Original Article

FROM THEORY TO PRACTICE – ASSESSING THE INFLUENCE OF EDUCATION AND EXPERIENCE ON INTERDENTAL AID PRACTICES AMONG DENTAL WORK-FORCE : A PAN INDIA SURVEY

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ABSTRACT

Background: Dentists are key educators in promoting good oral hygiene. Although toothbrushing is widely practiced, awareness and use of interdental aids remain limited, despite their crucial role in removing plaque from interproximal areas and preventing periodontal disease. Their importance is often underemphasized in clinical practice and patient education. This study aims to evaluate the impact of theoretical training and clinical experience on the knowledge, attitudes, and practices related to interdental aids among dental professionals in India. The aim of this study is to assess the influence of education and experience on interdental aid practices among dental workforce.

Methods: A cross-sectional survey is being carried out among dentists across India. Study population comprised final-year undergraduate dental students, interns, postgraduate students, dental practitioners & academicians. Up-till now participants completed a pretested and structured questionnaire developed to address the study objectives. **Results:** Among 1,458 respondents, males predominated (54.2%), with Karnataka contributing the highest responses. Most participants were postgraduate students or interns with 1–3 years of clinical experience. Awareness of interdental aids was reported by 69%, and 55.8% had received undergraduate training. Interdental brushes were preferred (81.3%), though patient demonstrations were performed inconsistently.

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Conclusion: Adequate awareness exists; however, inconsistent use of interdental aids underscores the need for improved training and continuing education to enhance periodontal prevention.

Keywords: Interdental aids; Oral hygiene; Dental professionals; Preventive dentistry; Periodontal health; Dental education.

INTRODUCTION

Dental plaque is a highly organized microbial biofilm that forms naturally on tooth surfaces within a matrix of bacterial and salivary polymers. Following tooth cleaning, an acquired enamel pellicle rapidly develops, allowing early bacterial colonizers to attach and subsequently facilitate the adhesion of secondary colonizers through specific molecular interactions. As the biofilm matures, complex environmental gradients emerge, enabling diverse microbial species to coexist. Although plaque formation is physiological, its persistence is closely linked to the development of gingivitis, dental caries, and periodontal diseases.[1]

Gingivitis arises primarily due to the accumulation of microbial plaque at the gingival margin. Other local and systemic factors contribute by enhancing plaque retention or increasing the susceptibility of gingival tissues to microbial challenge. The microbial composition associated with gingivitis evolves sequentially, with increasing complexity over time. The disease progresses through initial, early, and established lesions, characterized by shifts in the host immune response. Clinically, gingivitis presents as episodic inflammatory bursts, most of which remain reversible; however, a proportion may progress to periodontitis, particularly when inflammation extends to deeper periodontal tissues.[2]

The human oral cavity harbors a diverse microbiota, predominantly commensal, with a smaller fraction of pathogenic species capable of initiating periodontal destruction. Periodontitis is a multifactorial inflammatory disease originating from gingival tissues and advancing to involve the periodontal ligament and alveolar bone if left untreated. While bacterial biofilm is the primary etiologic factor, disease progression is modulated by host immune response, genetic predisposition, systemic health, environmental influences, lifestyle habits, and social determinants. Importantly, the impact of periodontal pathogens extends beyond the oral cavity, influencing systemic health.[3]

With increasing public awareness of oral hygiene, toothbrushing remains the most common practice for plaque control. However, brushing alone is insufficient, particularly in interdental areas. The interdental spaces, located beneath contact points and occupied by interdental papillae, are highly susceptible to plaque accumulation and food lodgment. These regions represent primary sites for residual plaque, making them more prone to gingivitis, periodontitis, and proximal caries than facial or lingual surfaces. As toothbrushes are less effective in cleaning interproximal areas, the use of interdental aids is essential for comprehensive plaque control and prevention of periodontal disease.[4]

Dentists and dental students must be educated and motivate patients to use interdental tools effectively, so they can have good knowledge and habits themselves. However, there is limited research assessing the influence of education and experience on interdental aid practices among dental workforce particularly in India.

Recognizing this gap, the present study seeks to assess how theoretical education and clinical experience influence the knowledge, attitudes, and practices related to interdental aids among the dental workforce across India.

MATERIALS AND METHODS

This cross-sectional study was conducted among dental students and professionals to assess their knowledge, attitudes, awareness, and practices regarding interdental aids. The study population included final-year B.D.S. students, interns, dental practitioners, academicians and PG students. The study was carried out at AME'S Dental College and Hospital, Karnataka, from September 2025 to December 2025 . Ethical clearance for the study was obtained from the Institutional Ethical Committee prior to data collection (AME/DC/255/25-26).

Inclusion criteria: The study population comprised final-year undergraduate dental students, interns, practicing dentists, academicians, and individuals with undergraduate or postgraduate dental qualifications.

Exclusion criteria: The exclusion criteria included non-dental participants, first-, second-, and third-year undergraduate students, respondents with incomplete submissions, and dental professionals practicing outside India.

Study Sample: The study included 1,458 participants comprising final-year B.D.S. students, interns, dental practitioners, academicians, and professionals with B.D.S. or postgraduate qualifications who participated in the survey.

Survey Instrument: A validated questionnaire form was prepared using Google Forms and it was distributed among final-year B.D.S. students, interns, dental practitioners, academicians, and post graduates.

Survey Methodology: The questionnaire was structured to assess participants' knowledge, awareness, attitudes, and practices related to dental flossing and other interdental aids. It comprised 22 close-ended questions divided into four sections. The first section included five questions on demographic details such as gender, current designation, years of clinical exposure, and region of practice or study in India. The second section consisted of eight questions evaluating awareness and knowledge, followed by five questions assessing attitude in the third section. The fourth section included four questions related to the practice of interdental aids. Only completely filled Google Form responses were considered for analysis.

STATISTICAL ANALYSIS

Data were analyzed using SPSS version 23.0. Descriptive statistics, including frequencies and percentages, were used to summarize the results.

RESULTS

A total of 1,458 responses were obtained. The study population comprised a slightly higher proportion of males (54.2%) compared to females (45.8%). Karnataka contributed the highest number of responses among all participating states. The majority of respondents were postgraduate students (33.2%) and interns/undergraduate students (29.9%), with most participants reporting 1–3 years of clinical experience (36.1%). The questionnaire responses are presented and summarized in the accompanying table and figure. The questionnaire responses are presented in the accompanying table1-4

Questionnaire and its response

TABLE 1: DEMOGRAPHIC DATA

QUESTIONS	OPTIONS	RESPONDENTS TOTAL= 1458
Name		
Gender	Male	45.8%
	Female	54.2%
Current Designation	UG(IV Bds/Intern)	29.7%
	PG Students	33.2%
	Clinical Practitioner	21%
	Academician	16.1%
Years of clinical exposure	< 1 year	26.1%
	1-3 year	36.1%
	4-7 year	16.1%
	> 7 year	12.6%
	> 15 year	9%

TABLE 2: AWARENESS AND KNOWLEDGE

QUESTIONS	OPTIONS	RESPONDENTS TOTAL= 1458
Are you aware of any of these interdental aids	Dental floss	5.8%
	Interdental brush	2.6%
	Water flosser	1%
	Wooden stick	2%
	All of the above	69%
	Few of the above	21%
Have you received formal training in the use of interdental aids?	Yes, during graduation course	55.8%
	Yes, during post graduation course	20%
	CDE programme/Conference, etc	14.2%
	No	10%
What is the recommended aid for cleaning large interdental spaces or papillary loss?	Dental floss	15.2%
	Interdental brush	81.3%
	Tooth pick	1.6%
	None of the above	1.9%
Are interdental aids necessary even for patients with healthy gingiva?	Yes	61%
	No	26.8%
	Not sure	12.3%
Which area do interdental aids primarily target?	Occlusal surface	2.9%
	Gingival margin	9.4%
	Interproximal plaque biofilm	87.4%
	Root surface	0.3%
How often should interdental	Once a week	11%

aids be used for optimal results?	Every alternate day	35.5%
	Once daily	51.3%
	Only during professional cleaning	2.3%
Are you aware that interdental brushes are available in different sizes?	Yes	81%
	No	19%
Are you aware that different interdental aids are designed for varying needs and situations?	Yes	79.4%
	No	20.6%

TABLE 3: ATTITUDE

QUESTIONS	OPTIONS	RESPONDENTS TOTAL= 1458
How important do you think interdental aids are in maintaining oral hygiene?	Not important	3.9%
	Moderately important	24.8%
	Very important	42.9%
	Essential	28.4%
Do you believe interdental aid usage should be routinely taught and reinforced in clinics?	Strongly agree	42.3%
	Agree	51.6%
	Disagree	3.5%
	Strongly agree	2.6%
Do you think patients find interdental aids difficult to use?	Yes	33.9%
	No	25.8%
	Sometimes	40.3%
Absence/Irregular use of interdental aids by an individual?	Cost	6.5%
	Time	25.2%
	Not sure	30%
	Negligence	38.4%
Do you believe using interdental aids can reduce the need for periodontal treatment in the future?	Yes	54.5%
	No	19.4%
	Uncertain	26.1%

TABLE 4: PRACTICE

QUESTIONS	OPTIONS	RESPONDENTS TOTAL= 1458
Do you personally use interdental aids?	Yes, daily	30.3%
	Occasionally	51.6%
	Rarely	12.3%
	Never	5.8%
Do you demonstrate interdental aid use to patients during appointments?	Always	34.2%
	Sometimes	52.3%
	Rarely	11.3%
	Never	2.3%

Do you assess whether the patient uses your prescribed interdental cleaning aids at their subsequent visits?	Yes	45.5%
	Sometimes	46.5%
	No	8.1%
Do you think interdental aids cause any harmful effects on gingiva?	Yes	29.7%
	No	70.3%

DISCUSSION

The present cross-sectional investigation examined how theoretical instruction and clinical experience influence knowledge, attitudes, and practices related to interdental aids among the Indian dental workforce. Participants generally demonstrated favorable awareness and positive perceptions toward interdental cleaning, reflecting the increasing integration of comprehensive plaque control concepts within modern dental education. Although respondents showed adequate understanding of the role of interdental aids in eliminating interproximal plaque, deficiencies were observed in formal undergraduate training, routine personal usage, patient demonstration, and follow-up evaluation of compliance. These observations indicate a continuing gap between professional knowledge and consistent clinical application of interdental hygiene practices.

Comparable findings have been documented in earlier studies. Mohamed HH (2025) et al. reported that dental professionals and students possessed satisfactory knowledge and positive attitudes toward interdental aids; however, practical implementation remained limited, suggesting that theoretical competence alone may not translate into sustained preventive behavior[5]. Similarly, Vijayan A et al. (2025) found that dental interns acknowledged the importance of interdental cleaning following crown placement, yet patient education and reinforcement were not routinely practiced, highlighting challenges in incorporating preventive recommendations into everyday clinical care[6].

Studies involving dental students further support these outcomes. Chawla S and Sangeeta UN (2019) observed adequate awareness and favorable perceptions regarding interdental aids among dental students, while routine utilization and patient reinforcement practices were comparatively inadequate. These findings emphasize the importance of strengthening experiential learning and clinical skill development during undergraduate dental training[7]. Beyond the dental profession, Vandana KL et al.(2015) demonstrated that

medical professionals exhibited reasonable awareness but limited practical use of interdental aids, indicating that absence of structured oral health education may influence preventive practice adoption among non-dental healthcare providers[8].

Community-based investigations provide additional insight into this issue. Studies conducted by SN K[9] (2025) and RM TM et al[10](2026). revealed improving public awareness of oral hygiene measures; nevertheless, adjunctive interdental cleaning practices were less frequently adopted, with toothbrushing remaining the dominant oral hygiene method. These observations highlight the essential role of dental practitioners in guiding patients through effective education, motivation, and reinforcement strategies aimed at improving adherence to preventive oral health behaviors.

When considered collectively, evidence across professional groups, students, healthcare providers, and community populations consistently demonstrates a knowledge–attitude–practice disparity related to interdental hygiene adoption. The persistence of this pattern suggests that preventive dentistry should move beyond knowledge dissemination toward competency-based clinical training, structured chairside demonstrations, behavioral counseling techniques, and patient-centered communication strategies. Strengthening these educational and clinical components may help convert professional awareness into sustained preventive practices, thereby improving plaque control efficiency and long-term periodontal health outcomes.

Overall, both the present findings and existing literature indicate that awareness and favorable attitudes toward interdental aids are widely established; however, regular clinical implementation and patient compliance remain insufficient. Effective preventive oral health behavior depends not only on theoretical understanding but also on practical instruction, individualized demonstration, and periodic reinforcement during maintenance visits. Greater integration of preventive principles within dental curricula and routine clinical workflows may therefore enhance measurable improvements in periodontal health.

Certain limitations of this study should be acknowledged. The cross-sectional design restricts interpretation of causal relationships between educational exposure and interdental aid practices. Furthermore, reliance on self-reported responses introduces the

possibility of recall bias and social desirability bias. The study sample was limited to a specific geographic region, which may affect the generalizability of the findings to broader populations.

Future investigations should include multicenter longitudinal studies involving diverse professional and community groups to better explore behavioral factors influencing adoption of interdental hygiene measures. Interventional research assessing the impact of structured clinical training, chairside demonstration protocols, and patient motivation strategies is recommended to determine their effectiveness in improving long-term adherence and periodontal outcomes.

In summary, reducing the gap between knowledge and clinical practice remains a central challenge in preventive dentistry. Emphasis on competency-based education, continuous professional reinforcement, and patient-centered preventive approaches may enhance routine utilization of interdental aids and contribute to improved periodontal health at both individual and population levels.

CONCLUSION

Although dental professionals in India exhibit satisfactory awareness and positive attitudes toward interdental aids, their consistent incorporation into routine clinical practice remains limited. Strengthening competency-based training and continuing dental education may help improve periodontal preventive care

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