Original Research Article

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

Abstract

Background: Inappropriate antibiotic prescribing contributes to antimicrobial resistance. Dental professionals play an important role in rational antibiotic use. This study assessed awareness, knowledge, andpractices 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. Chi-square test was used to assess 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 guidelines was high, clinical knowledge and stewardship practices improved with higher academic training. Continuous education programs are essential to promote rational antibiotic use.

Introduction

Antibiotics are frequently prescribed in dental practice for the management of odontogenic infections and prevention of the spread of local infections to systemic involvement (3). They play an important role in controlling infection and preventing complications associated with oral diseases. However, the misuse and overuse of antibiotics have accelerated the emergence of antimicrobial resistance, which has become a serious global healthcare concern (1,8,15).

Drug resistance contributes to adverse clinical outcomes, including increased morbidity, prolonged hospitalization, and higher healthcare costs (1,15). Reports from the World Health Organization indicate that inappropriate antibiotic use is a major factor responsible for the development and spread of resistant microorganisms worldwide (1). The reduced effectiveness of commonly used antimicrobial agents has further complicated infection control and treatment strategies (8).

In dental practice, certain conditions can often be effectively managed through local treatment procedures such as drainage, extraction, or endodontic therapy without the need for antibiotic therapy (4,5). However, previous studies have reported that a considerable proportion of antibiotic prescriptions in dentistry may not always be clinically justified, which increases the risk of antimicrobial resistance and adverse drug reactions (4,5,9). Therefore, dental professionals play a crucial role in promoting rational antibiotic use and preventing unnecessary prescriptions (9,10).

To improve prescribing practices, evidence-based clinical guidelines have been developed to assist clinicians in selecting appropriate antibiotics, dosage, and duration of therapy (2,13). These guidelines also provide recommendations regarding prophylactic antibiotic use in medically compromised patients and individuals at risk of infective endocarditis (13). Antibiotic stewardship involves coordinated strategies aimed at optimizing antibiotic use and minimizing the development of antimicrobial resistance (11).

Adequate knowledge and awareness of antibiotic prescribing guidelines among dental students and practitioners are essential for appropriate clinical decision-making (5,9). Undergraduate education, clinical training, and continuing professional development programs contribute significantly to improving prescribing behavior and antibiotic stewardship practices (11). Despite the availability of prescribing guidelines, variations in knowledge and clinical practice among dental professionals continue to exist (5,9).

Assessment of awareness, knowledge, and prescribing practices across different academic levels helps identify existing knowledge gaps and supports the development of targeted educational strategies. Therefore, the present study aimed to evaluate 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.

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 2025 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.

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.

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**

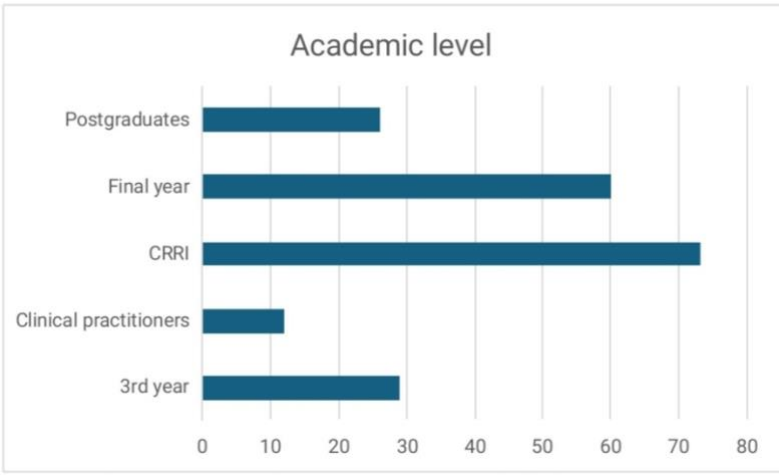

Figure 1: Distribution of participants

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 (χ^2=5.79, df=4, p=0.216), adherence to guidelines while prescribing (χ^2=6.25, df=8, p=0.619), awareness of infective endocarditis prophylaxis guidelines (χ^2=1.27, df=4, p=0.867), knowledge of causes of antibiotic resistance (χ^2=13.2, df=12, p=0.356), or patient education on completing antibiotic courses (χ^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 (χ^2=17.6, df=8, p=0.024). Similarly, prescribing antibiotics for irreversible pulpitis varied significantly across academic levels (χ^2=11.4, df=4, p=0.022). Knowledge of safe alternatives for penicillin-allergic patients also showed a significant association with academic level (χ^2=26.3, df=12, p=0.010).

No significant association was found between academic level and knowledge of conditions not requiring antibiotics (χ^2=5.73, df=8, p=0.677), prescribing antibiotics after extraction (χ^2=7.26, df=4, p=0.123), or the most commonly prescribed antibiotic (χ^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 (χ^2=23.3, df=4, p<0.001). Frequency of updating knowledge on antibiotic guidelines also differed significantly across academic levels (χ^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

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

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 methods (11).

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 sufficient (16). 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 behavior

(17). 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 patients (18). 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 decisionmaking and rational prescribing practices (11).

Irreversible pulpitis is primarily an inflammatory condition and typically does not require antibiotic therapy unless systemic involvement or spreading infection is present (12). 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 outcomes (11). 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 guidelines (11). Continuing education programs help clinicians remain updated on emerging resistance patterns, revised recommendations, and evidence-based prescribing practices.

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

Participants demonstrated high awareness regarding antibiotic prescription guidelines. However, clinical knowledge and antibiotic stewardship practices improved with higher academic and clinical training levels. Regular educational programs and reinforcement of antibiotic prescribing guidelines are recommended to promote rational antibiotic use.

References

1.World Health Organization. Antimicrobial resistance: global report on surveillance. Geneva: WHO; 2014.

2.American Dental Association. Antibiotic use for the urgent management of dental pain and intraoral swelling: clinical practice guideline. J Am Dent Assoc. 2019;150(11):906-921

3.Palmer NOA. Antimicrobial resistance and antibiotic prescribing in dental practice. Dent Update. 2016;43:954–960.

4.Cope AL, Chestnutt IG. Inappropriate prescribing of antibiotics in primary dental care: reasons and resolutions. Prim Dent J. 2014;3:33–37.

5.Dar-Odeh NS, Abu-Hammad OA. Antibiotic prescribing practices by dentists: a review. Ther Clin Risk Manag. 2010;6:301–306.

6.Sweeney LC, Dave J, Chambers PA, Heritage J. Antibiotic resistance in general dental practice. Br Dent J. 2004;197:333–337.

7.Robertson D, Smith AJ. The microbiology of the acute dental abscess. J Med Microbiol. 2009;58:155–162.

8.Pallasch TJ. Antibiotic resistance. Dent Clin North Am. 2003;47:623–639.

9.Stein K, Farmer J, Singhal S, et al. The use and misuse of antibiotics in dentistry. J Am Dent Assoc. 2018;149:869–884.

10.Teoh L, Stewart K, Marino RJ, McCullough MJ. Antibiotic resistance and relevance to general dental practice. Aust Dent J. 2018;63:414–421.

11.Loffler C, Bohmer F. The effect of interventions aiming to optimise antibiotic prescribing in dental care. Clin Oral Investig. 2017;21:189–198.

12.Segura-Egea JJ, Gould K, Sen BH, Jonasson P, Cotti E, Mazzoni A, et al. Antibiotics in endodontics: a review. Int Endod J. 2017;50(12):1169-1184.

13.Lockhart PB, Tampi MP, Abt E, Aminoshariae A,Durkin MJ,Fouad AF, et al. Evidencebased clinical practice guideline on antibiotic use for the urgent management of dental pain and intra-oral swelling. J Am Dent Assoc. 2019;150(11):906-921.

14.Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and metaanalysis. BMJ. 2010;340:c2096.

15.Ventola CL.The antibiotic resistance crisis: part 1: causes and threats. P T. 2015;40(4):277283.

16.Teoh L, Stewart K, Marino RJ, McCullough MJ. Part 2: Current prescribing trends of antibiotics by dentists in Australia. Aust Dent J. 2020;65(2):145–152.

17.Thompson W, Tonkin-Crine S, Pavitt SH, McEachan RRC, Douglas GVA, Aggarwal VR, et al. Factors associated with antibiotic prescribing for adults with acute conditions: systematic review. Br J Gen Pract. 2021;71(704):e168–e177.

18.Khouly I, Braun RS, Glick M. Knowledge and implementation of antibiotic stewardship among dental practitioners. J Am Dent Assoc. 2022;153(5):427–435.