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**ORIGINAL ARTICLE**

## **Cross-sectional Study to Explore the Knowledge about Oral Hygiene Aids among Dental Interns in India**

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### **ABSTRACT**

Plaque control is a cornerstone for periodontal maintenance, which can be accomplished via mechanical and chemical methods. Various oral hygiene aids are available to maintain the oral health status. **Objective:** To assess the knowledge of dental interns about the use of different oral hygiene aids in specific situations. **Methods:** This cross-sectional, one point-time, multicenter questionnaire-based survey was conducted to collect data from 393 participants (16 men; mean age: 24.6 ± 5 years) who were randomly sampled from among dental interns across dental colleges in India. The questionnaires comprised 12 items. **Results:** Our data analysis revealed that dental interns possess adequate knowledge about the basic dental tools used for maintaining oral hygiene (60.1–79.7%). However, they possess less knowledge about the interdental aids pertaining to specific situations (35.8%) and the dose and frequency of use of chlorhexidine and other oral irrigation devices (32.9%). **Conclusion:** Although dental interns in India have basic knowledge about oral hygiene tools, there is a need for instilling greater awareness and learning about the use of oral hygiene aids in dental schools to upgrade the knowledge of students.

**Key words:** dental interns, knowledge, oral hygiene aids, survey

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### **INTRODUCTION**

Oral health is strongly related to the general health of an individual and is important for well-being at every phase of life. A healthy mouth not only allows adequate nutrition of the body but also improves the quality of social interface by promoting self-esteem.<sup>1</sup> It serves as a “window” to the rest of the body.<sup>2</sup> Among oral diseases, periodontitis and dental caries are the most prevalent ones. Both these conditions can largely be prevented by combining professional and self-care activities. The knowledge of general dentists and people’s attitude and behavior play an important role in the prevention of dental issues.<sup>3</sup>

Dental plaque or biofilm is the main etiological factor for periodontitis and dental caries, and the effective removal of bacterial plaque is the gold standard for its prevention. In addition, various epidemiological surveys have shown that bacterial plaque is the prime etiological agent in periodontitis.<sup>4</sup> Plaque control in periodontics can be accomplished via mechanical and chemical approaches. The mechanical plaque control methods are incontestably the easiest and most effective measures

to prevent periodontal diseases.<sup>5,6</sup> The most commonly employed mechanical plaque control procedure is tooth brushing. Approximately 90% of Americans brush twice daily, and 97% of Koreans brush at least once daily, whereas only 69% of Indians brush daily.<sup>7</sup>

Furthermore, past studies have strongly demonstrated that gingivitis is more common in the interproximal areas.<sup>8</sup> Generally, the interdental areas are inaccessible to a tooth brush. To overcome this shortcoming of tooth brushes, various interdental aids have been designed, including dental floss, toothpicks, and interproximal brushes.<sup>9</sup> According to some reports, only a small proportion of the population uses dental floss on a daily basis, despite the fact that dental floss is more effective than manual brushing in the reduction of plaque from interproximal areas.<sup>10-12</sup> The use of mouthwash is an integral component of chemical plaque control. It helps in maintaining the interproximal gingival health. Mouthwashes should be used as an adjunct to mechanical plaque control, but not regarded as a substitute.<sup>13</sup> In fact, some investigators have reported promising results for the use of dental irrigators as an interdental cleaner.<sup>14</sup>

Dentist plays an important role in providing knowledge about preventive measures and maintaining good oral health of individuals, families, and the society. It is extremely important for a dental student to have a sound knowledge about the oral health status and preventive measures because it could serve as an important motivational and educational tool to maintain and educate about good oral hygiene.

One-year internship program is the final requirement, after which a student is awarded his/her graduation degree. The knowledge gained during this tenure is used in the general practice, unless additional efforts are taken to supplement it.

Several studies and surveys have been conducted to access the knowledge and behavioral status of dental students toward oral health behavior and preventive measures, but very little attention has been paid to the extent of awareness and knowledge about the use of interdental aids and chemical plaque control agents among dental interns. We therefore undertook this study to assess the knowledge of dental interns about the use of different oral hygiene aids suitable to a specific situation.

## METHODS

The study was designed as a cross-sectional, one point-time, multicenter survey using a structured and pre-validated close-ended questionnaire to evaluate the knowledge base of dental interns from different colleges across India about the use of different oral hygiene aids and their use in specific situations. The study was conducted between September 2016 and August 2017. A draft questionnaire was constructed with 12 questions in English language and checked for face validity by a language expert. Ethical clearance for the survey was obtained from the Ethics Review and Research Board of our institution.

The sample size was calculated depending on the following formula:

$$\text{Sample size} = \frac{Z\alpha^2 (p) * (1-p)}{c^2}$$

Where,

Z = Z value (1.96 for 95% confidence level)

p = percent of picking a choice, expressed as decimal  
This value was found to be 60% for the present study, which was expressed as 0.40.

c = confidence interval, expressed as decimal

Thus, the sample size was calculated as per the following formula:

$$\text{Sample size} = (1.96)^2 \times 0.60 \times 0.40 / (0.05)^2$$

Accordingly, the sample size was calculated to be 390.

**Table 1.** Demographic data of the study population

Total participants	Gender	Number	Educational status	Mean age	Age range
393	Male	160 (41%)	Interns	24.5 ± 1.3	23–29
	Female	233 (59%)	Interns	23.3 ± 1.2	22–27

Written informed consent was obtained from each participant prior to the survey. The preformed questionnaires were distributed to the interns in their respective departments; the time duration of 15 min was allotted, with no compulsion to answer all the questions. Furthermore, the investigator was available all the time during the filling of the questionnaire form to answer any possible queries raised by the participants to help answer the form.

## RESULTS

This survey comprises 393 subjects (160 men, 233 women) who were selected using random sampling techniques from among dental interns across different dental colleges in India (Table 1). Our sample size of 393 was based on the results of our pilot study, which revealed that 12 out of 20 patients (60%) reported initiation of periodontal diseases in the interproximal areas.

In the survey, we recorded the response of 393 dental interns of mean age 24.6 ± 5 years. The survey included 233 (59.28%) women and 160 (40.78%) men. Table 2 shows the distribution of response recorded by each participant while filling of the form. Question 1 (Q.1) was responded by 389 (99%), which was the maximum response to any question present in the form, meanwhile Q.2 was answered by 387 (98.4%) participants, Q.3 by 386 (98.2%), Q.4 by 386 (98.2%), Q.5 by 388 (98.3%), Q.6 by 385 (98%), Q.7 by 386 (98.2%), Q.8 by 388 (98.3%), Q.9 by 384 (97.7%), Q.10 by 385 (98%), Q.11 by 383 (97.4%), and Q.12 by 379 (96.4%); the response rate to Q.12 was the minimum of all.

## DISCUSSION

Dental caries and periodontal disease is considered as the major oral health problem in developing countries due to its high prevalence rate and negative impact on the life of individuals affected by it.<sup>15</sup> Periodontal diseases are the major cause of tooth loss in adults<sup>16</sup>, and the rate of progression is more rapid in the developing countries. Oral health directly affects the quality of life due to the intricate relationship between oral health and general health, and it is also important for the physical appearance and a sense of well-being.<sup>17</sup> Prevention of dental caries and gingival and periodontal diseases can be attained by optimizing the oral health practices in

**Table 2.** Frequency of responses to the questions in the questionnaire

Question number	Option	Responses (n)	Responses (%)
Q.1 Which part of the periodontium is more vulnerable to the periodontal disease?	a. Buccal	73	18.7%
	b. Lingual	63	16.1%
	c. Palatal	12	3%
	d. Interproximal	241	61.9%
Q2. What is the optimum advised timing for tooth brushing to the patient is?	a. 2 min	162	41.8%
	b. 5 min	113	29.1%
	c. 10 min	49	12.6%
	d. 4 min	64	16.5%
Q3. State the type of tooth brush advised to patients with periodontitis.	a. Soft	174	45%
	b. Ultrasoft	156	40.4%
	c. Medium	56	14.5%
Q4. Do you know the different types of embrasure?	a. Yes	331	85.7%
	b. No	55	14.3%
Q5. Select proper interdental aids with respect to type of embrasure.	a. Type I embrasure: dental floss, type II embrasure: uni-tufted brush, type III: proxa-brush.	140	36.1%
	b. Type I embrasure: uni-tufted brush, type II embrasure: dental floss, type III: proxa-brush.	99	25.5%
	c. Type I embrasure: dental floss, type II embrasure: proxa-brush, type III: uni-tufted brush.	139	35.8%
Q6. What is the purpose of mouthwash in maintenance therapy?	a. To flush food debris	50	12.9%
	b. To inhibit bacterial binding on the tooth surface	307	79.7%
	c. To reduce calculus formation	28	7.2%
Q7. What should be the concentration and dose of chlorhexidine?	a. 0.2% 10 ml solution (without dilution)	125	32.4%
	b. 0.2% ,20 ml solution diluted in 10 ml of water	71	18.4%
	c. 0.2% 10 ml solution diluted in 100 ml of water	191	49.5%
Q8. What should be the frequency of use of chlorhexidine?	a. Once a day	96	24.7%
	b. Twice a day	245	63.1%
	c. As per convenience of the patient	18	4.6%
	d. After every meal	39	10%
Q9. For what should chlorhexidine mouth wash be used?	a. Before tooth brushing	82	21.3%
	b. After tooth brushing	231	60.1%
	c. Depends on patient compliance	71	18.5%
Q10. To whom is dental floss advised?	a. To all patients	175	45.5%
	b. To patients who are complaining of food lodgment	138	35.5%
	c. To a patient with open interdental contact	72	18.7%
Q11. Can we prescribe dental floss to the patients before complete scaling and root planing?	a. Yes, we can	106	27.7%
	b. No, we cannot	183	47.8%
	c. Yes, if the patient insists	63	16.4%
Q12. For what purpose is an oral irrigation device such as Water Pik used?	a. In addition to scaling and polishing	240	63.3%
	b. As an alternative to scaling and polishing.	65	17.1%
	c. To polish the tooth surface after scaling and polishing	74	19.5%

n = number

the form of proper tooth brushing, the use of interdental aids, chemical plaque control measures, and regular dental visits.

According to the World Dental Federation (FDI), the most serious challenges that developing countries are presently facing is in their quest of optimal oral health due to incomplete knowledge about oral hygiene measures in the general population. Dr. Tin Chun Wong (President of the Federation Dental International [FDI]) stated that "Oral health is integral to general health and a basic human right, and we must ensure cost-effective solutions become available to all. Promoting better research and obtaining valid data will help us achieve this objective." FDI suggested several changes in the dental curriculum to improve the knowledge and attitude of the students in order to prepare them for their clinical practice.<sup>18</sup> Comprehensive programs in preventive care, including oral self-care regimens, should form an essential part of undergraduate dental education.<sup>19</sup>

In the present study, majority of the interns, that is, 241 (61.9%) possessed the knowledge that the interproximal areas are highly vulnerable to periodontal diseases. It is a known fact that the interproximal area is the most susceptible part of the gingiva for periodontal diseases.<sup>20</sup> Based on this knowledge, the maintenance of this area becomes a prime concern. About 162 (41.8%) participants reported that 2–3 min is the optimum time of tooth brushing, as recommended by the American Dental Association.<sup>21</sup> Vigorous brushing for a long time is detrimental to the hard and soft structure of the periodontium. On the other hand, brushing for a short duration does not cover all surfaces and areas effectively.

The knowledge about the type of tooth brush and their use is also important due to its important in certain periodontal conditions. In the present study, 174 (45%) participants responded accurately regarding the type of brush to be used by periodontitis patients. In various studies, soft bristle tooth brush has been recommended for effective plaque removal and minimal hard tissue damage.<sup>22</sup> Gingival embrasures are defined as the embrasure cervical to the interproximal contact.<sup>23</sup> Open embrasures contribute to the retention of food debris and can adversely affect the health of the periodontium. Interproximal aids are advised to patients according to the type of embrasure. In the present survey, 331 (85.7%) participants confirmed their knowledge about the embrasure. However, only 139 (35.8%) participants recorded the correct combination while answering about the selection of proper interdental aids with respect to the type of embrasure.

Chemical plaque control can be used as an adjunctive to mechanical plaque control for oral hygiene maintenance. Chlorhexidine gluconate is the most widely used chemical plaque control agent prescribed by several

dentists and specialists. Chlorhexidine mouthwash prevents plaque formation by inhibiting the bacterial binding on the tooth surface. In the survey, 307 (79.7%) participants answered with the correct option. In their landmark studies, Loe<sup>24</sup> and Schiott<sup>25</sup> reported that the dose of chlorhexidine required to prevent plaque formation was 10 mL of 0.2% weight per volume (w/v) for 1 min, twice daily. While responding to this particular question, only 125 (32.4%) interns demonstrated the correct knowledge about the dose and instruction for use. Furthermore, 245 (63.1%) participants possessed the correct knowledge about the frequency of use. It is recommended that chlorhexidine mouthwash be used after brushing, because brushing reduces the substantivity of the mouthwash. In the survey, 231 (60.1%) participants demonstrated appropriate knowledge about the timing of use.

It has been reported that interdental plaque removal is inadequate with the use of toothbrush only. Hence, the use of other interdental aids such as dental floss has been emphasized.<sup>26</sup> Instead of knowing the fact that it is a good adjunct to oral hygiene, only a small part of the population uses it on a daily basis.<sup>27,28</sup> In the present study, only 175 (45.5%) participants confirmed that dental floss should be advised to all individuals. Other participant suggested its use in specific dental situations only, such as for food dislodgment and in open interdental spaces. Past reports have revealed that only 15.8% of the Indian population uses dental floss, which may be attributed to the lack of awareness among people and prescription practices of the dentists.<sup>29</sup> While prescribing dental floss, one should keep in mind that there should not be any remaining calculus in the interproximal area and scaling and that polishing has been completed. The question on this particulate situation was correctly answered by only 183 (47.8%) participants, which reflects the level of incomplete knowledge about the use of dental floss even among dental interns.

Oral irrigation devices have been shown to be clinically effective in inhibiting or reducing dental plaque. Jet irrigators (oral irrigators) have been reported to deliver medicaments more effectively in the interproximal area as compared to rinsing.<sup>30</sup> WaterPik is the most commonly and widely used oral irrigator system, and it is used in adjunct to scaling and polishing. In the present study, 240 (63.3%) participants recorded the right answer to this question. However, this question received the minimum number of response from the participants (96.4%), which suggests the lack of knowledge among the participants about the product.

This study had some limitations. First, the authenticity of the responses could not be established because of the use of a self-reported questionnaire. Second, the sample size was small. Multicenter survey with larger sample size needs to be conducted in the future to overcome this limitation. The fact that practicing dentist and

postgraduates have more exposure to scientific meeting, periodicals, and scientific articles about oral hygiene aids, the inclusion of these groups in the survey is also worth considering.

This survey can be conducted for other healthcare professionals and general population to understand their knowledge base and attitude regarding the use of oral hygiene aids.

## CONCLUSION

We provided a comprehensive overview of the knowledge and attitude related to oral hygiene aids among dental interns. Unlike in other surveys of the past, we focused more on the specific use of oral hygiene aids in a specific situation. The present study revealed that dental interns possess adequate knowledge about the basic tools required to maintain oral hygiene. The study subjects possessed less knowledge about the interdental aids in a specific situation as well as about the dose and frequency of use for chlorhexidine and other oral irrigation devices. A greater emphasis is thus warranted on oral hygiene aids education in the dental schools to upgrade the existing knowledge level of the students.

In the future, this survey can be applied for patients, practitioners, and post-graduate residents to evaluate their knowledge and attitude statuses.

## CONFLICT OF INTEREST

There were no conflict of interest related to this study.

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