



Awareness of Antibiotic Prescription among Dental Professionals in Davangere City: A Cross-Sectional Survey

Syeda Nikhat Mohammadi^{1*}, Prashant GM², PG Naveen Kumar³, Prashant Viragi¹ and Shivani Sachdeva¹

¹Department of Public Health Dentistry, Rural Dental College, PMT.PIMS, Loni, Maharashtra, India

²Department of Public Health Dentistry, College of Dental Sciences, Davangere Karnataka, India

³Department of Public Health Dentistry, Faculty of Dental Sciences, Banaras Hindu University, Varanasi, India

*Corresponding e-mail: hilaluysal@gmail.com

ABSTRACT

Background: Prescribing antibiotics has become an important trait of day-to-day practice for dental practitioners in managing dental infections. Clinical and bacteriological epidemiological factors can determine the indications of antibiotics in dentistry. Over the years, the overuse of antibiotics has been noticed, where bacterial species have developed resistance to the full range of antibiotics presently available, and hence antibiotic resistance is an important issue for public health. **Objectives:** To assess the knowledge of rational use of drugs and the pattern of prescribing of antibiotics among dental health care professionals in Davangere city. **Materials and method:** A closed-ended structured, pretested questionnaire was distributed to all the registered dentists of Davangere city with demographic details and questions regarding the antibiotics prescription. A total of 173 dental professionals participated in the survey. Descriptive statistics and Logistic regression analysis were performed. Chi-square test was applied to test any significant differences between respondents based on qualitative variables and $p < 0.05$ was considered as statistically significant. **Results:** Out of 173 respondents, 34.1% ($n=59$) were BDS and 65.8% ($n=114$) were MDS. Around 23.7% ($n=41$) of the dentists prescribed antibiotics based on the patient's history and there was a statistically significant difference in the age group of respondents regarding the reason for antibiotic prescriptions ($p=0.01$). 74% ($n=128$) of the respondents agreed that antibiotic resistance is a problem. And there was a highly statistically significant difference in the years of experience of the dentists ($p=0.001$). **Conclusion:** The biggest dynamism for change will be if all the dentists would be more rational in their pattern of prescribing antibiotics.

Keywords: Antibiotics, Dentistry, Resistance, Prescription

Abbreviations: GI: Gastrointestinal, AAE: American Association of Endodontics, AP: Antibiotic Prophylaxis, CDE: Continuing Dental Education program

INTRODUCTION

Ever since the odontogenic infections originated from human oro-facial infections, the prescribing of antibiotics by dental practitioners has become an important feature of dentistry [1]. This is the reason why antibiotics account for a huge majority of medicines being prescribed by dentists. Antibiotic use may be associated with unfavourable side effects, ranging from Gastrointestinal Tract (GIT) disturbances to fatal anaphylactic shock and development of resistance [2].

It has been observed that contributing toward the problem of antibiotic resistance by dentists can be substantial as dentists prescribe 10% of all common antibiotics [3,4].

There is an indiscretion among practitioners regarding the length, choice of drug, frequency, and obligation of prescribing them based on the literature review [5]. Findings from the study of Yingling, et al. among members of the

American Association of Endodontics (AAE) concluded that they were prescribing antibiotics inappropriately [3,6]. Although a boon, antibiotics can be called a double-edged sword as their imprudent usage might cause problems [7]. Antibiotic Prophylaxis (AP) must be considered as a probable choice related to a precise case and a specific patient to modulate bacterial load and potential inflammation and encourage an atraumatic surgical technique [8].

Hence, it is required to assess the knowledge and practice among dental practitioners by looking at the present-day trend of prescribing practices in dentistry. The survey aimed to assess the antibiotic prescription pattern for common oral conditions, routine dental treatment, and awareness of antibiotic resistance among dentists in South India.

SUBJECTS AND METHODS

This study was a cross-sectional survey designed to assess the antibiotic prescribing practices of the dentists in Davangere city. Ethical Clearance was obtained from the Institutional Review Board of College of Dental Sciences, Davangere, and the list of the dentists was received from the local dental council. To produce a homogeneous distribution, dentists in the list were chosen from different regions of Davanagere. A structured and pretested questionnaire was distributed to all dentists registered with the local association branch.

A pilot study was conducted among 20 dental practitioners to determine the sample size and feasibility of the study. The sample size was calculated with 80% statistical power, $\alpha=0.05$, 95% confidence interval, 10% margin of error (E). The internal consistency of the questionnaire was found to be good (Cronbach's $\alpha=0.80$). The questionnaire was finalized with necessary modifications after the pilot study.

The questionnaire included socio-demographic factors and questions that elicited responses regarding antibiotic prescriptions. The information was kept confidential by eliminating all the possible personal identifiers. The knowledge of respondents was evaluated based on recommended guidelines and standards.

Statistical Analysis

Anonymous data were numerically coded and entered into Statistical Package for the Social Science version 22.0 (IBM Corp, Armonk, New York, United States) database and analysed. Data analysis included descriptive statistics, Chi-square test to test any significant differences between the means of respondents based on qualitative variables, and Multivariate logistic regression analysis and p-value of 0.05 (confidence interval of 95%) was considered statistically significant.

RESULTS

A total of 194 questionnaires were distributed and 173 were returned filled. The response rate was 89.17%. The majority of the respondents were males (69.3%) and females were 30.6%. The majority had work experience up to 10 years (59.53%) and most of them were private practitioners (41.04%) with many postgraduates (65.8%) and age ≤ 35 years (72.8%) were most common (Table 1).

Table 1 Demographic characteristic of study participants

Demographic variable	n (%)
Gender	
Male	120 (69.3%)
Female	53 (30.6%)
Age	
≤ 35 years	126 (72.8%)
>35 years	47 (27.16%)
Years of Experience	
<5 years	42 (24.2%)
5-10 years	103 (59.53%)

>10years	28 (16.18%)
Qualification	
BDS	59 (34.1%)
MDS	114 (65.8%)
Type of Practice	
Private practice	71 (41.04%)
Group practice	64 (36.99%)
Institutionally attached	38 (21.9%)

Frequency of Antibiotic Prescription in a Week

About half of the responding dentists (53.8%) answered 1-2 prescriptions, 27.2% of the participating dentists responded with 4-5 prescriptions with a highly statistically significant difference related to years of experience (p=0.004) and chi-square value of 22.43.

Antibiotic Duration of Prescription

More than half of the dentists (55.5%), reported about 5 days of prescription, less frequently, participants mentioned a minimum prescription of 3 days.

Reasons for Prescribing Antibiotics

In terms of reasoning, the patient’s history was the sole reason (23.7%). Postponement of the treatment was the second most common reason (22.5%). Another reason was the patient’s expectation of prescription (9.2%) and very few dentists prescribed due to pressure of time (4.6%). with statistically significant difference related to age (p=0.01) and chi-square value of 22.43.

In terms of antibiotic use for dental infection with various clinical signs, an encouraging range of answers was found (Table 2). 95.3% of dentists prescribed antibiotics for dental infections with difficulty in swallowing, while localized and fluctuant swelling and generalized diffuse swelling were the second most common reasons (75.7% and 72.3%), and the Chi-square test was significant for gender (p=0.03).

Table 2 Different responses of dentists regarding the antibiotic use in relation to age, gender, qualification, years of experience, and type of practice

	Yes	No	Age		Gender		Qualification		Years of Experience		Type of Practice	
			γ^2	p-value	γ^2	p-value	γ^2	p-value	γ^2	p-value	γ^2	p-value
Pain	54.30%	6.90%	1.24	0.87	4.97	0.08	3.57	0.16	2.95	0.51	2.6	0.6
Systemic spread	78.60%	2.90%	5.8	0.21	3.07	0.21	2.63	0.26	5.17	0.22	1	0.9
Localized fluctuant swelling	75.70%	1.20%	3.49	0.47	6.81	0.03*	1.93	0.37	2.15	0.73	2.659	0.61
Gross diffuse swelling	72.30%	1.70%	7.1	0.13	6.55	0.03*	1.6	0.44	3.721	0.42	1.92	0.75
Difficulty in swallowing	95.30%	4.70%	2.93	0.23	0.86	0.31	1.01	0.31	3.13	0.24	2.25	0.32
Closure of the eye due to infection	60.10%	2.90%	7.09	0.88	0.08	0.25	1.05	0.13	4.259	0.37	4.99	0.28

*Statistically significant at p-value<0.05, γ^2 (Chi-square)

Dentists seldom prefer culture and sensitivity tests before prescribing antibiotics in case of severe facial infections. 11.6% reported that they did not prefer culture and sensitivity tests, where 31.2% reported doing so occasionally, 28.3% always did.

The following pie chart shows (Figure 1) the responses regarding the prescription pattern of the dentists, about the safest antibiotics during pregnancy. Amoxicillin was the first choice for most of them (42.8%), followed by ciprofloxacin

(16.8%) and gentamycin (15.6%). 11.6% of dentists thought that they do not consider any antibiotic safe in pregnancy and Chi-square test was not significant for age, gender, qualification, years of experience, and type of practice.

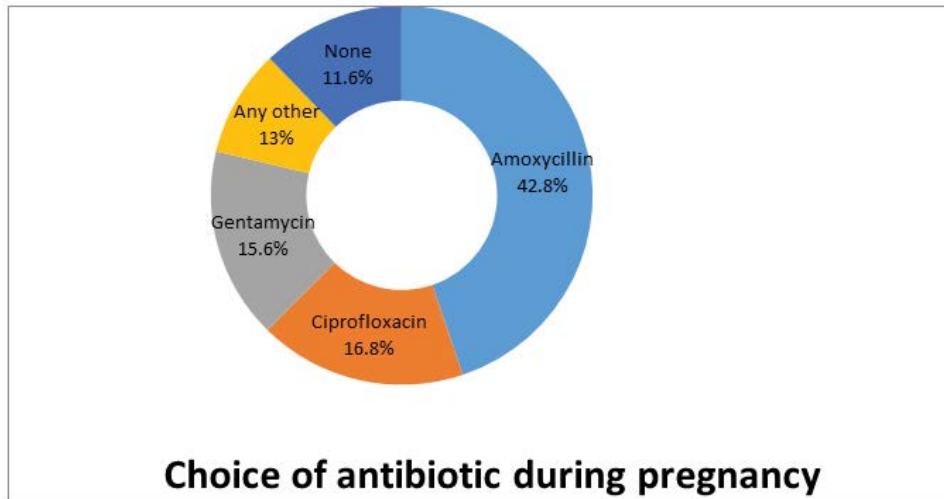
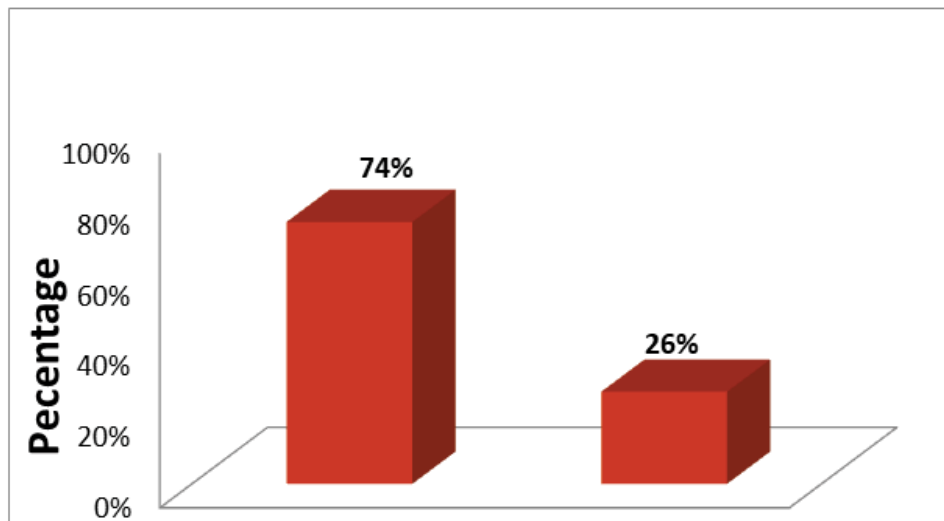


Figure 1 Percentage of responses regarding the choice of antibiotic during pregnancy

Graph 1 shows 74% of the participating dentists agreed that antibiotic resistance is a problem for which Chi square test was highly significant for years of experience (p=0.001).



Graph 1 Percentage of responses for agreement of antibiotic resistance

The dentists who attended continued medical/dental education programs or short course duration courses on antibiotics were only 33.5%. The source of knowledge gained and information regarding antibiotic prescription for 29.7% of the participants was University courses and for 24.2% of the respondents, it was WHO guidelines, and the Chi-square test was significant for gender (p=0.012) and qualification (p=0.021).

Antibiotic Preference in Odontogenic Infections

Multivariate logistic regression analysis of the influence of the independent variables Gender (male: 1, female: 2), Age (1: ≤ 35 years, 2: >35 years), Experience (1: <5 years, 2: 5-10 years, 3: >10 years), and Academic qualification (1: BDS, 2: MDS), Type of practice (Practice/Group practice/Institutionally Attached) on the dependent variable preference of antibiotic in patients with odontogenic infections (Table 3).

Table 3 Responses regarding antibiotic preference in odontogenic infections

Independent variable	B	p-value	Odds ratio	95% confidence interval
Gender	2.667	0.03*	0.006	0.006-0.767
Age	7.38	0.154	1.907	0.726-1.132
Years of experience	18.741	0.001*	6.832	0.006-0.914
Qualification	2.530	0.514	2.57	0.011-1.737
Type of practice	18.14	0.352	2.15	0.524-1.767

*Statistically significant at p-value<0.05, B: Unstandardized Beta

Study Limitations

We need to consider the results of this study in light of some study limitations. As the survey was self-administered, responses might have been subjected to response bias. The dentists who participated may not be the representative dentists of Davanagere. Although a few trends were evident, the sample size was small and thus inferences were difficult. Despite these limitations, the study also has strengths. The study results provide preliminary data regarding the extent to which professionals were adhering to professional guidelines. The present study sets the stage for further research.

DISCUSSION

Antibiotics were prescribed almost daily by more than half of the Dentists (53.8%) and seven percent of the respondents hardly ever prescribed antibiotics. These findings can be correlated with the study done by Sumit Mohan [7]. The results of the present study show that patient's history was the main reason for prescribing, only 9.2% of the dentists prescribed the antibiotics on patients demand similar to the study of Salako, et al., i.e. 4%-8% whereas studies done in Australia and US showed small but significant% of prescriptions due to patients expectation [9-11]. Where some dentists prescribed antibiotics from patient pressure, the fear of medical litigation, or just simply poor clinical decision making [12,13]. In another study more than half of the dentists prescribed due to patients' expectations (57.32%) which does not match our study results (9.2%) and is non-significant p=0.13 [14]. Postponement of the treatment was the second most common reason which can be compared with the study conducted by Kohler, et al. [15].

As per the results, half of the dentists prescribed the antibiotics for five days of duration followed by three days, but a survey in Canada found that the average duration of antibiotic use prescribed by dentists is 6.92 days [16]. And a study done in Spain and Croatia, the average duration of antibiotic therapy was 7 days [17,18].

Dentists prescribing antibiotics for the reason of pain were 54.3% in our study but other studies have said that the presence of severe pain, such as acute pulpitis, for example, is not a justification for antibiotic therapy; rather its use is reserved for conditions associated with evidence of systemic spread [19].

Our respondent dentists feel amoxicillin is the first choice for the safest antibiotic during pregnancy (42.8%) which favours the study conducted by Sukhvinder S. Oberoi and this is because of better absorption from GIT (Gastro-Intestinal Tract) providing higher and more sustained serum levels and post-antibiotic effect [20]. If the decision to prescribe an antibiotic is made, it may be necessary to use microbiological testing to choose the appropriate antibiotic. Microbiological testing by culture and sensitivity tests will help choose the best antibiotic [21,22].

Continuing Dental Education program (CDE) offers an important source for dental professionals that enlightens and upgrades their clinical skills and knowledge, updating the knowledge on the use and misuse of antibiotics which in turn will affect the prescribing practices. The proportion of the participants who have attended the Continued Dental Education program on antibiotics was 33.5%, a bit closer to the study conducted by Bullapa which was more than the study conducted by Salako, et al., (18%) [9,23]. In the present study, participants had a good opportunity to attend Continuing Dental Education program (CDE) programs on antibiotic prescription but lacked the enthusiasm to do so.

Limitations

As the majority of the study participants in our study belonged to age \leq 35 years, there might be plausibility in

decision-making about the use of antibiotic prescription. There is a need for the dental profession as a whole to acquire an in-depth understanding of the global effects of superfluous antibiotic prescription. But when they are used judiciously, can be precise life-saving drugs.

CONCLUSION

As per their views, there was an over-prescription of antibiotics. The dentist's over-prescription of antibiotics may be due to the lack of scientific awareness of the condition and pharmacology of the medication, patient requirement, or other unknown factors. Dentists need to understand the importance of antibiotic stewardship in the oral health setting and reflect on their antibiotic prescription practices. Good knowledge about the prescription of antibiotics is the need of the hour to suppress the emergence of antibiotic-resistant organisms.

DECLARATIONS

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

- [1] Dar-Odeh, Najla Saeed, et al. "Antibiotic prescribing practices by dentists: A review." *Therapeutics and Clinical Risk Management*, Vol. 6, 2010, p. 301.
- [2] Mohsen, Samiha, James A. Dickinson, and Ranjani Somayaji. "Update on the adverse effects of antimicrobial therapies in community practice." *Canadian Family Physician*, Vol. 66, No. 9, 2020, pp. 651-59.
- [3] Yingling, Nicole M., B. Ellen Byrne, and Gary R. Hartwell. "Antibiotic use by members of the American Association of Endodontists in the year 2000: Report of a national survey." *Journal of Endodontics*, Vol. 28, No. 5, 2002, pp. 396-404.
- [4] Pallasch, T. J. "Global antibiotic resistance and its impact on the dental community." *Journal of the New Jersey Dental Association*, Vol. 71, No. 2, 2000, pp. 14-15.
- [5] Yu, Jiali, et al. "Analgesic and antibiotic prescription pattern among dentists in Guangzhou: A cross-sectional study." *Pain Research and Management*, Vol. 2020, 2020.
- [6] Kaul, Rahul, et al. "A survey on the use of antibiotics among the dentists of Kolkata, West Bengal, India." *International Journal of Clinical Pediatric Dentistry*, Vol. 11, No. 2, 2018, p. 122.
- [7] Sumit, Mohan, and Jyoti Thakur. "A questionnaire based survey on the antibiotic prescription pattern of dentists in eastern part of India." *International Journal of Contemporary Medical Research*, Vol. 6, No. 4, 2019, pp. 16-19.
- [8] Buonavoglia, Alessio, et al. "Antibiotics or No antibiotics, that is the question: An update on efficient and effective use of antibiotics in dental practice." *Antibiotics*, Vol. 10, No. 5, 2021, p. 550.
- [9] Salako, N. O., et al. "Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait." *Journal of Dentistry*, Vol. 32, No. 7, 2004, pp. 503-09.
- [10] Teoh, L., et al. "A survey of prescribing practices by general dentists in Australia." *BMC Oral Health*, Vol. 19, No. 1, 2019, pp. 1-8.
- [11] Germack, Mark, et al. "Antibiotic use in 2016 by members of the American Association of Endodontists: Report of a national survey." *Journal of Endodontics*, Vol. 43, No. 10, 2017, pp. 1615-22.
- [12] Steed, M., and J. Gibson. "An audit of antibiotic prescribing in general dental practice." *Primary Dental Care: Journal of the Faculty of General Dental Practitioners (UK)*, Vol. 4, No. 2, 1997, pp. 66-70.
- [13] Patait, Mahendra, et al. "Antibiotic prescription: An oral physician's point of view." *Journal of Pharmacy & Bioallied Sciences*, Vol. 7, No. 2, 2015, p. 116.
- [14] Vardhan, T. Harsha, N. Vijaya Lakhshmi, and B. Haritha. "Exploring the pattern of antibiotic prescription by dentists: A questionnaire-based study." *Journal of Dr. NTR University of Health Sciences*, Vol. 6, No. 3, 2017, p. 149.
- [15] Kohler, Melanie, et al. "Prescription of antibiotics in the dental practice: A survey of dentists in Switzerland." *Swiss*

- Monthly Journal of Odontology and Stomatology*, Vol. 123, No. 9, 2013, pp. 748-59.
- [16] Epstein, Joel B., Sandra Chong, and Nhu D. Le. "A survey of antibiotic use in dentistry." *The Journal of the American Dental Association*, Vol. 131, No. 11, 2000, pp. 1600-09.
- [17] Segura-Egea, Juan José, et al. "Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons." *International Endodontic Journal*, Vol. 43, No. 4, 2010, pp. 342-50.
- [18] Peric, Marina, et al. "The pattern of antibiotic prescribing by dental practitioners in Zagreb, Croatia." *Central European Journal of Public Health*, Vol. 23, No. 2, 2015, pp. 107-13.
- [19] Alkhabuli, J., M. Kowash, and A. Shah. "Knowledge and attitude of Northern Emirates dental practitioners towards antibiotic prescription and its resistance." *International Journal of Dentistry and Oral Health*, Vol. 2, No. 3, 2016.
- [20] Oberoi, Sukhvinder S., et al. "Antibiotics in dental practice: How justified are we." *International Dental Journal*, Vol. 65, No. 1, 2015, pp. 4-10.
- [21] Ramasamy, Akilesh. "A review of use of antibiotics in dentistry and recommendations for rational antibiotic usage by dentists." *The International Arabic Journal of Antimicrobial Agents*, Vol. 4, No. 2, 2014.
- [22] Peterson, Larry J. "Contemporary management of deep infections of the neck." *Journal of Oral and Maxillofacial Surgery*, Vol. 51, No. 3, 1993, pp. 226-31.
- [23] Bullappa, Deepa. "Current Trends in prescription of antibiotics among dentists working in various dental colleges of Bangalore city, India-A cross sectional study." *Journal of Oral Health and Medical Research*, Vol. 2, No. 2, 2015, pp. 8-14.