



Research Article

Knowledge and awareness of the emerging tobacco products among dental students

Samarita Pearlin R¹, Raghavelu Narendran Mugundan¹, Kannan Ranganathan¹

¹Department of Oral and Maxillofacial Pathology, Ragas Dental College and Hospital, Affiliated to The Tamil Nadu Dr. M.G.R. Medical University, Uthandi, Chennai, Tamil Nadu, India.



*Corresponding author:

Samarita Pearlin R.,
Department of Oral and
Maxillofacial Pathology, Ragas
Dental College and Hospital,
Affiliated to The Tamil Nadu
Dr. M.G.R. Medical University,
Uthandi, Chennai, Tamil Nadu,
India.

dr.samaritapearlin18@gmail.com

Received: 15 August 2024
Accepted: 24 October 2024
Epub Ahead of Print: 14 December 2024
Published: 26 December 2024

DOI
10.25259/JGOH_28_2024

Quick Response Code:



ABSTRACT

Objectives: Tobacco usage poses a significant global health challenge, necessitating increased awareness, particularly among dental students who play a pivotal role in addressing oral health issues related to tobacco use. The study aims to assess awareness and knowledge levels of emerging tobacco products among dental students of different academic years. **Materials and Methods:** This study was conducted at Ragas Dental College and Hospital in September 2023, and this cross-sectional questionnaire study involved 215 undergraduate dental students from academic years first, second, third, and fourth, utilizing a convenience sampling method. A cross-sectional questionnaire survey covered demographics, tobacco familiarity, emerging product awareness, ingredient understanding, media exposure, and perceived harmful effects among 215 dental students. The chi-square test assessed significant associations ($P < 0.05$). Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences software version 25.0. The Chi-squared test explored the association between academic year and awareness levels of various tobacco forms. **Results:** Fourth-year students demonstrated the highest awareness of diverse tobacco forms (58.5%), while first year (50%) and second year (35.7%) were more familiar with traditional smoking. All academic years believed that the ingredients in commercial smokeless tobacco products differ, with a significant difference in awareness ($P = 0.00^*$). However, no significant difference was observed in media exposure awareness ($P = 0.04^*$). **Conclusion:** Specific gaps exist in knowledge, emphasizing the necessity for targeted education and improved anti-tobacco communication strategies. Dental students' awareness is crucial for addressing the unique challenges posed by these products on oral health.

Keywords: Tobacco, Dental students, Emerging tobacco products, Awareness, Knowledge

INTRODUCTION

Global Adult Tobacco Survey revealed high tobacco usage rates, leading to millions of deaths globally.^[1] Smokeless types such as bidi and pan, alongside emerging products such as electronic cigarettes (e-cigarettes) and nicotine pouches exist.^[2-4] Dental students must understand these developments to address oral health challenges. The evolving tobacco products, particularly smokeless and pouched tobacco (PT)^[5] remain unrecognized, thereby creating a gap in the literature. Recognizing this, the study was conducted to assess the awareness and knowledge levels regarding emerging tobacco products among dental students in their first, second, third, and fourth years of study, utilizing a validated questionnaire methodology.

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MATERIALS AND METHODS

A cross-sectional survey, using a questionnaire-based approach, was conducted at Ragas Dental College and Hospital in September 2023.

The study employed a convenience sampling method involving undergraduate dental students from academic years first, second, third, and fourth. Before their participation, students received information about the study's purpose, and assurances of confidentiality were provided. A total of 215 students ($n = 215$) participated and responded to the study. Ethical clearance for this study was done (IRB No.: RIEC/20240619/OP).

An anonymous self-administered close-ended questionnaire comprising 30 questions was developed through literature review and consultation with field experts. A pilot study involving 25 participants was conducted. Based on the feedback, the final questionnaire was changed, ensuring relevance to the research question. The study aimed to assess participants' demographic details, different forms of tobacco, familiarity with emerging tobacco products, their understanding of product ingredients, availability, usage among their peers and colleagues, advertisements regarding the discard of tobacco usage, and awareness of potential oral and systemic health effects. The questions were then disseminated through a URL link on social media such as WhatsApp and Email created using Google Forms.

The data collected which was obtained from the questionnaire study were gathered and entered into a Microsoft Excel 15.0 spreadsheet and were then statistically analyzed using the Statistical Package for the Social Sciences software version 25.0. The Chi-squared test was employed to investigate a significant association between participant's academic year and their awareness levels concerning various forms of tobacco. The significance level was set at $P < 0.05$.

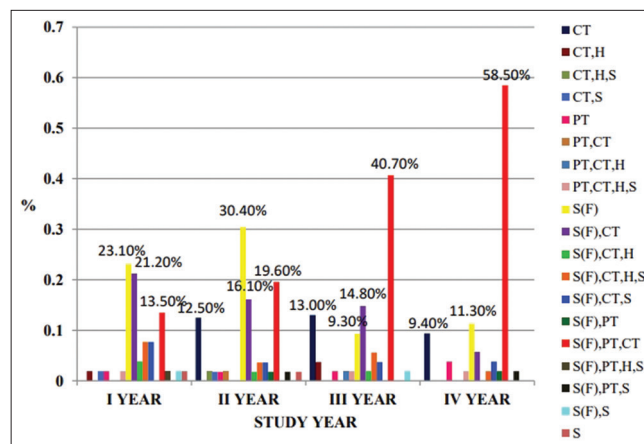
RESULTS

The study included 215 participants with a 100% response rate distributed across academic years: First year (24.2%), second year (26.0%), third year (25.1%), and fourth year (24.7%). Graph 1 shows varied awareness of different tobacco forms, with fourth year (58.5%) and third year (40.7%) demonstrating the highest awareness of smoking filtered (SF), PT, and chewing tobacco (CT). No significant differences in awareness were observed across academic years ($P = 0.72$). In Table 1, we highlight the awareness levels of products such as Pan Parag, Manikchand, Hans, and Mawa. Second year (64.3%) and fourth year (52.8%) were largely unaware, while third years (59.3%) demonstrated higher awareness, indicating no significant differences ($P = 0.45$). Graph 2 indicates the awareness levels of products such as Cool Lip

(CL), Vimal (V), Rasiklal Manikchand Dhariwal (RMD), D.S. Pattanam Podi (DSP), Mishri (M), and Green Dragon (GD). Varying awareness was noted across academic years, with no significant overall difference ($P = 0.18$). Graph 3 indicates that first (67.3%), second (78.6%), and third years (53.7%) believed that smokeless tobacco (SLT) products had different ingredients, while 52.8% of fourth years perceived them to be the same. A significant difference in perceptions was observed across academic years ($P = 0.03^*$). Graph 4 shows disparities in receiving targeted advertisements. Majority of the fourth years (84.9%) noted insufficient ads, while 75%, 80.4%, and 63% were first, second, and third years, respectively, demonstrating a significant difference ($P = 0.04^*$). Table 2 presents perceptions of media content adequacy to deter tobacco usage. Overall, 67.3% found it insufficient, with no significant differences observed across academic years ($P = 0.14$). Table 3 displays participant's belief about SLT harm compared to traditional smoking. Across all years, the majority considered SLT equally or more harmful, with no significant differences ($P = 0.15$).

DISCUSSION

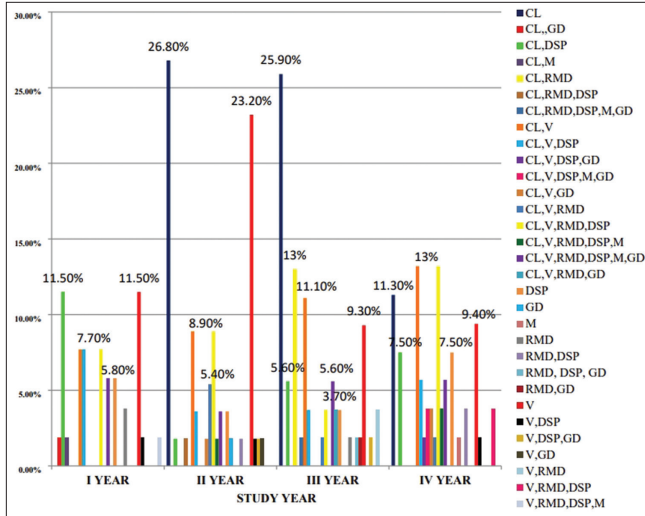
The first-year dental students had limited awareness of different tobacco forms, with 23.1% recognizing SF and 21.2% CT. Notably, their awareness was predominantly limited to



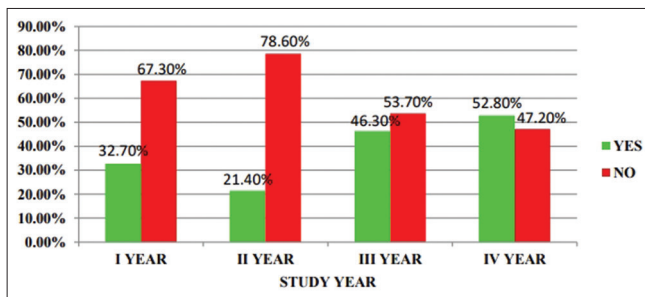
Graph 1: Awareness of different forms of tobacco. CT: Chewing tobacco, PT: Pouched tobacco, H: Hookah, S: Smoking, S(F): Smoking filtered.

Table 1: Awareness of other tobacco products like Pan Parag, Manikchand, Hans, and Mawa.

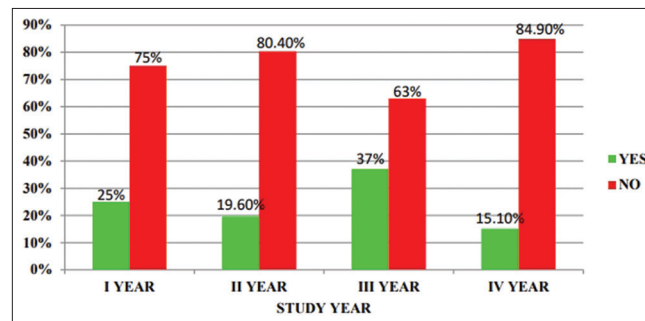
Year of study	Yes	No	P-value
I	26 (50%)	26 (50%)	0.10
II	20 (35.7%)	36 (64.3%)	
III	32 (59.3%)	22 (40.7%)	
IV	25 (47.2%)	28 (52.8%)	
Total	103 (47.9%)	112 (52.1%)	



Graph 2: Awareness of Cool Lip (CL), Vimal (V), Rasiklal Manikchand Dhariwal (RMD), D.S Pattanam Podi (DSP), Mishri (M), Green Dragon (GD).



Graph 3: Ingredients of all commercial smokeless tobacco products are same.



Graph 4: Received targeted advertisements on emerging tobacco products in social media.

these two forms but no other varieties. The equal percentage of participants being both aware and unaware of specific tobacco products indicates a diverse range of awareness levels within this cohort. Well-recognized products such as CL (11.5%) and V (11.5%) suggest a baseline familiarity with certain brands. However, lower awareness of products such as DSP (5.8%) and GD (5.8%) highlights potential knowledge gaps. The

Table 2: Current media content to stop tobacco usage

Year of study	Yes	No	P-value
I	20 (38.5%)	32 (61.5%)	0.14
II	15 (26.8%)	41 (73.2%)	
III	20 (37%)	34 (63%)	
IV	11 (20.8%)	42 (79.2%)	
Total	66 (30.7%)	149 (69.3%)	

Table 3: Believe that smokeless tobacco products are less harmful compared to traditional smoking

Year of study	Yes	No	P-value
I	19 (36.5%)	33 (63.5%)	0.15
II	11 (19.6%)	45 (80.4%)	
III	20 (37%)	34 (63%)	
IV	15 (28.3%)	38 (71.7%)	
Total	65 (30.2%)	150 (69.9%)	

finding that 67.3% believed SLT ingredients differ suggests a general understanding of product distinctions. Additionally, the majority (75%) not receiving targeted advertisements on social media aligns with a potential limited exposure to promotional content related to emerging tobacco products. The fact that 61% of the students found the current media content insufficient to deter tobacco usage, underscores the need for more comprehensive and impactful anti-tobacco communication strategies tailored to this specific group of dental students.

Around 30.4% of the second-year dental students were aware of SF tobacco, while 19.6% were aware of PT, and 16.1% were aware of CT forms. Although awareness was limited for other forms, well-recognized products included CL (26.8%) and V (23.2%). The finding that 78.6% believed the SLT ingredients differ, suggests an understanding of product distinctions among this group. The reported absence of targeted advertisements on social media (80.4%) aligns with the notion that second-year students may not be extensively exposed to promotional content related to emerging tobacco products. About 73.2% expressing the current media content as insufficient to deter tobacco usage suggests a potential need for more impactful and tailored anti-tobacco communication strategies for students in the second year.

In third-year dental students, 40.7% awareness of SF, PT, and CT forms indicates understanding of the various tobacco forms. While specific products such as CL (25.9%) and R.M.D (13%) were recognized, the finding that 63% believed SLT ingredients differ suggests potential misconceptions or gaps in knowledge, emphasizing the importance of targeted educational interventions. The lack of targeted advertisements on social media (63%) aligns with the finding that this group might not be extensively

exposed to promotional content related to emerging tobacco products. Additionally, 63% expressing the current media content as insufficient to curb tobacco usage, highlights a need for more impactful anti-tobacco communication strategies tailored to the perceptions and preferences of third-year dental students.

The notable 58.5% awareness among fourth-year dental students regarding various forms of tobacco, particularly SF, PT, and CT, could be attributed to their advanced academic status and increased exposure to clinical cases involving diverse tobacco use. However, the limited awareness of other tobacco forms and specific products such as CL, R.M.D, V, and DSP might indicate potential gaps in the educational curriculum or the need for additional targeted education on emerging tobacco products. 52.8% believed that SLT ingredients are the same, suggesting a need for reinforcing accurate information on SLT compositions during the later stages of dental education. About 84.9% report no targeted advertisements and 79.2% find the current media content insufficient to deter tobacco usage could reflect challenges in the reach and effectiveness of anti-tobacco campaigns, emphasizing the importance of refining communication strategies and interventions for this specific group of students.

The comparative analysis across the four academic years indicates varying levels of awareness among dental students regarding different forms of tobacco. Fourth-year students demonstrated the highest awareness, encompassing SF, PT, CT, Hookah, and Snuffs. In contrast, first and second-year students primarily recognized only the smoking form of tobacco. While there was a trend toward increased awareness with higher academic years, the differences in awareness of other tobacco products such as Pan Parag, Manikchand, Hans, and Mawa were not statistically significant ($P = 0.10$), with 59.3%, 50%, 47.2%, and 35.7%, respectively. Notably, fourth-year students exhibited the most comprehensive awareness of specific tobacco products, being aware of all listed items (CL, V, R.M.D, DSP, M, and GD), compared to lower awareness among second and third-year students. First-year students demonstrated limited awareness of only CL, V, and DSP. All academic years unanimously believed that the ingredients of commercial SLT products differ, and they did not receive targeted advertisements on emerging tobacco products in social media, showcasing significant statistical differences ($P = 0.00$ and $P = 0.04$). Regarding the insufficiency of current media content to deter tobacco usage, there was no significant statistical difference ($P = 0.14$), with 79.2%, 73.2%, 63%, and 61.5% of fourth, second, third, and first-year students expressing dissatisfaction. Similarly, in the belief that SLT is more harmful than traditional smoking, there was no significant statistical difference ($P = 0.15$), with 80.4%, 71.7%, 63%, and 61.5% of second, fourth, first, and third-year students, respectively, sharing this perception.

Many studies demonstrated the use of tobacco products and its relation with the risk of oral cancer.^[6] Kentala *et al.*, reported that most warning labels on tobacco products are focused on severe health problems of tobacco use; they are more often aimed at lung cancer, passive smoking, and sexual impotence.^[7] Appropriate interventions are needed to reduce tobacco use among tobacco users. These interventions should focus on raising awareness about the dangers of tobacco use to reduce peer influence and provide support for quitting.^[8] Awareness programs should highlight the health risks associated with cigarette smoking and extend their focus to other tobacco products, including hookah, bidis, and smokeless products like areca nut and betel nut.^[9,10] There were varying awareness levels among dental students regarding emerging tobacco products.^[11] While certain forms of tobacco are recognized, there is a notable knowledge gap for specific products. The findings emphasize the need for targeted education and improved anti-tobacco communication strategies.

The findings of this study suggest the need for more innovative approaches to increase tobacco awareness among dental students, particularly concerning emerging products. One effective strategy could be the use of interactive digital platforms, such as mobile applications and e-learning modules, which can engage students through real-time updates on tobacco products such as e-cigarettes, nicotine pouches, and other newer forms of SLT. These platforms can offer gamified learning experiences and virtual simulations, enhancing students' understanding in a more dynamic way.

Peer-led awareness programs, where students educate each other through workshops and discussions, can also foster a collaborative learning environment, making the education process more relatable and impactful. Another potential initiative is the implementation of "Tobacco-Free Campus" campaigns that integrate tobacco cessation training into the dental curriculum, which would reinforce the role of future dental professionals in preventing and managing tobacco use. Furthermore, targeted social media campaigns, possibly in collaboration with influencers or health professionals, can raise awareness of less familiar products, such as flavored tobacco pouches, making the information more engaging and relevant to students.

Artificial intelligence-based educational tools can further enhance the learning process by offering personalized modules that address individual knowledge gaps, helping students grasp the evolving landscape of tobacco products and their health risks. In addition, community outreach programs, where dental students actively participate in tobacco awareness drives, can bridge the gap between theoretical knowledge and practical application, especially when dealing with tobacco users in clinical settings. Collectively, these strategies could help enhance awareness

and knowledge of tobacco products among dental students, equipping them to better address the challenges posed by both traditional and emerging forms of tobacco.

CONCLUSION

This study reveals varied awareness levels among dental students about different forms of tobacco, especially emerging products like smokeless tobacco and nicotine pouches. Although senior students demonstrated greater familiarity, knowledge gaps were observed across all years, particularly regarding specific products and their associated health risks. These results indicate a need for targeted education and improved anti-tobacco communication strategies in the dental curriculum, to better prepare future dental professionals to address tobacco-related oral health issues.

Ethical approval

The research/study was approved by the Institutional Review Board at Ragas dental college, number RIEC/20240619/OP, dated June 03, 2024.

Declaration of patient consent

Patient's consent is not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI.

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How to cite this article: Pearlin SR, Mukundan RN, Ranganathan K. Knowledge and awareness of the emerging tobacco products among dental students. *J Global Oral Health*. 2024;7:98-102. doi:10.25259/JGOH_28_2024