

Awareness, Knowledge and Practices Regarding Antibiotic Prescription Guidelines among Dental Students and Practitioners – A Cross-Sectional Study

ABSTRACT

Background: Inappropriate antibiotic prescribing contributes significantly to antimicrobial resistance. Dental professionals play a crucial role in promoting rational antibiotic use. This study aimed to assess awareness, knowledge, and practices regarding antibiotic prescription guidelines among dental students and practitioners.

Aim: To evaluate awareness, clinical knowledge, and antibiotic stewardship practices related to antibiotic prescription guidelines across different academic levels.

Materials and Methods: A cross-sectional questionnaire-based study was conducted among 200 dental students and practitioners. Data regarding awareness, knowledge, and prescribing practices were collected using a structured questionnaire. The Chi-square test was used to assess the

association between academic level and antibiotic-related variables. A p-value <0.05 was considered statistically significant.

Results: Most participants demonstrated high awareness of antibiotic prescription guidelines (99.5%). No significant association was found between academic level and awareness or attitude variables ($p>0.05$). However, significant associations were observed between academic level and knowledge of correct antibiotic indications ($p=0.024$), prescribing antibiotics for irreversible pulpitis ($p=0.022$), knowledge of penicillin alternatives ($p=0.010$), attendance at continuing dental education programs ($p<0.001$), and frequency of updating knowledge ($p=0.012$).

Conclusion: Although awareness regarding antibiotic prescription guidelines was high, clinical knowledge and antibiotic stewardship practices improved with higher academic training. Continuous education programs are essential to promote rational antibiotic use among dental professionals.

Keywords: Antibiotic prescription, Antimicrobial resistance, Dental students, Dental practitioners, Antibiotic stewardship.

INTRODUCTION

Antibiotics are commonly prescribed in dental practice for the management of odontogenic infections and for preventing the progression of localized infections to systemic complications³. They play a significant role in controlling infection and reducing the risk of complications associated with oral diseases. However, the inappropriate and excessive use of antibiotics has contributed to the rapid development of antimicrobial resistance, which is now considered a major global public health concern^{1, 8, 15}.

Antimicrobial resistance is associated with several adverse consequences, including increased morbidity, prolonged duration of illness, and higher healthcare expenses^{1, 15}. According to reports from the World Health Organization, irrational and unnecessary use of antibiotics remains one of the major drivers for the emergence and spread of resistant microorganisms worldwide¹. The declining effectiveness of commonly used antimicrobial agents has further complicated infection control and treatment planning in healthcare settings⁸.

In dentistry, many oral infections can be effectively managed through appropriate local interventions such as drainage of abscess, tooth extraction, or endodontic treatment without necessarily prescribing systemic antibiotics^{4, 5}. Nevertheless, several studies have indicated that a significant proportion of antibiotic prescriptions in dental practice may not always be clinically indicated, thereby increasing the risk of antimicrobial resistance and adverse drug reactions^{4, 5, 9}. Therefore, dental professionals have a crucial responsibility in ensuring the rational and judicious use of antibiotics in clinical practice^{9, 10}.

To support appropriate prescribing practices, evidence-based clinical guidelines have been developed to guide clinicians in selecting suitable antibiotics, appropriate dosage, and duration of therapy^{2, 13}. These recommendations also address the use of prophylactic antibiotics in medically compromised patients and individuals at risk of infective endocarditis¹³. Antibiotic stewardship programs aim to optimize antibiotic use and limit the development of antimicrobial resistance through coordinated and responsible prescribing strategies¹¹.

Evaluating the awareness and prescribing behavior of dental professionals is essential in identifying gaps that may contribute to inappropriate antibiotic use and the development of resistance. Understanding the level of knowledge and clinical practices related to antibiotic prescribing helps promote safer prescribing habits, thereby reducing the risk of patient harm and improving treatment outcomes. Furthermore, assessing awareness and practices among dental

students and practitioners helps determine whether clinicians adhere to evidence-based guidelines and highlights areas where additional education or reinforcement may be required.

Improving knowledge and adherence to antibiotic prescription guidelines can strengthen dental education, reduce unnecessary healthcare expenditure associated with inappropriate antibiotic use, and contribute to better public health outcomes. In addition, identifying barriers that prevent clinicians from following established guidelines is important for developing effective interventions to enhance responsible antibiotic prescribing practices.

Adequate awareness and understanding of antibiotic prescribing guidelines among dental students and practitioners are essential for appropriate clinical decision-making^{5,9}. Undergraduate education, clinical exposure, and continuing professional development programs play a significant role in improving prescribing behavior and supporting antibiotic stewardship¹¹. Despite the availability of established guidelines, variations in knowledge and clinical practices among dental professionals continue to exist^{5,9}.

Assessment of awareness, knowledge, and prescribing practices across different academic levels helps identify existing gaps and supports the development of targeted educational strategies. Therefore, the present study aimed to evaluate the awareness, clinical knowledge, and antibiotic stewardship practices related to antibiotic prescription guidelines among dental students and practitioners and to assess their association with academic level.

Recent studies have emphasized that antimicrobial resistance continues to increase due to the inappropriate and excessive prescription of antibiotics in healthcare settings, including dentistry. Dentists are considered among the important prescribers of antibiotics in outpatient healthcare, and irrational prescribing practices can significantly contribute to the development of resistant microorganisms worldwide.¹⁹

Studies have also reported that although many dental students and practitioners are aware of antibiotic resistance, gaps still exist in their confidence and decision-making regarding appropriate antibiotic prescribing. In a recent cross-sectional study among dental students, a majority recognized that antibiotic misuse contributes to resistance, yet only a limited proportion felt confident in prescribing antibiotics appropriately.²⁰

Another recent systematic review has highlighted that educational interventions, clinical audits, and antibiotic stewardship programs can significantly reduce inappropriate antibiotic prescriptions among dentists and improve adherence to evidence-based guidelines.²¹ These strategies help ensure rational prescribing practices and support efforts to control antimicrobial resistance in dental practice.

Furthermore, recent research has emphasized the importance of integrating antimicrobial stewardship concepts into dental education curricula. Strengthening training related to antibiotic prescription guidelines during undergraduate and postgraduate education can improve clinicians' prescribing behavior and promote responsible antibiotic use in dental practice.²²

MATERIALS AND METHODS

Study Design: Cross-sectional questionnaire-based study.

Study setting :The present study was conducted at Adhiparasakthi Dental College and Hospital, Tamil Nadu, India, among undergraduate dental students, interns, postgraduates, and clinical practitioners.

Study duration:The study was conducted over a period of 4 months, from October 2026 to December 2026, during which data were collected from 200 dental students and practitioners.

Study Population: A total of 200 dental students and practitioners participated, including third year students , final year students , CRRIs , postgraduates , and clinical practitioners .

Inclusion criteria:

- Dental students (Third year, Final year, CRRIs) and Postgraduate students.
- Clinical dental practitioners actively involved in patient care.
- Participants willing to complete the questionnaire fully.

Exclusion criteria:

- First and second-year dental students.
- Participants not involved in clinical practice.
- Incomplete or partially filled questionnaires.

Questionnaire Validation:

The questionnaire used in the present study was developed based on previously published studies and established antibiotic prescribing guidelines. To ensure content validity, the questionnaire was reviewed by a panel of experts from the Department of Oral Medicine and Radiology and Public Health Dentistry. Based on their suggestions, necessary modifications were made to improve the clarity and relevance of the questions. A pilot study was conducted among 20 dental students to assess the reliability and feasibility of the questionnaire. The responses obtained during the pilot study were not included in the final analysis. Minor modifications were made based on the feedback before distributing the final questionnaire to the study participants.

Data Collection: A structured questionnaire assessed awareness of antibiotic guidelines, clinical knowledge of antibiotic indications, prescribing practices, and antibiotic stewardship behavior.

Statistical Analysis: Data were analyzed using chi-square test to assess association between academic level and antibiotic-related variables. $p < 0.05$ was considered statistically significant.

Ethical considerations : The present study was conducted using a questionnaire-based survey among dental students and practitioners. Participation was voluntary and informed consent was obtained from all participants prior to filling the questionnaire. The questionnaire was anonymous and no personal identifying information was collected. Confidentiality of the collected data was strictly maintained and used only for research purposes.

RESULTS

A total of 200 dental students and professionals participated in the study. Participants were distributed across academic and clinical levels as follows: third-year students (n=29, 14.5%), finalyear students (n=60, 30%), Compulsory Rotatory Residential Interns (CRRIs) (n=73, 36.5%), postgraduates (n=26, 13%), and clinical practitioners (n=12, 6%). **Figure 1**

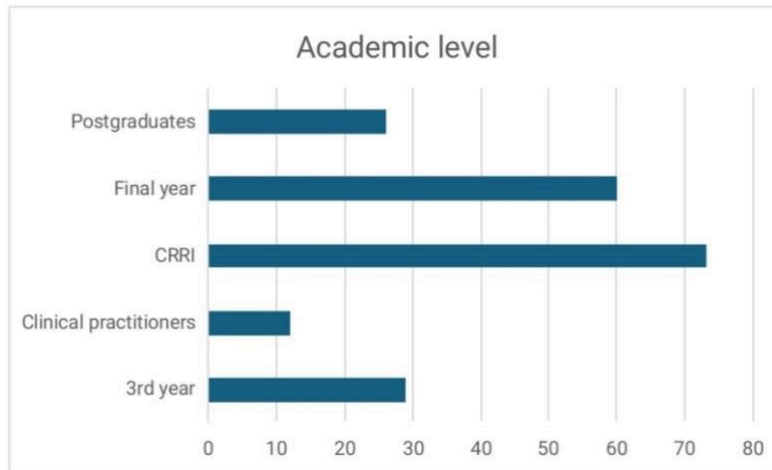


Figure 1: Distribution of participants

Descriptive Data

Most participants reported being aware of antibiotic prescription guidelines (195/196, 99.5%) and following them during clinical practice. The majority also demonstrated correct responses to knowledge-based questions regarding antibiotic indications, resistance, and alternatives in penicillin-allergic patients.

Main Results

Chi-square tests were performed to examine associations between academic/clinical level and antibiotic-related knowledge and practices.

Awareness and Attitude

There was no significant association between academic level and awareness of antibiotic prescription guidelines ($\chi^2=5.79$, $df=4$, $p=0.216$), adherence to guidelines while prescribing ($\chi^2=6.25$, $df=8$, $p=0.619$), awareness of infective endocarditis prophylaxis guidelines ($\chi^2=1.27$, $df=4$, $p=0.867$), knowledge of causes of antibiotic resistance ($\chi^2=13.2$, $df=12$, $p=0.356$), or patient education on completing antibiotic courses ($\chi^2=2.35$, $df=4$, $p=0.673$). Table 1

Clinical Knowledge

A statistically significant association was observed between academic level and knowledge of correct antibiotic indications ($\chi^2=17.6$, $df=8$, $p=0.024$). Similarly, prescribing antibiotics for irreversible pulpitis varied significantly across academic levels ($\chi^2=11.4$, $df=4$, $p=0.022$). Knowledge of safe alternatives for penicillin-allergic patients also showed a significant association with academic level ($\chi^2=26.3$, $df=12$, $p=0.010$).

No significant association was found between academic level and knowledge of conditions not requiring antibiotics ($\chi^2=5.73$, $df=8$, $p=0.677$), prescribing antibiotics after extraction ($\chi^2=7.26$, $df=4$, $p=0.123$), or the most commonly prescribed antibiotic ($\chi^2=7.82$, $df=8$, $p=0.452$). Table 2

Antibiotic Stewardship Practices

Attendance at continuing dental education (CDE) programs on antibiotic stewardship was significantly associated with academic level ($\chi^2=23.3$, $df=4$, $p<0.001$). Frequency of updating knowledge on antibiotic guidelines also differed significantly across academic levels ($\chi^2=25.8$, $df=12$, $p=0.012$). Table 3

Overall, participants demonstrated high awareness of antibiotic guidelines. However, clinical knowledge and antibiotic stewardship practices were significantly associated with higher academic and clinical training levels, suggesting that advanced training contributes to improved antibiotic prescribing behavior.

Table 1. Association between academic level and awareness/attitude toward antibiotic guidelines

Questions	χ^2	df	p-value	Significance
Awareness of antibiotic prescription guidelines (Q3)	5.79	4	0.216	Not significant
Following guidelines while prescribing (Q4)	6.25	8	0.619	Not significant
Awareness of IE prophylaxis guidelines (Q9)	1.27	4	0.867	Not significant
Cause of antibiotic resistance (Q10)	13.2	12	0.356	Not significant
Patient education on full course (Q12)	2.35	4	0.673	Not significant

Table 2. Association between academic level and clinical knowledge of antibiotic use. *Chi-square test applied. P < 0.05 considered statistically significant.

Questions	χ^2	df	p-value	Significance
Correct indication for antibiotics (Q5)	17.6	8	0.024	Significant
Condition not requiring antibiotics (Q6)	5.73	8	0.677	Not Significant
Antibiotics after extraction (Q7)	7.26	4	0.123	Not Significant
Most commonly prescribed antibiotic (Q8)	7.82	8	0.452	Not Significant
Prescribing for irreversible pulpitis (Q11)	11.4	4	0.022	Significant
Penicillin allergy alternative (Q14)	26.3	12	0.010	Significant

Questions	χ^2	df	p.-value	Significance
Attendance at CDE programs (Q13)	23.3	4	<0.001	Significant
Frequency of updating knowledge (Q15)	25.8	12	0.012	Significant

Table 3. Association between academic level and antibiotic stewardship practices. *Chi-square test applied. P < 0.05 considered statistically significant.

DISCUSSION

The present study evaluated awareness, clinical knowledge, and prescribing practices related to antibiotic prescription guidelines among dental students and practitioners across different academic levels. The findings demonstrated that most participants showed high awareness regarding antibiotic prescription guidelines, indicating adequate theoretical knowledge of antibiotic use in dental practice. These findings are consistent with previous studies reporting high awareness levels but variations in clinical application among dental professionals^{5, 9}.

No significant association was observed between academic level and awareness-related variables such as knowledge of antibiotic guidelines, adherence to prescribing protocols, awareness of infective endocarditis prophylaxis, and patient education regarding completion of antibiotic therapy. These observations suggest that fundamental knowledge regarding antibiotic use is generally acquired during dental education and training. The uniform awareness across academic levels may be attributed to structured curricula and standardized teaching methods¹¹.

Recent literature also supports the findings of the present study. Teoh et al. (2020) reported that although awareness of antibiotic guidelines among dental practitioners was generally high, discrepancies persisted in clinical application, particularly in situations where operative treatment alone would have been sufficient¹⁶. Similarly, Thompson et al. (2021) observed that less

experienced clinicians demonstrated a greater tendency toward precautionary antibiotic prescribing, highlighting the influence of clinical confidence and exposure on prescribing behavior¹⁷. These observations parallel the present findings, where awareness was uniformly high, yet clinical knowledge and prescribing decisions varied significantly with academic level.

Furthermore, Khouly et al. (2022) demonstrated that postgraduate education and continuing professional development significantly improved adherence to antibiotic stewardship principles and appropriate selection of alternative agents in penicillin-allergic patients¹⁸. This aligns with the current results showing better clinical knowledge and stewardship practices among individuals with higher academic and clinical training.

However, significant differences were observed in clinical knowledge related to antibiotic prescribing. Participants with higher academic and clinical training demonstrated better understanding of appropriate indications for antibiotic use, management of irreversible pulpitis, and selection of alternatives for penicillin-allergic patients. These findings indicate that advanced clinical exposure and professional training play an important role in improving clinical decision-making and rational prescribing practices¹¹.

Irreversible pulpitis is primarily an inflammatory condition and typically does not require antibiotic therapy unless systemic involvement or spreading infection is present¹². Inappropriate antibiotic use in such conditions may result in unnecessary drug exposure, adverse reactions, and increased antimicrobial resistance^{6, 14, 15}. These findings highlight the importance of strengthening clinical training with emphasis on evidence-based management of dental infections.

The present study also demonstrated a significant association between academic level and knowledge of alternative antibiotics for penicillin-allergic patients. Appropriate selection of alternative medications is essential to ensure patient safety and effective treatment outcomes¹¹. Improved knowledge among postgraduates and practitioners may be attributed to greater clinical experience and continuous professional education.

Antibiotic stewardship practices varied significantly across academic levels, particularly with respect to participation in continuing dental education programs and frequency of updating knowledge regarding antibiotic guidelines¹¹. Continuing education programs help clinicians remain updated on emerging resistance patterns, revised recommendations, and evidence-based prescribing practices.

Recent studies have also highlighted similar patterns in antibiotic prescribing behavior among dental professionals. Sbricoli et al. (2024) reported that although most dentists demonstrated adequate awareness regarding antibiotic prescription guidelines, inappropriate prescribing was still observed in certain clinical situations, particularly in the management of localized dental infections where operative treatment alone would have been sufficient¹⁹. This finding supports the results of the present study, where awareness was generally high but variations were observed in clinical knowledge and prescribing decisions.

Similarly, a recent cross-sectional study among dental students conducted by Danadneh et al. (2025) revealed that although participants were aware of antimicrobial resistance and its consequences, a considerable proportion lacked confidence in selecting appropriate antibiotic regimens in clinical practice²⁰. This observation is consistent with the present study, where differences in clinical knowledge were observed across academic levels, suggesting that increased clinical exposure and training may influence prescribing confidence and decision-making.

Furthermore, recent systematic reviews have emphasized that educational interventions, antimicrobial stewardship initiatives, and clinical audit programs can significantly improve antibiotic prescribing behavior among dentists and reduce unnecessary antibiotic use²¹. Integrating

antimicrobial stewardship training into dental curricula has also been recommended as an effective strategy to strengthen prescribing competence among future dental professionals²².

From a clinical and public health perspective, inappropriate antibiotic prescribing contributes to the development of resistant microorganisms, treatment failure, and increased healthcare burden^{14, 15}. Antimicrobial resistance is currently recognized as a major global health challenge associated with increased morbidity, mortality, and healthcare costs^{1, 15}. Dental professionals therefore have an important responsibility in promoting rational prescribing practices and reducing unnecessary antibiotic use^{9, 10}.

The present study has certain limitations. The cross-sectional design limits causal interpretation of the findings. The use of self-reported responses may introduce response bias, and the relatively limited sample size may affect generalizability. Future research should include multi-center studies with larger sample populations and interventional approaches to evaluate the effectiveness of antibiotic stewardship programs.

Overall, the findings highlight the importance of academic training, clinical exposure, and continuing professional education in improving antibiotic prescribing behavior. Strengthening antibiotic stewardship programs and promoting evidence-based prescribing practices are essential to minimize antimicrobial resistance and improve patient care outcomes in dental practice.

CONCLUSION

The present study demonstrated that dental students and practitioners generally showed high awareness regarding antibiotic prescription guidelines. However, variations were observed in clinical knowledge and antibiotic stewardship practices across different academic levels, with better understanding among participants with higher academic and clinical training. These findings indicate that clinical exposure and professional experience play an important role in improving appropriate antibiotic prescribing behavior. Strengthening educational strategies related to antibiotic prescribing guidelines during undergraduate and postgraduate training, along with regular continuing dental education programs and antibiotic stewardship initiatives, may help improve adherence to evidence-based guidelines. Promoting rational antibiotic use among dental professionals is essential to reduce unnecessary prescriptions, minimize antimicrobial resistance, and ensure safe and effective patient care in dental practice.

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