



A questionnaire-based survey about the prescription pattern and awareness of antibiotic prophylaxis and resistance among general dentists and dental students in Dakshina Kannada: A cross-sectional study

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Abstract : Prescribing antibiotics by dental practitioners has become an important aspect of day-to-day dental practice. This is the reason why antibiotics account for a huge majority of medicines being prescribed by dentists. As it has been associated with bacteremia induced due to dental procedures, antibiotics have historically been prescribed as a prophylactic measure. Keeping in mind the results obtained from previous studies, we took up the present study to investigate the antibiotic prescribing practices of dentists.

IndexTerms -Antibiotic prescriptions, antibiotic resistance, prophylactic

INTRODUCTION

The term "antibiotic" was derived from a combination of two words.

Anti means "against" and Biosis means "life".

Proper use of antibiotics in conjunction with surgical treatment is the most appropriate method for treating various odontogenic infections. Alexander Fleming, who along with Howard Florey and Ernst Chain shared the Nobel Prize in 1945 in Physiology and Medicine, addressed in his lecture: "It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body."

Prescribing antibiotics by dental practitioners has become an important aspect of day-to-day dental practice. This is the reason why antibiotics account for a huge majority of medicines being prescribed by dentists.

The global issue of antimicrobial resistance has risen dramatically, which has now been recognized by the World Health Organization (WHO) as a serious public health threat facing humanity.

The relatively uncommon condition, infective endocarditis is an infection within the heart affecting the inner lining and/or heart valves. As it has been associated with bacteremia induced due to dental procedures, antibiotics have historically been prescribed as a prophylactic measure.

We have now entered an era where some bacterial species are resistant to the full range of antibiotics presently available, with the methicillin-resistant Staphylococcus aureus and vancomycin-resistant Staphylococcus aureus being the most widely known example of extensive resistance.

Keeping in mind the results obtained from previous studies, we took up the present study to investigate the antibiotic prescribing practices of dentists. The present study aims to determine the pattern of antibiotic prescription among dental surgeons of Dakshina Kannada and assess their attitude toward growing antibiotic resistance.

AIM OF THE STUDY:

The study aims to assess the pattern of antibiotic prescription and its prophylactic use in dentistry.

OBJECTIVES OF THE STUDY:

1. The prevalence of prescribing antibiotics for dental problems;
2. Clinical (therapeutic/prophylactic) and non-clinical indications where antibiotics are prescribed in dentistry;

3. The types and regimen of antibiotics used;
4. Differences in antibiotic prescription based on provider characteristics;
5. The factors influencing practitioners' prescription patterns; and
6. To quantify the magnitude of inappropriate antibiotic prescribing by dentists

MATERIALS & METHODS:

Source of the data and Sample size: A total sample size of 150, KVG Dental College and Hospital

Method of collection of data: The present study was designed as a descriptive cross-sectional study performed among the dentists of Dakshina Kannada after obtaining ethical clearance from the Institutional Ethics Committee of KVG Dental College and Hospital,

Survey questionnaire :

We will use Forms App, a self-administered online questionnaire), made up of 15 questions in 3 blocks:

The third block assessed participants addressing attitudes toward antibiotics and bacterial resistance;

- The second block assessed antibiotic prescribing habits in different scenarios;
- The first block gathered personal and professional data.

Scoring and data analysis:

The score of each option will be multiplied by the percentage of intensivists who selected that option and an average score of individual questions will be calculated for comparison.

The intensivists will be asked to choose the most suitable option in their opinion. The data will be collected in percentage responses, the options will be scored for ranking.

SELECTION CRITERIA

Inclusion criteria :

- Studies will be carried out in India and on Indian populations and those that were available electronically were included.
- The study will evaluate the prescription of prophylactic or therapeutic antibiotics by general dental practitioners, specialist dental practitioners (dentists with additional training and included in the Dental Council of India's specialist register), will be considered eligible.
- Final year students and interns of BDS

Exclusion criteria :

- Any nationality except Indian.

SURVEY QUESTIONS :

1. How frequently do you write prescriptions for antibiotics for dental infections?
 - a) Daily
 - b) Weekly
 - c) Monthly
 - d) Hardly ever
2. What is the most common antibiotic prescribed by you?
 - a) Amoxicillin
 - b) Amoxiclav
 - c) Amoxicillin + Metronidazole
 - d) Ofloxacin + Ornidazole
3. What is the most common route of antibiotic administration?
 - a) Oral
 - b) Intravenous
4. Minimum number of days for prescribing antibiotic
 - a) 3
 - b) 5
 - c) 7
 - d) 10
5. Do you take a medical history of the patient before prescribing antibiotics
 - a) Yes
 - b) No
6. Most common determinant for prescribing antibiotics:

7. If the patient is allergic to penicillin which antibiotic, do you usually prescribe?
 - a) Erythromycin
 - b) Clindamycin
 - c) Azithromycin
 - d) Others
8. Factors you consider primarily while prescribing a particular Brand of antibiotics:

- a) Popularity of Brand
 - b) Availability of Brand
 - c) Affordability of Brand
9. Indiscriminate antimicrobial use leads to the emergence of a growing problem of resistance:
 - a) Yes
 - b) No
 10. What according to you is the solution for the growing problem of Antimicrobial Resistance?
 - a) Judicious, careful, and rational use of medicine
 - b) Complete full course of antimicrobials in the prescribed dose
 - c) Avoid self-medication
 - d) Multiple drug therapy
 - e) Symptomatic management in self-limiting conditions
 - f) Awareness among patients by organizing a public health campaign
 - g) Prescribing using a culture sensitivity report
 - h) New drug discovery
 11. What is your primary source of updated information?
 - a) Scientifically Published Literature
 - b) CDE & Conferences
 - c) Textbooks
 - d) Internet

INVESTIGATION DESIGN

An electronic link to the questionnaire will be generated and will be distributed to a representative sample of 150 dentists and students through emails. The study sample will be chosen using a random number generator from a list containing all dentists and students fulfilling the inclusion and exclusion criteria obtained from the KVG Dental College and hospital. The questionnaire will be prefaced with the consent section which explains the study's purpose, nature of the survey, study objectives, and voluntary participation.

Informed consent will be obtained from each participant in the form of answering a question (Yes/No) before proceeding with answering the questionnaire. The questionnaire will consist of close-ended questions (Yes/No) or multiple choices. Five questions related to demographic details and practice information including specialty, graduation from university, clinical experience, and work practice. 10 questions describing clinical situations for which antibiotics were prescribed routinely, the most commonly prescribed antibiotics, the duration of the antibiotic course, prescription in the presence of anaerobic infection, and systemic conditions., along with awareness of antibiotic resistance. Possible causes of antibiotic misuse from the dentist's perspective were evaluated in 2 questions with Yes/No answers.

Table 1 Demographic data and practice information for the study population

Variable	Number (N)	Percentage (%)
<i>1. Educational qualification</i>		
General Dentist/ Clinician	28	18.67 %
Post Graduate	53	35.33 %
Dental surgeon / Intern / Students	63	42.00 %
Academician	4	6 %
<i>2. Age</i>		
< 30 years	111	74 %
30 – 40 years	34	22.67 %
40 – 50 years	3	2 %
> 50 years	2	1.33 %
<i>3. Gender</i>		
Female	98	65.33 %
Male	52	34.67 %
<i>4. Type of practice :</i>		
Specialty	29	19.33 %
General Practice	77	51.33 %
Both	44	29.33 %

Bias

All dental practitioners who took part in the study were chosen randomly and asked to complete a self-administered questionnaire anonymously to limit selection bias. All participants were given the same explanation about the study's nature and purpose to limit information bias.

Table 2: Responses to the questionnaire

Question	Number (N)	Percentage (%)
5. How frequently do you write prescriptions for antibiotics for dental infections?		
Daily	55	36.67 %
Weekly	52	34 .67 %
Monthly	41	27.33 %
Hardly ever	2	1.33 %
6. What is the most common antibiotic prescribed by you?		
Amoxicillin	88	59.46%
Amoxicillin + Metronidazole	37	25%
Ofloxacin + Ornidazole	0	0
Amoxiclav	23	15.3%
Not Answered	2	-
7. What is the most common route of antibiotic administration?		
Oral	147	98.66%
Intravenous	2	1.34%
Not Answered	1	-
8. Minimum number of days for prescribing antibiotic :		
3	54	36.00%
5	90	60.00%
7	5	3.33%
10	1	0.67 %
9. Do you take a medical history of the patient before prescribing antibiotics:		
Yes	145	97.97%
No	3	2.03
Not Answered	2	-
10. If the patient is allergic to penicillin which Antibiotics do you usually prescribe?		
Erythromycin	73	49.66%
Clindamycin	60	40.82%
Azithromycin	14	9.52%
Others	0	0
Not Answered	3	-
11. Factors you consider primarily while prescribing a particular Brand of antibiotics:		
The popularity of Brand	53	35.57%
Availability of Brand	49	32.89%
Affordability of Brand	47	31.54%
Not Answered	1	-
12. Most common determinant for prescribing antibiotics:		
Acute pulpitis / irreversible pulpitis	15	10%
Apical periodontitis	29	19%
Periapical abscess / dentoalveolar abscess	47	31.3%
Periodontal abscess	25	16.66%
Pericoronitis	34	22.66%
13. Indiscriminate antimicrobial use leads to the emergence of a growing problem of resistance:		
Yes	142	96.60%
No	5	3.40%
Not Answered	3	-
14. What is your primary source of updated information?		
Scientifically Published Literature	24	16.11%
CDE & Conferences	29	19.46%
Textbooks	70	46.98%
Internet	26	17.45%
Not Answered	1	-
15. What according to you is the solution for the the growing problem		

of Antimicrobial Resistance?

Judicious, careful, and rational use of medicine	42	28%
Complete the full course of antimicrobials in the prescribed dose	36	24%
Avoid self-medication	25	25 %
Multiple drug therapy	10	6.66%
Symptomatic management in self-limiting conditions	3	2%
Awareness among patients by organizing a public health campaign	23	15.53%
Prescribing using a culture sensitivity report	9	6%
New drug discovery	2	1.33%

RESULTS

The present survey link was sent to 150 subjects including dentists and interns out of which all 150 dentists completed the survey, thereby achieving a response rate of 100%. Responders of the present survey included 34.64% males and 65.33% females with 74% of respondents being <30 years of age; 22.61% being 30-40 years; 2 % being 40 – 50 years; > 50 years being 1.33%. The majority of the respondents were Interns(42%), postgraduates (35%), general dentists (18.67%), and academicians (6%) . The main source of updated information regarding the use of antibiotics was found to be the latest editions of textbooks (46.98%).

Most of the respondents (59.46%) chose amoxicillin in nonallergic patients and associated with clavulanic acid(15.3%).

Amoxicillin was prescribed as the first-choice antibiotic by 59.46% of respondents, which is appropriate for oral infection, while 25, 23,0, selected a combination of amoxicillin and metronidazole, amoxicillin/clavulanic acid, and ofloxacin + ornidazole respectively as in (Table 2). If patient was found to be allergic to penicillin, drug of first choice in that case was erythromycin (49.66%), followed by clindamycin (40.82%) and azithromycin (9.52%). As per the results of the current study, the minimum duration of antibiotic therapy was 5 days for majority (60%), while a considerable number of respondents prescribed antibiotics for a minimum of 3 days (36.0%). The principal determinant for prescribing antibiotics was Periapical abscess / dentoalveolar abscess(31.3%).

The popularity of that particular brand (35.57%) was the factor that was primarily considered while prescribing a particular brand while Availability of Brand by 32.89% and Affordability of brand (31.54%) respectively .

Overall, evidence suggesting over-prescription was found for the following conditions: reversible pulpitis and irreversible pulpitis (10%) with and without vital pulp, localized dentoalveolar abscess with (31.3%) and without draining fistula, periodontal abscess (16.66%), apical periodontitis (19%) chronic or acute, pericoronitis (22.66 %). Almost everyone (96.60%) among the respondents believed that antibiotic resistance was an emerging problem of drug resistance and, there was an overprescription of antibiotics.

Table 3: Duration of the antibiotic course and Awareness of dentists to the antibiotic prescription and prophylaxis guidelines, and antibiotic resistance :

	Coefficient B	Standard error	z	p	Odds Ratio	95% conf. interval
Constant	-0.78	2.04	0.38	.701	0.46	0.01 - 24.87
6. How often do you write prescription for antibiotics for dental infection ? Daily	1.4	0.68	2.06	.04	4.07	1.07 - 15.55
6. How often do you write prescription for antibiotics for dental infection ? Weekly	1.02	0.7	1.46	.145	2.78	0.7 - 11.03
6. How often do you write prescription for antibiotics for dental infection ? Hardly ever	2.53	1.54	1.65	.1	12.54	0.62 - 254.77
11. Do you take medical history of patient before prescribing antibiotic : Yes	-1.31	1.44	0.91	.362	0.27	0.02 - 4.54
11. Do you take medical history of patient before prescribing antibiotic : No	-0.31	2.11	0.15	.884	0.73	0.01 - 46.21
14. Do you believe that Antibiotic Resistance is of growing concern ? Yes	-0.43	1.27	0.34	.734	0.65	0.05 - 7.81
14. Do you believe that Antibiotic Resistance is of growing concern ? No	-0.92	1.91	0.48	.628	0.4	0.01 - 16.63

DISCUSSION

The present study evaluated the antibiotic prescribing practices among the dentists and dental surgeons of Dakshina Kannada and their attitude toward the growing concern of antibiotic resistance. In the present study, the questions were based on those in previous surveys developed in the USA [10] and Spain. [11,12]. The overall response rate was similar to response rates found in other published surveys [9,13]. Endodontic infections typically have a rapid onset and short duration, most specifically if the cause is treated or eliminated. Prolonged courses of antibiotics destroy the commensal flora, thereby abolishing colonization resistance. The prescribing of systemic antibiotics hence needs to be justified. A broad spectrum of activity of amoxicillin, what is required for endodontic needs, and its injudicious use in a healthy individual may contribute to the global antibiotic resistance problem [14]. The results of the present study were per the results obtained from a study conducted in the USA which found that amoxicillin was prescribed only by 27.5% of members of the AAE [10].

This study found that the second most frequently prescribed antibiotic for non-penicillin-allergic patients was a combination of amoxicillin and metronidazole (25%). On the contrary, as per the survey conducted in Spain, the leading antibiotic was amoxicillin plus clavulanic acid, followed by amoxicillin alone [4]. Amoxicillin has also been found to be the most commonly prescribed antibiotic in European countries [15]. In the present study, the drug of first choice in patients with a penicillin allergy was found to be erythromycin (49.66%). In contrast to the results of the present study, clindamycin was the most prescribed drug in penicillin-allergic patients in the USA (21.6 and 57.03%) [10] and Spain (63.2 and 65.4%) [11,12]. Other antibiotics prescribed for patients with a penicillin allergy were azithromycin (9.52%) and clindamycin (40.82%).

Azithromycin does not find any role in oral infection because about 82% of oral streptococci develop resistance to macrolides after a single course [16]. Clindamycin is a good choice if the patient is allergic to penicillin, although clindamycin has a low, but serious, risk of pseudomembranous colitis [17]. Metronidazole is very effective against obligate anaerobes, but not against facultative anaerobic bacteria. Hence, it becomes necessary for it to be used in conjunction with other agents. Moreover, if within 48 hours the patient is not responding to penicillin alone, one can consider adding metronidazole to the existing drug regimen.

Inadequate duration of the therapy or overdosing of the antibiotics has resulted in damaging the host response, thereby producing toxic effects [10]. Treatment of most odontogenic infections requires an average of 5 to 7 days of therapy; however, treatment of severe infections or immunocompromised patients' therapy can be of longer duration owing to reduced immunity. A rule of thumb when prescribing is that the antibiotic should last for 3 days after the patient's symptoms have been resolved [10].

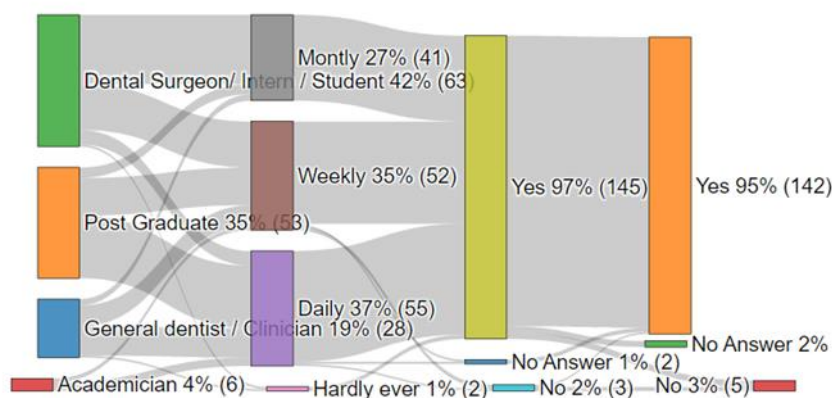
In the present study also, many respondents (60%) responded that they would give antibiotics for a minimum of 5 days. Patient compliance also plays a major role in effective treatment. Most of the patients stop the drug therapy as and when initial symptoms are resolved. Affordability of the brand was considered the main factor while prescribing a particular brand whereas present study most of the respondents chose the popularity of the brand as a main factor. The drug may be too expensive or not covered by a third-party payer and the prescription remains unfilled. An alternative to this can be a prescribing generic drug. Dosing frequency may be complicated. The compliance issue most often observed is missed doses after clinical symptoms have subsided. Another compliance challenge is the untoward or unexpected side effects that can occur when taking antibiotics. In all these cases, there is a chance for mutated microbes to flourish thereby causing serious consequences.

Endodontic conditions like reversible pulpitis, and irreversible pulpitis with moderate/severe preoperative symptoms, with or without acute periodontitis do not warrant antibiotic coverage [7,10]. Necrotic pulp with dentoalveolar abscess, with or without fistula, with no swelling, and no/mild symptoms does not require the use of antibiotics as treatment can be restricted to nonsurgical root canal therapy; however, 31.3% of respondents of this study population reported antibiotic use. In the present study, a higher percentage of dentists prescribed antibiotics for necrotic pulp with chronic apical periodontitis with sinus tract and no/mild preoperative symptoms as compared with that prescribed by Spanish [11] and American dentists [10]. Therefore, antibiotics must be considered only as an adjunct to conventional root canal therapy or when emergency treatment is not possible [18]. This outcome suggests that the scientific basis for prescribing antibiotics was ignored by the majority of dental surgeons. Dental surgeons need to have a thorough understanding of the clinical indications for antibiotic prescription to prevent the misuse or overuse of these drugs [19]. Since the majority of respondents were young, i.e., age <30 years, it is their duty toward society to initiative not to repeat these practices, instead help in the prevention of the resistance problem which is now accepted as a challenge worldwide.

Fig 1: Sankey Diagram based on the results about prescription frequency, medical history and growing concerns about the Antibiotic Resistance among Dentists :

Research Through Innovation

Sankey Diagram (Click here)



1. Are you :
 6. How often do you write prescription for antibiotics for dental infection ?
 11. Do you take medical history of patient before prescribing antibiotic :
 14. Do you believe that Antibiotic Resistance is of growing concern ?

STUDY LIMITATIONS

This study has a series of limitations. The sample may not be representative of all dentists in Dakshina Kannada, something that may affect the estimation of the magnitude of the problem, since this could be affected by non-response bias. Since the survey was self-administered, responses may have been subject to response bias. Although a few trends were evident, the sample size was small and thus inferences were difficult. Despite all these limitations, this study has several strengths, including being the first in the region to our knowledge to report on this topic of importance and clinical relevance. The questionnaire used is not fully validated because it was not possible to assess the validity criterion since there is no external gold standard method for measuring attitudes. However, finding statistically significant differences between knowledge/attitudes and prescribing practices would support the construct validity of this statement, since there is a conceptual framework (model of knowledge, attitudes, and practices) that would explain these associations. The study results provide preliminary data regarding the extent to which professionals were adhering to professional guidelines. The data also included patterns among not only general dentists but also all specialties. The present study sets the stage for further research.

CONCLUSIONS

In the context of the current global emergency surrounding the problem of resistance, dentists play an important role in the misuse of antibiotics. In this survey, prescription patterns of the antibiotics indicated high levels of variability. De-escalation, which plays a critical role in decreasing antimicrobial resistance, was not adopted by all the intensivists surveyed. An antibiotic policy should be formed and followed. Most of the respondents of this survey were young dentists. It is their responsibility to curb this problem instead of going along with the flow. There is an urgent need to raise public and professional awareness regarding the risks of injudicious use of antibiotics in dentistry.

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