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Assessing Knowledge, Attitude and Practice About Oral Cancer Detectionand Treatment Among Dental Undergraduates of Maharashtra, Karnataka and Goa States

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ABSTRACT

Background: Oral cancer refers to the squamous cell carcinoma, arising from the epithelial cell lining of the oral cavity. It may affect any part of the oral mucosa but usually affects floor of mouth, buccal mucosa, gums, lip and tongue. Oral cancer is associated with consumption of tobacco, alcohol and other factors like HPV virus.

Aims and objectives: The present study was aimed to assess the knowledge , attitude and practice about oral cancer among dental undergraduates from states of Maharashtra, Karnataka and Goa.

Methodology: A questionnaire study was conducted on 250 dental undergraduates from the states of Maharashtra, Karnataka and Goa through means of Google forms consisting of 15 questions about knowledge ,attitude and practice about oral cancer. The institutional ethical committee clearance was obtained before the start of the study. A set of questions were circulated through whatsapp and the responses were collected and analyzed.

Results: Out of 250 participants 74.2% were females and 25.8% were males. Majority of the participiants were between 20-21 years accounting for 49.8%.. Maximum number of student responses were obtained from the state of Maharashtra (76.5%), followed by Karnataka (20.2%) and lastly Goa (3.3%). About 97.7% participants were aware of oral cancer and various forms of smoked and smokeless tobacco. About 61%, claimed of never having participated in Oral Cancer awareness campaigns. Amongst the surveyed students, 97.2% students agreed to oral cancer campaigns being effective. About 93% proportion of dental students agreed upon oral cancer to be treatable. About 91.5% of participants knew that risk of oral cancer increases with age. A total of 97.2% students knew that tobacco and tobacco products aids in progression of oral cancer.Among the total evaluated students, 98.6% agreed on alcohol having a synergistic effect on the progression of oral cancer. A total of 202(94.8%) students identified that a non-healing ulcer is a sign indicative of oral cancer.About 84% of students stated that loss of alveolar bone radiographically and exfoliation of adjacent teeth also is a sign of oral cancer.Among the total surveyed students, 95.8% students believed that proliferative growth in oral cavity of tobacco consumers is indicative of oral cancer.Almost 94.8% of participants were aware of association of viral etiology like HPV- human papilloma virus in oral cancer. About 97.2% students felt that dentists play a major role in detection of oral cancer. Among the total surveyed students, only about 79.8% students were aware of different modalities for oral cancer detection. A large number of dental

students, (56.3%), claimed to have never received formal training in detection and screening of oral cancer.

Conclusion: Based on the results of our study majority of participants were aware about etiological factors clinical features and treatment modalities of oral cancer.

Keyword: *Knowledge, Attitude, practice, Oral cancer*

1. INTRODUCTION

Oral cancer primarily refers to squamous cell carcinoma, which arises from the epithelial cells lining the oral cavity. It may affect all areas of oral cavity, particularly floor of mouth, buccal mucosa, gums, and tongue. Oral cancer represents a significant global health challenge, with particularly high incidence and mortality rates in regions such as South and Southeast Asia, including India . [1, 2] The World Health Organization (WHO) reports that early detection and timely treatment are crucial in reducing the morbidity and mortality associated with oral cancer. [3] Oral cancer ranks sixth among the top most common cancers worldwide. [4]According to Global Cancer Observatory (GLOBOCAN) and other reliable sources, oral cancer affects approximately 2% of the global population. [4]

The primary risk factor for oral cancer is tobacco. Both smoking and smokeless tobacco products significantly increase the risk. Alcohol synergistically increases the risk when combined with tobacco use. Certain strains of HPV (Human Papilloma Virus) are associated with a subset of oral cancers, particularly oropharyngeal cancers. The previous literature has found that high number of general dental practitioners lack sufficient knowledge in recognizing clinical signs of oral cancer at early stages. Despite advances in medical science, the early detection and timely treatment of oral cancer remain critical in reducing the associated morbidity and mortality.

The states of Maharashtra, Karnataka, and Goa, known for their diverse and populous regions, also host a significant number of dental colleges, producing a substantial portion of India's future dental workforce. However, the effectiveness of dental education in these states, specifically concerning the knowledge, attitude and practice of oral cancer detection among undergraduates, has not been thoroughly evaluated. [5] Hence the present study was designed to assess the knowledge, attitude and practice regarding detection of oral cancer and its treatment among dental undergraduates in Maharashtra, Karnataka, and Goa.

2. METHODOLOGY

Design of the study

The present descriptive cross-sectional study was carried out in three different states of India including Maharashtra, Goa and Karnataka from June 2024 to December 2024. The undergraduate dental students of all three states were enrolled in the study. The ethical committee approval was obtained from the Institutional Review Committee of Krishna Vishwa Vidyapeeth (KVV/IEC:097/2024-2025). The permission was obtained from the respective institution prior to starting the study. The informed consent was obtained from the participants before enrolling them in the study. The students unwilling to participate were excluded from the study.

Sample size Calculation-

The sample size of 250 was obtained by the below mentioned formula.

Sample size (N)= Z^2 P (1-P)/e^2

Z = standard normal variable at 95%;

Confidence interval CI= 1.96

P= proportion of student participants on oral cancer

= 80%

=0.8

1-P = 1-0.8 = 0.2

e = allowable error at 95% CI

= 0.05

Therefore,

N = (1.96)2 (0.8)(0.2)/ (0.05)2

N = 0.6146/ 0.0025

N = 245.84

≈N= 250 (Undergraduate students)

A total of 250 students from undergraduates of 3rd year, 4th year and interns

of dental colleges in Maharashtra, Karnataka and Goa were invited to participate in this questionnaire study.

Questionnaire

The study contained structured questionnaire written in English and was conducted with voluntary participation and informed consent was obtained. The students were informed that no incentives would be provided for participation in the study and that their personal data would not be disclosed. Participants were given enough time to complete the questionnaire.

The questionnaire was prepared by modifying questions from Carter and Ogden *et al*, with additional questions added. [6]The questionnaire was written in English, the language used for teaching in this University. The information elicited included participants' demographics (age, gender and year of study).

The questionnaire study was undertaken by the means of Google Forms. The google forms survey link with a set of 15 questions was distributed among the students of dental colleges in Maharashtra, Karnataka, and Goa through Whatsapp application or direct emails.

The questionnaire were divided into two sections of which first section highlights the knowledge and attitude about oral cancer consisting of 13 questions. The second section evaluates the practice about oral cancer and comprises of two questions.

The questionnaire included set of 15 questions with responses as yes/no, as follows:

	Section A: Questions regarding Knowledge and Attitude about Oral Cancer
1	Have you heard of oral cancer?
2	Are you aware of different smokeless and smoked tobacco forms?
3	Have you ever participated in oral cancer awareness campaigns?
4	Do you feel that oral cancer awareness campaigns are effective?
5.	Is oral cancer treatable?
6.	Does the risk of oral cancer increase with age?
7.	Do you think tobacco and tobacco products aid in the progression of oral cancer?
8.	Do you think alcohol along with tobacco has a synergistic effect on the progression of oral cancer?
9.	Do you think chronic non-healing ulcers in chronic tobacco users are indicative of oral cancer?
10.	Do you think loss of alveolar bone radiographically and exfoliation of adjacent teeth clinically are indicative of oral cancer?

11.	Do you think proliferative growth in the oral cavity in tobacco users is indicative of oral cancer?
12.	Is there any association of viruses like Human papilloma virus (HPV) and oral cancer?
13.	Do you think dentists play a major role in the early detection of oral cancer?

	Section B: Questions regarding Practise about Oral Cancer detcetion
1.	Are you aware of different modalities for the detection of oral cancer?
2.	Have you received formal training on the detection of oral cancer during your dental studies?

The data was further collected and analysed.

Statistical Analysis:

The data obtained was analyzed using Google Forms' built-in analytics to summarize responses and descriptive statistical analysis was done using SPSS software version 23.0.

3. RESULTS

Out of 250 participants majority were females accounting for 74.2% and 25.8% were males. Maximum number of students participated in the study were from the state of Maharashtra (76.5%), followed by Karnataka (20.2%) and lastly Goa (3.3%). According to the age group, among 250 dental students, 49.8% were of age group between20-21 years. About 40.3% were of age group between 22-23. There were 6.3% of students above 23 years of age and about 2.8% were below 20 years of age [Table 1].

Table 1- Demographic data of the study participants.

Age in years	**Participants *n* (%)**
< 20	10 (4%)
20-21	125(50%)
22-23	100(40%)
>23	15(6%)
Gender	
Male	(25.8%)
Female	(74.2%)
State	
Maharashtra	(76.5%)

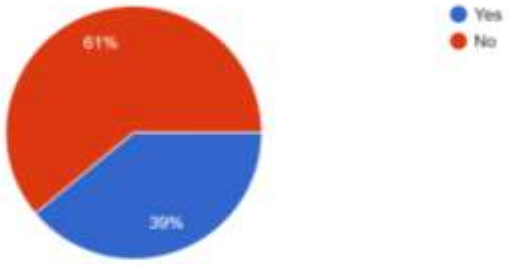
Karnataka	(20.2%)
Goa	(3.3%)

Regarding Awareness of oral cancer about 97.7% participants agreed that they had heard about oral cancer and also were aware of various forms of smoked and smokeless tobacco products. (Pie Chart 1 & 2)

Chart 1- Have you heard of oral cancer?

Regarding awareness about oral cancer campaigns high percentage of dental students, about 61%, claimed of never having participated in Oral Cancer awareness campaigns. (Pie chart 3)

Chart 2- Are you aware of different smokeless and smoked tobacco forms.



Amongst the surveyed students, 97.2% students agreed to oral cancer campaigns being effective. (Pie Chart 4)

Chart 3- Have you ever participated in oral cancer awareness campaigns.

Chart 4- Do you feel oral cancer awareness campaigns

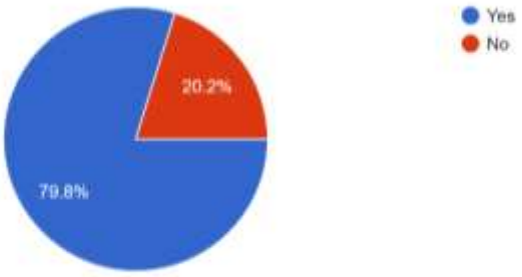
Regarding the Knowledge and attitude towards etiology, clinical features and treatment of oral Cancer more significant proportion of dental students about 93% agreed upon oral cancer to be treatable. About 91.5% of participants knew that risk of oral cancer increases with age. A total of 97.2% students expressed positive responses over tobacco and tobacco products being aids in progression of oral cancer. Among the total evaluated students, 98.6% students agreed on alcohol having a synergistic effect on the progression of oral cancer. When asked to choose about signs and symptoms, a total of 94.8% students identified that a non-healing ulcer is indicative of oral cancer. About 84% of students stated that loss of alveolar bone radiographically and exfoliation of adjacent teeth also holds indicative of oral cancer. Among the total surveyed students, 95.8% students believed that proliferative growth in oral cavity of tobacco consumers is indicative of oral cancer. Almost 94.8% of participants were aware of association of viral etiology like HPV in oral cancer. Knowledge regarding detection of oral cancer revealed that about 97.2% students expressed that dentist does play a major role in detection of oral cancer [Table 2].

Table 2- Participants responses towards Knowledge and attitude about oral cancer

QUESTIONS	*Responses of Dental undergraduates (in percentage)*	
	YES	*NO*
Is oral cancer treatable?	93%	7%
Does the risk of oral cancer increase with age?	91.5%	8.5%
Do you think tobacco and tobacco products aid in the progression of oral cancer?	98.1%	1.9%
Do you think alcohol along with tobacco has a synergistic effect on the progression of oral cancer?	98.6%	1.4%
Do you think chronic non-healing ulcers in case of chronic tobacco users are indicative of oral cancer?	94.8%	5.2%
Do you think loss of alveolar bone radiographically and exfoliation of adjacent teeth clinically are indicative of oral cancer?	84%	16%
Do you think proliferative growth in the oral cavity in tobacco users is indicative of oral cancer?	95.8%	4.2%

Is there any association of viruses like Human papilloma virus (HPV) and oral cancer?	94.8%	5.2%
Do you think dentists play a major role in the early detection of oral cancer?	97.2%	2.8%

Regarding knowledge towards the detection of oral cancer Among the total surveyed students, only about 79.8% students were aware of different modalities for oral cancer detection. (Pie Chart 5)



Remarkably, a large number of dental students about 56.3% claimed to have never received formal training in detection and screening of oral cancer. (Pie Chart 6)

Chart 5- Are you aware of different modalities for the detection of oral cancer.

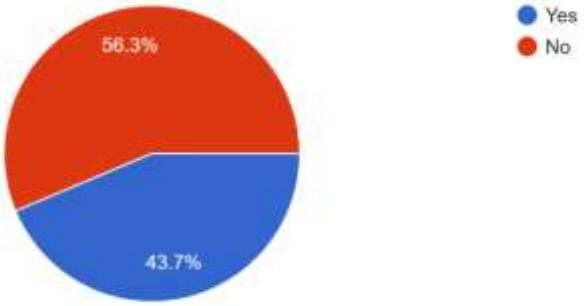


Chart 6- have you received formal training on the detection of oral cancer during your dental studies.

4. DISCUSSION

Oral cancer is a very common occurring malignancy in India. [1] Early detection and treatment of Oral cancer hence holds importance in reducing the morbidity rates. Dental practitioners play a pivotal role in the primary diagnosis of oral cancer. Hence it is of utmost importance that dental undergraduates are aware of early signs and symptoms and have knowledge and adequate training in detection of oral cancer. Therefore, this study was conducted to investigate knowledge and awareness in detection of oral cancer among dental undergraduates of Maharashtra, Karnataka and Goa states.

The present study showed slightly higher female predominance (72.4%) in the dental field than the males. This trend has not changed much from previous studies conducted by Malaysian private university, [7] Malaysian dental schools,[8] H.P government dental college, Shimla-Himachal Pradesh, [9Error! Reference source not found.] and in university in Saudi Arabia. [10] The majority of study participants were between 20-21 years followed by 22 to 23 years. The Majority of students participated in the study were from Maharashtra since the study was carried out in the state accounting for 76.5% followed by Karnataka and Goa.

The present study revealed that the awareness of students regarding oral cancer showed that 97.7%of dental undergraduates

were aware of oral cancer, which was higher than the study conducted in Malaysian private university which reported about 86.3% . [7]A Study conducted by Dubai et al showed that about 92.0% respondents were aware of oral cancer. [11]The previous study conducted by Carter LM in Scottish showed lesser awareness of oral cancer in dental students which accounts for 36.6%. [6]

In the present study about 97.7% of students agreed upon being aware of smoked and smokeless forms of tobacco which was slightly more than that recorded by a study done in Malaysian dental schools (>90%). [8] The results of our study were also in accordance with the previous studies. [6,12] Few other studies conducted in Malaysia showed conflicting results to the present study . [11, 12, 13] The present study revealed that about 61% dental undergraduates have never participated in oral cancer awareness campaigns which highlights the need for carrying out more campaigns and oral cancer screening camps. These statistics were far more than that obtained from a study by H.P Government Dental college, Shimla-Himachal Pradesh (3.7%). [9**Error! Reference source not found.**] Regarding the effectiveness of oral cancer awareness campaigns about 97.2% students felt that oral cancer awareness campaigns are effective, which is strikingly more than that reported in a study done in Malaysian private university which reported that 46.7% of medical students stated as effective and 56.8% dental students stated effective. [**Error! Reference source not found.**]

There are different modalities of treatment of oral cancer like radiotherapy, chemotherapy, surgery and combination of all the above. The present study revealed that about 93% undergraduates stated that oral cancer was treatable, which was more than that noted from the responses given by the students of Malaysian private university (65.7%). [7] and Malaysian dental schools (90.6%) . [8]

About 91.5% dental students expressed that oral cancer risk increases with age which was quite comparable to the values obtained from statistics found in Malaysian dental schools (86.6%). [8] and more than that obtained from Malaysian private university (74.1%). [7]According to a study conducted Brazil, about 28.57% dental students believed age was a contributing factor. [14] From a study conducted in South Carolina, about 93% students stated the same. [15]

In our study about 98.1% undergraduate expressed positive result for having knowledge about tobacco and its products lead to progression of oral cancer which was more than that recorded by a study done in Palestine (88.8%). [16] Halawany et al.reported that more than 95% of dental students identified smoked tobacco as associated factor for oral cancer. [17] About 25.5% of students from a study conducted by Dubai et al stated smokeless tobacco being a responsible factor. [11] Almost 98.6% students stated that alcohol plays synergistic role in progression of oral cancer, which was far more than statistics obtained from a study in Palestine (80.6 %) . [16] About 84.5% respondents in a study conducted by Dubai et al, identified alcohol as a responsible factor. [**Error! Reference source not found.**] In a study conducted by S.Fotedar, smoking and alcohol consumption were correctly reported as risk factors by 63.5% of subjects, [9] whereas it is more than 92.4% as reported by Soares *et al* [14] and 94% as reported by Carter and Ogden [6] and 79.2% as reported by Uti and Fashina. [18]

The clinical feature of oral cancer presents as non-healing ulcers, proliferative growth, mixed red and white lesion which is elevated with loss of alveolar bone leading to tooth mobility and loss. In the present study 94.8% students believe it as true which is slightly more than the values obtained from a study in Malaysian private university[, [13] and Malaysian dental schools (89.4%). [8] Whereas, a study conducted in Nourah bint Abdulrahman University, Saudi Arabia gave lesser percentages (67%) of students agreeing to the same. [10] The results of our study showed slightly more percentage of students agreed that oral cancer occur as non-healing ulcer than the study conducted by Dubai et al which recorded about 71% and Srivastava R et al which recorded about 48.92 %. [11,19]

Oral cancer progresses with involvement of alveolar bone radiographically and mobile teeth clinically which was asserted in our study by almost 84% of students. A study conducted by Malaysian private university gave contradictory results stating oral cancer manifests without signs and symptoms (82%) . [13]

Tobacco has been the main causative ethology of oral cancer. About 95.8% undergraduates in our study said proliferative growth in oral cavity of tobacco users is most certainly indicative of oral cancer.Human papilloma virus (HPV) is also associated with oropharyngeal cancers.In our study about 94.8% undergraduates agreed HPV plays a role as a viral ethology in relation to oral cancer.Similar results were obtained from a study conducted in Palestine where dental undergraduates recognized HPV as one of the high-risk factors for oral cancer. [16]A study conducted by Gunjal S [7] in assessing the oral cancer awareness among dental and medical students showed a significantly smaller number of medical students than dental students identifying HPV as a risk factor, which contrasts with a study by Sitheeque *et al*. [12]

About 97.2% undergraduates stated that dentists do play a major role in early detection of oral cancer. Staggering results were obtained from a study in Malaysian private university which revealed only about only 22% undergraduates felt competent to detect oral cancer. [7] Whereas from a study conducted in Malaysian dental schools only 40.67% students were confident to detect oral cancer themselves. [8] Only about 53.49 % students from a study in Palestine weren't confident to examine patient for oral cancer. [16] Hence it is alarming to know that even after dentists being the ones to play most pivotal role in early detection of oral cancer, undergraduates aren't that confident in detection of oral cancer.

According to our study about 79.8% students were aware of different modalities for oral cancer detection. A study conducted in Malaysian dental schools revealed about 74.1% undergraduates knew various detection methods. [8] Whereas a study conducted in Malaysian private university, about only 47% students were aware of different oral cancer detection methods. [7] About only 26.2% students knew methods like punch biopsy or usage of VizaLite for oral cancer detection from a study conducted in Palestine . [16]

Astounding 56.3% undergraduates in our study claimed to have never received formal training on detecting oral cancer during their dental studies. A study conducted in Palestine revealed about 46% students felt that they were adequately trained to examine patients for oral cancer. [16] About 99.06% students from a study done in college in Shimla-Himachal Pradesh revealed that there is need for additional training to them regarding oral cancer. [9]Accordingto a study conducted in Malaysian public university, 95.6% agreed upon need for additional information and teaching regarding oral cancer. [13] These plummeting numbers indicate a need to introduce more clinical and treatment base curriculum to provide hands-on training for timely detection and identification of oral cancer in undergraduates.

Limitations of the study

The present study was limited to dental undergraduate students only and comparision of knowledge ,attitude and practice of oral cancer was not recorded between the different years like third year,final year and interns and between the different colleges of Maharasthra,Goa and Karnataka.

Future prospects

The future study should compare between different medical fields like bachelor of medicine and surgery ,bachelor of physiotheraphy,nursing and between the third year,final year and interns of all undergraduate students.

5. CONCLUSION

With increasing numbers of death and morbidity rates due to oral cancer in India and worldwide, it's really critical that dental undergraduates are well equipped with expertise in accurate and early identification of oral cancer. In the present study majority of students were having a knowledge and awareness of oral cancer etiological factors, clinical features and radiographic features along with the different treatment modalities

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