Cross-sectional Study

Oral cancer knowledge and practice among medical students: A cross-sectional study during the Syrian crisis

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ABSTRACT

Background: lack of medical practitioners' knowledge about oral cancer has contributed to delays in referral and treatment. Oral cancer is amenable to treatment when detected early, which leads to better prognosis and survival rates. In this study, we aimed to assess the knowledge of the Syrian medical students about the risk factors of oral cancer, oral cavity changes associated with oral cancer, and the relation between the relation with Human Papilloma Virus (HPV) and oral cancer.
Methods: This is a cross-sectional study conducted at the Syrian Private University. Data were collected through self-administered questionnaires, which targeted social demographic information, general knowledge, risk factors, oral changes and HPV knowledge associated with oral cancer. Data was categorized and analyzed to assess and compare the levels of knowledge between clinical and preclinical students.
Results: 301 out of 401 medical students responded to the questionnaires bringing the response rate to 75.25%. The study revealed adequate knowledge about oral cancer, general information, clinical features, risk factors and relation to HPV. Clinical students showed higher levels of awareness compared to pre-clinical students. No significance in knowledge was found between the genders.
Conclusion: The findings of the present study suggest that there is a need to reinforce the medical curriculum concerning oral cancer education, particularly in prevention and early detection to improve practices.

1. Introduction

Oral cancer (OC) and oropharyngeal cancer (OPC) are principally divided into two subtypes: Human Papillomavirus (HPV)-positive OC and OPC), which result from an oral HPV sexually-transmitted infection (STI), and HPV-negative OC and OPC, which are mainly linked to the use of alcohol and tobacco. OC and OPC, which include malignant neoplasms of the lips, oral cavity, and pharynx, pose a significant and growing concern to health systems worldwide [1,2]. OC and OPC rank in the top 10 cancers worldwide [3]. In 2018, the worldwide incidence and mortality for OC were reported to be 656,000 and 336,000 respectively, accounting for 3.6% of both new cancer cases as well as cancer deaths [4]. These rates are likely to increase, as indicated by one report that expected the incidence rate of HPV-positive head and neck cancer (HNC)

to surpass that of cervical cancer in the United States by the year 2020 [5]. The significance of this report predict the increasable risk of diffusion the cancer in the next years if there is no reliance the suitable investigations for early diagnosis and accurate therapy. GLOBOCAN estimated the incidence and mortality of OC and OPC in the Middle East and North Africa region (MENA) as 2.2 and 1 per 100,000 per annum. In Syria, the incidence and mortality rates of OC and OPC were 2 and 0.8 per 100,000 annum, respectively, which were higher than what was observed in Iran (1.8 and 0.7 per 100,000 annum) and Jordan (1.7 and 0.6 per 100,000 annum) but lower than those reported in Iraq (2.3 and 1.1 per 100,000 annum), and Egypt (2.4 and 1 per 100,000 annum) [6].

OC has various etiological agents such as tobacco, alcohol, areca nut chewing, advanced age, and HPV infection [7]. HPV is among the most common STI8, and studies from developed countries reported that 56% of OPCs are HPV-related [8]. However, developing countries provided

Abbreviations

OC	Oral cancer
SCC	Squamous cell carcinoma
HPV	human papillomavirus
MENA	Middle East and North Africa region
OPC	Oropharyngeal Cancer
HNC	Head and Neck Cancer
SCC	Squamous Cell Carcinoma
SPU	Syrian Private University
SD	standard deviation
SPSS	Statistical Package for Social Sciences
IRB	Institutional Review Board
GPA	Grade Point Average
CME	Continuing Medical Education

limited studies on this topic [9]. In Syria, the absence of a widely available HPV suggests the OC is becoming a serious problem on the national level.

The majority of OCs can be detected in their early stages during screening programs, thereby reducing rates of morbidity and mortality, lowering treatment costs, and improving quality of life [10]. Therefore, physician and patient awareness must be the first line of defense in preventing the proliferation of this disease and subsequent malignancies. Increasing the number of medical professionals who perform accurate oral examinations is one way to meet this goal and improve prognosis. This invaluable training must start at medical school to alter future career habits. Studies suggest that most pediatricians do not routinely discuss HPV-positive HNC owing to a self-reported lack of knowledge [11]. Hence, it becomes imperative to examine how we are training our next generation of physicians regarding this epidemic.

The awareness and knowledge of OC is essential for the diagnosis, treatment, and prevention of this disease, especially among medical students who are going to tackle this health problem in different specialization. Therefore, the aim of this study is to measure the level of awareness and general knowledge of OC among medical students at the Syrian Private University (SPU), note the influence of clinical years on the students' knowledge, identify the gabs in the medical students' awareness, and suggest solutions for these problems.

2. Methods

2.1. Study design, setting, and participants

A cross sectional study was conducted at the medical school of the Syrian Private University (SPU) in Damascus, Syria. The data were collected in July 2021. The sample included medical students in all years of study. Participation was voluntary, and anonymity was assured. Students were permitted to withdraw from the study at any in time. The sample size was calculated using an online sample size calculator (https://epitools.ausvet.com.au/oneproportion). Setting the confidence level at 95% and the desired accuracy at 5%, the target sample size was 297 students out of 1300. The questionnaire was distributed to 401 random students to ensure that the required number was reached even after excluding the incomplete questionnaires. In total, 343 students responded to the questionnaires. Of these, 301 students returned complete questionnaires, and these were included in the data analysis. Our article is fully compliant with the STROCSS 2021 criteria [38].

2.2. Tools of study

We used a structured self-administered questionnaire in English. The questionnaire was formulated using questions from previously published studies [12,13], and it was reviewed by a specialist. The first section of the questionnaire included socio-demographic questions including, age, marital status, gender, current residence, educational year, GPA, smoking and alcohol consuming. The second section of the survey contained 28 knowledge-assessing questions organized in four sections, and these were "basic knowledge and practices" which contained 6 questions, "risk factors", which contained 7 questions, "oral cavity changes in oral cancer" which contained 10 questions, and "knowledge of the relation between HPV and OC" which contained 5 questions. For each question, the participants were offered multiple options to choose from with only one option being the correct answer. One point was given to each correct answer, while incorrect answers or "Do not know" answers were given zero points. Individual knowledge scores were calculated as the percentage of points obtained by each student, with 100% considered equivalent to the maximum number of points that a student can obtain. Mean knowledge scores were calculated as the average of the individual scores. The questionnaire is available in Appendix.

Ethical approval of the study was obtained from the Institutional Review Board (IRB) at the Faculty of Medicine in SPU.

2.3. Statistical analysis

Data was analyzed using the Statistical Package for Social Sciences version 25.0 (SPSS Inc., Chicago, IL, United States). Data was reported as frequencies and percentages (for categorical variables) or means, medians and standard deviations (SD) (for continuous variables). The relationship between independent variables and the mean knowledge scores was assessed using Independent Samples t-Test and Pearson chi-square test. P-values < 0.05 was considered statistically significant.

2.4. Ethical consideration

Informed consent was obtained from all participants before filling out the questionnaires.

3. Results

3.1. Demographic characteristics

Of the 401 medical students who participated in this study, 301 fully answered the administered questionnaire, thereby placing the respondent rate at 72.25%. The age of participants ranged from 18 to 30 years (21.6years $\pm$ 3.6). Moreover, the majority were males [148 (61.15%)], single [266(88.3%)], and live in Damascus [172 (57.1%)]. Finally, our sample was composed of clinical [197 (65.5%)] and preclinical students [104 (34.5%)] (Table 1).

3.2. Knowledge assessment

1. Oral cancer Basic knowledge and Practice:

Overall, 165 students (54.8%) knew that squamous cell carcinoma (SCC) is the most common type of OC. Of these, 145 students (73.6% were in their clinical years, while only 20 students (19.2%) were in their the preclinical years, and the difference was significant (Chi-square = 81.248, P-value <0.001) .

Moreover, 226 students (86.8%) stated that early detection of OC leads to curation. On the other hand, only 83 participants (27.5%) declared that tongue and floor of the mouth are the most common sites of OC, and 260 responders(86.4%) incorrectly believed that the median border of the tongue is most likely to develop OC. Finally, 217 students (72%) stated that they screen the oral mucosa of high-risk patients. Of these, 157 were clinical students (79.7%) and 60 werepre-clinical students (57.7%), and the difference was significant (Chi-square = 16.379, P-value <0.001)(Table 2). As for referral preferences, 202 responders

Table 1
Socio-demographic characteristics: (n = 301).

Age	Under 20	52 (17.2%)	GPA	<2.0	34 (11.2%)
	20–25	235 (78%)		2.0–2.5	176 (58.5%)
	Above 25	14 (4.6%)		2.5–3.0	71 (23.5%)
Gender	Male	184 (61.1%)		>3.0	20 (6.6%)
	Female	117 (38.8%)	Current residence	City	172 (57.1%)
Social Status	Single	266 (88.3%)		Rural	129 (42.8%)
	In a relationship	28 (9.3%)	College Year	1st	43 (14.2%)
	Married	7 (2.3%)		2nd	13 (4.3%)
Alcohol Use	yes	30 (10%)		3rd	48 (15.9%)
	no	271 (90%)		4th	51 (16.9%)
Smoking	yes	103 (34.2%)		5th	85 (28.2%)
	no	198 (65.7%)		6th	61 (20.2%

Table 2
Oral cancer basic knowledge and practice questions. (n = 301).

Oral cancer basic knowledge and practice	Assessment results (the correct answer), N (%)				
	Pre-clinical (n = 104)	Clinical (n = 197)	Total (n = 301)	Chi-Square	p-value
1- Squamous cell carcinoma is the most common form of oral cancer.	20 19.2%	145 73.6%	165 (54.8%)	81.248	0.000*
2- Tongue and floor of the mouth are the most common sites of oral cancer.	25 24%	58 29.4%	83 (27.5%)	0.995	0.345
3- Median border of the tongue is most likely to develop oral cancer.	14 13.5%	27 13.7%	41 (13.6%)	0.003	1
4- Oral cancer can be cured if detected early. practice question	73 70.2%	153 77.7%	226 (75%)	2.032	0.163
5- Do you screen the oral mucosa if the patients are in a high-risk category	60 57.7%	157 79.7%	217 (72%)	16.379	0.000*

Fig. 1. Where would you refer a patient if you suspect a malignant tumor in the mouth?.

Fig. 2. Clinical and pre-clinical students knowledge of oral cancer Risk factors.

Fig. 3. Comparison between Pre-medical and medical students knowledge in each axis.

(67.1%) indicated that they would refer patients with suspicion of OC to an oncologist (Fig. 1).

In total, the mean knowledge score in this section was 48.6% ± 23.1 with pre-clinical students having a significantly lower mean knowledge score (36.9%) compared with clinical students (54.8%) (t = -6.851, P value <0.001) (Fig. 3).

2. Oral cancer risk factors

The majority of students knew that smoking [287 (95.3%)], viral infection [209 (69.4%)], and alcohol [206 (68.4%)] were risk factors of OC. Other risk factors of OC that were less recognized by the participants included old age [156 (51.8%)], sunlight [149 (49.5%)], hot and spicy food [124 (41.2%)], and low fiber diet [47 (15.6%)] (Fig. 2).

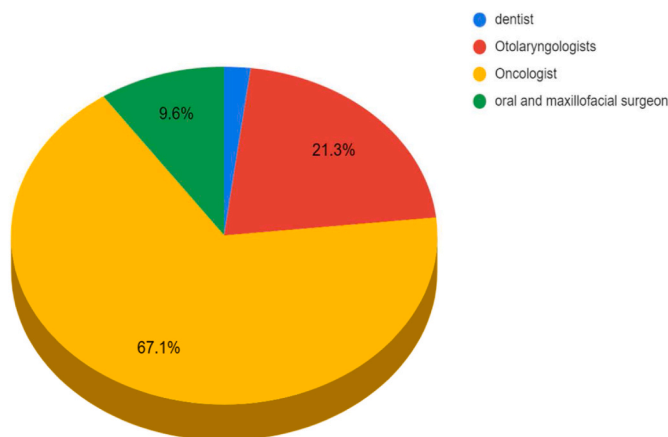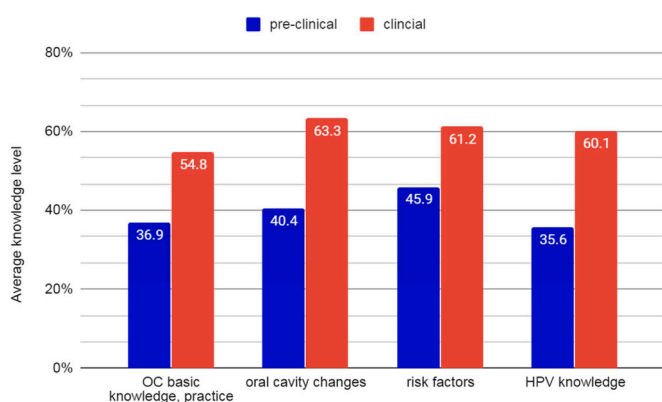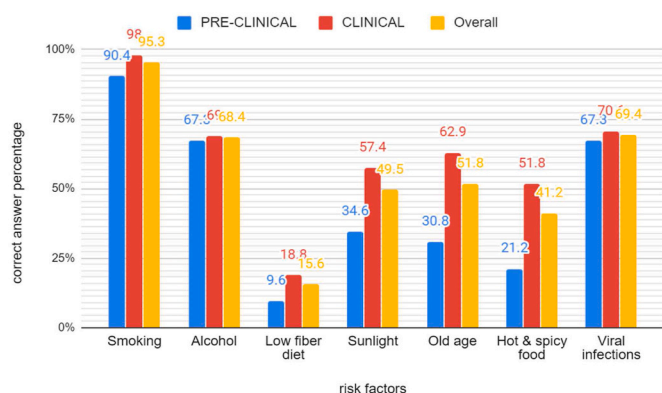Overall, the mean knowledge score in this section was 55.9% ± 21.7 with pre-clinical students having a significantly lower mean knowledge score (45.9%) compared with clinical students (61.2%) (t-test = -6.169, P-value <0.001) (Fig. 3).

3. Oral cavity changes in OC

Most students named oral cavity mass [242 (80.4%)], non-healing ulcers [229 (76.1%)], necrosis [220 (73.1%)], and bleeding [198 (65.8%)] as oral cavity changes in OC. However, only 121 students (40.1%) and 137 students (45.5%) could identify Erythroplakia and

leukoplakia, respectively, as oral cavity changes in OC (Table 3). Overall, the mean knowledge score in this section was 55.4% ± 23.2 with pre-clinical students having a significantly lower mean knowledge score (40.4%) compared with clinical students (63.3%) (t-test = -9.193, P-value <0.001) (Fig. 3).

4. Knowledge about the relation between HPV and OC

The awareness level in this section was (51.6% of 29). About half of the participants [148 (49.1%)] knew that HPV infection is one of the main causes of OC development. Moreover, 77 female students (65.8%) and 118 male students (64.1%) stated that HPV could be transmitted through dental procedures. Finally, 146 of the responders (48.5%) were aware of the HPV vaccine, and 123 students (40.8%) knew that it is unavailable in the Syrian national vaccination program (Table 4).

Overall, the mean knowledge score in this section was 51.6% ± 29 with pre-clinical students having a significantly lower mean knowledge score (35.6%) compared with clinical students (60.

1%) (t-test = -7.453, P-value <0.001) (Fig. 3).

4. Discussion

The mean knowledge score in the field of OC was significantly higher among clinical students (65.8% ± 16.7) compared with pre-clinical students (47.9% ± 16.7) (t-test = -10.30, P-value <0.001). This is expected because, unlike preclinical students, clinical students have already attended lectures and completed clinical rotations in otorhinolaryngology which may have contributed to their high level of knowledge about OC. Our findings are consistent with similar studies that were conducted in South Carolina, Nepal, and Sri Lanka [14–16]. In our study, 34.2% of the students reported being smokers. This number is higher than what was observed in a previous study that found that 24.7% of university students in Syria smoke cigarettes [CIC] [7,17]. Similarly, our result is higher than what was reported in studies conducted in Dublin (28.8%), France (21%), Brazil (16.3%), and Nepal 10 (3.5%) [14,18–20]. This high prevalence of smokers among our medical students does not only increase the risk of OC, but it also attracts 19 other types of cancers.

Regarding OC basic knowledge. SCC was considered the most common form of OC by 54.8% of the responders, with the significant

Table 3
Knowledge about oral cavity changes. (n = 301).

Oral changes	Assessment results (yes), n (%)				
	Pre-clinical (n = 104)	Clinical (n = 197)	Overall	Chi-Square	p-value
Oral leukoplakia	30 28.8%	107 54.3%	137 (45.5%)	17.804	0.000*
oral erythroplakia	21 20.2%	100 50.8%	121 (40.1%)	26.203	0.000*
chronic hyperplastic candidiasis (Candida albicans)	28 26.9%	62 31.5%	90 29.9%	0.672	0.130
non-healing ulcers	61 58.7%	168 85.3%	229 76.1%	26.515	0.000*
Bleeding	51 49%	147 74.6%	198 65.8%	19.788	0.000*
Necrosis	44 42.3%	176 89.3%	220 73.1%	76.551	0.000*
Difficulty in chewing and swallowing	59 56.7%	160 81.2%	219 72.8%	20.592	0.000*
Restrict mouth movement	48 46.2%	139 70.6%	187 62.1%	17.229	0.000*
Lymphadenopathy	63 60.6%	164 83.2%	227 75.4%	18.870	0.000*
mass in the oral cavity	78 75%	164 83.2%	242 80.4%	2.939	0.095

Table 4
HPV knowledge.

	Female (n = 117)	Male (n = 184)	Overall (n = 301)	Chi-Square	P-value
HPV infection is one of the most important causes of OC development	59 50.4%	89 48.3%	148 49.1%	0.243	0.638
HPV can be transmitted through oral sex	69 58.9%	96 52.1%	165 54.8%	1.335	0.285
HPV can be transmitted through dental treatment tools	77 65.8%	118 64.1%	195 64.7%	0.089	0.805
There is a vaccine for HPV	60 51.2%	86 46.7%	146 48.5%	0.591	0.479
The HPV vaccine is included in the Syrian National Vaccine Program	48 41%	75 40.7%	123 40.8%	0.002	1

majority being clinical students (73.6%) (Chi-Square = 81.248, P-value <0.001). Our results are in agreement with several other similar studies. In South Carolina, 49.8% of medical students regarded SCC as the most common type of OC with the majority of the responders being clinical students(72.7%). In Midwestern University, SCC is considered the main type of OC by 83% of medical students, among which 80% are in their clinical years. A study in Chicago reported that 87.5% of clinical students knew that SCC is the most common type of OC compared with only 27.5% of preclinical students [15,21,22]. On another hand, our study revealed a gap in knowledge among our students about the anatomical sites of OC, as only 27.5% of the participants knew that the tongue and the floor of the mouth are the most common sites of OC. In a similar fashion, only 18%, 21% and 31.6% of medical students were aware of the anatomical sites of OC in South Carolina, Chicago and Midwestern University, respectively [15,21,22].

Even though there is a huge development in cancer diagnosis and treatment, OC still has poor survival rates, mainly due to delays in presentation. This is reflected in the 5-year survival rates for late-stage OC, as these rates do not exceed 50% except in the best treatment centers. However, studies show that these results can be improved with early detection and treatment [12,23]. The public health initiative "Healthy People 2010: Understanding and Improving Health and Objectives for Improving Health" predicted that early detection of OC should increase the survival rate from 33% to 51%. In our study, 75% of the students were aware of this information. In comparison, only 38% of Malaysian medical students (38%) said that oral cancer could be cured if detected early [24].

Health care workers do not routinely examine the oral cavity, partially due to inappropriate training on how to conduct a full oral examination [25]. Our study showed that 72% of the students will screen high risk patients for oral cancer, which is higher than what was observed in studies conducted in the UK (28%) and Malaysia (60.6%) [13,26].

The majority of patients with head and neck cancers are diagnosed in advanced stages. This is all dependent on the number of healthcare visits in early stages (median=21 visits) and late stages (median=6 visits), and type of healthcare received before diagnosis and location of the facility providing this service [27]. In our study, Oncologists were the most preferred specialists by students to refer patients with suspicion of OC (67.1%). On the other hand, otolaryngologists and maxillofacial surgeons were preferred in Midwestern University and Malaysia, respectively [21,26]. As there are no primary health care systems in Syria, dentists can act as a safety net, since they frequently examine the oral cavity. Therefore, investing in workshops and awareness campaigns among dental students to identify lesions and request referrals on that basis will act as an efficient screening program in the community.

Smoking, viral infection and alcohol consumption were correctly

named as risk factors OC by (95.3%), (69.4%), and (68.4%) of our students, respectively. This is in line with the results of similar studies conducted in Saudi Arabia and Malaysia [12,28]. In contrast, our participants were less aware about other risk factors such as old age (51.8%), sunlight (49.5%), hot and spicy food (41.2%), and low fiber diet (15.6%). Similar misconceptions were noticed in other studies [24, 28]. The high level of awareness of the dangers cigarette and tobacco smoking, alcohol abuse, and other health risks among medical students is an essential prerequisite for any tobacco and alcohol cessation campaigns targeted at the community.

Regarding the oral cavity changes in OC, only 40.1% and 45.5% of the participants recognized erythroplakia and leukoplakia, respectively, as oral cavity changes in OC. Studies in America, Malaysia, and Midwestern University reported that 19.6%, 24.5%, and 27.5% of the medical students, respectively, were aware that erythroplakia was a sign of OC. Moreover, 35.4%, 33.8%, and 28.5% of the participants, respectively, knew that leukoplakia is associated with OC [15,21,26]. Chronic hyperplastic candidiasis caused by candida albicans was recognized by 29.9% of students, which is lower than what was observed in a Nepali study (38.1%) [14]. In contrast, the majority of our responders were aware that an oral cavity mass (80.4%), an unhealed ulcer (76.1%), necrosis (73.1%), and bleeding (65.8%) were oral cavity changes in OC, and this result was similar to other studies [24]. Finally, 68.1% and 62.1% of our students knew that chewing and swallowing difficulties, and restricted mouth movements, respectively, were oral changes associated with OC. This observation was in line with what was reported in other studies [29].

HPV is the most sexually transmitted infection worldwide, and oropharyngeal cancer (OPC) is an ominous outcome of HPV infection8. In light of the forgoing, we assessed the knowledge of male and female students about the relation between HPV infection and OC, and we found no significant difference in the awareness levels between the two groups. Our study showed that 49.1% of the responders were aware of the association of HPV infections with OC development. However, a higher level of awareness was found in Nepal (83.5%) and Malaysia (53.7%) [14,28]. Data from the Health Information National Trends Survey revealed poor awareness about the relation between HPV and OC, with only 30% of the participants acknowledging this association [30].

Sexual contact, including deep kissing and oral sex, are pathways of HPV transmission. The likelihood of contracting oral HPV is directly associated with the number of sexual partners, and with the early onset of sexual activity. In our study, 54.8% of the students chose oral sex as a source of HPV infection, which is higher than a Polish study (45.1%) [30]., Educational intervention on safe-sex behaviors and evaluations to determine high-risk groups are paramount for primary prevention strategies, especially in this war crisis.

Our study showed that 48.5% of the students knew about the availability of HPV vaccine, which is similar to a Polish study (50%) but higher than a Chinese study (17.5%) [29,31]. A marked decline in HPV infections were noted in countries with implemented HPV vaccination programs as a primary preventive intervention [32,33]. Syria has not integrated the HPV vaccination into the national immunization program [34], and only 123(40.8%) students were aware of this. The key reason for this delay is the inability of the currently suffering economy to manage the added costs of this integration. According to the World Health Organization, phased introductions of HPV vaccination can serve as an alternative in countries where financial or operational constraints prevent implementation of a national immunization programme. In this case, priority should be given to populations that have high risk groups and less access to screening programs [35]. We need to pay more attention to spreading educational understanding about cancer timely identification and how to avoid false and delayed cancer examination outcomes. Continuing medical education reduced the risk of developing cancer of speedily patients – as assessed by medical doctors and had a confined effect on general practitioners' awareness of serious illness and

perception toward their own responsibility in the early diagnosis; even so, continuing medical education (CME) had no influence on Physicians' attitudes on procedures associated of emergency consultation and self-assessed competence to examine. A structured CME practice might be successful in improving Physician attitude and perception, particularly risk assessment, that can lead to improve clinical outcomes [36, 37]. Finally,We faced limitations in the student response rate, as some final year medical students opted out of the study, which may have affected the results. Some survey questions may have been limiting. For example, question 5 did not specify the type of examination as in inspection, palpation, or both. Moreover, the participants in this study were from a single university, yielding a relatively small.

5. Conclusion

This study showed a higher level of awareness about OC among clinical students compared with pre-clinical students. The low level of awareness about OC found among medical students requires an enhancement in the curricula and teaching methods to optimize oral cancer practices. The increase in the global prevalence of oral cancers requires early prevention and detection from medical practitioners to improve the overall prognosis.

Availability of data and materials

All data related to this paper's conclusion are available and stored by the authors. All data can be made available by the corresponding author upon a reasonable request.

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) at the Syrian Private University (SPU), and it was rated as a study with humans not on humans. A written consent was obtained from all participants. Participation in the study was voluntary and participants were assured that there would be no negative consequences on anyone who did not want to participate or who decided to withdraw after giving consent.

Authors' contributions

MAA and HA contributed equally in all stages of the study. HA, MS, MAA, DAA, SS, HG, KM conceptualized the study, participated in the design, wrote the study protocol, performed statistical analysis and drafted the manuscript. HI, MAA, BS, FM participated in the design, did literature search and revision of draft. All authors read and approved the final draft.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

None of the authors have any competing interests. The authors alone are responsible for the content and the writing of the article. No conflict of interest is declared.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.amsu.2022.103504.

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