Original Research Article

Oral cancer knowledge, attitudes and practices among dental and medical students in Saudi Arabia

Abstract

Background: Oral cancer had important public health concern, ranking as the world's 16th most common cancer. Despite being highly preventable, oral cancer is associated with multiple risk factors and a high mortality rate and contributes significantly to the global cancer burden. The 5-year survival rate for oral cancer remains low (50%), and it has not improved in recent decades. The prognosis is relatively good when caught in the early stages, but it deteriorates dramatically in the advanced stages.

Objective: The aim of this study was to investigate and assess the knowledge, attitude and practices of dental and medical students in Saudi Arabia towards oral cancer.

Methods: A pre-designed questionnaire had been distributed to 1033 dental and medical student in Saudi Arabia, and data were analysed using IBM SPSS Statistics 26.0. The participants' confidentiality was maintained.

Results: This study included 1033 participants (males = 558 [54.0%] and females = 475 [46.0%]). Medical students represented 734 (71.1%) of the participants and dental students represented 299 (28.9%) of the participants. Overall, 686 (66.4%) participants thought they had good aware about oral cancer, and 771 (74.6%) were concerned about its prevention. Both dental and medical students thought that oral cancer is more common in people over the age of 60 years, with no difference between medical and dental students (degrees of freedom [df] = 1, $p = 0.793$). Regarding risk factors, both smoking tobacco and alcohol consumption were mentioned by 66.1% of the sample, with no difference between medical and dental students (df = 1, $p = 1.000$). In addition, 29.9% of students identified the buccal mucosa as the most common site of oral cancer, with no difference between medical and dental students (df = 1, $p = 0.691$). No significant differences in the mean total score (number of correct answers) between dental students and also medical students at each study level except for the fifth-year students. At this level, the mean score was higher in dental students (6.05 ± 1.88) than medical students (5.13 ± 2.01) ($p < 0.01$).

Conclusions: Medical and dental students had similar knowledge, attitude and practices towards oral cancer. Furthermore, fifth-year dental students from the northern region of Saudi Arabia had the highest mean score on the questionnaire.

Keywords: oral cancer; knowledge, attitude, and practice; Saudi Arabia.

Introduction

Oral cancer is defined as any cancerous tissue within the oral cavity, which includes the front two thirds of the tongue, the mouth floor, the buccal mucosa, the gingiva, the lips, the retromolar trigone and the hard palate.

Oropharyngeal cancers affect the base of the tongue, the soft palate, the tonsils and the posterior part of the pharyngeal wall [1]. The most common sites for oral cancer are the tongue and the floor of the mouth [2].

Oral cancer ranks as the sixteenth most common cancer worldwide and the fifteenth leading cause of death worldwide [3]. Estimates indicate that by 2030, there will be approximately 600,000 new cases [2]. The incidence differs between the sexes: 5.8 per 100,000 people for men and 2.3 per 100,000 for women [4]. Moreover, men from 40 to 70 years old have the highest incidence [2]. It was reported that squamous cell carcinoma (SSC) [1], accounting for > 90% of all cases. Other types of oral cancer are uncommon, including adenocarcinoma, Kaposi sarcoma and melanoma are most common types [5].

There are many premalignant lesions associated with SCC, such as erythroplakia, leukoplakia, oral lichen planus and oral submucous fibrosis [5]. Erythroplasia, which is uncommon and challenging to identify clinically, appears as bright red, velvety plaques. The primary reasons why erythroplasia occur are thought to be comparable to those of SCC, and most cases involve older adults [6]. Leukoplakia appears as thick, white spots on the tongue, the bottom of the mouth, inside the cheeks and on the gums. These areas are difficult to remove by using a scraper [6]. Oral submucous fibrosis is a chronic, debilitating, potentially cancerous condition characterised by submucosal fibrosis and epithelial dystrophy [7].

Risk factors for oral cancer include heavy smoking, use of tobacco, alcohol drink , sun exposure, poor oral hygiene [2], a compromised immune system, a diet deficient in nutrients, genetics, radiation [8] and human papilloma virus (HPV) types 16 and 18 [1]. The incidence of oral cancer cases associated with HPV (mainly HPV type 16) has increased in recent decades, especially among younger patients [9], and in North America and Europe it is considered high risk, especially among young patients [3]. Imbalance between microorganisms can cause oral and systemic disorders as well as chronic inflammation, which typically occurs due to bacteria and contributes to the growth of cancer. The mouth microbiota plays very important role in the human microbiome and human health [10].

The clinical picture of oral cancer varies among patients; however, most patients come to seek medical attention related to the primary tumour and fewer patients seek medical attention related to the picture of metastases [11]. The most common clinical picture is an ulcerated lesion in the oral cavity. Furthermore, as stated by WHO, any lesions inside the oral cavity that do not subside in 2–3 weeks should raise suspicion and be clinically examined. Other clinical pictures may be mobile teeth, pain and bleeding or numbness in the mouth or face, or a dental prosthesis that does not fit properly [11].

Oral cancer is usually diagnosed in late stages (stage III and IV) as most patients are asymptomatic in early stages [9] or experience signs that mimic benign conditions [12]. In advanced stages, oral cancer is diagnosed in up to 50% of the cases, resulting in a poor prognosis and a 5-year survival rate of 40%. However, if the diagnosis is made at early stages, the survival rate could improve up to 80% [9].

Oral cancer diagnosis begins with a physical examination of the oral cavity, which can detect up to 99% of the cases [9]. This puts dental professionals in good position to opportunistically inspect the oral cavity and, to a lesser extent, the oropharynx during routine patient examinations and interactions. Additionally, having dental tools including mouth mirrors, gauze squares and a focused, adjustable light source – as well as having training in both the normal and pathological appearance of oral sub-sites – improves their capacity to assess the clinical status of oral tissues [13]. A visual examination of the mouth can quickly identify precancerous abnormalities. The most prevalent oral precancerous lesions are leukoplakia (white changes), erythroplakia (red changes) and erythroleukoplakia (a combination of white and red changes). These lesions are described as clinical white/red patches that cannot be stripped away and that clinically cannot be characterised as a sign of a specific disease [14]. It is important to realise that non-dysplastic lesions may also transform into malignancies, while not all dysplastic lesions may progress to cancer [9].

Patients with early-stage oral cancer have a higher chance of survival and better quality of life. However, early-stage cancers are frequently asymptomatic and mimic benign conditions, reducing the likelihood that a patients would seek medical attention. As a result, screening offers a chance for early detection [12]. Computed tomography (CT), magnetic resonance imaging (MRI) and ultrasound are three imaging methods that have been suggested to help with the diagnosis and treatment of SCC. [15]

To evaluate a diagnosis, treatment, and prognosis, accurate initial tumour staging is required. Accurate detection of the original tumour (T), cervical lymph node involvement (N), and distant metastases (M) are part of this staging. One of the most significant adverse

prognostic indicators is the occurrence of cervical lymph node metastases [16]. Surgical biopsy for histopathology is the gold standard for oral cancer diagnosis [9]. To aid in an accurate, definitive diagnosis, the biopsy process includes administering local anaesthesia, ensuring the appropriate width and depth of the excised tissue, proper handling of the tissue and submission without contamination [17]

Treatment options for oral cancer include single-modality surgery, radiation or different combinations of these modalities with or without systemic agents. The choice of treatment is based on the disease stage, disease control factors, expected functional and cosmetic outcomes, and expertise. Surgery is the standard

method of oral cavity cancer treatment [18]. Additionally, using chemotherapy or radiotherapy, particularly when combined, might raise the chances of side effects including oropharyngeal mucositis, odynophagia, taste changes, xerostomia, nausea, vomiting and fatigue; all of these can cause dehydration noand considerable weight loss [19]. The chief goal of treatment is to completely eradicate the cancer by managing the primary lesion and local metastases while restoring form and function [20].

The effect of screening for oral cancer has not been proved and remains controversial [4]. However, the prevention of oral cancer could be significant for reducing the mortality rate. Primary prevention includes educating individuals about behavioural risk factors and limiting them. Secondary prevention includes HPV vaccination, but the beneficial effect is not yet known [9].

Given that oral cancer cases are increasing and the mortality rate is due to lack of knowledge, we find it essential for health care providers to improve their knowledge and awareness to reduce morbidity mortality. Therefore, in thi study we examined the knowledge, attitude and practices of undergraduate medical and dental students in Saudi Arabia towards oral cancer.

Statistical analysis

IBM SPSS Statistics 26.0 was used to analyse the data. The data were checked for normality using the X test and showed a normal distribution. The chi-square (χ^2) test was used to compared between the medical and dental students in terms of the questions towards oral cancer. An independent samples t-test was used to compared the number of correct answers between medical and dental students. The significance level was set at $p < 0.05$.

Materials and Methods

-Study Design A Cross-sectional study was conducted from May 2022 till July 2022

-Study population A survey of undergraduate medical and dental student in Saudi Arabia

-Sample collection We collected a sample size of 500, with a confidence level of 95% and a margin of error of 5%

-Sample collection and processing Pre-validated Online questionnaire.

-Statistical Analysis The statistical analysis was processed using the Statistical Package for Social Sciences (SPSS) software version 25 (SPSS Inc., Chicago, IL, USA).

Ethical Consent

• An invitation to participation in this study was added in the questionnaire.

• Objectives of the research were clarified to participants.

• participants were notified that their comments will be confidential and will be used for research purposes only.

• Ethical approval was obtained from the ethical committee of university of Hail,

• No.of research H-2022-017

Results

Table 1 shows the demographics of the study participants. There were 1033 participants, with 558 men (54.0%) and 475 women (46.0%). The medical college had 734 students (71.1%) and the dental college had 299 students (28.9%). Only 67 (6.5%) of the participants were from Saudi Arabia's northern region; the majority of the students (331, 32.0%) were from the country's eastern region. Out of 1033 participants, 686 (66.4%) believed they were aware of oral cancer, and 771 (74.6%) were concerned about oral cancer prevention. The majority of participants (407, 39.4%) preferred continuous education lectures to gain knowledge, followed by information packages (247, 23.9%), and webinars were the least preferred (109, 10.6%).

Table 1 Demographics of the study participants

Variable	Category	Frequency	(%)
Gender	Male	558	54.0%
	Female	475	46.0%
College	Medical	734	71.1%
	Dental	299	28.9%
Level	Fourth-year students	313	30.3%
	Fifth-year students	223	21.6%

	Sixth-year students	246	23.8%
	Interns	251	24.3%
Region	Eastern	331	32.0%
	Western	273	26.4%
	Central	262	25.4%
	Southern	100	9.7%
	Northern	67	6.5%
Are you aware of oral cancer?	No	262	25.4%
	Yes	771	74.6%
Are you concern about preventive management of oral cancer?	No	262	25.4%
	Yes	771	74.6%
What is your preferred way of gaining knowledge?	Webinars	109	10.6%
	Continuous education lectures	407	39.4%
	Information package	247	39.4%
	Seminars	146	14.1%
	Participation in organised research	124	12.0%

Knowledge of oral cancer among medical and dental students

Q1–Q9 of the questionnaire asked the participants about their knowledge of oral cancer. The chi-square test was used to determine differences between medical and dental students in terms of knowledge of oral cancer (Table 2). There were no significant differences between medical and dental students for any question. The most common answers provided by the participants to each question are discussed below. For Q1, 'Which structure is mostly examined during the diagnosis of the oral cancer?', 31.3% of students answered the buccal mucosa

(medical 32.02%, dental 29.43%, $\chi^2 = 0.148$, degrees of freedom [df] = 1, $p = 0.701$). For Q2, 'Which age group is diagnosed more frequently with oral cancer?', most of the students selected 'Older than 60 years' (medical 27.52%, dental 30.10%, $\chi^2 = 0.069$, df =1, $p = 0.793$). For Q3, 'What do you think the aetiological factors for oral cancer?', the majority of students in both groups selected 'both' referring to smoking tobacco and alcohol consumption (medical 66.35%, dental 65.55%, $\chi^2 = 0.000$, df = 1, $p = 1.000$). For Q4 'Where do you think is the common site for oral cancer?', most of the medical students selected buccal mucosa (30.39%)s followed by tongue (27.11%). On the other hand, the same percentage of dental students chose the buccal mucosa (27.42%) and tongue (27.42%). However, the differences between medical and dental students were not significant for tongue ($\chi^2 = 0.000$, df =1, $p = 1.000$) or buccal mucosa ($\chi^2 = 0.158$, df =1, $p = 0.691$). For Q5, 'What do you think is the most common presentation of oral cancer?', most of the medical and dental students thought that an abnormal mass in the mouth is the most common presentation (medical 28.07%, dental 34.78%, $\chi^2 = 0.778$, $p = 0.378$). For Q6, 'Do you think the oral malignancy patient is asymptomatic in the early stage?', both medical (46.05%) and dental (53.85%) students thought that oral malignancy is asymptomatic in the early stage ($\chi^2 = 0.640$, $p = 0.424$). For Q7, 'Do you think the oral cancer patient can be diagnosed in the advanced stage?', 76.3% of medical students chose 'Yes' and 76.59% of dental students chose 'Yes' ($\chi^2 = 0.007$, df = 1, $p = 0.936$). For Q8, 'Are erythroplakia and leukoplakia the most common lesions associated with oral cancer?', 77.5% of students selected 'Yes' (medical 76.84%, dental 79.26%, $\chi^2 = 0.058$, $p = 0.810$). Finally, for Q9, 'Does the early detection of oral cancer improve survival?', 60.95% of the students selected 'Yes' (medical 61.44%, dental 59.53%, $\chi^2 = 0.019$, $p = 0.891$).

Table 2 differences between medical and dental students with different questions on knowledge of oral cancer

Variable	**College (N, %)**					
Question	**Medical (734, 71.1%)**	**Dental (299, 28.9%)**	**Total (1033, 100%)**	**df**	**χ^2**	***P***
Q1: Which structure is mostly examined during the diagnosis of oral cancer?						
Tongue	220 (29.97%)	90 (30.10%)	310 (30.0%)	1	0.000	1.000
Gingiva	72 (9.81%)	20 (6.69%)	92 (8.9%)	1	0.529	0.467
Buccal mucosa	235 (32.02%)	88 (29.43%)	323 (31.3%)	1	0.148	0.701
Palate	56 (7.63%)	26 (3.54%)	82 (7.9%)	1	1.333	0.248
Floor of the mouth	151 (20.57%)	75 (25.08%)	226 (21.9%)	1	0.348	0.555

Q2: Which age group is diagnosed more frequently?						
30–40 years	145 (19.75%)	57 (19.06%)	202 (19.6%)	1	0.026	0.873
41–50 years	187 (25.78%)	74 (24.75%)	261 (25.3%)	1	0.020	0.889
51–60 years	200 (27.25%)	78 (26.09%)	278 (26.9%)	1	0.019	0.891
> 60 years	202 (27.52%)	90 (30.10%)	292 (28.3%)	1	0.069	0.793
Q3: What do you think the aetiological factors for oral cancer?						
Smoking tobacco	175 (23.84%)	66 (22.07%)	241 (23.3%)	1	0.087	0.768
Alcohol consumption	72 (9.81%)	37 (12.37%)	109 (10.6%)	1	0.182	0.670
Both	487 (66.35%)	196 (65.55%)	683 (66.1%)	1	0.000	1.000
Q4: Where do you think is the common site for oral cancer?						
Tongue	199 (27.11%)	82 (27.42%)	281 (27.2%)	1	0.000	1.000
Gingiva	91 (12.40%)	34 (11.37%)	125 (12.1%)	1	0.043	0.835
Buccal mucosa	227 (30.39%)	82 (27.42%)	309 (29.9%)	1	0.158	0.691
Palate	77 (10.49%)	39 (13.04%)	116 (11.2%)	1	0.391	0.532
Floor of the Mouth	140 (19.07%)	62 (20.74%)	202 (19.6%)	1	0.100	0.752
Q5: What do you think is the most common presentation of oral cancer?						
White/red patch in mouth	175 (23.84%)	87 (29.10%)	262 (25.4%)	1	0.472	0.492
Mouth sore that does not heal	161 (21.93%)	59 (19.73%)	220 (21.3%)	1	0.095	0.758
Difficulty in chewing and swallowing	111 (15.12%)	22 (7.36%)	133 (12.9%)	1	2.909	0.088
Slow change of voice quality	81 (11.04%)	27 (9.03%)	108 (10.5%)	1	0.200	0.655
Abnormal mass in mouth	206 (28.07%)	104 (34.78%)	310 (30.0%)	1	0.778	0.378
Q6: Do you think the oral malignancy patient is asymptomatic in the early stage?						
No	114 (15.53%)	55 (18.39%)	169 (16.4%)	1	0.118	0.732
Yes	338 (46.05%)	161 (53.85%)	499 (48.3%)	1	0.640	0.424
Maybe	282 (38.42%)	83 (27.76%)	365 (35.3%)	1	1.515	0.218

Q7: Do you think the oral cancer patient can be diagnosed in the advanced stage?						
No	174 (23.71%)	70 (23.41%)	224 (23.6%)	1	0.021	0.884
Yes	560 (76.29%)	229 (76.59%)	789 (76.4%)	1	0.007	0.936
Q8: Are erythroplakia and leukoplakia the most common lesions associated with oral cancer?						
No	170 (23.16%)	62 (20.74%)	232 (22.5%)	1	0.091	0.763
Yes	564 (76.84%)	237 (79.26%)	801 (77.5%)	1	0.058	0.810
Q9: Does the early detection of oral cancer improve survival?						
No	84 (11.44%)	43 (14.38%)	127 (12.3%)	1	0.360	0.549
Yes	451 (61.44%)	178 (59.53%)	629 (60.95)	1	0.008	0.928
Maybe	199 (27.11%)	78 (26.09%)	277 (26.8%)	1	0.019	0.891

Attitude and practices of medical and dental students towards oral cancer

Q10–Q13 of the questionnaire asked about the participants' attitude and practices towards oral cancer. The chi-square test was used to compare between medical and dental students (Table 3). There were no significant differences between medical and dental students. For Q10, medical and dental students mostly chose that early detection of oral cancer can be done by 'biopsy' (medical 36.65%, dental 35.45%, $\chi^2 = 0.056$, df =1, $p = 0.814$). For Q11, 'How can we prevent oral cancer?', medical and dental students chose 'All of the above' most often (medical 69.07%, dental 67.89%, $\chi^2 = 0.007$, df =1, $p = 0.932$). For Q12, 'Which specialist would you refer a patient suspecting oral malignancy?', an oncology specialist was selected by most dental and medical students to refer a patient with suspected malignancy (medical 41.28%, dental 38.80%, $\chi^2 = 0.050$, df =1, $p = 0.823$). For Q13, 'Are you concerned about the prevention and management of oral cancer?', 75.07% of medical students and 73.58% of dental students selected 'Yes' ($\chi^2 = 0.007$, df =1, $p = 0.935$).

Table 3 Attitude and practices towards oral cancer among medical and dental students

Variable	**College (N, %)**					
Question	**Medical (734, 71.1%)**	**Dental (299, 28.9%)**	**Total (1033, 100%)**	**df**	**χ^2**	***P***

Q10: Early detection of oral cancer can be done by?						
Clinical exam	195 (26.57%)	82 (27.42%)	227 (26.8%)	1	0.000	1.000
Regular check-up	186 (25.34%)	83 (27.76%)	269 (26.0%)	1	0.170	0.680
Biopsy	269 (36.65%)	106 (35.45%)	375 (36.3%)	1	0.056	0.814
Patient education	84 (11.44%)	28 (9.36%)	112 (10.8%)	1	0.200	0.655
Q11: How can we prevent oral cancer?						
Quit tobacco use	96 (13.08%)	36 (12.04%)	132 (12.8%)	1	0.040	0.841
Good oral hygiene	66 (8.99%)	26 (8.70%)	92 (8.9%)	1	0.000	1.000
Regular check-up	65 (8.86%)	34 (11.37%)	99 (9.6%)	1	0.200	0.655
All of the above	507 (69.07%)	203 (67.89%)	710 (68.7%)	1	0.007	0.932
Q12: Which specialist would you refer a patient suspecting oral malignancy?						
Plastic surgery specialist	80 (10.90%)	37 (12.37%)	117 (11.3%)	1	0.043	0.835
Oral and maxillofacial surgeon	225 (30.65%)	98 (32.78%)	323 (31.3%)	1	0.063	0.803
Oncology specialist	303 (41.28%)	116 (38.80%)	419 (40.6%)	1	0.050	0.823
Otorhinolaryngology head and neck surgeon	126 (17.17%)	48 (16.05%)	174 (16.8%)	1	0.030	0.862
Q13: Are you concerned about the prevention and management of oral cancer?						
No	183 (24.93%)	79 (26.42%)	262 (25.4%)	1	0.020	0.889
Yes	551 (75.07%)	220 (73.58%)	771 (74.6%)	1	0.007	0.935

Finally, an independent samples t-test was preformed to find the differences between medical students and dental student regarding the total score on the questionnaire (the number of correct answers) (Table 4). no important significant differences in the mean correct answers between medical students and dental students at each study level except for the fifth-year students. At this level, the mean was higher in dental students (6.05 ± 1.88) than medical students (5.13 ± 2.01) ($p < 0.01$).

Table 4 Differences in the total score of medical and dental students for each study level

Study level	Medical students		Dental students		Mean difference	Mean difference	*p*
	Mean	(SD)	Mean	(SD)		(95% CI)	
Fourth-year students	5.38	1.80	5.37	2.45	0.02	(-0.49, 0.52)	0.95
Fifth-year students	5.13	2.01	6.05	1.88	-0.92	(-1.46, -0.39)	0.001*
Sixth-year students	5.66	1.93	5.30	1.93	0.36	(-0.20, 0.93)	0.21
Interns	5.68	1.77	5.38	1.78	0.30	(-0.18, 0.78)	0.22

Normality assumption is fulfilled based on CLT

Independent samples t-Test was applied

*$p < 0.05$

CI, confidence interval; SD, standard deviation

The differences in the total scores of medical and dental student were also compared based on the region where the students were attending school (Table 5). There were significant differences between medical and dental students in the eastern region ($p < 0.05$) and the southern region ($p < 0.05$). The dental students of the eastern region had a higher mean score compared with the medical students. On the other hand, medical students in the southern region had a higher mean score compared with dental students. The other regions did not show any significant differences between medical and dental students.

Table 5 shows that dental students in the southern region had the lowest mean score (4 ± 1.87), while dental students in the northern region had the highest mean score (6.09 ± 1.87). According to the results of the questionnaire, dental students from the northern region have the best knowledge of oral cancer among the student participants.

Table 5 Differences in the total score of medical and dental students for each region of Saudi Arabia

Study level	Medical Students		Dental Students		Mean Difference	Mean difference	*p*
	Mean	(SD)	Mean	(SD)		(95% CI)	
Eastern region	5.50	1.90	5.99	2.03	-0.49	(-0.95, -0.03)	0.04*
Western region	5.54	1.89	5.12	2.24	0.42	(-0.15, 0.99)	0.14
Central region	5.31	1.83	5.29	1.70	0.02	(-0.45, 0.48)	0.94

Northern region	5.57	1.77	6.09	2.03	-0.52	(-1.28, 0.24)	0.18
Southern region	5.55	2.13	4.00	1.87	1.55	(0.46, 2.64)	0.007*

Normality assumption is fulfilled based on CLT

Independent samples t-Test was applied

*$p < 0.05$

CI, confidence interval; SD, standard deviation

According to the results, medical and dental students have the same level of knowledge, attitude, and practices regarding oral cancer. Furthermore, fifth-year dental students from the northern region demonstrated the greatest knowledge.

Discussion

The knowledge, attitude and practices of dental and medical students towards oral cancer is a very important issue because they are considered the first contact to patients who are seeking oral health care. Hence, they help to detect oral cancer early, promoting early treatment and a good prognosis [21] [22]. There are limited data regarding the knowledge, attitude and practices of medical and dental students towards oral cancer. A very recent study examined this topic in undergraduate medical and dental student at the University of Hail, Saudi Arabia [23].

In this study, there were slightly more male students than female students, and almost three quarter of the participants were medical students. While the participants came from all regions of Saudia Arabia, the majority were from the eastern region and the fewest were from the northern region. Two-thirds of the students thought that they are aware of oral cancer. In Kuwait, 65%–81.5% of dental students thought they had good knowledge of oral cancer [24]. Hence, the level of awareness of oral cancer in this study is similar to previous studies. The students' most preferred method to gain information about oral cancer was lectures (39.4%) and the least preferred was webinars (10.6%). This finding is consistent with other studies There is a need for routine continuing education

programmes for dental professionals [25]. In addition, there is a need for good training and workshops to increase the awareness and abilities of health care professionals to diagnose oral cancer [26].

Regarding knowledge of oral cancer among medical and dental students, 31.3% of students answered that the buccal mucosa is the most examined structure during oral cancer diagnosis, with no significant difference between medical and dental students. This slightly lower than in another study in which 34.9% of participants answered the buccal mucosa, followed by the floor of the mouth (25.3%), the tongue (22%), the gingiva (9.1%) and the palate (8.7%) [23].

A plurality of students selected 'Older than 60 years' as the age group diagnosed with oral cancer most frequently, with no difference between medical and dental students. In a similar study, the participants selected > 60 years most often (39.8%), followed by 51–60 years (26.1%), 41–50 years (18.3%) and 30–40 years (15.8%) [23].

In relation the aetiological factor for oral cancer, two thirds of the students selected 'both' referring to smoking tobacco and alcohol consumption, with no difference between the groups. This is lower than in another study where 81.3% of the students selected alcohol consumption and smoking, 15.4% selected smoking only and 3.3% selected alcohol consumption only. In another study, almost all participants (95.8%) identified smoking and alcohol consumption as very important risk factors for oral cancer. Thus, there was very good level of knowledge about oral cancer risk factors among practitioners [23]. The findings are consistent with earlier studies in which a majority of dentists stated tobacco use and alcohol consumption are common factors for oral cancer occurrence [27] [28]. In another study done in Kuwait, the majority of dental and medical students reported that tobacco smoking had a vital effect on the occurrence of oral cancer [29]. However, alcohol was identified less often as important risk factor for oral cancer among Japanese oral health workers [30].

In relation to the common site for oral cancer, most of the medical students selected the buccal mucosa (30.39%) followed by the tongue (27.11%). On the other hand, an equal number of dental students selected the buccal mucosa (27.42%) and the tongue (27.42%). The differences between the groups were not significant. In another study, 93.5% of dentists correctly recognised the most common site of oral cancer [28]. However, in a Brazilian study, only 55.5% of dentists knew the most frequent anatomical region for oral cancer [31].

More than two thirds (71.9%) of the dentists in Brazil reported that the tongue and floor of the mouth were common sites of oral cancer [32].

The majority of dental students (79.3%) in Spain stated that they routinely examine the oral mucosa of their patients [33].

In this present study, 30.0% of the medical students and dental students thought that an abnormal mass in the mouth is the most common presentation of the oral cancer, with no differences between the groups. In another study, 30.3% of the students selected abnormal mass in the mouth, 29% selected a mouth sore than does not heal, 22% selected white/red patch in mouth, 10.4% selected difficulty in chewing and swallowing and 8.3% selected slow change in voice quality.

More than three quarters of both medical and also dental students knew that oral cancer can be diagnosed in advanced stages. In addition, more than three quarters of the students knew that erythroplakia and leukoplakia are the most common lesions associated with oral cancer. In another study, the participants reported that erythroleukoplakia has the highest premalignant potential to develop into oral cancer [29]. However, in a study of dentists in Brazil, one third of them did not know about regional oral cancer metastases [31].

Like this study, about 54.9% of dentists in Iran replied correctly the most common symptoms of cancerous lesions [34].

In a recent systematic review study, the authors reported a relatively low frequency of oral squamous cell carcinoma screening by oral health care providers throughout the world [35].

A high percentage (68%–70%) of dentists in Sri Lanka indicated that their oral cancer/pre-cancer knowledge was current [23]. In the same study, about 81% agreed that they had sufficiently trained in the screening of the oral cancer but 70% felt they required more training.

There were no significant differences between dental and medical students in terms of their attitude and practices towards oral cancer. Most students chose biopsy as the means for early detection of oral cancer. In addition, most students selected ‘All of the above’ – quit tobacco use, good oral hygiene, and regular check-up – as the way to prevent oral cancer. Finally, most students

selected an oncology specialist as the medical professional to refer a patient with a suspected malignancy. In another study evaluating early detection of oral cancer improves survival, most participants selected biopsy (34.9%), then regular check (34%), clinical examination (23.2%) and patient education (7.9%). Regarding prevention of oral cancer, 79.3% selected all of them, followed by stop tobacco use (10.4%), good oral hygiene (5.4%) and regular check-up (5%) [23]. In another study, 37.3% of students selected an oncology specialist, 30.7% selected an oral and maxillofacial surgeon, 27.4% selected an otorhinolaryngologist and 4.6% selected a plastic surgery specialist. Overall, 67.2% of the students had enough information concerning prevention and management of oral cancer.

There were no more important differences was found in the mean total score on the questionnaire (the number of correct answers) among the medical and the dental students at each study level except what was found in the fifth-year students. At this level, the dental students had scored significantly higher than the medical students. There were important differences among the medical and the dental students in the eastern region and the southern region: dental students in the eastern region scored higher than medical students, while medical the students of the southern region had scored higher than the medical students. The other regions did not show any higher significant differences among the medical and the dental students. Dental students in the southern sector had the lowest mean total score while the dental students from the northern sector had the highest mean total score. This finding is indicating that dental students of the northern region had the best knowledge in relation to oral cancer.

Conclusion

It was found that oral cancer knowledge, attitude and practices were similar between both of medical and dental students in Saudi Arabia. But it was found that there were no important differences in the mean correct answers among the medical students and dental students, The fifth-year dental students from the northern region had the highest mean correct answers on the questionnaire. Overall, a majority of the dental and medical student in this study were good aware and knowledgeable about different types of oral cancer. There is a need to prepare training programmes related to oral cancer education mainly in relation to the prevention and early prediction .

Continuing education programs and also the workshops are recommended to increase the level of the awareness of the dentists regarded the main risk factors and management of oral cancer.

Consent and ethical approval

The research is approved by The Research Ethics Committee at university of Hail reference No.:H-2022-017. During the research activities, each participant studied was informed of the objectives of the study while ensuring the confidentiality of the data collected and obtaining consents from the study participants.

Data and materials availability

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

References

[1] L. Y. Algudaibi, S. AlMeaigel, N. AlQahtani, N. A. Shaheen, and A. Aboalela, “Oral and oropharyngeal cancer: knowledge, attitude and practices among medical and dental practitioners,” Cancer Rep., 2021, vol. 4, no. 4, pp. 1–10, doi: 10.1002/cnr2.1349.

[2] S. de Mattos Camargo Grossmann et al., “Knowledge of oral cancer by a Brazilian population,” J. Cancer Educ., 2021, vol. 36, no. 5, pp. 965–70, doi: 10.1007/s13187-020- 01722-4.

[3] F. Inchingolo et al., “Oral cancer: a historical review,” Int. J. Environ. Res. Public Health, 2020, vol. 17, no. 9, doi: 10.3390/ijerph17093168.

[4] T. Nagao and S. Warnakulasuriya, “Screening for oral cancer: future prospects, research and policy development for Asia,” Oral Oncol., 2020, vol. 105, p. 104632, doi: 10.1016/j.oraloncology.2020.104632.

[5] P. H. Montero and S. G. Patel, “Cancer of the oral cavity,” Surg. Oncol. Clin. N. Am., 2015, vol. 24, no. 3, pp. 491–508, doi: 10.1016/j.soc.2015.03.006.

[6] B. Poojar et al., “Methodology used in the study,” Asian J. Pharm. Clin. Res., 2017, vol. 7, no. 10, pp. 1–5, doi: 10.4103/jpbs.JPBS.

[7] A. Rai, T. Ahmad, S. Parveen, S. Parveen, M. I. Faizan, and S. Ali, “Expression of transforming growth factor beta in oral submucous fibrosis,” J. Oral Biol. Craniofacial Res., 2020, vol. 10, no. 2, pp. 166–70, doi: 10.1016/j.jobcr.2020.03.015.

[8] F. Lousada-Fernandez, O. Rapado-Gonzalez, J. L. Lopez-Cedrun, R. LopezLopez, L. Muinelo-Romay, and M. M. Suarez-Cunqueiro, “Liquid biopsy in oral cancer,” Int. J. Mol. Sci., 2018, vol. 19, no. 6, pp. 1–15, doi: 10.3390/ijms19061704.

[9] S. Abati, C. Bramati, S. Bondi, A. Lissoni, and M. Trimarchi, “Oral cancer and precancer: a narrative review on the relevance of early diagnosis,” Int. J. Environ. Res. Public Health, 2020, vol. 17, no. 24, pp. 1–14, doi: 10.3390/ijerph17249160.

[10] L. Zhang, Y. Liu, H. J. Zheng, and C. P. Zhang, “The oral microbiota may have influence on oral cancer,” Front. Cell. Infect. Microbiol., 2020, vol. 9, pp. 1–11, doi: 10.3389/fcimb.2019.00476.

[11] T. S. C. Wong and D. Wiesenfeld, “Oral cancer,” Aust. Dent. J., 2018, vol. 63, pp. S91–9, doi: 10.1111/adj.12594.

[12] S. Warnakulasuriya and A. R. Kerr, “Oral cancer screening: past, present, and future,” J. Dent. Res., 2021, vol. 100, no. 12, pp. 1313–20, doi: 10.1177/00220345211014795.

[13] W. J. Psoter et al., “Oral cancer examinations and lesion discovery as reported by U.S. general dentists: findings from the National Dental Practice-Based Research Network,” Prev. Med. (Baltim.), 2019, vol. 124, pp. 117–23, doi: 10.1016/j.ypmed.2019.03.034.

[14] P. Badri, H. Lai, S. Ganatra, V. Baracos, and M. Amin, “Factors associated with oral cancerous and precancerous lesions in an underserved community: a cross-sectional study,” Int. J. Environ. Res. Public Health, 2022, vol. 19, no. 3, doi: 10.3390/ijerph19031297.

[15] J. Vonk, J. G. de Wit, F. J. Voskuil, and M. J. H. Witjes, “Improving oral cavity cancer diagnosis and treatment with fluorescence molecular imaging,” Oral Dis., 2021, vol. 27, no. 1, pp. 21–6, doi: 10.1111/odi.13308.

[16] C. Linz et al., “Accuracy of 18-F fluorodeoxyglucose positron emission tomographic/computed tomographic imaging in primary staging of squamous cell carcinoma of the oral cavity,” JAMA Netw. Open, 2021, vol. 4, no. 4, doi: 10.1001/jamanetworkopen.2021.7083.

[17] I. Farooq and A. Bugshan, “Oral squamous cell carcinoma: metastasis, potentially associated malignant disorders, etiology and recent advancements in diagnosis,” F1000Res., 2020, vol. 9, pp. 1–10, doi: 10.12688/f1000research.22941.1.

[18] K. Lang et al., “Definitive radiotherapy for squamous cell carcinoma of the oral cavity: a single-institution experience,” Radiol. Oncol., 2021, vol. 55, no. 4, pp. 467–73, doi: 10.2478/raon-2021-0041.

[19] M. G. Cristofaro et al., “The health risks of dysphagia for patients with head and neck cancer: a multicentre prospective observational study,” J. Transl. Med., 2021, vol. 19, no. 1, pp. 1– 8, doi: 10.1186/s12967-021-03144-2.

[20] G. M. Divya et al., “Risk factors for post-operative complications in primary oral cancer surgery—a prospective study,” Indian J. Surg. Oncol., 2018, vol. 9, no. 1, pp. 28–34, doi: 10.1007/s13193-017-0668-8.

[21] D. H. Jboor, M. S. Al-Darwish, and U. Nur, “Oral cancer knowledge, attitude and practice of dentists in the State of Qatar,” Dent. J., 2019, vol. 7, p. 43.

[22] H. Nazar, M. Shyama, J. Ariga et al., “Oral cancer knowledge, attitudes and practices among primary oral health care dentists in Kuwait,” Asian Pac. J. Cancer, 2019

[23] Alqahtani et al., “Oral cancer knowledge, attitudes and practices: a survey of undergraduate medical and dental student at University Of Hail, Saudi Arabia,” Eur. J. Mol. Clin. Med., 2022, vol. 9, no. 3, pp. 5461–78.

[24].A. Ariyawardana and L. Ekanayake, "Screening for oral cancer/ precancer: knowledge and opinions of dentists employed in the public sector dental services of Sri Lanka," Asian Pac. J. Cancer Prev., 2008, vol. 9, pp. 615–8.

[25]. A. A. Tadbir, H. Ebrahimi, S. Pourshahidi, and M. Zeraatkar, "Evaluation of levels of knowledge about etiology and symptoms of oral cancer in southern Iran," Asian Pac. J. Cancer Prev., 2013, vol. 14, pp. 2217–20.

[26] F. Kazmi, S. Alkait, H. Alghamdi, G. Alhussain, A. Tabassum, "Assessing knowledge, attitude and practices for oral squamous cell carcinoma among health care professionals in Princess Nourah University, Riyadh, KSA," Asian Pac. J. Cancer Prev., 2020, vol. 21, pp. 539–45.

[27] R. Mariño, S. Haresaku, R. McGrath et al., "Oral cancer screening practices of oral health professionals in Australia," BMC Oral Health, 2017, vol. 17, p. 151.

[28] R. Hashim, A. Abo-Fanas, A. Al-Tak, A. Al-Kadri, and Y. Abu Ebaid, "Early detection of oral cancer-dentists' knowledge and practices in the United Arab Emirate," Asian Pac. J. Cancer Prev., 2018, vol. 19, pp. 2351–5.

[29] L. Saleem, H. Mahmoud, and B. Joseph, "Knowledge and attitude about oral cancer among medical and dental students at Kuwait University: a cross-sectional study," Asian Pac. J. Cancer Care, 2021, vol. 6, pp. 277–83.

[30] S. Haresaku, M. Makino, S. Sugiyama, T. Naito, and R. J. Mariño, "Comparison of practices, knowledge, confidence, and attitude toward oral cancer among oral health professionals between Japan and Australia," J. Cancer Educ., 2018, vol. 33, pp. 429–35.

[31] G. Pavão Spaulonci, R. Salgado de Souza, V. Gallego Arias Pecorari, and L. Lauria Dib, "Oral cancer knowledge assessment: newly graduated versus senior dental clinicians," Int J Dent, 2018, vol. 14, p. 9368918.

[32] A. C. L. D. S. Leonel, C. B. R. B. Soares CBRB, J. F. Lisboa de Castro et al., "Knowledge and attitudes of primary health care dentists regarding oral cancer in Brazil," Acta Stomatol. Croat., 2019, vol. 53, pp. 55–63.

[33] M. I. Frola and R. Barrios, "Knowledge and attitudes about oral cancer among dental students after Bologna Plan implementation," J. Cancer Educ., 2017, vol. 32, pp. 634–9.

[34] J. B. Taheri, Z. Namazi, S. Azimi et al., "Knowledge of oral precancerous lesions considering years since graduation among dentists in the Capital city of Iran: a pathway to early oral cancer diagnosis and referral?," Asian Pac. J. Cancer Prev., 2017, vol. 24, pp.2103–8.

[35] N. Coppola, M. D. Mignogna, I. Rivieccio et al., "Current knowledge, attitudes, and practice among health care providers in OSCC awareness: systematic review and meta-analysis," Int. J. Environ. Res. Public Health, 2021, vol. 18, p. 4506.