

Original Article

Oral Cancer Knowledge in Medical and Pharmacy Students: Are we on the right track?

Basant H. AbouZaid¹, Nora Shalaby¹, Yomna A. Saleh¹, Aya A. Hamzawy¹, Tamer Hifnawy², Heba EM Youssef¹

¹Oral Pathology Department, Faculty of Dentistry, Tanta University, Egypt.

²Public Health and Community Medicine Department, Faculty of Medicine, Beni Suef University, Egypt.

Email: basant_abozeed@dent.tanta.edu.eg

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Abstract

Aim: This study aimed to assess level of oral cancer knowledge among medical and pharmacy students since they represent an integral part of the oral health care system in Egypt. Also, to determine the need of planning future intervention programs. **Subjects and methods:** A cross-sectional study was performed via delivering anonymous questionnaires to the students. The questionnaire was designed to gather demographic data and basic knowledge regarding incidence of oral cancer, most known clinical features, importance of oral mucosal screening, prior oral cancer education and motivation toward learning more about oral cancer. **Results:** The most widely known cancer (87.7%) was breast cancer (n = 243) whereas oral cancer was reported by only 9.7% of participants (n = 27). Medical students were generally more knowledgeable than pharmacy students with significant differences ($p < 0.05$) observed in identifying some risk factors as well as tongue and leukoplakia as preferred site and early sign respectively. **Conclusion:** The role of medical and pharmacy students as future contributors to public health message should be emphasized via designing educational curricula that better teach students about burden, risk factors, early signs, and screening modalities of oral cancer.

Keywords: Oral cancer; Awareness; Early detection; Students; Egypt

I. INTRODUCTION

Oral cancer represents an everlasting issue for scientific research owing to its continuously increasing incidence as well as persistent high mortality rate which make it a pressing problem throughout the world. Incidence varies greatly between different geographical regions, yet it is generally more prevalent in developing countries (Pokhrel and Khadka, 2020). Despite implying new management strategies, the 5-year survival rate of oral cancer is still below 50% in most countries (Pollaers *et al.*, 2017). Several risk factors have been linked to these alarming rates such as tobacco consumption, alcohol intake along with advancing patient's age (Ozdemir-Ozenen *et al.*, 2021). Furthermore, the unfamiliarity with early signs of

oral cancer can defer clinical presentation and/or referral which, consequently, worsen morbidity and mortality percentages (Limaye *et al.*, 2019). Several studies have declared deficient awareness about oral cancer among healthcare providers; chiefly amongst dental and medical students (Carter and Ogden, 2007; Brzak *et al.*, 2012; Kujan *et al.*, 2014; Ramaswamy *et al.*, 2014; Joseph, Sundaram and Ellepola, 2015; Al-Maweri *et al.*, 2017; Pokharel *et al.*, 2017; Shrestha *et al.*, 2017; Amer *et al.*, 2018; Keser and Pekiner, 2019; Kazmi *et al.*, 2020; Pokhrel and Khadka, 2020; Poudel, Srii and Marla, 2020; Ozdemir-Ozenen *et al.*, 2021), yet overlooking pharmacy students.

In Egypt, pharmacists' role exceeds being mere dispensers of prescribed medications. They

are actively influencing, modifying, switching patient's decision, and even prescribing medications. Despite the presence of Egyptian laws forbidding drug administration without physician's prescription, these laws are largely ignored by the patients, pharmacists, and the regulators themselves (Taher, Stuart and Hegazy, 2012). Hence, there is a rising need for estimating the real qualifications of undergraduate medical and pharmacy students in identifying signs and symptoms of oral malignancy and pre-malignancy as well as early referral of patients with suspicious oral lesions.

To our knowledge, this is the first study in English literature which includes pharmacy students' side by side with medical students and eventually evaluates their level of oral cancer awareness.

II. SUBJECTS AND METHODS

A nonprobability quota sample was utilized in this study via delivering self-administered questionnaire to undergraduate medical and pharmacy students existing in the medical campus. The study team included third year dental students and Oral Pathology staff members. Anonymous questionnaires modified from Carter and Ogden (Carter and Ogden, 2007) were handed out by dental students to participants who voluntarily accepted enrolling in the research. Questionnaires were then returned by participants and handed to dental students. A total of 300 questionnaires were prepared for distribution. The present study was approved by the institutional ethical committee (#R-OP-1-22-2) which also approved waiving the documentation of informed voluntary consent. An introductory section was added describing aim and benefit of the study in addition to voluntary participation in the research.

The questionnaire was divided into 4 sectors. The first section of the questionnaire involved demographic data including student age, sex, year, and faculty of study. The second section was concerned with incidence of oral cancer and importance of screening oral mucosa. This section yielded responses in different formats including multiple-response questions, single-response questions, and closed-ended questions with "yes"

or "no" format. This section focused on the mostly known clinical features and suggested referral authority which also involved multiple-response questions and single-response questions. The last section targeted student's prior cancer education and if they like to get much knowledge about oral cancer in a "yes" or "no" format with a subsequent single-response, multiple choice question determining the preferred information package.

• Statistical Analysis

All results were analyzed using SPSS software version 23 under Mac OS. Descriptive analysis was done followed by inferential statistics using Chi-Square test and Fisher's exact test. P-value of 0.05 was used as a cut-off point for statistical significance.

III. RESULTS

Questionnaires were returned by all students enrolled in the study who were existing at their faculties at time of initial delivery and willing to participate. The study team collected 284 answered questionnaires attaining 94.66 % response rate. A total of 277 valid responses were recorded after excluding 7 forms with missing data. Out of the 277 responses, 144 were medical students (52%) and the remainder 133 (48%) were pharmacy students (fig.1). Most of respondents (26.5%) were 4th year students with mean age 21.4 ± 1.9 . Sex distribution and number of respondents per academic year are shown in table 1.

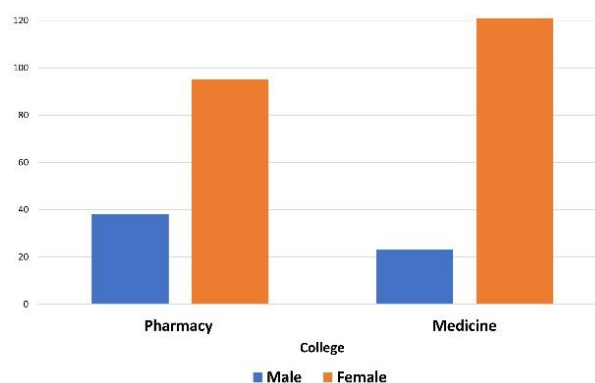


Fig.1: sex and college distribution of respondents

- Awareness of oral cancer incidence and importance of screening oral mucosa

Breast cancer was the most widely heard of cancer (87.7% of total answers) amongst respondents followed by lymphomas and leukemias (33.9%). Liver cancer was significantly ($p < 0.05$) more identified by medical students than pharmacy students. Whereas oral cancer was known by 9.7% of respondents (fig.2) (table 2).

When asked about the rough incidence of oral cancer, only 45 student (16.2%) in both faculties chose Egypt as the country with the highest incidence among the Middle East Countries. 128 students (46.2%) didn't have prior knowledge and 73 (26.4%) believed that oral cancer doesn't represent a general health problem. Such diverse responses created an overall highly significant ratio ($p = 0.001$).

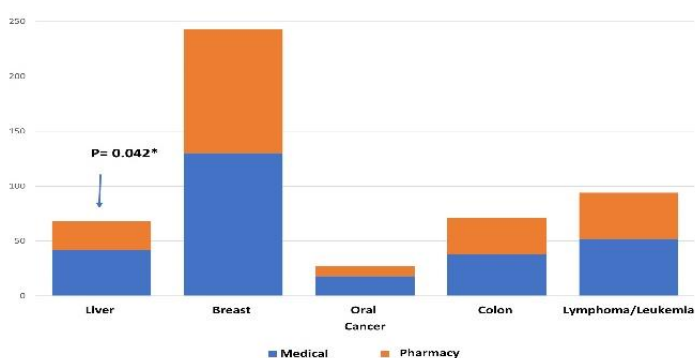


Fig.2: Types of mostly known cancers as reported by participants

The majority (67% medical and 60% pharmacy students) positively replied to the question asking if they are going to perform oral examination in their future practice. Moreover, most of respondents (91.2%) emphasized the importance of routine oral mucosal screening in dental clinics (table 2).

• Mostly known clinical features and suggested referral

Generally medical students were better in discriminating oral cancer risk factors than pharmacy students (table 3). Tobacco was the most frequently recognized among respondents (81.2% of answers) in addition to alcohol as another potential risk factor (53% of total answers). Next to tobacco and alcohol, viral infection (HPV) was significantly ($p < 0.05$) identified by medical students (57.6%) as than pharmacy students (46%) (fig.3). There was no statistically significant difference between both groups of students (47%

of total students) in identifying prior oral cancer lesion as one of the risk factors. However, on recognizing older age as a potential risk factor, medical students showed significantly ($p < 0.05$) more responses than pharmacy students. This was further augmented in the next question, regarding the most frequent age set diagnosed by oral cancer, when a highly significant difference ($p = 0.009$) evolved between students of both groups (figs.3 and 4).

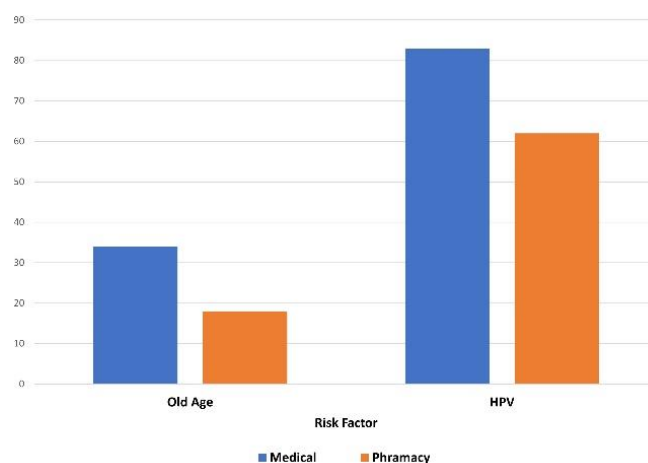


Fig.3: Risk factors which showed significant difference in identification by respondents.

The most common site of oral cancer (tongue) was significantly ($p < 0.05$) more distinguished by medical students (36.4%) than pharmacy students (19.5%). Other potential sites were variably selected with no significant difference among either group of students as depicted in figure 5.

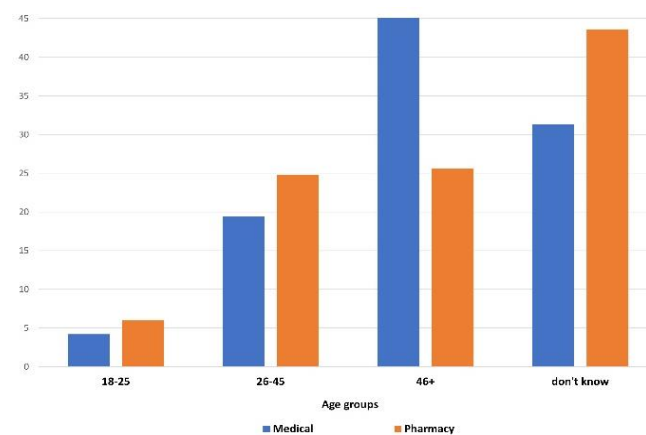


Fig.4: Most frequent age groups affected by oral cancer as selected by students

Recognizing chronic ulceration resistant to therapy as the main suspicious clinical sign was attained by students of both groups (overall ratio 57.8%). However, identifying other possible oral cancer signs revealed statistically significant differences. Medical students showed significantly ($p < 0.05$) more awareness regarding the early oral cancer sign; leukoplakia (persistent white patch) than pharmacy students. In addition, a highly significant difference ($p = 0.001$) was noted when more medical students signed painless swelling as a potential worrisome oral cancer feature.

It's noteworthy that fungal infections were erroneously recognized as suspicious sign for oral cancer by some participants (14.8% of total answers).

Considering referral of suspected oral cancer patients, the majority of students in both groups (42.3%) preferred referral to oncology specialist. The choice of referring to oral and maxillofacial surgeon showed highly significant difference ($p = 0.000$) as more medical students (44.3%) favored this option over pharmacy students (19.7%).

Most students in both groups (72.1%) didn't receive any prior education about oral cancer in the last 5 years; likewise, most of them (87.3%) cared about getting much knowledge on oral malignancy and potentially malignant lesions. Continuous education lectures and participation in organized research were the most preferred format (26.4% and 22.4% respectively) to gain more education about oral cancer.

Table 1: Sex distribution and number of respondents per academic year

Faculty	Sex		Not specified	Year of study						Total
	Male	Female		1 st year	2 nd year	3 rd year	4 th year	5 th year	6 th year	
Pharmacy	38	95	10	23	14	26	30	30	0	133
Medicine	23	121	3	6	18	36	40	22	19	144
Total	61	216	13	29	32	62	70	52	19	277

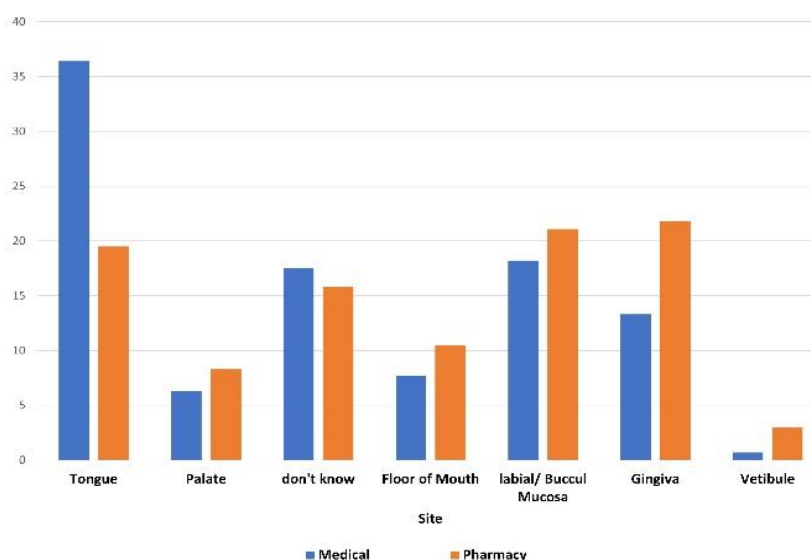


Fig.5: Most common site of oral cancer as identified by respondents

Table 2: Knowledge of oral cancer incidence and importance of oral mucosal screening

Incidence of oral cancer and importance of screening oral mucosa	Medical students n=144 (%)	Pharmacy students n=133 (%)	Total n=277 (%)	P value	
Among the following cancers, which one do you know of or have heard of most frequently?	Liver cancer	42 (29.2)	26 (19.5)	68 (24.5)	0.042*
	Breast cancer	130 (90.3)	113 (85)	243 (87.7)	0.122
	Oral cancer	18 (12.5)	9 (6.8)	27 (9.7)	0.079
	Colon cancer	38 (26.4)	33 (24.8)	71 (25.6)	0.436
	Lymphoma/leukemia	52 (36.1)	42 (31.6)	94 (33.9)	0.252
	Other	6 (4.2%)	8 (6%)	14 (5.1)	0.334
In your future practice, will you have to perform a clinical oral mucosal examination?	Yes	96 (67)	80 (60)	176 (63.5)	0.158
	No	48 (33)	53 (40)	101 (36.5)	
Do you think it is important to screen oral mucosa as part of oral cancer detection in patients routinely attending dental clinics?	Yes	124 (88.6)	124 (94)	248 (91.2)	0.088
	No	16 (11.4)	8 (6)	24 (8.8)	

Table 3: Knowledge regarding mostly known clinical features and suggested referral

Clinical features and preferred referral	Medical students N=144 (%)	Pharmacy students N=133 (%)	Total N=277 (%)	P value		
What would you consider as a risk factor for oral cancer?	Use of tobacco	120 (83)	105 (79)	225 (81.2)	0.218	
	Use of alcohol	78 (54.2)	69 (52)	147 (53)	0.397	
	Older age	34 (23.6)	18 (13.5)	52 (19)	0.023*	
	Male sex	21 (14.6)	15 (11)	36 (13)	0.262	
	Low consumption of fruit and vegetables	18 (12.5)	19 (14)	37 (13.4)	0.397	
	Viral infections (HPV)	83 (57.6)	61 (46)	144 (52)	0.033*	
	Prior oral cancer lesion	68 (74)	62 (46.6)	130 (47)	0.508	
	Heredity	33 (23)	42 (31.6)	75 (27)	0.069	
At which age do you think oral cancer is diagnosed more frequently?	18 – 25 years	6 (4.2)	8 (6)	14 (5.1)	0.009*	
	26 – 45 years	28 (19.4)	33 (24.8)	61 (22)		
	Over 46 years	65 (45.1)	34 (25.6)	99 (35.7)		
	I don't know	45 (31.3)	58 (43.6)	103 (37.2)		
What do you believe is the most common site for oral cancer?	Tongue	52 (36.4)	26 (19.5)	78 (28.3)	0.04*	
	Palate	9 (6.3)	11 (8.3)	20 (7.2)		
	I don't know	25 (17.5)	21 (15.8)	46 (16.7)		
	Floor of the mouth	11 (7.7)	14 (10.5)	25 (9.1)		
	Labial/buccal mucosa	26 (18.2)	28 (21.1)	54 (19.6)		
	Gingiva	19 (13.3)	29 (21.8)	48 (17.4)		
What changes in the mouth would drive you to suspect oral cancer?	Vestibule	1 (0.7)	4 (3)	5 (1.8)	0.069	
	Ulceration non-responsive to therapy	92 (63.9)	68 (51.1)	160 (57.8)		
	Persistent white patch in oral mucosa	67 (46.5)	46 (34.6)	113 (40.8)		0.029*
	Persistent red patch in oral mucosa	27 (18.8)	36 (27.1)	63 (22.7)		0.066
	Painless swelling	85 (59)	52 (39.1)	137 (49.5)		0.001*
	Fungal infections	21 (14.6)	20 (15)	41 (14.8)		0.524
When you are graduated, to whom would you refer a patient when you suspect an oral malignancy?	Other	7 (4.9)	14 (10.5)	21 (7.6)	0.06	
	General surgeon	10 (7.1)	10 (7.6)	20 (7.4)	0.000*	
	Otolaryngologist	6 (4.3)	5 (3.8)	11 (4)		
	Oral and maxillofacial surgeon	62 (44.3)	26 (19.7)	88 (32.4)		
	Oncology specialist	50 (35.7)	65 (49.2)	115 (42.3)		
Dentist/ general practitioner	12 (8.6)	26 (19.7)	38 (14)			

IV. DISCUSSION

As far as we know, this is the first study that incorporate pharmacy and medical students to evaluate their baseline oral cancer knowledge. In developing countries, where many people reside at or below the poverty level, pharmacists play a very important role as health influencers. In Egypt, Taher *et al.* found that nearly one in four pharmacists could be classified as influencers with a level of influence approximating or exceeding 39%. Such a role of pharmacists as influencers, switchers and prescribers of drugs is expected to expand in the future as it correlates with the economic realities of the country (Taher, Stuart and Hegazy, 2012). In addition, during the COVID-19 pandemic many patients preferred consulting community pharmacists over the lengthy stay at waiting rooms in busy clinics. Therefore, it is crucial to address the knowledge of pharmacists regarding various health issues as it would significantly impact the patient's disease outcome.

Our findings revealed that oral cancer was among the least known cancers among participants (12.5% for medical students and 6.8% for pharmacy students), substantially lower than other studies (Limaye *et al.*, 2019; Gunjal *et al.*, 2020; Kazmi *et al.*, 2020; Wong *et al.*, 2021). This would signify a large knowledge gap concerning oral cancer in the current educational curricula. In the same context, the majority of students (46.2%) didn't know the rough incidence of oral cancer in Egypt whereas 26.4% believed that it doesn't represent a general health problem. In 2010, Egypt recorded one of the highest incidence rates of oral cancer among the Middle East Cancer Consortium countries (Attar *et al.*, 2010). A more recent report by Kujan *et al.* (Kujan, Farah and Johnson, 2017) demonstrated that oral cancer incidence and mortality rates are expected to significantly double by the year 2030 within Middle East and North Africa region, especially in Egypt, Iran, Morocco, Sudan and Turkey.

Oral cancer is a multifactorial disease which entails the interplay of many factors to occur. Hence, it's important to understand the impact of various risk factor in the etiopathogenesis of oral

cancer. Tobacco smoking, as the major risk factor, was rightly identified by most medical and pharmacy students which is consistent with previous literature addressing dental and medical students (Carter and Ogden, 2007; Joseph, Sundaram and Ellepola, 2015; Pokharel *et al.*, 2017; Shrestha *et al.*, 2017; Keser and Pekiner, 2019; Gunjal *et al.*, 2020; Pokhrel and Khadka, 2020; Poudel, Srii and Marla, 2020; Ozdemir-Ozenen *et al.*, 2021).

Alcohol was recognized by more than half of participants (53%) which was better than comparable ratios in other studies (Carter and Ogden, 2007; Jayasinghe *et al.*, 2016; Shrestha *et al.*, 2017; Pokhrel and Khadka, 2020; Poudel, Srii and Marla, 2020). This could be linked to the global warning campaigns against tobacco threats and the Islamic scriptures which prohibit drinking alcohol. In addition, significantly more medical students identified HPV as a potential risk factor for oral cancer than pharmacy students which might be attributed to different teaching-learning styles among students at either faculty. However, since 48% of participants didn't link HPV to oral carcinogenesis, this calls for upgrading educational curricula to adopt HPV as an emerging risk factor for oro-pharyngeal cancer.

Aging is a known risk factor for development of several cancers including oral cancer (Ozdemir-Ozenen *et al.*, 2021). This study revealed poor knowledge regarding advancing age as a risk factor for oral cancer (19% of participants) with significant difference in favor of medical students. In the same context, only 35.7% correctly knew the most frequent age of oral cancer incidence comparable to 28.57% in Soares *et al.* (Soares, Carvalho and Francisca Tereza Coelho Matos, 2014) and 31.5% in Pokharel *et al.* (Pokharel *et al.*, 2017) who evaluated oral cancer awareness among medical students. This indicates the need for stressing oral cancer-related issues in the present medical and pharmaceutical curricula.

Oral cancer is known for its diverse clinical presentations and progression rates (Poudel, Srii and Marla, 2020). Successful recognition of early mucosal changes preceding the clinically overt

cancer is of prime importance for good patient outcome. Our findings showed that significantly more medical students identified leukoplakia as a suspicious oral cancer sign than pharmacy students ($P < 0.05$). This is in line with findings of Shrestha *et al.* (Shrestha *et al.*, 2017) and Pokharel *et al.* (Pokharel *et al.*, 2017). Furthermore, medical students were more significantly able to assign painless swelling as another clinical oral sign. Despite quite satisfactory, this doesn't preclude the importance of emphasizing the issue of potentially malignant lesions in future teaching of medical and pharmacy students.

Students showed a highly significant difference in selecting the preferred point of referral for presumed oral cancer patients. More medical students preferred oral and maxillofacial surgeons (44.3%) than pharmacy students (19.7%). Similar findings were reported by Carter and Ogden (Carter and Ogden, 2007) who proposed that such trend towards selecting oral surgeons could be due to the influence of the word 'oral' shown in the title. Whereas the majority of pharmacy students (49.2%) preferred referral to oncology specialists. Such tendency would be reasonable by the virtue that most oral cancer patients are usually managed by oncology specialists in private practice or at public cancer institutes.

Regarding prior oral cancer education, most students in both faculties (72.1%) reported that they didn't get such education during their study which logically ended up with a low knowledge level as seen in the current results. This critical finding should be seriously taken into consideration while planning educational curricula in both faculties. It is obviously clear that undergraduate curricula of medical and pharmacy students include a limited and insufficient oral health program which overlooks important topics such as potentially malignant oral lesions and early oral cancer detection. In addition, these topics are being taught by general pathology, lab medicine, and otorhinolaryngology staff members.

It is recommended that undergraduate medical and pharmacy students being posted to dental colleges for a sufficient time to receive adequate theoretical and practical education by

oral pathology, oral medicine, and maxillofacial surgery specialists as reported in other allied studies (Carter and Ogden, 2007; Shrestha *et al.*, 2017). Moreover, participation in systematic research and organizing anti-cancer campaigns in collaboration with their dental colleagues would significantly raise oral cancer awareness in students and the public as well.

V. CONCLUSION

Significant role in the early detection and referral of oral cancer patients is played by medical and pharmacy graduates especially in low-income societies and developing countries. Understanding the global burden of oral cancer as well as its risk factors, clinical presentations, common intra-oral sites as well as early referral to the correct specialty are of utmost importance. The present study has uncovered the large knowledge gap regarding oral cancer amongst medical and pharmacy students which would adversely impact the outcome of oral cancer patients. It is necessary to re-address educational curricula to embrace a solid oral health program which serves to raise the oral cancer awareness of future graduates theoretically and practically.

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Conflict of Interest

The authors have no relevant financial or non-financial interests to disclose.

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Ethics

This study protocol was approved by the ethical committee of the faculty of dentistry- Tanta university on: July 2021, approval number: (#R-OP-1-22-2).

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