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Assessment of Oral Cancer Awareness among Dental Students and Patients: A Cross-sectional Survey

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Abstract

Background: Oral cancer, ranked among the top three cancers in India, is associated with low survival and significant mortality rates. Early diagnosis makes the treatment more amenable, increases the chance of cure as well as the quality of life. Lack of awareness about premalignant lesions/oral cancer among medical professional and patients is the probable reason behind the delay in referrals and treatment. Hence, it is indispensable to assess and improve the awareness of oral cancer.

Objective: To evaluate the oral cancer awareness among dental students and patients

Methods: The present cross-sectional survey was conducted among patients (n = 50) with pre-malignant lesions of oral cancer and dental students (n = 50). Sociodemographic characteristics including clinical and behavioral characteristics of all the patients as well as age and gender of all the dental students were recorded. A 10-item close-ended questionnaire was used to gauge patients' awareness and structured 5-item open-ended and close-ended questionnaires were distributed to dental students to assess their theoretical and practical knowledge. Data were analysed using Chi-square test, Mann – Whitney U test, Fischer test, and multivariate regression analysis.

Results: Almost 84 % of the patients had heard about oral cancer. None of the factors (sociodemographic, clinical, and behavioural characteristics) were significantly associated with oral cancer knowledge. Alcohol consumption and financial burden significantly influenced knowledge of oral cancer among patients. Almost 78 % of the students routinely examined the oral mucosa of the patients. Age of the student significantly affected the theoretical knowledge score of oral cancer, whereas age

and gender did not significantly affect the practical knowledge.

Conclusion: Overall, dental students' and patients' level of awareness and knowledge are satisfactory. However, further training is recommended to improve the knowledge, in terms of vaccines used, risk factors, and changes associated with oral cancer, to potentially diagnose the oral cancer at an early stage.

Keywords: Alcohol, Knowledge, Leukoplakia, Lucknow, Tobacco, Ulceration.

Introduction

Oral cancer is a malignant disease that ranks among the top three cancers in India [1, 2]. It has been predicted that India's oral cancer incidence rate may increase from 1 million in 2012 to 1.7 million or more in 2035 [1]. Etiological factors including smoking, chewing smokeless tobacco products, alcohol consumption, lack of physical activity, poor oral hygiene, HPV infections, and low consumption of vegetables and fruits attributes to oral cancer [2-4]; smoking and alcohol consumption being the major risk factors [5]. Most affected regions of oral cancer include lip, floor of the mouth, cheek lining, gingiva, palate, and tongue [2]. Early detection of oral cancer makes the treatment amenable, increases the chance of cure, and reduces the risk of morbidity and mortality in patients [6]. Late diagnosis may increase the disease progression as well as treatment cost, and decrease the survival rate. Lack of awareness is the most significant factor that contributes to delayed diagnosis and management of oral cancer [7]. Till date, lacking prognostic improvements and overlooking of the early manifestations and diagnosis by the medical professionals is made at an advanced stage, contributing to the significant progression of cancer [8]. Hence, awareness-based health campaigns are required to be implemented to upgrade the knowledge of dental/medical students, nurses, medical practitioners, and patients regarding oral cancer.

Globally, several studies have reported on the awareness of oral cancer among dental students and patients in different regions [5, 9, 10]. However, despite increase in knowledge, the morbidity and mortality rate of oral cancer has not been significantly improved [11]. Moreover, little is known about the knowledge and awareness regarding oral cancer in Indian population [12]. Hence, the present study was designed to assess the level of oral cancer awareness in dental students and patients attending KGMUH, Lucknow by evaluating their knowledge about risk factors, clinical features, prognosis, management, and prevention of oral cancer.

Materials and Methods

A. Study design and setting

The present cross-sectional study was conducted among dental students and patients attending the tertiary care hospital, KGMUH, Lucknow for a period of 6 months. Approval to perform the survey was obtained from the Institutional Ethical and Research Committee. Written informed consent was obtained from the patients before the commencement of the study. All the patients diagnosed with premalignant oral lesions, aged 16 years or above, referred to the oral department for examination and treatment, were included in the study. A total of 100 participants (dental students: 50; premalignant oral lesion patients: 50) participated in the survey. The patients in the study were selected through a non-probability purposive sampling technique.

B. Data collection

Sociodemographic data and behavioural characteristics including age, gender, marital status, location, occupation, financial burden, habits (tobacco and alcohol consumption), and other comorbidities of all the patients were recorded using a predesigned proforma.

Demographic data including name, gender, and age of all the dental students involved in the study were also recorded. Awareness-based structured questionnaires were designed to assess the knowledge of oral cancer in patients and dental students.

C. Questionnaire

A structured questionnaire comprised of 10 close-ended questions was used to gauge patients' knowledge and awareness regarding oral cancer as part of which 10 questions were asked to the patients investigating: oral cancer screening, oral mucosal habits; risk factors associated with oral cancer; knowledge on oral cancer detection and prevention measures; desire for the requirement of campaigns/training programmes. The questionnaire approximately required 10 min to complete. Each patients' answers were totalled to construct a scale, "knowledge score" with 0 being the lowest and 10 being the highest. Illiterate patients were directly interviewed, and their responses were recorded. All the respondent answers towards the questions were recorded. *(Supplementary material I)*

Structured 5-item close-ended and open-ended questionnaires were designed to assess the dental students on their theoretical and practical knowledge of oral cancer. The questions were asked to the dental students, investigating knowledge on the mode of decreasing the rate of oral cancer, clinical features; risk factors; prevalence rate, diagnosis, and its management and treatment. The questionnaires together approximately required 10 min to complete and were evaluated for completeness and consistency. Scoring of the answers to the 5 close-ended questions was: Strongly agree:2; Strongly disagree:1; Don't know: 0. With close-ended questions (risk factors, clinical manifestations, point of referral, and modes to improve oral cancer awareness) multiple responses were observed. Based on the responses given by the students scoring was done i.e., for each response score given was one. *(Supplementary material II)*

D. Statistical analysis

R i386 3.5.1v was used to analyse the data. Data are represented as mean ± SD for continuous variables and categorical variables are represented using percentages. Comparison of scores within gender and age group were done using Mann – Whitney U test. Categorical data were compared using chi-square/proportion/Fischer test. Effect of different factors on knowledge score were studied using multivariate regression analysis. Results were considered statistically significant at $P < 0.05$.

Results

A. Awareness of patients regarding oral cancer

Sociodemographic characteristics of the patients including clinical characteristics of all the patients were as shown in Table 1. Mean age of patients was 35.14 ± 14.14 years with male predominance (78 %). More than half of the patients (54 %) were aged in between 18 and 35 years, married (66 %), and were rural residents (56 %). Nearly two-thirds of the patients had no financial burden (68 %). Most of the patients had normal a sleep pattern (96 %) and were interested in music (80 %). Except one, none of the patients had the systemic illness.

Table 1: Sociodemographic including clinical characteristics of the patients

Variables		Mean ± SD, n (%)
Gender	Male	39 (78)
	Female	11 (22)
Age		35.82 ± 14.16
Age category	< 18	1 (2)
	18 – 35	27 (54)
	36 – 55	19 (38)
	> 55	3 (6)
Marital status	Married	33 (66)
	Unmarried	17 (34)
Location/Residence	Rural	28 (56)
	Urban	22 (44)

Occupation	Agriculture	7 (14)
	Student	5 (10)
	Housewife	7 (14)
	Professional	12 (24)
	Self-employed	14 (28)
	Laborers	3 (6)
	Others	2 (4)
Financial burden	Yes	16 (32 %)
	No	34 (68 %)
Sleep pattern	Normal	48 (96 %)
	Abnormal	2 (4 %)
Interest in music	Yes	40 (80 %)
	No	10 (20 %)
Presence of systemic illness	Yes	1 (2 %)
	No	49 (98 %)

Out of 50 patients, 84 % had awareness about oral cancer and 10 % had no proper awareness. Among patients who had awareness, nearly one-fourth of the patients identified tobacco (40 %) as the risk factor of oral cancer; 72 % thought that regular alcohol consumption may increase the risk of getting oral cancer; 76 % thought that early diagnosis increases the probability of cure; 98 % thought that awareness campaigns are necessary to spread awareness; 95 % were intended to quit the bad habits after the survey. Whereas, among the patients with no awareness, 68 % had not observed any abnormality in the oral cavity, 74 % patients never took any oral cancer counselling, 82 % were unaware of HPV vaccine, and 64 % did not know that men are more prone to oral cancer. Although, most of the patients were referred cases of oral cancer, few patients lacked awareness, which support the implementation of educational campaigns to update the knowledge of oral cancer.

Table 2: Frequency distribution regarding awareness and knowledge in oral cancer patients

Items	Response	N (%)
Aware of oral cancer	Yes	42 (84 %)
	No	8 (16 %)
Habit	Tobacco consumption	20 (40 %)
	Alcohol consumption	8 (16 %)
Any abnormality in the oral cavity	Yes	16 (32 %)
	No	34 (68 %)
Counselling received from dentist regarding oral cancer	Yes	13 (26 %)
	No	37 (74 %)
Oral cancer prevalent in male?	Yes	18 (36 %)
	No	32 (64 %)
Aware of HPV vaccine	Yes	9 (18 %)
	No	41 (82 %)
Regular alcohol drinking will increase the chance of getting oral cancer?	Yes	36 (72 %)
	No	14 (28 %)
Early diagnosis increases the probability of cure	Yes	38 (76 %)
	No	12 (24 %)
Need of Awareness campaigns	Yes	49 (98 %)
	No	1 (2 %)
Want to quit the habit? #	Yes	45 (95 %)
	No	1 (5 %)

#Subjects who had the habit were included

None of the factors were significantly associated with awareness about oral cancer ($P > 0.05$). Out of 84 % patients who heard about oral cancer, most of the patients i.e., 80.95 % were male subjects, 54.76 % were aged between 18 and 35 years, 64.29 % were married, 57.14 % were rural residents, 71.43 % had no financial problem, 57.14 % had no tobacco addiction, 83.33 % had no alcohol addiction, 95.24 % had normal sleep pattern, 66.67 % had observed abnormality in the oral cavity, 78.57 % had not acquired any counselling and 80.95 % were unaware of HPV vaccine (Table 3).

Table 3: Factors associated with awareness in oral cancer patients

Variables		Oral cancer awareness		
		Yes = 42	No = 8	*P* value
Gender	Male	34 (80.95)	5 (62.5)	0.3506
	Female	8 (19.05)	3 (37.5)	
Age category	< 18	1 (2.38)	0	0.8543
	18 – 35	23 (54.76)	4 (50)	
	36 – 55	15 (35.71)	4 (50)	
	> 55	3 (7.15)	0	
Marital status	Married	27 (64.29)	6 (75)	0.6994
	Unmarried	15 (35.71)	2 (25)	
Location/Residence	Rural	24 (57.14)	4 (50)	0.7181
	Urban	18 (42.86)	4 (50)	

Financial burden	Yes	12 (28.57)	4 (50)	0.2488
	No	30 (71.43)	4 (50)	
Occupation	Agriculture	6 (14.29)	1 (12.5)	0.3782
	Student	4 (9.52)	1 (12.5)	
	Housewife	5 (11.91)	2 (25)	
	Professional	12 (28.57)	0	
	Self employed	10 (23.81)	4 (50)	
	Laborers	3 (7.14)	0	
	Others	2 (4.76)	0	
Tobacco consumption	Yes	18 (42.86)	2 (25)	0.4501
	No	24 (57.14)	6 (75)	
Alcohol consumption	Yes	7 (16.67)	1 (12.5)	1
	No	35 (83.33)	7 (87.5)	
Sleep Pattern	Normal	40 (95.24)	8 (100)	-
	No	2 (4.76)	0	
Abnormality in the oral cavity	Yes	14 (33.33)	2 (25)	1
	No	28 (66.67)	6 (75)	
Counselling attained	Yes	9 (21.43)	4 (50)	0.1807
	No	33 (78.57)	4 (50)	
HPV vaccine	Yes	8 (19.05)	1 (12.5)	1
	No	34 (80.95)	7 (87.5)	

Adjusted multivariate linear regression model measured all the predictors (gender, age, marital status, residence, financial burden, habits such as smoking and tobacco, and other systemic disease) of oral cancer knowledge and found that alcohol consumption and financial burden were the significant predictors. Around 90 % of the subjects wanted to quit the habit after the survey. Patients who had financial burden (β = -15.77; 95 % CI: - 30.72 - -0.81) and habit of alcohol consumption (β = -24.23; 95 % CI: -43.26 - -5.20) had lower oral cancer knowledge compared to patients who did not. Whereas, all the other variables were not statistically significant predictors of oral cancer knowledge.

B. Awareness of dental students regarding oral cancer

A total of 50 dental students aged between 18 and 27 years completed the survey. The mean age of the students was 22.38 ± 2.32 years, with female preponderance 28 (56 %). Most of the students (78 %) examined patients' oral mucosa routinely, believed tobacco consumption (94 %) was the main risk factor and ulceration/sores (62 %) and leucoplakia (42 %) were the common clinical manifestations of oral cancer. Most of them referred patients to oral maxillofacial radiology/surgery (52 %) and believed that spreading awareness can control the risk of oral cancer (44 %) (Table 4).

Table 4: Practical knowledge of dental students about oral cancer

Factor		n (%)
Examining patients' Oral mucosa routinely	Yes	39 (78 %)
	No	10 (20 %)
	No response	1 (2 %)
Risk factors involved in oral cancer[#]	Tobacco consumption	47 (94 %)
	Alcohol consumption	18 (36 %)
	Family History	0
	Denture problems	6 (12 %)
	Poor oral health	3 (6 %)
	Others	12 (24 %)
	No response	1 (2 %)
Changes within mouth[#]	Ulceration/sores	31 (62 %)
	Leukoplakia	21 (42 %)
	Erythroleukoplakia	7 (14 %)
	Erythroplakia	4 (8 %)
	Bleeding	2 (4 %)
	Fibrosis	7 (14 %)
	Dysphagia	8 (16 %)
	Denture problems	4 (8 %)
	Others	15 (30 %)
Refer a patient suspected with oral malignancy[#]	Oral pathology	17 (34 %)
	Oral medicine and radiology	1 (2 %)
	Oral and Maxillofacial radiology and Surgery	26 (52 %)
	Ear, Nose, Throat specialist	2 (4 %)
	Dentist	0
	Oral cancer specialist	5 (10 %)
	No response/others	4 (8 %)
Limit of oral cancer[#]	Spreading awareness	22 (44 %)
	Early diagnosis	6 (12 %)
	Regular oral check-ups	5 (10 %)
	Healthy oral habits	11 (22 %)
	Others	5 (10 %)
	No response	6 (12 %)

We observed that 94 % of the students didn't know the status of oral cancer in India. Almost 96 % of the students agreed that smokeless tobacco increases the risk of oral submucous fibrosis, 58 % agreed that oral cancer screenings are inexpensive and safe method and 86 % agreed that radiotherapy, targeted, combination therapy is superior to chemotherapy. All the students knew the role of mass media in imparting health education (Table 5).

Table 5: Theoretical knowledge of dental students about oral cancer

Items	Strongly agree	Don't know	Strongly Disagree
Every 4 in 10 cancers diagnosed in India are oral cancers?	3 (6)	47 (94)	0
Consumption of smokeless tobacco increases the risk of oral submucous fibrosis?	48 (96)	1 (2)	1 (2)
Oral cancer screenings are an inexpensive, safe method of detection?	29 (58)	12 (24)	9 (18)
Radiology therapy, targeted therapy, and combination therapy are superior to chemotherapy?	43 (86)	5 (10)	2 (4)
The role of mass media should be stressed to play a key role in imparting health education?	50 (100)	0	0

When practical knowledge of oral cancer was taken into consideration along with age and gender, a significant difference ($P > 0.05$) was not observed within gender as well as age group. Whereas, a significant difference in theoretical knowledge score was observed only in age — students above 22 years having better knowledge ($P < 0.0276$), and no significant difference was observed within the gender (Table 6).

Table 6: Gender and age-wise comparison of theoretical and practical knowledge score.

Factor		Practical knowledge score	*P* value	Theoretical knowledge score	*P* value
Gender	Male	5.682 ± 1.39	0.992	8.64 ± 1.29	0.2465
	Female	5.679 ± 1.63		9.07 ± 1.12	
Age category	< 23	5.96 ± 1.60	0.161	8.52 ± 1.28	0.0276*
	> 22	5.35 ± 1.37		9.30 ± 0.97	

*Significant

Analysis via multivariate regression model revealed that age of the student significantly affected the theoretical knowledge of oral cancer ($\beta = 0.8208$; 5 % CI: 0.17-1.47; $P < 0.0144$). Whereas, age and gender did not significantly affect the practical knowledge of oral cancer ($P > 0.05$).

Discussion

The present study was the first of its kind to assess the knowledge and practices among dental students and level of awareness among patients of oral cancer. Most of the patients in our study were aware of oral cancer, irrespective of their habits. Consumption of tobacco was realized as a risk factor for oral cancer by majority of the patients. On the other hand, alcohol consumption was identified to a lesser degree as a risk factor, although patients knew that alcohol consumption increases the risk of oral cancer. The findings were comparable to the studies conducted in similar trend [3, 6, 13]. Greater awareness about tobacco chewing might be due to the publicity of various anti-tobacco programs/campaigns [10]. In our study, almost three-fourths of patients had never been counselled regarding oral cancer, which is in accordance with published reports [3]. Dentists are therefore encouraged to conduct continuing education programmes/campaigns to update patients' knowledge about oral cancer which will, in turn, improve dentist's clinical skills to screen for oral cancer.

Most of the patients were unaware about HPV vaccine in our study which reveals that they have partial knowledge and understanding of the disease. Hence, it is necessary to organize educational and awareness campaigns to

emphasize the role of HPV in multiple cancers. It is encouraging that patients knew that early diagnosis will increase the treatment outcome, which is comparable to the study conducted by Monteiro et al [3].

In our study, none of the factors were significantly associated with oral cancer knowledge. Majority of the patients, who had knowledge regarding oral cancer in the study, were rural residents, self-employed and had financial burden. Further, income level is directly proportional to education status [14]. Hence, low income and low education level might be reason for lack of association. In contrast, a study conducted by Hassona et al. [10], reported that older patients (> 40 years of age) and alcohol drinkers were significantly associated with oral cancer knowledge signifying their low level of awareness. While other factors (gender, education, and smoking) did not find any significant association with oral cancer knowledge [10]. A study conducted by Dubai et al. [15], also found that knowledge of oral cancer was associated significantly with age ($P < 0.01$), year of study ($P < 0.01$), and course of study ($P < 0.01$).

It is important to analyse the sociodemographic and behavioral characteristics to determine the predictors of oral cancer. After adjusting the covariates of all the variables in the model, financial burden and alcohol consumption were found to be the significant predictors associated with oral cancer knowledge. Those patients who had financial burden and habit of alcohol consumption had lower oral cancer knowledge than those without. However, there is no similar literature to support these findings. Whereas, a study by Peters et al. [16] among patients in urban African - American communities, reported that education status and race had significant influence on their oral cancer knowledge. A similar study conducted by Reddy et al.[17], in South India also reported that education level of the patients played a significant role in determining oral cancer awareness.

Routinely examination of oral mucosa by the dental students in the present study was in accordance with Assiri et al. (66.9 %) [18] and Fotedar et al (51.1 %) [19]. Tobacco chewing and alcohol consumption were the risk factors identified by the dental students. This is consistent with a similar study performed among dental, medical, and medical practitioners [6, 19-21]. However, knowledge of other risk factors that causes oral cancer was poor. Similar to the study conducted by Carter et al., most of the dental students referred the suspected patients to oral and maxillofacial surgery; a plausible reason may be due to virtue of the word oral in the department's name [6].

Ulceration and leukoplakia were the common oral manifestations regarded as the risk factors of oral cancer. This is consistent with the previous studies [3, 6, 10, 19]; however, erythroplakia, which has greater malignant potential, was not identified by the dental students in our study. Dental students in our study felt that promoting/spreading awareness through health campaigns might limit the risk of oral cancer. A study conducted by Carter et al. [6], reported that approximately 90 % of both medical and dental students were also interested in information pack, to attain further knowledge for early detection and prevention of oral cancer.

Most of the dental students had good theoretical knowledge on — risk factors, the effectiveness of oral cancer screening and its expenditure, advanced treatment options available, and the role of media in improving the knowledge about oral cancer. Whereas, they had poor knowledge regarding the status of oral cancer in India. Therefore, studies intervened in the future should include the status of oral cancer in India, i.e. prevalence, mortality rate, and survival rates. Age of the student in our study played an important role in determining the theoretical

knowledge about oral cancer. Dental students aged above 22 years had a good knowledge regarding oral cancer, which may be because most of them were pursuing master's in dental science or were final year graduate students.

Our study has few potential limitations. Firstly, dental students from only dental college were included in the study. Hence, this may not reflect the dental students' overall knowledge and awareness towards oral cancer in India. Secondly, we surveyed the hospital population attending the outpatient department. It would have been more ideal if the survey was conducted in a random sample of the general population. Hence, we would not generalize the findings of the survey.

Overall, the data of the present study suggests patients' awareness on oral cancer risk being associated with smoking tobacco, nevertheless knowledge of other risk factors was limited. Although our results showed that more than three-quarters of patients had awareness of oral cancer, their knowledge regarding the assessment of abnormality, vaccines used, and clinical manifestations, and risk factors other than tobacco consumption was limited. Hence, our study emphasizes the need for educational programmes/campaigns for early diagnosis of the disease.

V. Conclusion

This study highlights that the level of awareness and knowledge of oral cancer among patients and dental students is satisfactory. However, the study puts forward need for further training to improve the knowledge in terms of vaccines used, risk factors, changes associated with oral cancer, and clinical manifestations, to strengthen their abilities to potentially diagnose oral cancer at an early stages. The findings attained from this survey will promote to implement effective health education campaigns to decrease the incidence rates of oral cancer. As the present study is hospital-based study, in future well-designed random population-based studies are essential to be conducted to assess in-detail public knowledge about oral cancer.

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