

Original Research Article

Oral Cancer Awareness and Knowledge among population in Tabuk City, Saudi Arabia: A Cross Sectional Questionnaire-Based Study

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Abstract: Background: Oral cancer (OC) is a major global health concern, with squamous cell carcinoma accounting for more than 90% of cases. Major risk factors include tobacco and alcohol consumption, while other factors such as human papillomavirus (HPV) infection and prolonged sun exposure may also contribute. This study aimed to assess oral cancer awareness among the general population. **Materials and Methods:** A cross-sectional, questionnaire-based study was conducted among 474 participants. A structured questionnaire collected demographic information and assessed awareness using 14 knowledge-based items covering risk factors, warning signs, disease progression and early detection, and prevention. Awareness was categorized as low (0–6), moderate (7–10), or high (11–14). Data were analyzed using SPSS version 26.0. Chi-square and independent-samples t-tests were used, with statistical significance set at $p < 0.05$. Ethical approval was obtained from the Institutional Review Board of the Ministry of Health in the Tabuk Region (TU-077/026/400). **Results:** Overall oral cancer awareness was generally high, with nearly three-quarters of participants classified as having high awareness. Knowledge was particularly strong regarding tobacco-related risks, early detection, and preventive measures. However, lower awareness was observed for alcohol consumption (72.9%), HPV infection (53.5%), and prolonged sun exposure as a risk factor for lip cancer (42.9%). Knowledge gaps were also identified regarding red or white oral lesions. Previous familiarity with oral cancer was significantly associated with greater knowledge, whereas age and gender were not significantly associated with overall awareness. **Conclusion:** Participants demonstrated generally high oral cancer awareness. Continued community education should emphasize less-recognized risk factors, warning signs, prevention, and the importance of early detection.

Keywords: Oral Cancer, Oral Cancer Awareness, Oral Cancer Knowledge, Risk Factors, Early Detection, Prevention, General Population, Tabuk, Saudi Arabia, Cross-Sectional Study.

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1. INTRODUCTION

Oral Cancer (OC) is considered one of the most common cancer-related causes of death worldwide [1]. Squamous cell carcinomas account for more than 90% of OCs [2]. The main risk factors for OC are alcohol, tobacco consumption, and chewing betel. A combination of these factors significantly increases the risk [3–5]. Other factors include human immunodeficiency virus (HIV) and human papillomavirus (HPV) [6]. It commonly affects people older than 40 years [7].

Low levels of general knowledge of OC have been observed in Iran and the UK [8, 9], whereas in Australia, more people appear to be aware of OC [10].

Only two studies have investigated the levels of awareness of OC in Saudi Arabia, both were conducted in Riyadh. One study found that only 62.4% of dental patients were aware of OC [11].

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Al-Maweri *et al.*, (2015) reported limited awareness of oral cancer among the Saudi general population. Smoking and alcohol were recognized as risk factors by 81.7% and 56.3% of participants, respectively, while participants with lower educational levels demonstrated poorer knowledge of oral cancer risk factors and warning signs [12].

As a consequence, the present study was undertaken to assess the level of oral cancer awareness and knowledge among the population in Tabuk City, Saudi Arabia.

2. MATERIALS AND METHODS

2.1 Study Design and Participants

A cross-sectional, questionnaire-based study was specifically designed to assess oral cancer awareness among the general population. A total of 474 participants completed the questionnaire and were included in the study.

The questionnaire gathered demographic data and evaluated participants' awareness of oral cancer risk factors, warning signs, disease progression, early detection, and preventive strategies. Participation was voluntary, and all responses were collected anonymously without any personally identifiable information.

2.2 Questionnaire and Data Collection

Data were collected using a structured questionnaire consisting of demographic characteristics and oral cancer awareness items. Demographic variables included 3 age groups (<30 years, 30–50 years, and >50 years) and gender (male or female).

Oral cancer awareness was evaluated using 14 knowledge-based items covering four main domains: risk factors, warning signs, disease progression and early detection, and prevention.

The risk-factor domain assessed participants' awareness of smoking, smokeless tobacco/Shamma, alcohol consumption, human papillomavirus (HPV), and prolonged sun exposure as a risk factor for lip cancer. The warning-sign domain assessed recognition of a non-healing oral ulcer, red or white oral patches, and an oral lump or swelling.

The remaining items assessed knowledge related to tumor progression, early detection, consequences of delayed treatment, regular dental examinations, smoking cessation, and health awareness and education.

Responses were recorded as Yes or No. Participants were additionally asked whether they had previously heard of oral cancer. This question was analyzed separately as an indicator of previous familiarity with oral cancer and was not included in the composite awareness score.

2.3 Oral Cancer Awareness Score

Each awareness-consistent response to the 14 knowledge-based items was assigned 1 point, whereas an incorrect response was assigned 0 points. The total awareness score consequently ranged from 0 to 14, with higher scores indicating greater oral cancer awareness.

For descriptive interpretation, awareness was classified into three levels according to the proportion of correct responses: low awareness (<50%; score 0–6), moderate awareness (50–74%; score 7–10), and high awareness (≥75%; score 11–14).

Missing responses were retained as missing values. Item-level percentages were therefore calculated using valid responses for each question. For calculation of the composite awareness score, a complete-case approach was applied; only participants with valid responses to all 14 awareness items were included.

2.4 Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26.0 (IBM Inc. Chicago, Illinois, USA). Categorical variables were summarized as frequencies and percentages, while the composite awareness score was summarized using the mean, standard deviation (SD), median, and range.

The Chi-square test was used to examine associations between categorical awareness level and demographic characteristics and between previous awareness of oral cancer and overall awareness level. The independent-samples t-test was additionally used to compare mean awareness scores between two independent groups, including males versus females and participants who had versus had not previously heard of oral cancer. All statistical tests were two-tailed, and a p-value <0.05 was considered statistically significant.

2.5 Ethical Considerations

The present study was undertaken following the approval of the Institutional Review Board of the Ministry of Health in the Tabuk Region (Reference No. TU-077/026/400).

Participation was voluntary, and the confidentiality of all responses was ensured throughout the study. No personally identifiable information was collected or included in the analytical dataset.

3. RESULTS

3.1 Participant Characteristics

A total of 474 participants were included. Age information was available for 469 participants. Most were younger than 30 years ($n = 402$, 85.7%), followed by those aged 30–50 years ($n = 64$, 13.6%), while only three participants (0.6%) were older than 50 years. Gender information was available for 458 participants;

393 (85.8%) were female and 65 (14.2%) were male, as shown in Table 1.

3.2 Awareness of Oral Cancer

Participants generally demonstrated high awareness of tobacco-related risk factors. Smoking was recognized as a risk factor by 89.9%, while 92.0% recognized smokeless tobacco/Shamma. Awareness was lower for alcohol consumption (72.9%) and HPV infection (53.5%). Prolonged sun exposure as a risk factor for lip cancer showed the lowest level of recognition (42.9%).

Perception of warning signs varied. A non-healing oral ulcer was recognized by 79.4% of participants, and an oral lump or swelling by 79.5%. In comparison, 57.4% recognized red or white oral patches as potential warning signs.

Awareness of disease progression, early detection, and prevention was consistently high. More than 90% recognized an increase in lesion size over time (92.6%), the importance of early detection (95.7%), and the consequences of delayed treatment (94.0%). Regular dental examinations (93.0%), smoking cessation (93.6%), and health awareness and education (96.4%) were also widely recognized, as shown in Table 2.

3.3 Overall Oral Cancer Awareness

Complete responses to all 14 knowledge-based items were available for 423 participants. The mean overall awareness score was 11.43 ± 2.23 out of 14, with a median of 12 and a range of 0–14.

Most participants ($n = 309$, 73.0%) demonstrated a high level of oral cancer awareness. Moderate awareness was observed in 99 participants (23.4%), whereas only 15 (3.5%) were classified as having low awareness, as shown in Table 3.

3.4 Association between Awareness and Demographic Characteristics

High awareness was observed in 78.6% of males and 72.5% of females but no statistically significant association was observed between gender and categorical awareness level ($\chi^2 = 3.139$, $p = 0.078$).

Similarly, the mean awareness score did not differ significantly between male and female participants (11.70 ± 2.17 vs. 11.42 ± 2.17 ; $t(407) = 0.870$, $p = 0.385$) respectively.

No statistically significant association was found between age group and categorical awareness level ($\chi^2 = 4.717$, $p = 0.318$). High awareness was observed among 71.9% of participants younger than 30 years and 80.4% of those aged 30–50 years. All three participants older than 50 years were classified as having high awareness; however, this finding should be interpreted cautiously because of the very small number of participants in this age category as shown in Table 4.

3.5 Previous Awareness of Oral Cancer

Among participants with valid responses to the previous-awareness question, 254 (54.2%) reported having heard of oral cancer before the survey, while 215 (45.8%) gave a negative response.

Among participants with complete composite scores, those who had previously heard of oral cancer had a statistically significantly higher mean awareness score than those who had not (11.98 ± 1.95 vs. 10.73 ± 2.37 ; $t(417) = 5.925$, $p < 0.001$) respectively.

Previous awareness was similarly statistically significantly associated with the categorical level of oral cancer awareness ($\chi^2 = 21.330$, $p < 0.001$). High awareness was observed in 81.7% of participants who had previously heard of oral cancer, compared with 61.9% among those who had not (Table 5).

Overall, the findings demonstrated a generally high level of oral cancer awareness, with nearly three-quarters of participants classified in the high-awareness category. Awareness was particularly strong regarding tobacco-related risks, early detection, and preventive measures, whereas important knowledge gaps were evident regarding sun exposure, HPV infection, and red or white oral lesions. Previous familiarity with oral cancer was significantly associated with greater knowledge, while gender and age were not significantly associated with overall awareness level.

Table 1: Sociodemographic characteristics of the study participants

Characteristic	n	%*
Age group		
<30 years	402	85.7
30–50 years	64	13.6
>50 years	3	0.6
Gender		
Male	65	14.2
Female	393	85.8

Percentages are based on valid responses.

Table 2: Participants' awareness of oral cancer

Domain	Awareness item	Yes n (%)	No n (%)
Risk factors	Smoking	426 (89.9)	48 (10.1)
	Smokeless tobacco/Shamma	426 (92.0)	37 (8.0)
	Alcohol consumption	342 (72.9)	127 (27.1)
	HPV infection	249 (53.5)	216 (46.5)
	Prolonged sun exposure and lip cancer	201 (42.9)	267 (57.1)
Warning signs	Non-healing oral ulcer	373 (79.4)	97 (20.6)
	Red or white oral patches	270 (57.4)	200 (42.6)
	Oral lump or swelling	372 (79.5)	96 (20.5)
Disease progression and early detection	Increase in lesion size over time	437 (92.6)	35 (7.4)
	Importance of early detection	448 (95.7)	20 (4.3)
	Consequences of delayed treatment	442 (94.0)	28 (6.0)
Prevention	Regular dental examinations	440 (93.0)	33 (7.0)
	Smoking cessation	439 (93.6)	30 (6.4)
	Health awareness and education	456 (96.4)	17 (3.6)

Percentages are based on valid responses for each item.

Table 3: Overall oral cancer awareness level

Awareness level	Score	n	%
Low	0–6	15	3.5
Moderate	7–10	99	23.4
High	11–14	309	73.0
Total	—	423	100.0

Table 4: Association between demographic characteristics and oral cancer awareness level

Characteristics	Low n (%)	Moderate n (%)	High n (%)	χ^2	p-value
Gender					
Male	3 (5.4)	9 (16.1)	44 (78.6)	3.139	0.208
Female	9 (2.5)	88 (24.9)	256 (72.5)		
Age group					
<30 years	11 (3.1)	90 (25.0)	259 (71.9)	4.717	0.318
30–50 years	3 (5.4)	8 (14.3)	45 (80.4)		
>50 years	0 (0.0)	0 (0.0)	3 (100.0)		

Table 5: Relationship between previous awareness of oral cancer and overall awareness

Previous awareness	n	Mean score $\pm$ SD	Low n (%)	Moderate n (%)	High n (%)	p-value
Yes	230	11.98 $\pm$ 1.95	4 (1.7)	38 (16.5)	188 (81.7)	< 0.001*
No	189	10.73 $\pm$ 2.37	11 (5.8)	61 (32.3)	117 (61.9)	

Independent-samples t-test: $t(417) = 5.925$, $p < 0.001$ / Chi-square test: $\chi^2 = 21.330$, $p < 0.001$

4. DISCUSSION

The present study showed a generally high level of oral cancer knowledge, with a mean score of 11.43 ± 2.23 out of 14, and 73.0% of participants classified as having high awareness. This is encouraging when compared with previous studies in Saudi Arabia [12–15]. Al-Maweri *et al.*, [12], reported that 53.6% of their participants had heard of oral cancer, while Altamimi *et al.*, [13], reported an awareness rate of 47.6% in Hail, and Sindi *et al.*, reported 65.8% in Jeddah [14]. Alqahtani *et al.*, found a considerably lower level of awareness (24.5%) among dental patients in Mecca [15]. Although direct comparison should be made cautiously because of differences in study populations and methods,

the findings suggest a relatively good level of oral cancer knowledge in our population.

One of the main findings of our study was that participants who had previously heard of oral cancer had significantly better knowledge than those who had not (11.98 ± 1.95 vs. 10.73 ± 2.37 ; $p < 0.001$) respectively. High awareness was also more common among participants with previous awareness (81.7% vs. 61.9%; $p < 0.001$). A similar finding was reported by Sindi *et al.*, where participants who had previously heard of oral cancer had significantly higher knowledge scores (5.90 vs. 4.66; $p < 0.05$) [14]. This supports the idea that previous exposure to oral cancer information may have an important role in improving public knowledge.

In the present study, gender was not significantly associated with oral cancer knowledge. Knowledge scores were similar between males and females (11.70 ± 2.17 vs. 11.42 ± 2.17 ; $p = 0.385$) respectively, and there was no significant difference in awareness level between the two groups ($p = 0.208$). This agrees with Al-Maweri *et al.*, and Alqahtani *et al.*, [12,15], who also found no significant gender differences. However, Sindi *et al.*, reported significantly higher knowledge among females, while Rupel *et al.*, found that males had lower odds of oral cancer awareness (OR = 0.68, 95% CI: 0.50–0.90; $p = 0.02$) [14,16]. These differences may reflect variations in the populations studied and their exposure to health information.

Age was also not significantly associated with awareness in our findings ($p = 0.318$). This is in agreement with Al-Maweri *et al.*, Alqahtani *et al.*, and Rupel *et al.*, who similarly found no significant association with age [11,16]. In contrast, Altamimi *et al.*, reported a significant relationship between age and awareness ($p < 0.001$), with greater awareness among older participants [13].

Educational level was likewise not significantly associated with overall awareness. This is consistent with Alqahtani *et al.*, [15], while differs from several other studies. Al-Maweri *et al.*, [11], found that higher education was associated with better oral cancer knowledge, while Altamimi *et al.*, and Sindi *et al.*, additionally reported significantly greater awareness or knowledge among participants with higher educational levels [13,14]. Rupel *et al.*, reported a similar association (OR = 1.54, 95% CI: 1.10–2.10; $p = 0.01$) [16].

The absence of this association in the present study may indicate that access to oral cancer information was not limited to participants with higher educational attainment.

Overall, our findings suggest that previous exposure to oral cancer information was more closely related to knowledge than age, gender, or educational level. While the generally high level of awareness is encouraging, continued community education remains important. Awareness programs should focus not only on introducing oral cancer as a disease but also on improving practical knowledge of its risk factors, early warning signs, prevention, and the importance of early detection.

5. CONCLUSION

This study showed a generally high level of oral cancer awareness among participants. Previous awareness of oral cancer was significantly associated with better knowledge, while age and gender showed no significant association. Despite the overall favorable findings, some knowledge gaps remain, highlighting the need for continued community education focusing on

risk factors, early warning signs, prevention, and early detection of oral cancer.

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