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ASSESSMENT OF KNOWLEDGE AND AWARENESS LEVELS REGARDING ORAL CANCER CAUSES AND COMPLICATIONS AMONG THE SAUDI ARABIAN POPULATION, A CROSS-SECTIONAL STUDY

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Abstract

Background: Oral cancer (OC). it's a neoplasm that primarily begins at the lips and stops at the anterior structures of the throat. The seventh most prevalent cancer worldwide and the ninth deadliest cancer site in terms of mortality were oral cavity tumors. Oral cancer is a silent, invasive disease, which usually presents as a persistent, painless ulcer that the patient tends to ignore. Oral squamous cell carcinoma is responsible for more than 90% of all oral cavity cancers, Oral cancer is the fifth most common of cancer cases, The tongue is the second most common site of oral cancer, after the lip. To assess knowledge and awareness level about oral cancer, its causes and complications among general population in the kingdom of Saudi Arabia.

Methods: This is a cross-sectional study conducted by utilizing a digitally distributed questionnaire which is based on a well-structured survey that was developed by other authors and was used for the Saudi Arabian population. The study is targeting Saudi Arabian adults above the age of 18 years old. It was conducted in 2024. The selection of Participants was from those who received the questionnaire. determine the minimum number of responders needed to create a representative sample for the entire population, estimations of sample size were made.

Results: The study assessed the knowledge and awareness of oral cancer causes and complications among a sample of 984 participants in Saudi Arabia, revealing both positive and concerning trends. Approximately 53.5% indicated awareness of oral cancer, yet misconceptions persisted, particularly with 30.4% uncertain about the relationship between alcohol consumption and the disease. A significant 81.3% acknowledged smoking and chewing habits as risk factors, but only 47.4% believed that oral cancer is treatable, highlighting a critical need for enhanced public health education. While 57.6% recognized the potential lethality of untreated oral cancer, over half lacked information on preventive measures. Notably, 77.3% expressed a desire for more educational resources. The study found that only 10.8% of participants had a high level of knowledge, with 72.5% categorized as having low knowledge.

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Factors such as age, region, educational level, marital status, and occupation significantly influenced knowledge levels, while gender and habits showed no significant relation.
Conclusion: the study revealed a significant gap in knowledge and awareness regarding oral cancer among the general population of Saudi Arabia, despite a moderate recognition of the disease's existence. While a majority of participants identified smoking and chewing habits as risk factors, misconceptions regarding the relationship between alcohol consumption and oral cancer persisted. Alarmingly, only a small percentage demonstrated a high level of knowledge or awareness of preventative measures and the treatability of the disease.

Keywords: Awareness, Knowledge, Oral Cancer, Saudi Arabia

Introduction:

Oral cancer (OC) is a neoplasm that primarily begins at the lips and stops at the anterior structures of the throat [1]. The seventh most prevalent cancer worldwide and the ninth deadliest cancer site in terms of mortality were oral cavity tumors [2]. The etiology of OC includes tobacco use, excessive alcohol intake, and betel quid use [3]. Oral cancer is a silent, invasive disease, which usually presents as a persistent, painless ulcer that the patient tends to ignore [4]. Oral squamous cell carcinoma is responsible for more than 90% of all oral cavity cancers [5]. A systemic review revealed a correlation between the occurrence of oral cancer and socioeconomic status [6].

Oral cancer is the fifth most common of cancer cases [7]. Oral cancer claims the lives of 240,000 patients a year, it is regarded as one of the top causes of mortality globally [8]. The tongue is the second most common site of oral cancer, after the lip [9]. Oral, pharyngeal, and lip cancers were reported to have incidence and mortality rates of 529,500 and 292,300 worldwide in 2012, respectively. These numbers represent 3.8% of all cancer cases and 3.6% of cancer deaths worldwide [10].

In 2019 a study was conducted to evaluate the knowledge and awareness of the Uganda population regarding oral cancer. The results were quite negative. More than ninety percent stated they had never heard of oral cancer, and more than ninety-five percent of those asked had never undergone an oral cancer screening. This is true even though over 60% of participants felt the likelihood of successfully managing some malignancies may rise with early identification [11]. Another similar study was conducted in the capital of Iran during the same year, a self-filled questionnaire was used to inquire about the knowledge of the general population regarding the risk factors of oral cancer. Over half percent of the selected sample accurately identified mouth soreness, persistent ulcers, and white or red patches as indicators of oral cancer. The shift in voice was what people knew the least about (28%) [12]. in 2020, a study was conducted in Aligarh of Uttar Pradesh of India where a questionnaire was distributed to the visitors of the Department of Oral Pathology and Oral Medicine and Radiology, Dental College.The study found that 79% of the study sample was aware of the early signs of oral cancer and that these signs were statistically significant (p-value < 0.05%) [13]. Undergraduate dental and medical students in Saudi Arabia were given a digital quiz in 2023 to gauge their knowledge about oral cancer. With a sample of only 1033 students. There were no significant differences in the mean number of correct answers between medical students and dental students at each study level, except for the fifth-year students. At this stage, dentistry students' mean was greater than that of medical students (5.13 ± 2.01) ($p < 0.01$) [14].

Further research is required to ascertain the level of knowledge and awareness regarding oral cancer among the general population. Even with prior studies on this topic covering such a wide geographic area as Saudi Arabia.

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Objective:
The study aims to assess the knowledge and awareness levels about oral cancer its causes and complications among the general population of Saudi Arabia.

Methodology:
Study Design and Setting:
This is a cross-sectional study conducted by utilizing a digitally distributed questionnaire which is based on a well-structured survey that was developed by other authors and was used for the Saudi Arabian population. This study is targeting Saudi Arabian adults above the age of 18 years old. It was conducted during the period ranging from 2024 July until 2024 November. The selection of Participants was from those who received the questionnaire.

Sample size:
To determine the minimum number of responders needed to create a representative sample for the entire population, estimations of sample size were made. The Rao soft sample size calculator was used to calculate the sample size. The sample size that was determined was 384, with an indicator percentage of 0.50, a margin of error of 5%, and a confidence interval (CI) of 95%.

Inclusion and Exclusion criteria:
Participants in our study were Saudi Arabian male and female individuals who were above the age of 18. Individuals under the age of 18 were excluded from our analysis.

Method for data collection, instrument, and score system:
This study was collected through online survey questions. The questionnaire compromised several demographical questions, followed by questions to assess the knowledge of participants on different topics, including knowledge of signs and symptoms of oral cancer, and risk factors of oral cancer. A consent form was included on the first page of the questionnaire. All participants were required to agree to the terms to proceed to the next page. Confidentiality and anonymity were strictly maintained, as no identifiers were recorded. Any individual with access to the online survey and living in Saudi Arabia, whether male or female, of Saudi that is above the age of 18 years was included in the study. Data collection was done in the form of the participant's responses to the questions.
There are three sections to the questionnaire. The first section starts with a brief description of the study and the consent question. The second section includes demographic features such as age, gender, residential area, educational qualifications, income, and habits. In the third section, the participants were asked about their knowledge and awareness of oral cancer.

Scoring system:
The survey that has been used consisted of a total of 20 questions, 6 questions to gather non-identifying demographical data such as age, sex, and sociodemographic status, 13 knowledge-related questions, and the last question to inquire if the participant would be open to knowing more about the disease.
Each correct answers were given (1 point), and wrong & I don't know answers were given (0 points). In the scoring system that utilized Likert scales (dichotomous, three-point, and quality scales), the highest point was 13, divided as informed to three groups based on The Original Bloom's cut-off points: 10-13 points are considered a high level of knowledge (80% –100%), 9-8 is a Moderate level of knowledge (60–79%), and 7 or less is a Low level of knowledge (less than 59%).

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Pilot test:
The questionnaire was delivered to 20 people and required them to complete it. This was done to test the questionnaire's simplicity and viability for the study. The pilot study's data was not included in the final study results.

Analyzes and entry method:
Microsoft Office Excel Software" application (2016) for Windows was used to enter data into the computer. After that, data was moved to be statistically analyzed using the Statistical Package of Social Science Software) SPSS program for Windows, Version 25.0. Armonk, NY: IBM Corp.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (984). The mean age of participants is 36.4 years, with a notably diverse age distribution; 22.1% are under 25 years, while 14.3% exceed 50 years. Gender representation skews towards females (57.4%), indicating a greater female participation rate. Residentially, the Southern region represents the majority at 48.2%, contrasted by minimal representation from the Eastern region (4.9%). Educationally, a striking 56.6% of participants hold a bachelor's degree or higher, suggesting a predominantly educated sample. The marital status data indicates that married individuals constitute the largest group (63.7%), while nearly a third are single. Occupationally, 27.3% are unemployed, which illustrates a notable demographic of individuals outside the workforce. Regarding financial circumstances, 28.8% report a monthly income of less than 1000 SR. Lastly, lifestyle habits show a low prevalence of smoking and other habits, with 82.2% of participants reporting no such behaviors, underscoring a health-conscious demographic.

Table (1): Sociodemographic characteristics of participants (n=984)

Parameter		***No.***	***Percent (%)***
Age (Mean: 36.4, STD:12.5)	less than 25 years	217	22.1
	25 to 35	294	29.9
	36 to 40	125	12.7
	41 to 50	207	21.0
	More than 50	141	14.3
Gender	Female	565	57.4
	Male	419	42.6
Residential region	Northern region	219	22.3
	Southern region	474	48.2
	Central region	111	11.3
	Eastern region	48	4.9
	Western region	132	13.4
Educational level	Primary school	8	.8
	Intermediate school	16	1.6
	Hight school	191	19.4
	Diploma	125	12.7
	Bachelor's degree	557	56.6
	Postgraduate	82	8.3
	None	5	.5

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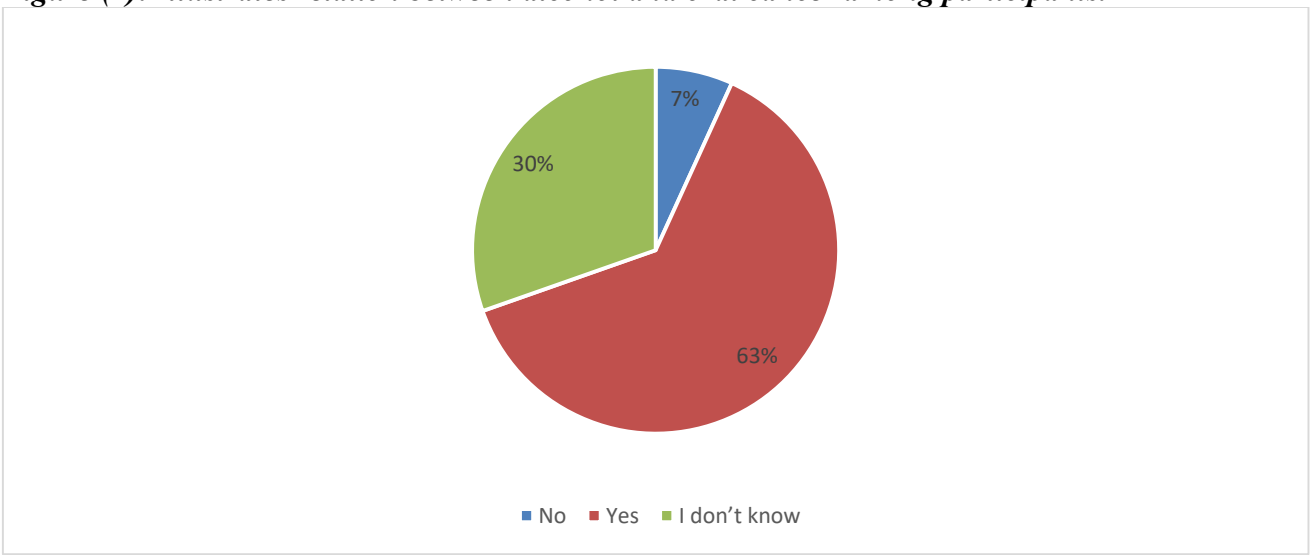
Marital status	Single	314	31.9
	Married	627	63.7
	Divorced	30	3.0
	Widowed	13	1.3
Occupational status	Student	172	17.5
	Health sector employee	95	9.7
	Non-health sector employee	313	31.8
	Self-employed	38	3.9
	Unemployed	269	27.3
	Retired	97	9.9
Monthly income	Less than 1000 SR	283	28.8
	1000-5000	210	21.3
	5001-10000	167	17.0
	10001-15000	164	16.7
	More than 15000	160	16.3
Habits	Smoking	69	7.0
	vaping	32	3.3
	Shesha	44	4.5
	Paan	28	2.8
	Khat	2	.2
	No Habit	809	82.2

As shown in figure 1, The data presented reveals a concerning perspective on the relationship between alcohol consumption and the prevalence of oral cancer. Out of a total of 984 respondents, an overwhelming majority of 618 individuals, constituting approximately 62.8%, affirmatively associate alcohol-drinking habits with the onset of oral cancer. In contrast, the number of individuals who reject this correlation is substantially lower, with only 67 respondents, representing about 6.8%. Notably, a significant portion, numbering 299 participants or roughly 30.4%, remains uncertain about this association, indicating a gap in awareness or understanding of the potential risks.

Figure (1): Illustrates relation between alcohol and oral cancer among participants.



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As illustrated in table (2), The data presented, which encompasses a sample of 984 participants, offers insightful revelations concerning the levels of knowledge and awareness related to oral cancer causes and complications. Notably, awareness of oral cancer is relatively balanced, with 53.5% of participants acknowledging their awareness. However, misconceptions persist, as evidenced by a significant proportion—approximately 30.4%—uncertain about the links between alcohol consumption and oral cancer, alongside a staggering 81.3% recognizing smoking and chewing-related habits as contributing factors. Alarmingly, just 47.4% believe oral cancer is treatable, spotlighting an urgent need for public health education. Furthermore, while 57.6% are aware that untreated oral cancer can lead to death, over half lack adequate information regarding preventive measures. Intriguingly, 77.3% of respondents expressed a desire for more information, revealing a clear gap between existing knowledge and a demand for education.

Table (2): Parameters related to knowledge and awareness levels regarding oral cancer causes and complications (n=984).

Parameter		***No.***	***Percent (%)***
Are you aware of Oral cancer?	No	458	46.5
	Yes	526	53.5
Do you think oral cancer occurs due to alcohol-drinking habits?	No	67	6.8
	Yes	618	62.8
	I don't know	299	30.4
Do you think oral cancer occurs due to smoking, paan, guthka, or paan masala chewing habit?	No	32	3.3
	Yes	800	81.3
	I don't know	152	15.4
Do you think oral cancer is an infectious disease?	No	569	57.8
	Yes	131	13.3
	I don't know	284	28.9
Do you think oral cancer is a disease of old age?	No	385	39.1
	Yes	266	27.0
	I don't know	333	33.8
Do you think red or white patches in the oral cavity are the initial signs of oral cancer?	No	188	19.1
	Yes	294	29.9
	I don't know	502	51.0
Is oral cancer treatable?	No	39	4.0
	Yes	466	47.4
	I don't know	479	48.7
Do you have adequate information regarding the prevention of oral cancer?	No	548	55.7
	Yes	210	21.3
	I don't know	226	23.0
Do you know the treatment cost of oral cancer?	No	593	60.3
	Yes	70	7.1
	I don't know	321	32.6
Do you know if not treated on time oral cancer may lead to death?	No	139	14.1
	Yes	567	57.6
	I don't know	278	28.3

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Oral cancer can metastasize?	No	45	4.6
	Yes	583	59.2
	I don't know	356	36.2
Causes of oral cancer Continuous cheeks and lips biting?	No	301	30.6
	Yes	130	13.2
	I don't know	553	56.2
Causes of Oral cancer Sun exposure?	No	390	39.6
	Yes	154	15.7
	I don't know	440	44.7
Do you want information and education regarding oral cancer?	No	223	22.7
	Yes	761	77.3

The data in figure (2) regarding the perceived causes of oral cancer in relation to sun exposure reveals insightful trends among respondents. Out of a total of 984 participants, a significant majority, 440 individuals, representing approximately 44.7%, expressed uncertainty about sun exposure as a contributing factor to oral cancer, indicating a notable lack of awareness or knowledge in this area. Conversely, 390 respondents, or about 39.6%, firmly stated that they do not believe sun exposure is a cause of oral cancer. In contrast, only 154 individuals, equating to around 15.6%, acknowledged sun exposure as a potential risk factor.

Figure (2): Illustrates the relation between sun exposure and oral cancer among participants.

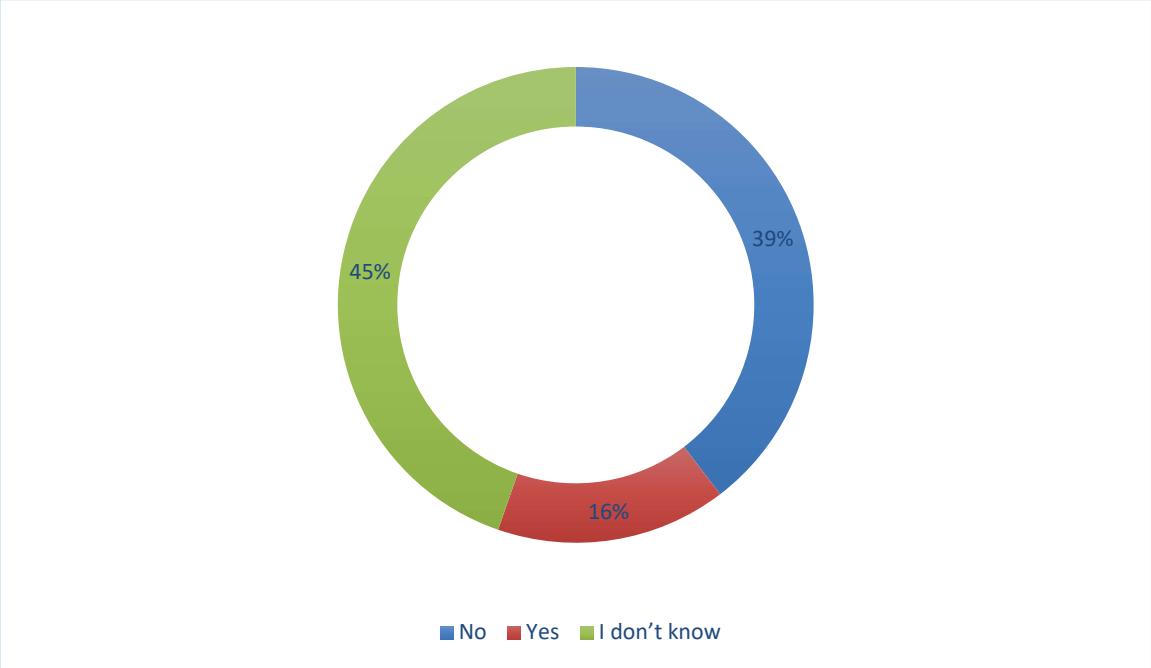

Table (3) reveals concerning trends in knowledge and awareness regarding the causes and complications associated with oral cancer among the surveyed population. Notably, a mere 10.8% of participants demonstrated a high level of knowledge, while 16.8% exhibited a moderate understanding, finishing with an overwhelming 72.5% classified as possessing low knowledge.

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Table (3): Shows knowledge and awareness regarding oral cancer causes and complications score results.

	Frequency	**Percent**
High knowledge level	106	10.8
Moderate knowledge	165	16.8
Low knowledge level	713	72.5
Total	984	100.0

Table (4) shows that knowledge level regarding oral cancer causes and complications has statistically significant relation to age (P value=0.0001), residential region (P value=0.0001), educational level (P value=0.0001), marital status (P value=0.0001), occupation (P value=0.0001), and monthly income (P value=0.035). It also shows statistically insignificant relation to gender, and habits.

Table (4): Relation between knowledge level about oral cancer causes and complications.

Parameters		***Knowledge level***		***Total (N=984)***	***P value****
		High or moderate knowledge	**Low knowledge level**		
Gender	Female	158	407	565	0.730
		58.3%	57.1%	57.4%	
	Male	113	306	419	
		41.7%	42.9%	42.6%	
Age	less than 25 years	87	130	217	0.0001
		32.1%	18.2%	22.1%	
	25 to 35	78	216	294	
		28.8%	30.3%	29.9%	
	36 to 40	20	105	125	
		7.4%	14.7%	12.7%	
	41 to 50	58	149	207	
		21.4%	20.9%	21.0%	
	More than 50	28	113	141	
		10.3%	15.8%	14.3%	
Residential region	Northern region	36	183	219	0.0001
		13.3%	25.7%	22.3%	
	Southern region	155	319	474	
		57.2%	44.7%	48.2%	
	Central region	30	81	111	
		11.1%	11.4%	11.3%	
	Eastern region	10	38	48	
		3.7%	5.3%	4.9%	
	Western region	40	92	132	

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		14.8%	12.9%	13.4%	
Educational level	Primary school	3	5	8	0.0001
		1.1%	0.7%	0.8%	
	Intermediate school	2	14	16	
		0.7%	2.0%	1.6%	
	Hight school	35	156	191	
		12.9%	21.9%	19.4%	
	Diploma	22	103	125	
		8.1%	14.4%	12.7%	
	Bachelor's degree	178	379	557	
		65.7%	53.2%	56.6%	
	Postgraduate	31	51	82	
		11.4%	7.2%	8.3%	
	None	0	5	5	
		0.0%	0.7%	0.5%	
Marital status	Single	121	193	314	0.0001
		44.6%	27.1%	31.9%	
	Married	142	485	627	
		52.4%	68.0%	63.7%	
	Divorced	5	25	30	
		1.8%	3.5%	3.0%	
	Widowed	3	10	13	
		1.1%	1.4%	1.3%	
Occupation	Student	81	91	172	0.0001
		29.9%	12.8%	17.5%	
	Health sector employee	39	56	95	
		14.4%	7.9%	9.7%	
	Non-health sector employee	69	244	313	
		25.5%	34.2%	31.8%	
	Self-employed	15	23	38	
		5.5%	3.2%	3.9%	
	Unemployed	46	223	269	
		17.0%	31.3%	27.3%	
	Retired	21	76	97	
		7.7%	10.7%	9.9%	
Monthly income	Less than 1000 SR	65	218	283	0.035
		24.0%	30.6%	28.8%	
	1000-5000	71	139	210	
		26.2%	19.5%	21.3%	
	5001-10000	44	123	167	
		16.2%	17.3%	17.0%	
	10001-15000	39	125	164	
		14.4%	17.5%	16.7%	
	More than 15000	52	108	160	

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		19.2%	15.1%	16.3%	
Habits	Smoking	18	51	69	0.914
		6.6%	7.2%	7.0%	
	Vaping	10	22	32	
		3.7%	3.1%	3.3%	
	Shesha	11	33	44	
		4.1%	4.6%	4.5%	
	Paan	9	19	28	
		3.3%	2.7%	2.8%	
	Khat	0	2	2	
		0.0%	0.3%	0.2%	
	No Habit	223	586	809	
		82.3%	82.2%	82.2%	

P value was considered significant if ≤ 0.05.

Discussion:

Oral cancer is a prevalent malignant tumor within the category of head and neck cancers. In 2018, it was estimated that there were approximately 355,000 new cases and 177,000 deaths attributed to cancer globally [15]. The issue of oral cancer is increasingly recognized as a serious global health concern. Oral Squamous Cell Carcinoma (OSCC) accounts for roughly ninety percent of all oral cancers. In recent years, there has been a notable rise in the incidence of OSCC in Saudi Arabia, where it is estimated to be the third most prevalent malignancy following lymphoma and leukemia. The age at which OSCC typically manifests and the affected sites can differ across various regions. Generally, OSCC is diagnosed in individuals aged 40 years and older. In South and Southeast Asia, the buccal (cheek) mucosa is identified as the most frequent site for OSCC, while in most other regions, the tongue is reported as the primary location [16]. Key risk factors contributing to the development of OSCC include tobacco use (both smoking and chewing), betel quid chewing with or without tobacco, and alcohol consumption. The oral cavity is readily accessible for examination, and the presence of abnormalities should facilitate easy diagnosis since such conditions can impact eating, chewing, pronunciation, and speech. Nevertheless, more than half of the cases are diagnosed at a clinically advanced stage of oral cancer [17]. Several factors contribute to the low rate of early diagnosis and the prevalence of advanced-stage oral cancers at presentation, including insufficient public awareness regarding oral health, lack of knowledge about early symptoms and potentially malignant oral lesions, as well as unhealthy lifestyle choices. Therefore, enhancing public awareness concerning oral cancer, its associated risk factors, and early warning signs is crucial in reducing exposure to these risk factors and encouraging individuals to seek medical attention upon noticing potential malignant or early-stage lesions [18]. Thus, we aimed in this study to assess knowledge and awareness level about oral cancer, its causes and complications among general population in the kingdom of Saudi Arabia.

The findings of our study align with previous literature on the knowledge and awareness surrounding oral cancer among various populations. A study by Sadeq Ali Al-Maweri et al. (2015) [19] reported a slight variation in awareness, with 53.6% of participants recognizing oral cancer, as opposed to our finding of 53.5%. This consistency underscores a pivotal yet troubling trend of moderate awareness among the public. The recognition of smoking as a significant risk factor was similarly high in both studies, with Al-Maweri et al. noting 81.7% recognized smoking, closely mirroring our findings of

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81.3%. Noteworthy discrepancies emerged regarding alcohol consumption, where Al-Maweri et al. found 56.3% acknowledged its risk, contrasting with our study where 30.4% remained uncertain about the link between alcohol consumption and oral cancer, suggesting a potential area for targeted education. Further supporting the need for increased public awareness, Yuniardini S Wimardhani et al. [20] reported that only 30% of their participants had been counseled about their tobacco and alcohol habits by dental professionals, indicating a gap in preventive communication that resonates with our finding that over half of participants lacked knowledge about preventive measures for oral cancer. Notably, they also noted similar socio-demographic influences on awareness levels, including education and occupation, reflecting our findings that age, region, educational level, marital status, and occupation impacted knowledge significantly. In contrast, P Varela-Centelles et al. [21] highlighted the role of non-healing ulcers as a chief warning sign for oral cancer, drawing attention to early detection, which complements the sentiment expressed by Farhat Kazmi et al. [22] that significant proportions of individuals believe oral cancer is preventable (71.2% to 85%) and that early detection markedly improves survival rates (86.7% to 100%). This shared understanding accentuates a fundamental gap in knowledge about early signs and the understanding of oral cancer's treatability observed in our findings, where only 47.4% considered oral cancer treatable. In terms of overall public knowledge regarding oral cancer, the exploration by Xing-Hong Zhou et al. [23] and R West et al. [24] supports our assertion that awareness remains suboptimal, with Zhou reporting an awareness rate of 52.9% and West noting that, while a majority recognized smoking and chewing tobacco as risk factors (84.7% and 80.1%, respectively), only 19.4% linked alcohol use with the disease. On the other hand, a study conducted by Sadeq Ali Al-Maweri et.al, (2017) [25] revealed that only 62.4 % were aware of oral cancer. Some 68.2 and 56.5 %, respectively, were able to correctly identify tobacco and alcohol as risk factors. More than two thirds of subjects had no knowledge about any signs of oral cancer. Participants with lower than university education were significantly less aware, and had much less knowledge, of the signs and risk factors of oral cancer.

Conclusion:

In conclusion, this study highlights a significant gap in knowledge and awareness regarding oral cancer among the general population of Saudi Arabia, despite a moderate recognition of the disease's existence. While a majority of participants identified smoking and chewing habits as risk factors, misconceptions regarding the relationship between alcohol consumption and oral cancer persisted. Alarmingly, only a small percentage demonstrated a high level of knowledge or awareness of preventative measures and the treatability of the disease. The findings underscore an urgent need for targeted public health education to enhance understanding of oral cancer, its risks, and the importance of early detection, which can ultimately lead to better outcomes for those at risk. Continued efforts in educational outreach are essential to foster awareness and empower individuals to take proactive steps in safeguarding their oral health.

Acknowledgement:

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Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying

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that participation is voluntary. Data collected were securely saved and used for research purposes only.

Funding

There was no external funding for this study.

Conflict of interests

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability

All data associated with this study are present in the paper.

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