a responsible prescribing practice is required to combat the resistance.

Our study illustrates the prescription pattern of antibiotics among the dentists in Karnataka and the factors that influence the dentist’s decision on prescription of antibiotics. This study included 17 questions regarding the demographic and characteristic information (age, gender, years of practice, qualification) (–Table 1) and also evaluated the knowledge, attitude, and practice of the dentists on antibiotic prescription.

It was seen that 95.5% of the dentists agreed that antibiotic overuse is a serious problem nowadays and can lead to antibiotic resistance (–Table 3; –Fig. 1). This is in accordance to Karibasappa and Sujatha who in their study found out that approximately 90% of the dentists were aware of the term “Antibiotic Resistance” and knew that injudicious prescription pattern among health professionals and self-medication with antibiotics inappropriately were contributing to the emergence of antibiotic resistance around the world.⁵ It

Fig. 1 Prescription pattern of antibiotic among dentists.**Fig. 2** Factors affecting the prescription pattern.

was seen that 54% of the dentists felt that patient preference is important and 71.4% of the dentists feared the loss of the patients when antibiotic was not prescribed (►Table 3), which was similar to studies conducted by Faure et al and Straand et al.^{6,7}

One of the significant findings in this study was that majority of the dentists (71.4%) failed to get a sensitivity test prior to antibiotic prescription, which was contradictory to the study conducted by Vardhan et al in 2017 where 86.6% of the dentists got a sensitivity test or microbial culture reports prior to antibiotic prescription.⁸ This could be due to the time constraints and the increased demand in maintaining the patient satisfaction.

Amoxicillin was the most common antibiotic prescribed by both the general practitioners and specialists (97%) (►Table 2; ►Fig. 2), which was similar to many previously conducted studies.^{9,10} This could be due to the fact that

amoxicillin has a broader spectrum of activity and continues to be an attractive alternative because of its longer dose interval, activity against certain Gram-negative anaerobes, and ability to be taken with food, resulting in better patient compliance.¹¹ Surprisingly, this is contradictory to the statement that majority of the dentists are aware regarding antibiotic resistance but still widely use a broad-spectrum antibiotic in their clinical practice which can further increase the chances of antibiotic resistance.

According to Peedikayil in 2011,¹² one of the most frequent and significant causes of increased use of antibiotics is the lack of knowledge regarding the definite indications and need of antibiotics. In the present study, both the general practitioners and specialists (85.3%) prescribed antibiotics for dental infections associated with localized swelling without any systemic spread and 65% of dentists felt that antibiotics are inevitable when there is an increase in body

Table 4 Statistical analysis on the prescription pattern of antibiotics based on educational qualification

Chi-square test					
			Qualification		p
			BDS	MDS	
The overdose of antibiotic can lead to resistance of bacteria	Do not know	Count	4	3	< 0.001
		% within qualification	4.3%	2.9%	
	False	Count	20	3	
		% within qualification	21.3%	2.9%	
	True	Count	70	99	
		% within qualification	74.5%	94.3%	
Antibiotics are inevitable for dental infections with increase in body temperature	Do not know	Count	22	13	0.008
		% within qualification	23.4	12.4%	
	False	Count	21	13	
		% within qualification	22.3%	12.4%	
	True	Count	51	79	
		% within qualification	54.3	75.2%	
For how many days do you usually prescribe the antibiotic?	2 days	Count	1	0	0.020
		% within qualification	1.1%	0.0%	
	3days	Count	40	27	
		% within qualification	42.6%	25.7%	
	5 days	Count	49	76	
		% within qualification	52.1%	72.4%	
	7 days	Count	4	2	
		% within qualification			
Which is the most common antibiotic that you prescribe?	Amoxicillin	Count	93	100	0.110
		% within qualification	98.9%	95.2%	
	Cephalexin	Count	1	5	
		% within qualification	1.1%	4.8%	
Antibiotics are mandatory for dental infections associated with localized swelling	False	Count	22	7	0.001
		% within qualification	23.4%	6.7%	
	True	Count	72	98	
		% within qualification	76.6%	93.3%	

Abbreviations: BDS, Bachelor of Dental Surgery; MDS, Master of Dental Surgery.

temperature (► **Tables 3** and **4**). It can be seen that symptomatic conditions of pain and inflammation determine usage of antibiotics rather than actual infections. An inadequate clinical judgment in assessing the use of antibiotics is also responsible for the negligent use of these drugs. According to Pallasch in 2000,¹³ this misuse can also be considered a result of inappropriate, inadequate, or extended use of the antibacterial agents to avoid any form of recurrence of infection. Studies suggest that the practitioners assume that using antibiotics is the quickest way to resolve any form of consultation.¹⁴

When it comes to pediatric dentistry, it is important to consider the child as a whole and prescribe accordingly. In the present study, majority of the dentists prescribed antibiotics for a duration of 5 days (62.8%) (► **Table 2**) which is in accordance to the American Academy of Pediatric Dentistry (AAPD) guidelines¹⁵ and few other studies.^{16,17} However, the

revised AAPD guidelines (2014)¹⁸ recommend monitoring the effectiveness of the antibiotics to avoid antibiotic resistance and practitioners are advised to alter or stop antibiotics after determining either uselessness or cure before the completion of 5- to 7-day course.

The use of antibiotics following simple exodontia of primary teeth is still controversial. However, a study done by Yousuf et al in 2016 reports that antibiotics are not necessary after simple extractions in patients who are not medically comprised nor they have any role in preventing postoperative complications. Hence, one must realize it is not always mandatory to prescribe antibiotics after any procedure. Most of the times the body's host response is more than sufficient to counter the level of bacteremia anticipated.¹⁹

On the contrary, only 24.7% of the dentists were aware of the latest AAPD guidelines (► **Table 3**) and majority of the

dentists were unaware of the guidelines of AAPD on antibiotic use. Moreover, these guidelines lack proper data on the use of antibiotic in every clinical situation encountered. Therefore, it is a clear indication of a widespread awareness on reinforcing knowledge through clearer and more specific nationwide guidelines which can help in assessing the definite indications of drug therapy but also in terms of the pediatric population, describe the appropriate duration and dosage regarding the body weight or age of the child.

Conclusion

This study indicated a lack of knowledge and uncertain diagnosis on prescribing antibiotics leading to overprescription and further antibiotic resistance. The study raised the question of “What is the use of awareness if one is not practicing it?” This is something which every dentist must ask to themselves when they are out in their clinics or hospitals prescribing various antibiotics.

Recommendations

Based on the findings of the study, the following can be recommended:

1. Inclusion of antibiotic history, with the type, dose, and duration in the case history pro forma. This gives a clear picture of the last antibiotic taken by the patient and avoids overprescription of antibiotics.
2. Active monitoring by the health authorities on a timely basis could also help to curb with the notion of prescribing just for the sake of patient satisfaction or to resolve any form of consultation.
3. Emphasis on the use of topical antibiotics, lesion sterilization and tissue repair, triple antibiotic pastes in the root canals instead of prescribing systemic drugs for root canal therapy, especially in children.
4. A holistic approach with the dentist and the physician working side by side and planning the treatment accordingly could further avoid unwanted antibiotic prescription.
5. A clearer nationwide guideline on the proper indications on the use of antibiotics for every clinical situation in dentistry that is known to every clinician practicing.

Conflict of Interest

None declared.

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