

Antibiotic Prescription Knowledge among Dental Students at BPKIHS, Dharan, Nepal

Mamta Dali,¹ Sneha Shrestha,² Bandana Koirala³

¹Associate Professor, ²Assistant Professor, ³Professor

¹⁻³Department of Pedodontics and Preventive Dentistry, B. P. Koirala Institute of Health Sciences, Dharan, Nepal.

ABSTRACT

Introduction: Drug prescription is the act of indicating one or more drugs which requires theoretical and clinical knowledge combined with practical skills. Wrong drug posology is the most common prescription error done by students creating a serious issue because it directly affects patients' health and safety.

Objectives: To assess the knowledge of fourth year and final year BDS students on antibiotic prescription for the common oral conditions.

Methods: A pretested questionnaire based cross-sectional study was conducted involving 82 BDS students from 4th and final years of BPKIHS, Dharan from January - December 2017, to assess the most commonly prescribed antibiotics, the dental conditions that need antibiotics, barriers during prescribing antibiotics, sources of information used for prescribing drugs, and awareness regarding the WHO Guide to Good Prescribing. Statistical analysis was performed in SPSS and expressed as frequency distribution in percentages.

Results: Amoxicillin was the most commonly prescribed drug for majority of dental infections (93%). It was used for 97% of orofacial infections and 88% of dentoalveolar abscess. The main barriers for the prescription were "not knowing the exact drug dose" (28%) and not knowing the brand names (24%). The WHO guidelines were not followed by 82% of the students, whereas 92% were aware of antibiotic resistance and their possible reasons.

Conclusion: Knowledge on antibiotic prescription was found insufficient and following of the specific professional guidelines was regrettably low. Most commonly prescribed drug was amoxicillin and main barrier during prescription writing was lack of knowledge on the proper drug posology.

Keywords: Antibiotics, dental students, prescription, resistance.

INTRODUCTION

Prescribing is an act of indicating the drug/drugs to be administered to or taken by the patient, including the dosage and duration. A graduate needs stiff foundation in the principles of therapeutics, underpinned by a scientific understanding of the drug action.¹

The advent of antibiotics constitutes a greatest revolutionary advancement. Initially, Penicillin and other

antibiotics viewed as miracle drugs, have now become a serious public health concern.² Indiscriminate prescription and improper use by the patients result in: antibiotic resistance, overgrowth of microbial agents, and many other side effects.³

Common dental infections like pulpitis and periodontitis require operative measures but antibiotics too are prescribed for them. Antibiotics are irrationally prescribed even for the oral viral infections.⁴ One of the basic factor for irrational prescription maybe improper instructions to the students.⁵

In Nepal, pharmacology is taught to dental students in the first and second years, while its clinical application occurs only years later. A study has shown that what is learned in pharmacology is very subjective and only less than 50% believed they had acquired enough knowledge in pharmacology.⁶

Correspondence



Dr. Mamta Dali

Associate Professor

Department of Pedodontics and Preventive Dentistry,
BPKIHS, Dharan, Nepal

E-mail: mamtadali@hotmail.com

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Therefore, this study aims to assess the antibiotic prescribing knowledge of fourth year and final year dental students.

METHODS

The present cross-sectional survey was carried out to assess the knowledge and awareness related to antibiotic prescription among 82 fourth year and final year BDS students at College of Dental Surgery (CODS), BPKIHS, Dharan, Nepal. Before the commencement of study from January to December 2017 BPKIHS, Dharan, the protocol was approved by the Institutional Review committee, (Ref. No. Ac.661/073/074). A semi-structured pretested

questionnaire with 15 closed-ended questions was used for this study (Table 1). A pilot study was also conducted on a sample of 10% of the total sample size of students to test the feasibility of conducting the study and understanding of the questionnaire. The results of pilot study were not included in the main study.

Written informed consent was taken. The questionnaire was distributed among students and was collected back the same day. All the collected data were then entered into the Statistical Package for Social Sciences (SPSS, Version 11.5). Responses obtained were tabulated and the results of the questionnaire were expressed as frequency distribution and computed in percentages.

Table 1. Questionnaire used for the survey.

1. Which is the most commonly prescribed antibiotics in dentistry?	
a. Amoxicillin	
b. Metronidazole	
c. Ampicillin	
d. Cephalosporin	
e. Doxycyclin	
2. In which of the following situations should you prescribe antibiotics?	
a. Dentoalveolar abscess	Yes / No
b. Orofacial infections with signs of systemic involvement	Yes/ No
c. Pain relief	Yes/ No
d. Simple extraction	Yes/ No
e. Minor surgical procedures	Yes/ No
f. Endodontic treatment	Yes/ No
g. Patient satisfaction	Yes/ No
3. What is the minimum number of days you should prescribe antibiotics?	
a. 3	b. 5
c. 7	d. >7
4. How will you manage a case of a dentoalveolar abscess?	
a. Prescribe antibiotics and give an appointment later	
b. Establish drainage immediately and then prescribe antibiotics	
c. Establish drainage only; no antibiotic prescription	
5. Do you enquire from your patient whether he/she has taken a course of antibiotics in the past one week before you prescribe it?	
a. Yes	b. No
6. What is your main source for prescription information?	
a. Faculties	
b. Pharmacology courses	
c. Prescription books	
d. Classmates	
e. Medical representatives	
7. What could be your barrier for prescribing antibiotics?	
a. Not knowing when to prescribe	
b. Not knowing what to prescribe	
c. Not knowing the brand names	
d. Not knowing the appropriate drug doses	
e. Not knowing the exact duration of course	

8. **What are the important things to be kept in mind before prescribing antibiotics?**
 - a. Adverse drug interaction
 - b. Side effects
 - c. Patient noncompliance
9. **Are you aware of the current WHO guidelines to good prescribing?**
 - a. Yes
 - b. No
10. **Do you follow the same? (Only if the answer of question no. 10 is yes)**
 - a. Yes
 - b. No
11. **Do you think you should advise your patient on strict adherence to prescribed antibiotic?**
 - a. Yes
 - b. No
12. **Do you believe that antibiotic resistance is a growing concern?**
 - a. Yes
 - b. No
13. **Have you encountered any case of antibiotic resistance?**
 - a. Yes
 - b. No
14. **What could be the possible reason for antibiotic resistance?**
 - a. Inappropriate antibiotic choice
 - b. Inappropriate dose
 - c. Inadequate duration
 - d. Patient noncompliance
15. **How do you primarily keep yourself updated?**
 - a. Lecture
 - b. Internet
 - c. Scientifically published literatures and journals
 - d. CDE and/or Conferences
 - e. Other sources

RESULTS

A total of 82 students responded to this study out of which 57 (69.5%) were females and 25 (30.48%) were males (Figure 1).

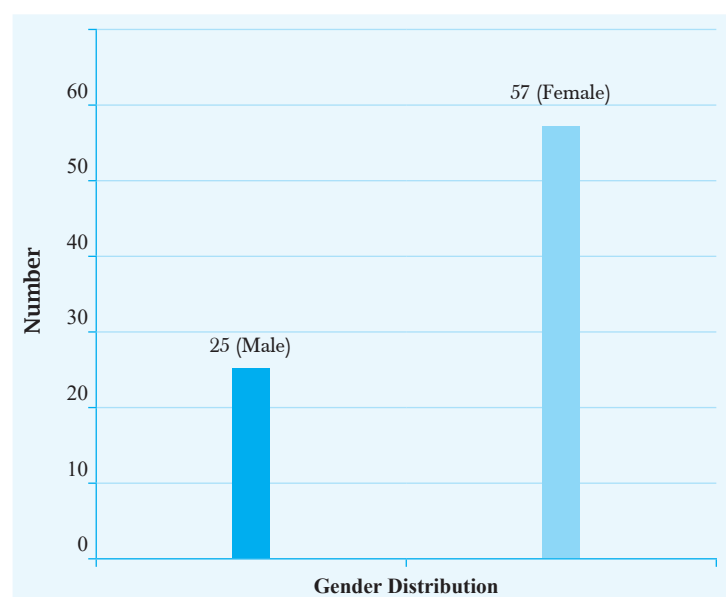


Figure 1. Gender distribution.

Table 2. Frequency distribution of responses to the questions.

Questions	Frequency (n)	Percentage (%)
Which is the most commonly prescribed antibiotics in dentistry?		
Amoxicillin	76	92.7
Metronidazole	3	3.7
Amoxicillin/ Metronidazole	3	3.7
Total	82	100.0
What is the minimum number of days you should prescribe antibiotics?		
3 days	29	35.4
5 days	35	42.7
7 days	16	19.5
>7 days	2	2.4
Total	82	100.0
How will you manage a case of a dentoalveolar abscess?		
Antibiotics	19	23.2
Drainage and antibiotics	58	70.7
Drainage, no antibiotics	5	6.1
Total	82	100.0
Do you enquire from your patient whether he/she has taken a course of antibiotics in the past one week before you prescribe it?		
Yes	75	91.5
No	7	8.5
Total	82	100.0
What is your main source for prescription information?		
Faculties	55	67.1
Pharmacology course	12	14.6
Prescription book	6	7.3
Medical representative	3	3.7
Faculties/ Course/ Books	6	7.3
Total	82	100.0
What could be your barrier for prescribing antibiotics?		
Not knowing when to prescribe	9	11.0
Not knowing what to prescribe	9	11.0
Not knowing the brand names	20	24.4
Not knowing the appropriate drug dosage	23	28.0
Not knowing the exact duration of the course	7	8.5
All	14	17.1
Total	82	100.0
What are the important things to be kept in mind before prescribing antibiotics?		
Adverse drug interaction	39	47.6
Side effects	26	31.7
Patient non compliance	4	4.9
Adverse drug interaction/ side effects	13	15.9
Total	82	100.0

Are you aware of the current WHO guidelines to good prescribing?		
Yes	14	17.03
No	68	82.9
Total	82	100.0
Do you follow the WHO guidelines that you are aware of ?		
Yes	12	85.71
No	2	14.28
Total	14	100
Do you think you should advice your patient on strict adherence to prescribed antibiotic?		
Yes	74	90.2
No	8	9.8
Total	82	100.0
Do you believe that antibiotic resistance is a growing concern?		
Yes	75	91.5
No	7	8.5
Total	82	100
Have you encountered any case of antibiotic resistance?		
Yes	21	25.6
No	61	74.4
Total	82	100
What could be the possible reason for antibiotic resistance?		
Inappropriate choice	21	25.6
Inappropriate dose	23	28.0
Inadequate duration	18	22.0
Patient non-compliance	10	12.2
Inappropriate choice/ dose/ duration	10	12.2
Total	82	100.0
How do you primarily keep yourself updated?		
Lecture	21	25.6
Internet	31	37.8
Published literature journals	19	23.2
CDE/ Conference	2	2.4
All	9	11.0
Total	82	100.0

Most common antibiotics prescribed

Regarding dental students' knowledge towards prescribing antibiotics, it was found that majority of them 76 (92.7%) knew that amoxicillin is the first-choice of antibiotics in dentistry (Table 2).

Clinical conditions where antibiotics are prescribed

A large proportion of students 80 (97.6%) and 72 (87.8%) prescribed antibiotic for orofacial infection

and dentoalveolar abscess respectively whereas others prescribed it for minor surgical procedures 39 (47.6%), endodontic treatment 19 (23.2%), pain relief 11 (13.4%), extraction 4 (4.9%) and patient satisfaction 3 (3.7%) (Table 3).

Minimum number of days for prescribing antibiotics

Most of the students 35 (42.7%) stated that antibiotic should be prescribed for at least 5 days. However, remaining students 29 (35.4%) and 16 (19.5%) answered it

should be for minimum of 3 days and 7 days, respectively. Very few 2 (2.4%) felt antibiotics should be prescribed for more than 7 days (Table 2).

Dentoalveolar abscess management

Most of the students 58 (70.7%) answered that dentoalveolar abscess is managed by drainage and with antibiotic postoperatively, whereas 19 (23.2%) students answered it could be managed only with the antibiotics and rest 5 (6.1%) felt that drainage of the abscess is sufficient and antibiotic is not required (Table 2).

Enquire about antibiotics course in the past one week before prescribing: Majority of the students 75 (91.5%) enquired from patients regarding the intake of antibiotic in the past before prescribing and the remaining 7 (8.5%) did not (Table 2).

Sources of prescription information

Most students sought information for prescription from the faculties 55 (67.1%), followed by 12 (14.6%) from pharmacology course, 6 (7.3%) from prescription books, 3 (3.7%) from medical representatives and rest 6 (7.3%) stated that the sources are from all i.e., faculties/ pharmacology course/ prescription books/ medical representatives (Table 2).

Barriers for prescribing antibiotics

Some students felt that the main barrier during prescription is “not knowing the exact drug dose” 23 (28%), whereas for 20 (24.4%) they did not know the exact brand names, 9 (11%) answered they do not know when to prescribe and what to prescribe. Very few i.e., 7 (8.5%) said they do not know the exact duration of antibiotic course,

whereas for 14 (17.1%) they answered the barrier to be the combination of all (Table 2).

Important things to be kept in mind before prescribing antibiotics: For 39 (47.6%) of the students, the answer was adverse drug interaction, 26 (31.7%) its side effects, and 13 (15.9%) patient noncompliance (Table 2).

WHO Guide to Good Prescribing used

About 68 (82.9%) students were unaware of the WHO guidelines for good prescribing (Table 2). Out of those who were aware, 14 (17.03%) do not follow it.

Strict adherence to prescribed antibiotic

Majority of the students 74 (90.2%) agreed that they should provide advice to their patients for strict adherence to the prescribed antibiotic (Table 2).

Antibiotic resistance, a growing concern and ever encounter it

A significant majority of the students 75 (91.2%) reported being aware of antibiotic resistance and about 21 (25.6%) having encountered the antibiotic resistance cases. The possible reasons being: inappropriate dose 23 (28%), inappropriate choice 21 (25.6%), inadequate duration 18 (22%) and patient noncompliance 10 (12.2%), respectively (Table 2).

Update yourself: Internet was used by 31 (37.8%) students to update themselves, 21 (25.6%) from lecture, 19 (23.2%) from published literature and journals, 2 (2.4%) from CDE and conferences and 9 (11%) stated that they update from all the sources (Table 2).

Table 3. Response to the questions on dental conditions where antibiotics are prescribed.

Dental conditions where antibiotics are prescribed	Yes n (%)	No n (%)	Total n (%)
Dentoalveolar abscess	72 (87.8%)	10 (12.2%)	82 (100)
Orofacial infections with signs of systemic involvement	80 (97.6%)	2 (2.3%)	
Pain relief	11 (13.4%)	71 (86.6%)	
Simple extraction	4 (4.9%)	78 (95.1%)	
Minor surgical procedure	39 (47.6%)	43 (52.4%)	
Endodontic treatment	19 (23.2%)	63 (76.8%)	
Patient satisfaction	3 (3.7%)	79 (96.3%)	

DISCUSSION

Prescribing medicine is a complex task requiring theoretical and clinical knowledge combined with the practical skills. Students must have a thorough knowledge and understanding of the clinical indications for antibiotic prescription including both the therapeutic and prophylactic aspects. It is very essential to have specific indication for antibiotic prescription. They also need an understanding of the risks of adverse effects and the development of resistant strains.⁷

Traditionally, most of the undergraduate dental curriculum has basic pharmacology courses in their first few years that incorporate the pharmacokinetics and pharmacodynamics knowledge needed to understand the pharmacotherapy. However, a true understanding of the context in which medications are prescribed comes with daily clinical practice and is not incorporated into basic pharmacology coursework.⁸

The teaching method often leaves the students to memorize drug information and poorly prepares them to prescribe rationally and thus there is sense of doubt and uncertainty when it comes to clinical prescribing practice. Students are not entirely responsible for prescribing as they prescribe under the guidance of seniors.

Present study attempted to assess the knowledge of BDS students where the pharmacological principles that is learnt during the first and second years gets translated into an effective clinical prescribing skills as they enter into their clinical postings.

This study showed that the majority of students 76 (92.7%) knew amoxicillin to be the most commonly prescribed antibiotics in dentistry. Other studies from England⁹ and Scotland¹⁰ showed that amoxicillin and metronidazole were the most commonly prescribed antibiotics by dental practitioners. Mainjot et al¹¹ in his study found that broad spectrum antibiotics (amoxicillin, amoxicillin-clavulanate and clindamycin) were most commonly prescribed in Belgian dental practice. In the present study, only 3 (3.7%) of the students answered combination of amoxicillin and metronidazole as being the most commonly prescribed drug for dental infections which is almost similar to a study conducted by Palmer et al⁹ where around 5.6% of the prescription frequently included the combination of amoxicillin and metronidazole.

Penicillin is undoubtedly the gold standard drug in treating dental infections. The rationale for choice of amoxicillin could have been its wide spectrum, low incidence of resistance, better pharmacokinetic profile and tolerance, along with its synergism in enhancing the anaerobic activity when combined with metronidazole.¹²

In the present study, response to the most common dental conditions where antibiotic should be prescribed frequently was orofacial infections and minor oral surgical procedures, which coincided with the observations of Guzman Alvarez et al.¹³ A minority of the students 3 (3.7%) reported that antibiotic had to be prescribed even for the purpose of patient satisfaction which was very inappropriate.

Duration of antibiotic prescription has always been variable but the majority of orofacial infections usually resolve within 3 to 7 days. In this study, 35 (42.7%) students answered that they prescribed for 5 days, 29 (35.4%) for 3 days and 16 (19.5%) for 7 days. Short course of antibiotic coverage for two-three days has shown an improvement in patient condition and is usually preferred in children for better compliance. In a survey in Canada¹⁴ and United States¹⁵, it was found that on an average, duration of antibiotics prescribed by dentists was 6.92 days and 7.58 days, respectively.

Available evidence suggests antibiotics prescription should be an exception rather than a rule and, in majority of cases, considered only when the conventional therapies are unsuccessful.¹⁶⁻¹⁹

However, systemic antibiotics should only be used in infections like facial cellulitis accompanied by elevated body temperature and evidence of systemic spread via lymph and blood circulation with the development of septicemia.

Ideally, mainstay therapy for conditions like periapical/dentoalveolar abscess should be incision and drainage and/or endodontic treatment. In the present study, most of the students 58 (70.7%) were found to have prescribed antibiotics even after establishing drainage for the management of periapical abscess, which directly reflects the overuse of antibiotics with no additional benefits. Surprisingly, it is very sad to receive the answer that still 19 (23.2%) students felt that the conditions could be managed only with the antibiotics which provided an evidence of

inadequate knowledge on prescribing practices and calls an alarm to provide a mandated guideline on who should prescribe antibiotics.

Very less numbers of students 5 (6.1%) knew that the most appropriate management of periapical abscess is incision and drainage with no use of antibiotics.

Majority of the students 55 (67.1%) gather their information for prescribing antibiotics from the faculties of their respective departments. This is a very good learning practice for students and is in agreement with a previous study.²⁰ Approximately 12 (14.6%) students rely on their pharmacology books whilst almost 3 (3.7%) and 6 (7.3%) rely on their prescription books or medical representatives, respectively, which is slightly disappointing.

Not knowing the exact dose and brand names were the main barriers for the students to prescribe antibiotics. These findings were similar to the study conducted at Mexican University.²¹ This is a serious issue indeed, concerning patient's health and safety. Factors such as not knowing what to prescribe improperly filled out prescriptions and not knowing the duration of drug administration will unquestionably lead to therapeutic failure. This could worsen the patient's condition and may result in serious medical complications as well.²² To avoid this problem, the WHO Guide to Good Prescribing recommends making a customized list including the essential drugs for each healthcare professional who prescribes drugs at the clinic.²³

The WHO Guide to good prescribing provides step by step guidance to the process of reasonable prescribing, together with many illustrative examples. It teaches skills that are necessary throughout a clinical career. Majority of the students 68 (82.9%) reported that they were not aware regarding WHO guide to good prescribing. Among the few 14 (17.03%) who were aware, around 2 (14.8%) still reported that they do not follow the guide while prescribing. Similar results were observed in another study by Jain et al.²⁴

Inappropriate, indiscriminate, and irrational use of antibiotics has led to the development of antibiotic resistance today. World Health Organization has recognized this growing global problem and announced the theme for the year 2011 as "Antibiotic resistance: No action today, No cure tomorrow".²⁵ Present study revealed approximately 75 (91.5%) of the students to have awareness regarding

antibiotic resistance, of which, 21 (25.6%) had encountered the cases of resistance. The students have highlighted the possible reasons for resistance to be inappropriate dose 23 (28%), inappropriate choice 21 (25.6%) and inadequate duration 18 (22%), respectively. However, the incidences of antibiotic resistance primarily due to their inappropriate use in dentistry are still unknown. Pharmacological information overload and proliferation of new drugs have been recognized as two of the major factors contributing to insufficient pharmacological education. Hence, the necessity to keep one abreast of the changes is a must.

This study revealed almost one-third of the students to have updated themselves with the use of internet, lectures, literatures and journals. Additional provision of teaching about drugs across all learning styles like prescribing workshops, tutorials, problem-based learning, and e-learning could also prove to be wondrous for the benefits of students overall learning.

CONCLUSION

Final year dental students are the future dentists who will be serving the community. Yet, the findings of this study suggest that there was insufficient knowledge on antibiotic prescription and awareness on professional guidelines was regrettably low. Lack of knowledge about drug posology was the main reason for faulty prescription. Our findings also showed that dental students may prescribe antibiotics inappropriately to manage various oral conditions when they are not indicated which provide an evidence that inadequate knowledge regarding antibiotic use and resistance do exists. A large proportion of students (82.9%) were not well acquainted about the "WHO Guide to Good Prescribing."

Prescription is influenced by undergraduate and postgraduate education which can be improved only by emphasizing the recommended guidelines in dental school's curriculum and clinical manuals. Sensitization and awareness on "WHO Guide to Good Prescribing" through educational interventions along with incorporating different aspects of antibiotic resistance in their pharmacology course will definitely help students to develop their better prescribing skills.

Conflict of interest: None.

INAPD

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