Assessing Awareness and Knowledge of Oral Cancer Risk Factors among Undergraduate Dental Students in the Konkan Region of Maharashtra

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Abstract

Background: Oral cancer remains a significant public health issue globally, with India bearing a high burden due to prevalent risk factors like tobacco and areca nut use. Dental professionals play a crucial role in early detection and prevention, making it essential to assess their awareness and preparedness. **Objective:** This study aimed to evaluate the awareness, knowledge, and clinical confidence regarding oral cancer among undergraduate dental students in the Konkan region of Maharashtra. **Methods:** A cross-sectional survey was conducted using a structured questionnaire among 190 dental students from Yogita Dental College. Data were analyzed using SPSS software, with descriptive statistics and Chi-square tests applied for evaluation. **Results:** While 97.9% of students were aware of oral cancer and 93.7% recognized it as a major health concern, 81.1% had never attended related seminars. Though most identified key risk factors and clinical features, only 48.4% felt confident in clinical detection. A substantial proportion (51%) acknowledged rising prevalence among young adults. **Conclusion:** Despite high theoretical awareness, a gap persists in clinical confidence and exposure. Integrating practical training, workshops, and community outreach into dental curricula is critical for improving early diagnosis capabilities.

Keywords: Oral cancer, Risk factors, Diagnosis, Awareness, Dental students

Introduction

Oral cancer is among the most prevalent malignancies in the head and neck region, contributing significantly to global morbidity and mortality [1]. Cancer continues to be one of the leading causes of death worldwide, and projections indicate it may become the most common cause of death by 2030 [2]. Oral cancers, accounting for

approximately 2–4% of all malignancies, demand special attention due to their substantial public health burden [3]. These malignancies affect various anatomical structures, including the lips, tongue, floor of the mouth, palate, gums, alveolar mucosa, buccal mucosa, and oropharynx [4]. Globally, oral and pharyngeal cancers account for over 419,000 new cases and more than 240,000 deaths each year [3,5]. The incidence is notably higher among men and continues to rank among the leading causes of cancer-related mortality [5]. The etiology of oral cancer is multifactorial, with key risk factors including tobacco use, alcohol consumption, Human Papillomavirus (HPV) infection—particularly relevant to oropharyngeal cancers—excessive ultraviolet (UV) exposure linked to lip cancer, and age over 45 years [6–8]. Additional contributing factors include malnutrition, immune deficiencies, and lower socioeconomic status [9].

Despite the oral cavity being readily accessible for clinical examination, early diagnosis rates for oral cancer remain unsatisfactorily low, ranging from 26% to 48% globally [5,10]. Dental professionals, particularly dentists and dental students, play a critical role in early detection and prevention through routine screenings and patient education on risk factors [11]. A comprehensive and meticulous examination of areas prone to malignant changes can be life-saving, and this requires practitioners to have in-depth knowledge of lesion characteristics, anatomical sites, and appropriate management strategies [11,12].Nevertheless, multiple studies across various countries have identified a concerning lack of routine involvement by dental professionals and students in the prevention and early diagnosis of oral cancer [13,14]. This highlights a substantial gap in current dental education and clinical practices, signalling the need for improved training and awareness among future dental practitioners.

Given this background, the present study aims to assess the awareness, knowledge, and attitudes of undergraduate dental students in the Konkan region of Maharashtra regarding oral cancer and its risk factors. Identifying educational gaps and evaluating preparedness among students can guide the development of targeted interventions and curriculum improvements to strengthen oral cancer prevention efforts.

Materials and Method

This study employed a cross-sectional questionnaire-based survey design to assess the awareness and knowledge of oral cancer risk factors among dental students. The study population consisted of students from Yogita Dental College and Hospital. A total of approximately 190 participants were included in the sample. A stratified random sampling technique was utilized, with stratification based on the academic year of dental students to ensure proportional representation across all levels of study.

Data were collected using a structured and validated questionnaire designed to gather relevant information in three key areas. The first section collected demographic details of the participants. The second section included questions focused on the participants' awareness of oral cancer, while the third section assessed their knowledge of risk factors and clinical signs associated with oral cancer. The questionnaire served as the

primary data collection tool, and its content was developed to comprehensively evaluate the participants' understanding and awareness relevant to early detection and prevention of oral cancer.

Data Analysis

The collected data were entered into Microsoft Excel and subsequently analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were employed to summarize the data and provide an overview of participant responses. Chi-square tests were used to assess associations between categorical variables, while correlation analysis was conducted to explore relationships between different components of awareness and knowledge regarding oral cancer. A significance level of $p< 0.05$ was considered statistically significant for all inferential analyses.

Selection Criteria

The study included undergraduate dental students and interns who were willing to provide informed consent to participate. Participants were selected based on their availability and voluntary agreement to be part of the survey. Postgraduate students and faculty members were excluded from the study. Additionally, individuals who declined to give informed consent were not considered eligible for participation.

Ethical Considerations

Prior to participation, informed consent was obtained from all individuals involved in the study. Participants were assured that their responses would remain anonymous and that confidentiality of the data would be strictly maintained throughout the research process. The study protocol was reviewed and approved by the institutional ethical committee to ensure compliance with ethical standards.

Results

The demographic details showed the mean age of study population was 21.32 ± 2.012 years. Female participants constituted the majority, accounting for 87.4% of the sample, while males represented 12.6%. Nearly half of the respondents (49.5%) were in their first and second year of BDS and half 50.5% were in their third, fourth year of BDS and interns. (Table 1)

Table 1: Demographic details of the participants

Variable	Category	Frequency	Percentage
Gender	Female	166	87.4
	Male	24	12.6
Year of study	First & Second	94	49.5
	Third, Fourth & Interns	96	50.5

A significant proportion of participants (81.1%) reported not having attended any seminar or workshop related to the oral cancer, highlighting a gap in awareness programs and educational exposure. Despite this, a high level of awareness was evident, with 97.9% of respondents having heard of oral cancer. Furthermore, an overwhelming majority (93.7%) acknowledged oral cancer as a significant public health issue. Attitudinal responses revealed strong positive perceptions; 67.9% of participants strongly agreed and 31% agreed that early detection of oral cancer improves prognosis. Regarding knowledge of oral cancer specifics, 81.6% identified the buccal mucosa as the most common site of occurrence, and 80.6% recognized squamous cell carcinoma as the predominant histological type. (Table 2)

Table 2: Awareness of Oral Cancer among participants

Variable	Category	Frequency	Percentage
Have you attended any seminar or workshop of oral cancer	No	154	81.1
	Yes	36	18.9
Have you heard about oral cancer	No	4	2.1
	Yes	186	97.9
Do you think oral cancer is a significant public health issue	No	7	3.7
	Not sure	5	2.6
	Yes	178	93.7
Early detection of oral cancer improves prognosis	Agree	59	31
	Disagree	2	1.1
	Strongly Agree	129	67.9
Most common site of oral cancer	Buccal Mucosa	155	81.6
	Floor of Mouth	13	6.8
	Hard Palate	1	.5
	Tongue	21	11.1
Most common type of oral cancer	Adenocarcinoma	12	6.3
	Melanoma	13	6.8
	Sarcoma	12	6.3
	Squamous Cell Carcinoma	153	80.6

In terms of risk factors, 63.7% of participants selected "All of the Above," indicating awareness that oral cancer is multifactorial and commonly associated with tobacco use, alcohol consumption, HPV infection, and poor oral hygiene. Notably, Areca Nut and Tobacco chewing were identified as key risk habits linked to oral conditions. The increasing incidence of oral cancer among younger adults aged 20 to 40 years underscores the urgent need for targeted public health interventions. Majority, 31.5%

participants recorded non-healing ulcer as a common clinical sign of oral cancer followed by white or red patches. Despite knowledge about clinical signs and symptoms, 51.6% participants reported less confidence in detection of oral cancer among routine dental check-ups. (Table 3)

Table 3: Knowledge regarding major risk factors, signs and symptoms of Oral Cancer

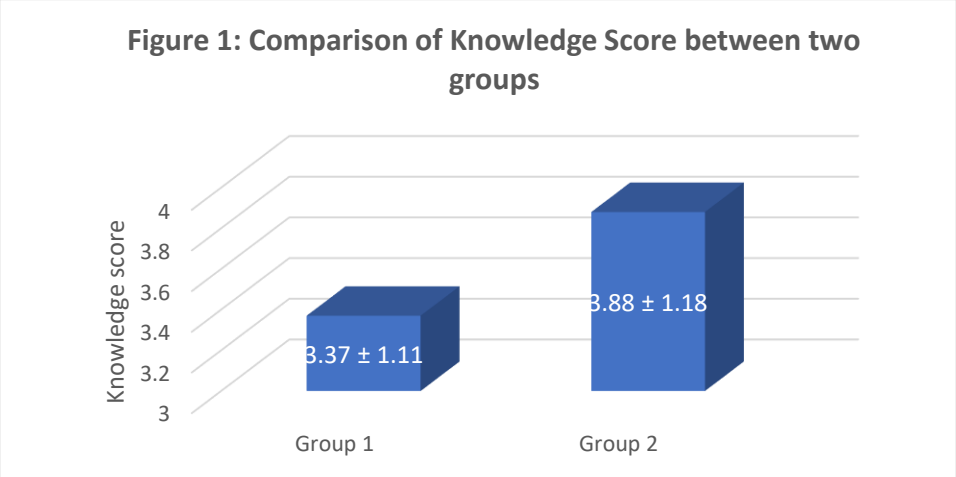
Variable	Category	Frequency	Percentage
Major risk factors for oral cancer	Alcohol Consumption	1	.5
	HPV Infection	3	1.6
	Poor Oral Hygiene	1	.5
	Tobacco Use	64	33.7
	All of the Above	121	63.7
Habits increase the risk of oral submucous fibrosis	Areca Nut Chewing	94	49.5
	None	1	.5
	Smoking	17	8.9
	Tobacco Chewing	78	41.1
Age group has the highest prevalence of oral cancer	10-20 yrs	2	1.1
	20-40 yrs	97	51
	40-60 yrs	84	44.2
	Above 60 yrs	7	3.7
Common clinical signs of oral cancer include	Non Healing Ulcers	60	31.6
	Non Healing Ulcers, Swelling or Lumps	6	3.2
	Non Healing Ulcers, Swelling or Lumps, Tooth Ache only	1	.5
	Non Healing Ulcers, White or Red patches	12	6.3
	Non Healing Ulcers, White or Red patches, Swelling or Lumps	30	15.8
	Non Healing Ulcers, White or Red patches, Swelling or Lumps, Tooth Ache only	10	5.3
	Swelling or Lumps	19	10.0
	Tooth Ache only	2	1.1
	White or Red patches	44	23.2
	White or Red patches, Swelling or Lumps	5	2.6

Routinely check for signs of oral cancer during patient examination	Always	102	53.7
	Never	23	12.1
	Sometimes	65	34.2
Have you ever encountered a suspected case of oral cancer during your training?	No	108	56.8
	Yes	82	43.2
Do you feel confident in identifying early signs of oral cancer?	Confident	92	48.4
	Not Confident	98	51.6

The comparison of Knowledge Score between two groups shows a statistically significant difference between Group 1 (First and Second Year) and Group 2 (Third, Fourth Year, Interns), indicating that Group 2 demonstrates a significantly higher level of knowledge compared to Group 1. (Table 4) (Figure 1)

Table 4: Comparison of Knowledge Score between two groups

Group	Knowledge Score	p value
1 (First and Second Year)	3.37 ± 1.11	0.004*
2 (Third, Fourth Year, Interns)	3.88 ± 1.18	



p value- 0.004*

Discussion

Oral cancer continues to pose a substantial public health burden, particularly in low- and middle-income countries like India, where risk factors such as tobacco and areca nut use are prevalent. This study aimed to assess awareness, knowledge, and confidence regarding oral cancer detection among undergraduate dental students in

the Konkan region of Maharashtra. The findings indicate a generally high level of awareness, but significant gaps remain in clinical confidence and exposure to structured training.

A noteworthy finding from our study is that 97.9% of participants had heard of oral cancer, and 93.7% acknowledged it as a significant public health issue. This aligns with previous studies conducted among dental students in India and elsewhere, which also reported high theoretical awareness [14, 15, 16]. Furthermore, a strong majority (67.9% strongly agreed, 31% agreed) recognized the importance of early detection in improving prognosis. These positive attitudes are promising and highlight that students appreciate the clinical implications of oral cancer.

However, a critical concern is that 81.1% of participants had never attended a seminar or workshop on oral cancer. This is indicative of a significant gap in formal training and corroborates findings from studies in Yemen, Saudi Arabia, and India, which reported limited exposure to practical or continuing education in oral cancer screening [14,15,16]. The lack of hands-on learning experiences likely contributes to the 51.6% of students reporting a lack of confidence in identifying early signs of oral cancer, despite high awareness of clinical features such as non-healing ulcers (31.6%) and red/white patches (23.2%).

Interestingly, buccal mucosa was correctly identified as the most common site of oral cancer by 81.6%, and 80.6% recognized squamous cell carcinoma as the most prevalent histological type. These figures are comparable to prior studies, such as Antoranz et al. [17], who also reported a high understanding of anatomical and histopathological characteristics. This suggests that the didactic portion of dental education is relatively effective in conveying theoretical knowledge.

In terms of risk factor identification, 63.7% of students selected "All of the Above," correctly acknowledging that oral cancer is multifactorial. This indicates a comprehensive understanding, although some students failed to identify specific factors individually (e.g., alcohol or HPV). The strong identification of areca nut (49.5%) and tobacco chewing (41.1%) as key contributors to oral submucous fibrosis is particularly important given the widespread use of these substances in the region. Similar findings were observed in studies by Sujir et al. [14] and Bsher et al. [15], highlighting consistency across different Indian regions and among international cohorts.

A concerning observation was that only 53.7% of students reported routinely checking for signs of oral cancer, and 43.2% had encountered a suspected case during training. These numbers suggest limited practical engagement and insufficient emphasis on oral cancer detection during clinical postings. This aligns with findings from Kujan et al. [16] and Patton et al. [9], who emphasized the inadequacy of oral cancer training in undergraduate curricula and the need for structured clinical modules.

The self-reported lack of confidence (51.6%) in identifying early signs, even among final-year students and interns, is concerning and indicates a gap between knowledge and clinical competence. This was similarly reported by Antoranz et al. [17], where

students expressed the theoretical importance of oral cancer detection but were reluctant to rely on their diagnostic abilities. Such trends underscore the urgent need for curricular reforms to bridge the gap between theoretical knowledge and clinical competence in oral cancer detection. Incorporating mandatory workshops and hands-on training in oral cancer screening techniques can provide students with practical skills essential for early identification of lesions. Additionally, simulation-based learning can enhance their ability to recognize potentially malignant disorders in a controlled, feedback-driven environment. Case-based discussions should be integrated into the curriculum to facilitate critical thinking around differential diagnoses and appropriate referral pathways. Furthermore, the inclusion of community outreach programs can expose students to high-risk populations, improving their real-world diagnostic abilities and reinforcing the importance of preventive care. These strategies collectively aim to produce more competent and confident dental professionals capable of contributing meaningfully to oral cancer prevention and early detection.
Lastly, the increased prevalence of oral cancer among younger individuals (20–40 years)—as recognized by 51% of participants—signals an urgent need for reinforcing preventive education and screening strategies at the undergraduate level. This study also found a statistically significant difference in knowledge scores between first- and second-Year students and third year, fourth year, and Interns. This is expected, as senior students typically have more academic and clinical exposure, contributing to better understanding and retention regarding knowledge of oral cancer.

Conclusion

While undergraduate dental students demonstrated good awareness of oral cancer and its associated risk factors, confidence in clinical examination skills was limited. These results highlight the need to enhance clinical training within the dental curriculum to better prepare students for early detection and prevention of oral cancer.

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