ORIGINAL ARTICLE

Assess Oral Cancer Awareness among Undergraduate Students at King Saud University

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Abstract

Aim: To assess the knowledge and awareness of undergraduate dental students at King Saud University (KSU) about oral cancer.

Materials and methods: A cross-sectional study was conducted based on a questionnaire containing 21 questions about prevention, clinical aspects, history taking, knowledge of risk factors, and changes related to oral cancer. One hundred fifty undergraduate dental students were enrolled. Statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS) 24 software.

Results: It was shown that of 150 respondents, above 95% of the dental students considered smoking and alcohol consumption as the main risk factor for oral cancer. Squamous cell carcinoma was described as the most common type of oral cancer by 78% of the students. Clinical changes of oral cancer were acknowledged well by dental students (52.6% erythroplakia and nonhealing ulcer 65%). Only 41.4% of students have reported that they consider oral cancer during dental examination in the first appointment.

Conclusion: Most of the students have a good level of awareness related to oral cancer, however an inadequate level of knowledge about the clinical features of oral cancer is present. Therefore, it is suggested that reinforcement of knowledge is recommended throughout the undergraduate dental course to enable improved early detection and diagnosis of oral cancer.

Keywords: Dental students, Lymph nodes, Nonhealing ulcers, Oral cancer, Precancerous lesions, Tobacco.

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Introduction

Oral cancer is a neoplastic lesion in the oral cavity that could have a worse prognosis whenever it's associated with late detection.[1] Oral cancers most commonly develop in the lower lip, tongue, buccal mucosa, floor of the mouth, and oropharynx (WHO,[2] 2020). Squamous cell carcinomas account for over 90% of oral cancers diagnosed (Schwab, 2017).[3]

Oral cancer is among the top 10 cancer-related diseases in the world. In 2012, It was reported that the incidence and deaths caused by oral malignancies worldwide were 300,000 and 145,000, respectively.[4] With the progressing age incidence of oral cancers increases. The disparity in incidence and mortality of oral cancers exists, with those from the lower socioeconomic status being at higher risk. The primary etiologic and risk factors for oral malignancies are the habit of tobacco and alcohol usage.[4]

Though the occurrence of oral cancer in most countries is comparatively lower compared to other malignancies, it is regarded as a chief public health problem owing to low 5-year survival rates. These rates are connected largely to the often-end stage of the disease at the time of diagnosis and management.[4]

End stage of oral cancers at the time of diagnosis and management results in decreased functional ability with deformity along with the continuous deterioration of the quality of life of patients. Therefore, in order to curtail the morbidity and mortality related to oral cancer, it is encouraged that efforts be made for early diagnosis and detection of these lesions. Several means of detecting oral malignancies at an initial stage comprise screening high-risk populations; assertive screening by primary healthcare specialists and lessening the postponements by both patients and primary healthcare specialists following the initial sign or symptom to formation of a decisive diagnosis.[4]

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In Saudi Arabia, oral cancer takes around 26% of the overall infection rate. From the age range of about 45–65 years, the rate of oral cancer is higher in females than males.[5]

In Saudi Arabia, there is a dearth of information about oral cancer amongst general dental consultants leading to deferral in the diagnosis and management of such lesions. Cancer mortality can be reduced if cases are detected and treated early.[6] It is imperative to persuade patients to leave harmful habits that might result in oral cancer, which is as vital as managing the disease per se. Dental undergraduates are future consultants, hence their understanding of oral cancer necessitates a continuous upgradation.

Timely recognition of oral cancer leads to early treatment. A deficiency of information about oral cancer leads to late treatment in patients due to its asymptomatic nature. Oral cancer being asymptomatic is diagnosed later because people rarely take frequent check-ups from the dentist.[6] The prevention of oral cancer requires the close relationship of patients with dentists, dental hygienists, and doctors. They help in oral cancer education and detection of oral mucosal changes in the early stages.[7] If an

oral malignancy is discovered by clinicians at an initial stage, or if a potentially malignant disorder is recognized and managed before progression to malignancy then there are fair chances to improve survival rates. The dearth of prevention and preliminary recognition of oral cancer by healthcare workers is a global challenge.[6]

Several studies have investigated knowledge and practices regarding oral malignancies amongst dental students and dentists around the world, most of these studies revealed that dentists and students have acceptable levels of knowledge but need improvement about some risk factors and diagnostic criteria.[1,8–10]

Few studies in Saudi Arabia have found that the level of understanding about oral malignancies among dental undergraduates and dental practitioners seems to be moderate but unsatisfactory and is lower than the levels of knowledge among similar populations in other studies.[9]

Nevertheless, to our knowledge, no study has been conducted at King Saud University (KSU) regarding the assessment of oral cancer awareness amongst dental undergraduates. However, this study aims to assess the working knowledge, awareness, and risks related to oral cancer detection and prevention among dental undergraduates at KSU in Saudi Arabia.[11,12]

Materials and Methods

A cross-sectional study was undertaken amongst dental undergraduates of KSU, Saudi Arabia, for students belonging to the academic year 2021–2022 through the period from 1st May 2021 to 12th January 2022. Prior to conducting the study. Ethical approval from KSU Institutional Review Board (IRB) and College of Dentistry Research Center (CDRC) was obtained. A total of 150 undergraduates from first to final year participated in the study. A questionnaire was prepared by modifying the questionnaire from Carter and Ogden 2007 and Awan et al. 2014 that consisted of 21 questions regarding knowledge and awareness about oral malignancy and the same was answered by students during their academic year. Informed consent was obtained from all the students. All the personal data and responses from the participants were kept confidential, participants who did not consent were excluded from the study.

The questionnaire was prepared using Google forms in English and a simple random sampling method was used for the selection of the sample.

The data that was obtained included participants' demographic information like age, sex, and the present year of study and there were seven questions related to knowledge, and six and five questions were related to attitude and awareness, respectively. A total of 21 questions were queried to evaluate students' knowledge regarding oral examination, their understanding related to signs and symptoms of oral malignancy, associated habits and risk factors, their awareness of the disease and those affected by it, and the patients' referral path for oral malignancies, as well as the undergraduate students' wish to have further knowledge on oral malignancy. Statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS) 24 software and demographic variables were described to answer research questions.

Results and Discussions

Results show that of 150 respondents, 78.7% were above 20 years old but <25 years. Both male and female undergraduate students contributed to the study from the 1st to 5th year. The participants' demographic characteristics are summarized below in Table 1.

The first objective of the current research was to investigate the awareness and understanding of undergraduate dental students in the early detection and prevention of oral cancer. Items that measure awareness were analyzed using the Chi-square test as shown in Tables 2 to 4.

Whether oral cancer is preventable or not, the percentages of answering yes did not have a specific trend. The association between academic year and q2 was significant ($p < 0.05$), the *post hoc* analysis yielded no significant cells, and this is the case mentioned by Cox and Key attribute it to either complex contrasts among proportions or large sample size.

Considering oral cancer during a first dental visit, in general, percentages of getting the right answer increased, as the academic year increased. The association between academic year and q3 was significant ($p < 0.05$) and the *post hoc* analysis yielded no significant cells, which could be attributed to either complex contrasts among proportions or large sample size.

Gaining and implementing knowledge on oral cancer, in general, percentages of answering yes for different groups were very close. The association between academic year and q4 was not significant ($p > 0.05$), which means that the academic year is independent of having a clear knowledge about the texture of the cervical lymph node after metastases take place from the oral cavity. In this study most of the students have a good level of awareness related to oral cancer that is increasing along with their academic years, however, an inadequate level of knowledge about the clinical features and recognition of oral cancer is present among some of the students.

Whether a balanced healthy diet has an impact on the prevention of oral cancer, in general percentages of answering yes for different groups were very close. The association between academic year and q5 was not significant ($p > 0.05$), which means that increasing the student's years of learning does not affect their belief that eating a healthy balanced diet is one of the ways to prevent mouth cancer.

The second objective of the research was to identify changes in the examination of the oral mucosa, the capability to detect high-risk patients, understanding, and the ability to aid in risk factors. Items that measure the detection of high-risk patients were analyzed using the Chi-square test as shown in Tables 5 to 7.

The existence of an association between the academic year and students' information about oral cancer spreading was significant ($p < 0.05$). The *z*-test for adjusted residuals revealed that the 1st-year students had a significant count less than expected.

Table 1: Demographics of respondents

Characteristics	*n (%)*
Age (years)	
≤20	32 (21.3)
21–24	118 (78.7)
Gender	
Male	76 (50.7)
Female	74 (49.3)
Medical students	
1st year	28 (18.7)
2nd year	28 (18.7)
3rd year	30 (20.0)
4th year	36 (24.0)
5th year	28 (18.7)

Table 2: Awareness and understanding of undergraduate dental students in early detection and prevention of oral cancer showed that the percentages of learning generally increased, as the academic year increased ($p < 0.05$). *Post hoc* comparisons using Bonferroni corrected *p*-values for the standardized residuals, results revealed that academic year was significantly associated with oral cancer learning from the 3rd academic year and beyond (the count of each cell for these last 3 years was greater than the expected value)

Question		*No n (%)*	*Yes n (%)*	*p-value*
Have you learned about oral cancer?	1	27 (90)	1 (0.8)	0.000
	2	3 (10)	25 (20.8)	
	3	0 (0)	30 (25)	
	4	0 (0)	36 (30)	
	5	0 (0)	28 (23.3)	
Is oral cancer inevitable or preventable?	1	8 (42.1)	20 (15.3)	0.029
	2	1 (5.3)	27 (20.6)	
	3	5 (26.3)	25 (19.1)	
	4	2 (10.5)	34 (26)	
	5	3 (15.8)	25 (19.1)	
Do you consider oral cancer during dental examination in the first appointment of your patient?	1	22 (25)	6 (9.7)	0.020
	2	16 (18.2)	12 (19.4)	
	3	21 (23.9)	9 (14.5)	
	4	18 (20.5)	18 (29)	
	5	11 (12.5)	17 (27.4)	
When cervical lymph node metastases take place in oral cancer, on palpation they are? • Hard, painful, and not fixed • Hard, painless, and not fixed • Soft, painful, and not fixed • Soft, painless, and may or may not be fixed	1	16 (25.8)	12 (13.6)	0.094
	2	11 (17.7)	17 (19.3)	
	3	10 (16.1)	20 (22.7)	
	4	18 (29)	18 (20.5)	
	5	7 (11.3)	21 (23.9)	
Eating a healthy balanced diet that includes fresh vegetables, citrus fruits, olive oil, and fish is one of the ways to prevent mouth cancer	1	4 (33.3)	24 (17.4)	0.466
	2	1 (8.3)	27 (19.6)	
	3	1 (8.3)	29 (21)	
	4	4 (33.3)	32 (23.2)	
	5	2 (16.7)	26 (18.8)	

Table 3: Overall awareness differences due to academic year using one-way analysis of variance (ANOVA) conducted

Academic year	*n*	*Mean*	*Standard deviation*
1st year	28	4.2500	1.04083
2nd year	28	5.8571	0.84828
3rd year	30	5.7667	0.89763
4th year	36	5.8333	0.73679
5th year	28	6.1786	0.81892
Total	150	5.5933	1.08124

Table 4: One-way ANOVA shows that there was a significant impact of the academic year on students' overall awareness; the obtained F-value was 21.6 (*p*-value < 0.05). *Post hoc* analysis revealed that the difference was between the 1st year and all other years in favor of the other years

Source of variance	*Sum of squares*	*Degree of freedom*	*Mean square*	*F*	*Significance*
Between groups	65.041	4	16.260	21.600	0.000
Within groups	109.152	145	0.753		
Total	174.193	149			

In general percentages of students' ability to identify oral cancer increased, as the academic year increased. The Chi-square test was found to be significant ($p < 0.001$), which suggests an association between the ability to identify for oral cancer and the academic year. The *z*-test for adjusted residuals revealed that the 1st-year students had a significant countless than expected to identify oral cancer. However, the association between the academic year and how students handled non-healing unexplained oral ulcers test was found to be not significant ($p > 0.05$).

The Chi-square test was found to be significant ($p < 0.001$), which suggests an association between students' knowledge and the academic year. The *z*-test for adjusted residuals revealed that the 3rd year students had an account more than the expected value, which means they have a good awareness of conditions that are more commonly associated with oral cancer.

For oral cancer, whether tobacco is a major risk factor the results were close and high for all academic years. The Chi-square test was found to be significant ($p < 0.05$), which suggests an association between students' beliefs and the academic year. The *z*-test for adjusted residuals revealed that the 1st year students had an account less than expected value.

It was evident that students progressed towards better identification of risk factors with each academic year. However, it was challenging to relate the level of understanding of risk factors among different year students because of a number of different factors such as curriculum, changes in faculty, and community awareness campaigns. These factors limit and influence their knowledge and awareness of the risk factors. Therefore, it is recommended that reinforcement of knowledge about oral cancer, and certainly about its clinical features, is suggested during the

Table 5: Detection of high-risk patients showed that the relationship between age and oral cancer, the difference of percentages was not significant ($p > 0.05$), which means no association between the academic year and students' belief

Question		*No n (%)*	*Yes n (%)*	*p-value*
Do you think with increasing age chances of getting oral cancer also increase?	1	12 (24.5)	16 (15.8)	0.192
	2	13 (26.5)	15 (14.9)	
	3	7 (14.3)	23 (22.8)	
	4	9 (18.4)	27 (26.7)	
	5	8 (16.3)	20 (19.8)	
Are there any chances of spreading oral cancers to other parts of the body?	1	13 (35.1)	15 (13.3)	0.021
	2	8 (21.6)	20 (17.7)	
	3	7 (18.9)	23 (20.4)	
	4	6 (16.2)	30 (26.5)	
	5	3 (8.1)	25 (22.1)	
Do you know different techniques for identifying oral cancer? • Dental exam • Imaging • Biopsy	1	26 (36.1)	2 (2.6)	0.000
	2	11 (15.3)	17 (21.8)	
	3	12 (16.7)	18 (23.1)	
	4	14 (19.4)	22 (28.2)	
	5	9 (12.5)	19 (24.4)	
A nonhealing unexplained oral ulcer for several weeks should be taken as malignant unless proved otherwise	1	9 (36)	19 (15.2)	0.136
	2	2 (8)	26 (20.8)	
	3	5 (20)	25 (20)	
	4	5 (20)	31 (24.8)	
	5	4 (16)	24 (19.2)	
Which of the following conditions is more commonly associated with oral cancer? • Oral leukoplakia • Submucous fibrosis • Geographic tongue • Erythroplakia	1	16 (20.3)	12 (16.9)	0.005
	2	20 (25.3)	8 (11.3)	
	3	7 (8.9)	23 (32.4)	
	4	20 (25.3)	16 (22.5)	
	5	16 (20.3)	12 (16.9)	
Do you think consumption of alcohol is a risk factor for oral cancer?	1	2 (28.6)	26 (18.2)	0.278
	2	2 (28.6)	26 (18.2)	
	3	0 (0)	30 (21)	
	4	3 (42.9)	33 (23.1)	
	5	0 (0)	28 (19.6)	
Do you think the utilization of tobacco is a risk factor for oral cancer?	1	3 (100)	25 (17)	0.018
	2	0 (0)	28 (19)	
	3	0 (0)	30 (20.4)	
	4	0 (0)	36 (24.5)	
	5	0 (0)	28 (19)	

Table 6: Descriptive statistics of overall ability to identify changes on examination of the oral mucosa, capability to detect high-risk patients, understanding and ability to aid on risk factors, differences due academic year using one-way ANOVA conducted

Academic year	*n*	*Mean*	*Standard deviation*
1st year	28	5.1071	1.19689
2nd year	28	6.0000	0.90267
3rd year	30	6.7333	1.11211
4th year	36	6.4167	1.29560
5th year	28	6.5714	1.31736
Total	150	6.1867	1.29732

Table 7: Shows that there was a significant impact of the academic year on students' overall ability to detect high-risk patients; the obtained *F*-value was 8.719 (p-value < 0.05). *Post hoc* analysis revealed that the difference was between the 1st year and all other years in favor of the other years

Source of variance	*Sum of squares*	*Degree of freedom*	*Mean square*	*F*	*Significance*
Between groups	48.621	4	12.155	8.719	0.000
Within groups	202.152	145	1.394		
Total	250.773	149			

undergraduate dental course to aid in improving early detection and diagnosis of oral cancer.

One of the objectives of this current research was to identify dental students' ability to categorize patients, the preferred pathway of referral of patients with suspected lesions, and the desire to have further information regarding oral cancer as shown in (Table 8 to 10).

When evaluating students' knowledge of the most common type of cancer affecting the oral cavity, as the academic year increased their knowledge generally increased. The Chi-square

Table 8: Shows the difference in percentages was significant ($p < 0.05$), which means the existence of an association between the academic year and students' actions in the case of malignancy suspicion. The *post hoc* analysis yielded no significant cells, which could be attributed to either complex contrasts among proportions or a large sample size

Question		*No n (%)*	*Yes n (%)*	*p-value*
How do you refer to the case, if you suspect malignancy in a particular lesion	1	9 (39.1)	19 (15)	0.018
	2	5 (21.7)	23 (18.1)	
	3	0 (0)	30 (23.6)	
	4	5 (21.7)	31 (24.4)	
	5	4 (17.4)	24 (18.9)	
What is the most common type of cancer affecting the oral cavity? • Lymphoma • Squamous cell carcinoma • Ameloblastoma • Pleomorphic adenoma	1	19 (57.6)	9 (7.7)	0.00
	2	6 (18.2)	22 (18.8)	
	3	1 (3)	29 (24.8)	
	4	5 (15.2)	31 (26.5)	
	5	2 (6.1)	26 (22.2)	
Which is the most frequent anatomical region for cancer in the oral cavity? • Tongue • Floor of mouth • Palate • Buccal mucosa	1	25 (28.4)	3 (4.8)	0.004
	2	17 (19.3)	11 (17.7)	
	3	17 (19.3)	13 (21)	
	4	16 (18.2)	20 (32.3)	
	5	13 (14.8)	15 (24.2)	
Is oral cancer a public health problem	1	5 (26.3)	23 (17.6)	0.393
	2	6 (31.6)	22 (16.8)	
	3	3 (15.8)	27 (20.6)	
	4	3 (15.8)	33 (25.2)	
	5	2 (10.5)	26 (19.8)	
Do you believe that oral cancer awareness campaigns can bring a change in our society to be more cautious about changes in the oral cavity	1	0 (0)	28 (18.8)	0.569
	2	1 (100)	27 (18.1)	
	3	0 (0)	30 (20.1)	
	4	0 (0)	36 (24.2)	
	5	0 (0)	28 (18.8)	
Do you intend to attend a continuing education course on oral cancer in the future	1	1 (14.3)	27 (18.9)	1.00
	2	1 (14.3)	27 (18.9)	
	3	2 (28.6)	28 (19.6)	
	4	2 (28.6)	34 (23.8)	
	5	1 (14.3)	27 (18.9)	

Table 9: The overall students' ability to identify patients and categorize them, differences due academic year using one-way ANOVA conducted

Academic year	*n*	*Mean*	*Standard deviation*
1st year	28	5.8929	1.13331
2nd year	28	6.7143	1.11744
3rd year	30	7.2333	0.81720
4th year	36	7.1389	0.99003
5th year	28	7.2143	0.78680
Total	150	6.8600	1.08702

Table 10: One-way ANOVA shows that there was a significant impact of the academic year on students' overall ability to categorize patients; the obtained *F*-value was 9.74 (*p*-value < 0.05). *Post hoc* analysis revealed that the difference was between the 1st year and all other years in favor of the other years

Source of variance	*Sum of squares*	*Degree of freedom*	*Mean square*	*F*	*Significance*
Between groups	37.281	4	9.320	9.738	0.000
Within groups	138.779	145	0.957		
Total	176.060	149			

test was found to be significant ($p < 0.001$), which suggests an association between their knowledge and the academic year. The *z*-test for adjusted residuals revealed that the 1st-year students had significantly countless than expected information.

While assessing students' knowledge of the most frequent anatomical region for cancer in the oral cavity, as the academic year increased their knowledge generally increased and students planned to attend a continuing education course on oral cancer in the future. The Chi-square test showed a significant association ($p < 0.001$) between their knowledge and the academic year. The *z*-test for adjusted residuals revealed that the 1st-year students had significantly countless than expected information.

It is also important for dental students to take the responsibility of not only advising but also counseling the patient on high-risk habits (smoking, tobacco chewing, and alcohol consumption). This comes with an additional responsibility of teaching the patients how to do a self-examination of the oral mucosa to not only improve awareness about oral cancer but also enable them to identify any suspicious lesions but also to recognize any early changes in the mouth.

Table 11: Overall oral cancer knowledge: the result in the table shows that only academic year could significantly predict overall oral cancer knowledge (b = 1.022, 95% confidence interval = 0.662, 1.383), the positive regression coefficient indicated that the more the academic year, the more the student's knowledge about oral cancer

	B	*β*	*t*	*Significance*	*F*	*R square*
Constant	15.943		14.900	0.000	17.642	0.266
Age	0.020	0.003	0.033	0.973		
Gender	−0.308	−0.056	−0.787	0.432		
Academic year	1.022	0.515	5.605	0.000		

Multiple regression analysis was conducted to investigate predictors associated with oral cancer knowledge as shown in Table 11. The overall regression model was significant and the model accounted for 26.6% of the variance in the data [F(3, 146) = 17.642, $p = 0.00$]. Unstandardized and standardized regression coefficients are computed as follows in the Table 11.

Conclusion

In this study most of the students have a good level of awareness related to oral cancer that is increasing along with their academic years, however, an inadequate level of knowledge about the clinical features and recognition of oral cancer is present among some of the students.

As the study was performed in a lone university in Riyadh, Saudi Arabia, it deals with limitations and therefore, the outcome of the study cannot be generalized to denote other institutes of the kingdom. The response rate of undergraduates was limited as many of the students refused to be part of the current study and this certainly affected the final outcome of the study. We propose widespread interinstitutional studies to be conducted that involve not just dental students but also their medical counterparts to assess oral cancer awareness in the future.

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