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Original Research Article

Assessment of dental students' knowledge, attitudes, and practices regarding the use of interdental aids: A questionnaire-based study

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Abstract

Background: The attitudes and behaviours of medical undergraduate & postgraduate students regarding their oral health reflect their understanding and perception of interdental cleaning aids in maintaining oral hygiene. Interdental aids are specially designed tools intended to clean the interproximal areas—spaces between the teeth—that are typically inaccessible to a regular toothbrush. These tools play a crucial role in achieving comprehensive oral hygiene and in preventing common dental conditions such as gingivitis, periodontitis, and dental caries.

Objective: To assess whether increasing dental education improves the Knowledge, Attitude and Practice of interdental aids among the dental students of Delhi-NCR.

Materials and Methods: A questionnaire-based cross-sectional study was conducted between January and March 2025 among dental students in the Delhi-NCR region. A total of 251 medical undergraduate students participated in the study. Data were collected using a self-designed questionnaire comprising 20 multiple-choice questions focused on knowledge, attitudes, and practices related to interdental aids.

The analysis aimed to assess the association between students' awareness of interdental cleaning and their oral hygiene practices across different academic years. Of the 251 participants, 153 were female and 98 were male, with an average age range of 20 to 25 years.

Approximately half of the students were aware that interproximal tooth surfaces are the most difficult to clean and cannot be effectively reached with a standard toothbrush. Statistically significant differences were observed across academic years in relation to tongue cleaning habits, the perceived importance of interdental aids, and the difficulties encountered during their use.

Conclusion: The findings indicate that the awareness and knowledge regarding interdental aids among the students were generally satisfactory. This survey highlights the crucial role of interdental aids in achieving and maintaining optimal oral hygiene. It underscores the responsibility of dental professionals to not only adhere to recommended oral self-care practices themselves but also to actively educate and encourage their patients about the proper use and benefits of interdental aids.

Keywords: Attitude, Interdental aids, Knowledge, Questionnaire, Students, Delhi-NCR, Gingivitis, Oral Health, Periodontitis, Plaque.

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1. Introduction

Maintaining good oral hygiene is essential for promoting overall dental and systemic health. Interdental aids—such as dental floss, interdental brushes, and water flossers—play a crucial role in preventing plaque accumulation and reducing the risk of gum-related diseases. While toothbrushing remains the most widely practiced method of oral hygiene, the knowledge, attitudes, and awareness of interdental aids among dental students are pivotal, as they can influence both their future clinical practices and the oral health guidance they provide to patients.[1-3]

Oral hygiene is a fundamental aspect of an individual's well-being, closely tied to the function and health of oral tissues. Good oral hygiene not only supports better daily functioning but also contributes significantly to overall health. Common issues such as periodontal disease and dental caries can severely impact oral health. These conditions often result from the accumulation of dental plaque—a biofilm that forms due to inadequate mechanical cleaning of the teeth, especially in interproximal areas.

The health of the periodontium can be compromised when there is an imbalance between localized microbial

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activity and the host's inflammatory response. Infections of the gingival and periodontal tissues typically arise from poor plaque control, highlighting the importance of effective self-care practices, including the use of interdental aids.[4]

Tooth cleaning remains the most effective mechanical method for removing bacterial plaque and maintaining plaque-free tooth surfaces. However, effective oral hygiene requires the thorough cleansing of all tooth surfaces, including the interdental areas, which are particularly susceptible to plaque accumulation and disease progression.[5]

While most individuals rely on non-professional means of plaque control, conventional toothbrushes often fail to adequately clean interdental spaces, where microorganisms can persist. Interdental aids such as dental floss, interdental brushes, and wooden sticks have been widely promoted as essential tools for cleaning these hard-to-reach areas. Their effectiveness, however, depends not only on the anatomical contour of the interproximal surfaces but also on the individual's manual dexterity, motivation, and behavior.[6]

Studies have consistently shown that proper use of interdental aids significantly reduces plaque accumulation and the incidence of gingivitis. Nevertheless, many individuals neglect interdental cleaning due to the time-consuming nature of the task and the precision it demands. This neglect is exacerbated by a general lack of awareness and education regarding interdental hygiene, despite the high prevalence of periodontal diseases worldwide.[7]

This issue becomes particularly concerning from a preventive health perspective. There is often insufficient emphasis on basic oral hygiene practices, and interdental cleaning remains underutilized even among populations with higher health literacy.

The present study is a quantitative cross-sectional survey designed to assess the Knowledge, Attitude, and Practice (KAP) of dental students regarding interdental aids. A KAP study is a well-established approach that helps in understanding what individuals know, how they feel, and how they behave in relation to a specific topic. In the context of oral health, especially interdental hygiene, this triad—Knowledge, Attitude, and Practice—serves as a critical framework for evaluating current awareness levels and identifying gaps that need to be addressed in both education and clinical practice (**Figure 1**).

Attitudes toward dental care are shaped by cognitive, affective, and behavioral factors. The cognitive component encompasses a person's beliefs and knowledge, while the affective component involves the emotional reinforcement of these beliefs. The behavioral component reflects an individual's readiness to take action in response to specific circumstances or stimuli. For example, one's self-assessment of dental health (cognitive) and willingness to attend regular dental check-ups (behavioral) collectively define their overall attitude toward dental care. To effectively design preventive and therapeutic oral health programs, as well as develop targeted training for dental professionals, it is essential to obtain accurate data from representative population studies.[8-10]

2. Materials and Methods

2.1. Study design and settings

This cross-sectional, questionnaire-based study targeted clinical-level dental students, including I-IV BDS students, interns, and MDS students, at dental colleges in the Delhi NCR region. Using convenience sampling, a total of 251 participants present during the study period were enrolled. The study was conducted from January 2025 to March 2025.

2.2. Questionnaire

The survey was administered online via Google Forms. A self-administered questionnaire was designed, beginning with an introductory paragraph that explained the study's objectives, assured participant anonymity, voluntary participation, and confidentiality of responses, which were accessible only to the research team. Students were informed that their participation was entirely voluntary and that choosing not to participate or withdrawing from the study at any point would have no impact on their academic standing. Consent to participate was obtained electronically before students could proceed with the questionnaire.

The questionnaire comprised 24 items: 4 demographic questions covering gender, age group, and year of study, and 20 questions focused on students' awareness, usage, benefits, key knowledge, and perceptions regarding interdental aids.

2.3. Data collection

The validated Google Forms questionnaire was distributed to the target sample via their official university email addresses. Participation was entirely voluntary, and no incentives were offered to encourage response. To enhance participation, reminder emails were sent three times at one-month intervals throughout the study period.

Data collection was conducted using Microsoft Excel (Version 2013), where responses were compiled and organized for analysis. The responses obtained from participants in the pilot study were included in the final dataset, as no modifications were made to the questionnaire following the pilot phase.

2.4. Statistical analysis

The data was tabulated and Collected using Google Docs. The analysis and comparison were also done by google docs software.

3. Result

In the present study, overall 251 students of Delhi-NCR responded to the questionnaire (**Figure 2**). Among them, 153 females and 98 males, with a mean age range of 20 - 25 years (**Figure 3**). Most of the students were interns, followed by students of 1st year, 3rd year, MDS students, 2nd year and 4th year as shown in (**Figure 4**).

3.1. Participants distribution according to gender and age

Among the 251 responses included in the study, 153 (60.9%) were females, and 98 (39.04%) were males. Of the 251 participants, 73 (29.08%) were aged 18–20, 38 (15.13%) were aged 21–23, 85 (33.86%) were aged 24–25, and 55 (21.91%) were aged 26–32.

3.2. Awareness, usage of interdental aids

The study revealed that dental students in the Delhi NCR region demonstrated a moderately high level of awareness regarding interdental aids. Key findings included:

1. A majority of students recognized the importance of mechanical plaque control as a supplement to routine toothbrushing.
2. Most participants were familiar with the different types of interdental aids, such as dental floss, interdental brushes, and oral irrigators.
3. Awareness levels were notably higher among senior students and those with greater clinical exposure, likely due to their curriculum and clinical postings.

These findings suggest that while foundational knowledge exists, integrating interdental aid education earlier in the curriculum and reinforcing it through clinical training may further enhance awareness and practical understanding.

However, a significant knowledge-practice gap was identified. Despite high levels of awareness, the actual usage of interdental aids was relatively low. Only a small proportion of students reported using these aids daily. Among the tools used, dental floss and interdental brushes were the most common. Reported barriers to consistent use included time constraints, inconvenience, difficulty in handling, and lack of established habits.

These insights highlight the need to incorporate structured oral hygiene modules within the dental curriculum that not only impart knowledge but also emphasize behavioral reinforcement. Encouraging personal use of interdental aids among dental students may also enhance their confidence and motivation to recommend these practices to future patients.

3.3. Comparison between knowledge based questions and year of study

As the academic year progressed, a statistically significant rise in knowledge scores was noted. When asked about the clinical application, technique, and relative benefits of different interdental aids, interns, final year BDS student and MDS students did the best. First and second-year BDS students frequently possessed theoretical knowledge but lacked depth in terms of clinical utility. Clinical exposure and curriculum design seem to be related to knowledge improvement.

Overall knowledge scores among the participants according to the year of study:

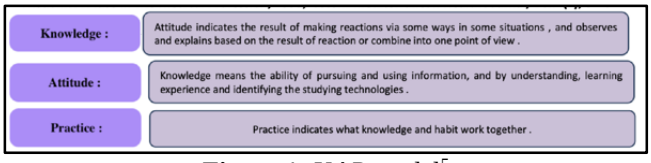

Figure 1: KAP model[5]

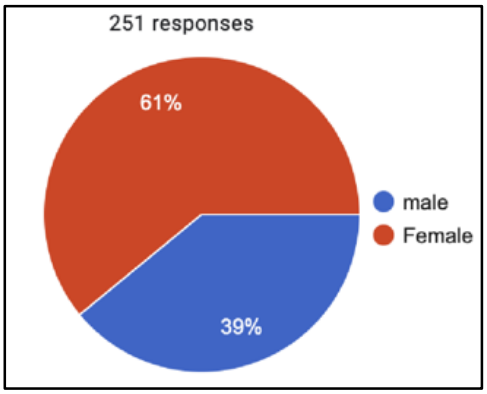

Figure 2: Gender

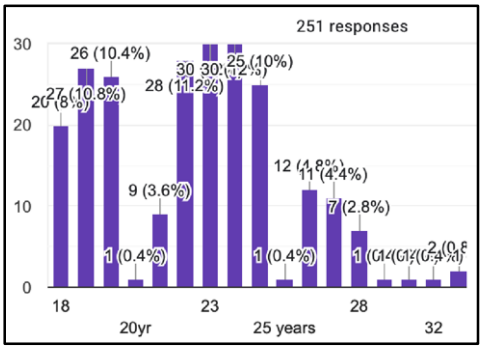

Figure 3: Age

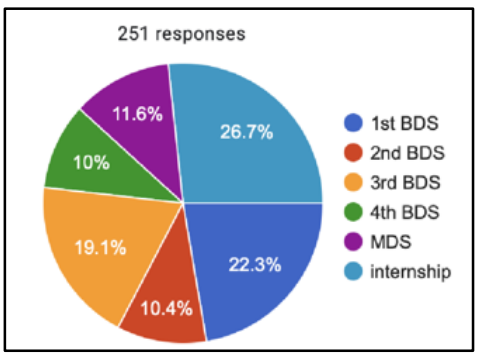

Figure 4: Year of study

Table 1: Mean Knowledge Score of students though different academic years

Year of study	Mean Knowledge Score [out of 10]	Interpretation
1st year BDS	4.1	Basic awareness only
2nd year BDS	5.0	Developing knowledge
3rd year BDS	6.2	Moderate knowledge
4th year BDS	6.8	Good theoretical knowledge
Interns	8.0	Strong clinical knowledge
MDS	8.7	Advanced clinical and academic knowledge

4. Discussion

Periodontal diseases and systemic health share a bidirectional relationship. Maintaining optimal oral hygiene is critical not only for oral health but also for overall well-being. This is primarily achieved through effective plaque control. Various oral hygiene modalities, a balanced diet, healthy lifestyle choices, and adherence to professional counseling and care are essential in promoting oral health.[11]

Dental plaque is the principal etiological factor in the development of both hard and soft tissue oral diseases. Its reduction significantly decreases the incidence of dental caries, gingivitis, and periodontal diseases. While toothbrushing is the cornerstone of daily oral hygiene, it is often insufficient in cleaning hard-to-reach interproximal areas. Adjunctive aids such as interdental floss, interdental brushes, and wooden picks play a crucial role in enhancing plaque removal and maintaining interdental cleanliness.

The present study aimed to assess and compare the Knowledge, Attitude, and Practice (KAP) regarding interdental aids among dental students at various stages of their academic training. It also examined whether the increase in knowledge was reflected in their personal oral hygiene behaviors.

Our findings revealed that with the progression in academic level, dental students demonstrated significant improvements in their knowledge, attitude, and practice regarding interdental aids. Postgraduate (MDS) students exhibited superior KAP scores compared to undergraduate students. Gender comparisons also indicated better awareness and utilization of interdental aids among MDS students.

Previous studies have reported varying outcomes on the influence of dental education on students' oral hygiene behaviors. Research by Cortes et al., Lang et al., Cavaillon et al., and Yildiz et al. indicated clear improvements in oral hygiene practices during dental education. Conversely, El-Mostehy et al. observed no significant improvement in hygiene practices among 100 Egyptian students, despite receiving adequate education and information.[6,10-13]

Despite these conflicting results, our study supports the notion that increased education level correlates with improved KAP regarding interdental hygiene. It is essential for all dental professionals to utilize this knowledge in both personal practice and patient care to prevent periodontal diseases and dental caries. Furthermore, departments dealing with orthodontics, prosthodontics, and other dental specialties must also emphasize the importance of interdental aids, given their role in long-term periodontal health.[14]

In conclusion, dental students must not only acquire knowledge about oral hygiene and interdental aids but also develop a positive attitude and implement proper practices. This is vital for maintaining the health of their own periodontium and for delivering effective care to their patients.[15]

5. Strengths

The study provides valuable insights into the current knowledge, attitudes, and practices (KAP) regarding interdental aids among the target population. A validated and structured questionnaire was used, enhancing the reliability and consistency of the data collection process. The findings help identify critical gaps in oral hygiene practices, offering direction for future oral health promotion strategies. If a diverse participant group was included, this increases the generalizability of findings within the population studied.

6. Limitations

The sample may not represent the broader population due to limited institutional or geographic scope. Reliance on self-reported data introduces potential recall bias and social desirability bias, which could affect the accuracy of responses. The cross-sectional design restricts the ability to assess changes in KAP over time. The study may not have accounted for all socioeconomic, cultural, or educational factors that influence oral hygiene behaviors.

7. Future scope

Conduct similar studies on a larger and more diverse sample across different geographic regions to enhance generalizability. Implement longitudinal studies to evaluate the impact of educational interventions on KAP over time. Incorporate qualitative research (e.g., interviews or focus groups) to explore barriers and motivators related to the use of interdental aids. Combine clinical evaluations with questionnaire responses for a more comprehensive assessment of oral hygiene practices.

8. Recommendations

Integrate educational programs about interdental aids into both academic curricula and community outreach efforts. Dental professionals should routinely recommend and reinforce the daily use of interdental aids as part of standard oral hygiene practices. Future research should aim to develop

tailored oral hygiene strategies informed by demographic and behavioral data from KAP studies. Policy makers and public health authorities should promote awareness through media campaigns, school programs, and primary healthcare services.

9. Conclusion

This KAP-based study offers significant insights into the awareness, attitudes, and behavioral patterns surrounding the use of interdental aids among dental students. While the majority demonstrated a basic understanding of the importance of interdental cleaning, discrepancies in attitude and actual practice were evident. The predominant reliance on toothbrushes, with limited use of adjunctive aids like floss, interdental brushes, and oral irrigators, highlights a gap between knowledge and practice.

These findings underscore the need for targeted educational initiatives and behaviour reinforcement strategies. Regular dental check-ups, along with public health programs, can play a crucial role in raising awareness, improving interdental hygiene practices, and ultimately contributing to the prevention of periodontal diseases.

10. Data Availability

The data supporting the findings of this study are available within the article.

11. Source of Funding

None.

12. Conflict of Interest

None.

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