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Research Article

Cross-Sectional Evaluation of Knowledge About Oral Cancer Among Dental Students: A Multicenter Study

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Abstract: This study aimed to evaluate the level of knowledge about oral cancer among final-year dental students from four different institutions in eastern Minas Gerais. This was a quantitative, analytical, observational, cross-sectional study conducted through a 25-item objective questionnaire administered via Google Forms. The questionnaire covered students' self-assessment of their knowledge, as well as specific concepts related to the etiology, diagnosis, and treatment of oral cancer. The sample consisted of 78 dental students, most of whom were in the eighth or ninth academic period. Among the participants, only 3% reported feeling "very confident" in their self-assessed knowledge of oral cancer, and 42.3% stated that they had never attended a continuing education course on the subject. Additionally, 57.7% reported feeling "slightly confident" in performing diagnostic procedures. While 69% considered it "very important" to enhance their knowledge after graduation, 96.2% recognized the critical role of the dental surgeon in this area. Furthermore, 83.3% correctly identified squamous cell carcinoma as the most common type of oral cancer. Although students demonstrated theoretical knowledge of various aspects of oral cancer, a significant number lacked the confidence to perform clinical procedures such as biopsies. They also considered their undergraduate training to be either insufficient or limited regarding the early diagnosis of oral cancer. These findings underscore the need for further research on the topic, to develop and implement more effective educational strategies within the academic curriculum.

Keywords: Carcinoma; Mouth Neoplasms; Outcome Assessment, Health Care.

Introduction

Cancer encompasses a group of more than 100 diseases characterized by the uncontrolled proliferation of cells, which, through disorganized growth, invade tissues and organs and can spread to other parts of the body [1].

Oral cancer (OC) is more prevalent in men over the age of 40 and affects structures such as the lips, gums, oral mucosa, cheeks, and tongue [1-3]. Among these anatomical regions, the tongue is one of the most frequently affected sites [2-4]. In addition, the floor of the mouth is also among the most involved areas [5-7].

According to statistics from the Brazilian National Cancer Institute (INCA), an estimated 15,190 new cases of OC were expected for the year 2020, of which approximately 11,180 occurred in men and 4,010 in women [1,3,8].

In this context, OC represents a major public health concern and is a global issue, ranking among the most common cancers worldwide. It holds the eighth position among men and the fourteenth among women, accounting for nearly 3% of all cancer cases globally [3,8].

Therefore, it is essential to educate the population about the risk factors associated with OC and the importance of eliminating them. Equally important is promoting oral self-examination, as early-stage lesions are often asymptomatic [9].

Alcohol and tobacco consumption are the two main risk factors for OC, especially when combined, which significantly increases the risk compared to individuals who only drink or use tobacco independently. Other contributing factors include poor diet and nutrition, sun exposure, and human papillomavirus (HPV) infection [3,10].

Diet and nutritional habits also play a significant role in the development of OC. A diet rich in fruits and vegetables has been shown to have a protective effect, likely due to the presence of vitamins and micronutrients [11].

Potentially malignant lesions such as oral leukoplakia, erythroplakia, and actinic cheilitis must be highlighted, as they are associated with an increased risk of progression to oral cancer [12]. Through clinical examination and screening, it is possible to assess whether asymptomatic patients may have malignant or potentially malignant lesions [3,11,12].

The late-stage diagnosis of OC is closely related to high morbidity and mortality rates. When diagnosed early, in its initial stages, the five-year survival rate can reach up to 80%. However, in advanced stages, this rate may decrease to as low as 20% [10,13].

In addition to poor prognosis being associated with late detection, it is also linked to a general lack of knowledge about the disease's clinical features and the limited ability of healthcare professionals to perform clinical procedures, including diagnosis, referral, and prevention of OC [10,14].

In this regard, a thorough examination of the oral mucosa must be routinely performed during dental appointments.3 The failure of professionals to conduct adequate diagnostic examinations for OC is associated with several factors, including insufficient knowledge about the topic and the lack of specific disciplines addressing this issue in undergraduate dental curricula [14].

The objective of the present study was to assess the knowledge, confidence, and/or insecurity of dental students regarding the identification of oral cancer. Additionally, the study aimed to understand students' opinions and level of education about OC and to determine whether they possess sufficient knowledge to educate the public and encourage the elimination of harmful habits associated with oral cancer.

Methodology

The present study was approved by the Research Ethics Committee of the Federal University of Juiz de Fora (UFJF), through the Brazil Platform (Approval No. 4.256.232). All participants took part in the study voluntarily and signed an Informed Consent Form (ICF).

This is a cross-sectional, analytical, observational study aimed at assessing the knowledge and opinions of dental students regarding oral cancer. A structured questionnaire was developed, consisting of 25 multiple-choice questions covering topics such as students' self-assessment of their knowledge of oral cancer, as well as specific concepts related to its etiology, diagnosis, and treatment. The questionnaire addressed themes including risk factors, clinical manifestations, biopsy, palpation of lymph node chains, among other relevant aspects of oral cancer. In addition, it sought to evaluate students' clinical practices and attitudes, as well as their interests and perceptions regarding prevention, diagnosis, and professional conduct in relation to oral cancer.

To obtain the data for the study, formal requests were made to the coordinators of dental programs at four higher education institutions in eastern Minas Gerais: the Federal University of Juiz de Fora – Governador Valadares Campus (UFJF-GV), the Vale do Rio Doce University/Foundation Percival Farquhar (UNIVALE), the Federal University of the Jequitinhonha and Mucuri Valleys (UFVJM – Diamantina), and the University Center of Eastern Minas Gerais (UNILESTE). All institutions that agreed to participate, represented by their respective course coordinators, contributed to the data collection process.

Inclusion Criteria

The inclusion criteria comprised regularly enrolled dental students attending institutions located in the state of Minas Gerais. For institutions with an eight-semester curriculum, students enrolled in the 7th and 8th semesters were eligible. For institutions with nine semesters, students from the 8th and 9th semesters were included. Similarly, for programs consisting of ten semesters, students enrolled in the 9th and 10th semesters were considered eligible to participate in the study.

Results

A total of 78 dental students from both public and private institutions participated in the study. At the time of data collection, many participants were enrolled in the 8th (38.5%) and 9th (32.1%) semesters of their respective programs.

Regarding self-reported knowledge about oral cancer (OC), only 3 students (3.8%) declared feeling very confident, while 36 (46.2%) reported feeling confident. Conversely, 36 students (46.2%) indicated feeling slightly confident, and 3 (3.8%) reported feeling not confident about aspects related to OC.

It was also found that a significant portion of the sample, 33 students (42.3%), had never participated in any continuing education course on oral cancer. Consequently, their knowledge on the topic was acquired exclusively during undergraduate training. On the other hand, 17 students (21.8%) reported attending a continuing education course within the past year, while 28 (35.9%) had participated in such courses between two and five years ago. In this context, 69 students (88.5%) considered it very important, and 9 (11.5%) considered it important to enhance their knowledge on the subject after graduation.

When asked about the role of dentists in the prevention and early diagnosis of oral cancer, 75 participants (96.2%) classified this role as very important. Similarly, when questioned about their own responsibility as dental students in the prevention and diagnosis of OC, a slightly smaller proportion 69 students (88.5%) acknowledged a high degree of responsibility.

When asked to evaluate the training they received during undergraduate education in relation to early diagnosis of OC, 20 participants (25.6%) rated it as excellent, and 33 (42.3%) rated it as good. However, more than half of the sample 45 students (57.7%) declared feeling not very confident when it came to performing diagnostic procedures. Additionally, regarding early diagnostic practices, 37 students (47.4%) and 13 (16.7%) reported feeling slightly confident or not confident, respectively, about performing biopsies.

Regarding the most frequent type of oral cancer, 65 students (83.3%) correctly identified squamous cell carcinoma. The remaining participants reported ameloblastoma (n = 6, 7.7%), verrucous carcinoma (n = 5, 6.4%), and Kaposi's sarcoma (n = 2, 2.6%).

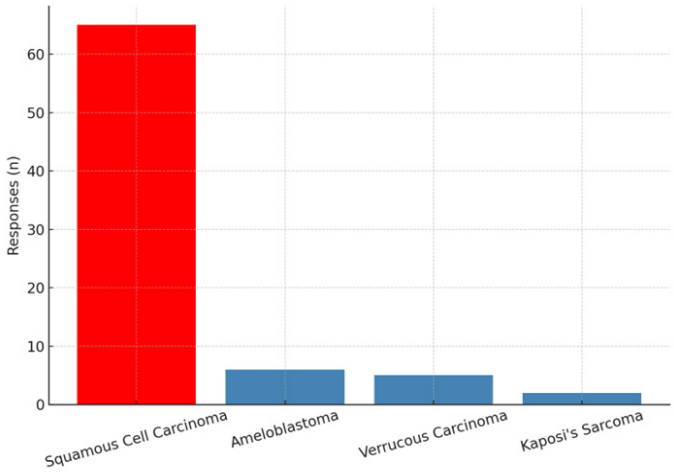

Figure 1: What is the most common type of Oral Cancer?

Table 1: Variables Related to Students' Self-Assessed Profiles

Variables	N	%
Self-assessment regarding knowledge about oral cancer		
Very confident	3	3.8
Confident	36	46.2
Slightly confident	36	46.2
Not confident	3	3.8
Importance of the dentist in the prevention and early diagnosis of oral cancer		
Very important	75	96.2
Important	3	3.8
Slightly important	0	0
Not important	0	0
How do you rate your responsibility in diagnosing and preventing oral cancer?		
High	69	88.5
Moderate	8	10.3
Low	1	1.3
I don't know	0	0
How would you rate your undergraduate training for early diagnosis of oral cancer?		
Excellent	20	25.6
Good	33	42.3
Fair	18	23.1
Insufficient	7	9.0
Confidence level in performing diagnostic procedures for oral cancer		
Very confident	4	5.1
Confident	22	28.2
Slightly confident	45	57.7
Not confident	7	9.0
Do you feel confident in performing a biopsy?		
Very confident	4	5.1
Confident	24	30.8
Slightly confident	37	47.4
Not confident	13	16.7
During a patient's first dental appointment, do you examine the oral mucosa?		
Always	59	75.6
Sometimes	16	20.5
Rarely	3	3.8
Never	0	0
Do you palpate lymph nodes during clinical care?		
Always	25	32.1
Sometimes	38	48.7
Rarely	13	16.7
Never	2	2.6
In your opinion, how important is it to enhance your knowledge of oral cancer after graduation?		
Very important	69	88.5
Important	9	11.5
Slightly important	0	0
Not important	0	0

Concerning their approach to patients who are alcohol consumers and smokers, 64 students (82.1%) reported that they provide guidance regarding the harmful effects of tobacco and alcohol. However, 14 (17.9%) stated that although they ask about these habits during anamnesis, they do not offer cessation counseling.

When asked how they would proceed when encountering a lesion suspicious for malignancy, 54 students (69.2%) indicated they would refer the patient to a dental specialist in oral medicine/stomatology, while 16 (20.5%) would refer to an oncologist, and 8 (10.3%) to a physician.

In terms of the most frequently affected anatomical regions, 71 students (91%) identified the tongue, floor of the mouth, and lip. Others mentioned the buccal mucosa (n = 4, 5.1%), palate and alveolar ridge (n = 2, 2.6%), and gingiva (n = 1, 1.3%).

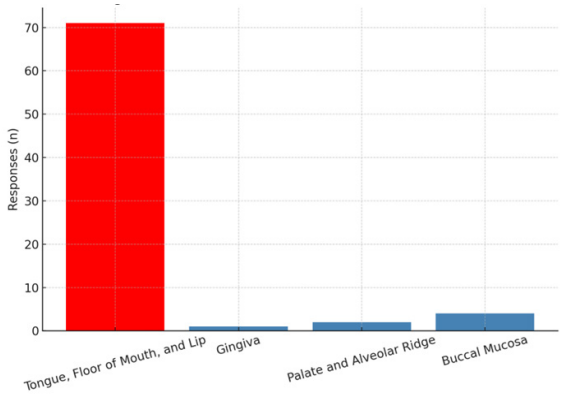

Figure 2: What are the most common Anatomical Regions for the development of Oral Cancer?

Regarding the most affected age group, many students (n = 70, 89.7%) selected individuals over 40 years of age, while 8 (10.2%) selected other age groups.

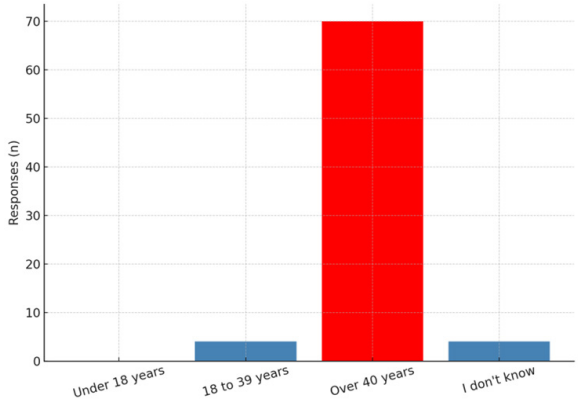

Figure 3: What is the most common Age Group affected by Oral Cancer?

A significant number of students (n = 66, 84.6%) identified ulcers, tumors or nodules with ulcerated surfaces, and white and/or red patches as the most common clinical presentations of oral cancer. The remaining 12 participants (15.3%) selected other clinical features.

As for the clinical staging at which oral cancer is most frequently diagnosed, 39 students (50%) reported Stage III, followed by 19 (24.4%) for Stage IV, 16 (20.5%) for Stage II, and 4 (5.1%) for Stage I.

Among the participants, 59 (75.6%) stated that they always perform an oral mucosal examination during the patient's first dental visit, 16 (20.5%) said they sometimes do, and 3 (3.8%) rarely perform it.

Regarding lymph node evaluation, 25 students (32.1%) reported they always assess lymph nodes during clinical care, 38 (48.7%) sometimes, 13 (16.7%) rarely, and 2 (2.6%) never. Furthermore, 55 students (70.5%) indicated that in cases of cervical metastases, the typical lymph node presents as firm, non-tender, and immobile.

When asked to define a suspicious lesion for malignancy, the majority (n = 70, 89.7%) responded that symptomatic or asymptomatic lesions that do not regress should be considered suspicious. Only 8 (10.3%) indicated other types of lesions. Regarding biopsy procedures, 54 students (69.2%) correctly stated that a biopsy should be performed using a wedge technique, ensuring adequate depth of tissue is included.

Concerning treatment options for oral cancer, 66 students (84.6%) indicated surgical removal as the main approach. Others mentioned pharmacological treatment (n = 6, 7.7%), no available treatment (n = 1, 1.3%), and did not know how to answer (n = 5, 6.4%).

When asked about the main risk factors, 42 students (53.8%) correctly cited alcohol, tobacco, sun exposure, and diet. The remaining 36 (46.2%) pointed to other factors. As for conditions most associated with oral cancer, 39 participants (50%) selected oral leukoplakia, while 4 (5.1%) chose lichen planus, 23 (29.5%) erythroleukoplakia, and 12 (15.4%) actinic cheilitis.

Table 2: Variables Related to Knowledge of Oral Cancer Concepts.

Variables	N	%
What are the most common anatomical regions for the development of oral cancer?		
Tongue, floor of the mouth, and lip	71	91.0
Gingiva	1	1.3
Palate and alveolar ridge	2	2.6
Buccal mucosa	4	5.1
What do you consider a lesion with suspected malignancy?		
Symptomatic lesions with recent onset	6	7.7
Symptomatic or asymptomatic lesions that do not regress	70	89.7
Fetid and purulent lesions	2	2.6
Painful lesions associated with trauma	0	0.0
What is the most characteristic presentation of a cervical lymph node affected by metastasis from oral cancer upon palpation?		
Firm, painful, and mobile	13	16.7
Firm, non-painful, and non-mobile	55	70.5
Soft, painful, and mobile	5	6.4
Soft, non-painful, with or without mobility	5	6.4
At which stage is oral cancer most frequently diagnosed in Brazil?		
Stage I	4	5.1
Stage II	16	20.5
Stage III	39	50.0
Stage IV	19	24.4
When encountering a suspicious lesion, to whom do you refer the patient?		
Dental surgeon, specialist in oral medicine	54	69.2
Medical doctor	8	10.3
Wait until it becomes the patient's main complaint	0	0.0
Oncologist	16	20.5
Which of the following best defines oral cancer?		
Hereditary disease characterized by abnormal cell growth	0	0.0
Contagious disease characterized by abnormal cell growth	1	1.3
Group of genetic diseases characterized by cell growth, including benign and malignant conditions	11	14.1
Group of multifactorial diseases characterized by abnormal cell growth and tissue invasion	66	84.6
What are the most common clinical presentations of oral cancer?		
Ulcer, tumor or nodule with ulcerated surface, white and/or red patches	66	84.6
Tumor or nodule with smooth surface, edema, and brown spots	5	6.4
Slow-growing tumor	4	5.1
Purplish lesions, gingival hyperplasias, and presence of canker sores	3	3.8
How should a biopsy be performed?		
In erythroleukoplakic lesions, the white areas should preferably be removed	7	9.0
In suspected malignant lesions, an excisional biopsy should be performed. Necrotic areas should be prioritized as they are highly diagnostic for the pathologist	16	20.5
The biopsy should be performed as a wedge to include adequate tissue depth	54	69.2

Discussion

The late diagnosis of oral cancer is closely associated with increased morbidity and reduced patient survival rates [28]. Therefore, dental students, as future professionals, must be equipped to perform accurate diagnoses, especially regarding oral cavity lesions with malignant potential. The dentist plays a fundamental and indispensable role in the early detection of the disease [14,26]. In alignment with this view, the present study found that 96.2% of the students recognized the critical importance of the dentist's role in the prevention and early diagnosis of oral cancer. Moreover, 88.5% of the respondents acknowledged their significant responsibility, as dental students, in this process.

Similar findings were reported by Angheben et al. (2013) [17], where 97.6% of students classified the dentist's role as highly important. This recognition is not limited to students; Tibaldi et al. (2015) [28] also reported that 73% of the general population acknowledged the importance of the dentist in the context of oral cancer.

Regarding continuing education, it is essential for students to pursue ongoing learning to enhance and expand the knowledge acquired during their undergraduate studies [14]. This study revealed that 42.3% of students had never attended a continuing education course on oral cancer. Even higher rates were observed by Angheben et al. (2013) [17], with 59.2% of dental students reporting no prior participation in such courses. Similar findings were noted by Andrade et al. (2016) [14], with 45.4% of students having never attended events such as lectures or seminars on the topic.

Awareness of risk factors is equally crucial. Understanding these elements not only aids in diagnosis but also empowers future professionals to counsel patients on harmful habits. In this study, 53.8% of participants identified alcohol, tobacco, sun exposure, and diet as the main risk factors for oral cancer. Additionally, 82.1% of students reported advising smoking and/or drinking patients on the harmful effects of these substances. Comparable findings were observed by Andrade et al. (2016) [14], where 89.2% of students stated they provided such guidance. Matos et al. (2023) [3] further emphasize the importance of encouraging patients to perform routine self-examinations. Reinforcing these preventive behaviors during dental training is vital, as reflected in Sales et al (2016) [26], where 94.1% of practicing dentists reported educating patients on risk factors.

Squamous cell carcinoma accounts for approximately 90% of all malignant neoplasms in the oral cavity [3,4,7]. In this context, 83.3% of the students in this study correctly identified squamous cell carcinoma as the most common type. This result surpasses those of previous studies by Oliveira et al. (2013) [6] and Souza et al. (2017) [2], where only 31.25% and 58.8% of students, respectively, recognized it correctly.

Regarding the most affected age group, 89.7% of respondents indicated individuals over 40 years old, corroborating findings by Andrade et al. (2016) [14] and Angheben et al. (2013) [17], in which 93.1% and 86.5%, respectively, identified the same age range.

It is also critical that students understand the anatomical regions most affected by oral cancer [6]. In the present study, 91% correctly identified the tongue, floor of the mouth, and lips as the most prevalent sites. These results contrast with Oliveira et al. (2013) [6], where only 30% and 11.9% of students identified the tongue/lateral tongue and lips, respectively.

When asked to self-assess their knowledge of oral cancer, only 3.8% of students rated themselves as very confident. This is consistent with Angheben et al. (2013) [17], where only 3.13% reported a high level of knowledge. However, a slightly higher percentage (12.7%) was found in Souza et al. (2017) [2].

Regarding confidence in performing diagnostic procedures, 57.7% of students in this study reported low confidence. This is comparable to Angheben et al. (2013) [17], where 55.4% reported a low level of confidence. These findings raise concerns, as dental schools should be equipping students with the competence, security, and skills necessary to conduct diagnostic procedures and provide comprehensive education on all aspects of oral cancer [3].

For students to approach clinical cases effectively, prior knowledge of the subject is essential, especially since dentists are key professionals in the diagnosis and management of oral cancer [6,30]. In this study, when asked about their course of action upon identifying suspicious lesions, 69.2% of students reported referring the patient to a dentist specializing in oral medicine. These findings are in line with Angheben et al. (2013) [17], where 76% of students stated the same. Likewise, Sales et al. (2016) [16] found that 85.3% of practicing dentists referred patients to oral medicine specialists.

Early detection of lesions is crucial for better prognosis, improved chances of cure, and less invasive treatments. Conversely, diagnosis at advanced stages often necessitates more aggressive interventions and reduces treatment success rates [3]. Thus, the clinical stage of diagnosis not only informs the prognosis but also guides treatment planning [30]. In the current study, 50% of students indicated that oral cancer is most frequently diagnosed at stage III, followed by 24.4% who selected stage IV. These findings highlight that students perceive oral cancer as often being diagnosed at more advanced stages. Similar results were reported by Andrade et al. (2016) [16], in which 96.1% of students indicated advanced stage as the most common among patients seeking care. This suggests that patients often present for treatment when the disease has progressed, pointing to a lack of awareness not only among professionals but also within the general population [3].

Conclusion

Based on the findings of this study, it can be concluded that the participating students demonstrated knowledge regarding the key aspects of oral cancer. However, a lack of confidence in performing clinical procedures particularly biopsies was evident. This suggests that the training provided during undergraduate education is either irregular or insufficient for the early diagnosis of the disease. The need for further complementary studies in this field is also highlighted, considering the limitations of this research, which include a relatively small sample size limited to students from only four public and private dental schools in the state of Minas Gerais. Therefore, the data presented in this study should be validated by future research employing similar methodologies, with a broader and more representative sample.

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