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Evaluation of oral cancer knowledge among dental students at the Federal University of Pernambuco, Brazil

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ABSTRACT

Objective: To evaluate the knowledge of oral cancer among dental students at the Federal University of Pernambuco, Brazil. **Materials and methods:** A cross-sectional study, in which a validated evaluation questionnaire was developed and administered to students via an interview invitation shared in virtual classrooms. Data were analyzed descriptively using inferential statistics, with a significance level of 5%. **Results:** A total of 212 students responded to the questionnaire: 70 from the first semester, 71 from the fifth semester, and 71 from the tenth semester. The majority were women (71.7%), with a mean age of 22.8 years. **Conclusions:** It was observed that students, especially those from the fifth and tenth semesters, despite having good theoretical knowledge of oral cancer and its main risk factors plus the ability to detect the disease during the clinical examination of patients, do not feel confident to perform diagnostic procedures such as biopsies. As a result, they refer patients to another professional.

Keywords: dentistry students; oral neoplasms; knowledge.

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INTRODUCTION

Estimates from the National Cancer Institute (INCA, for its Portuguese acronym) (1) indicate that, for each year of the 2023-2025 triennium, there will be 15,100 new cases of oral cancer in Brazil, of which 10,900 will be in men and 4,200 in women, ranking 5th among the most frequent malignant tumors in men and 13th in women. In northeastern Brazil, it ranks 11th among women, revealing a variation in magnitude between different regions of Brazil.

Despite advances in the diagnosis and treatment of this disease, its overall survival rate is around 50%, reflecting the advanced stage of the tumor (III and IV) at the time of diagnosis, often involving lymph nodes and distant metastases (2). This prolonged interval between the onset and diagnosis of the lesion is due both to barriers in access to the health system and to the lack of preparedness of dental surgeons to perform routine procedures, such as a thorough examination of the oral cavity in search of asymptomatic lesions, which is already a simple and practical way to identify and diagnose the tumor early (3, 4).

Aware that dental students are the future oral health professionals, several studies conducted in Brazil have evaluated the performance of future dental surgeons in diagnosing oral cancer. The results indicate low confidence in performing diagnostic procedures (5-8), although they may feel capable of identifying lesions with malignant potential (6).

Considering the importance of dental education and the role of the university during this stage, this study proposes to investigate the knowledge of dental students at the Universidade Federal de Pernambuco (UFPE) regarding the epidemiological aspects, risk factors, and clinical characteristics involving lesions with malignant potential and oral cancer.

MATERIALS AND METHODS

This is a cross-sectional cohort study used a convenience sample and was submitted to the UFPE Human Research Ethics Committee, which approved it under opinion number 4.766.485 and CAAE: 44924521.4.0000.5208.

The research was conducted in two stages:

Stage 1: Construction and validation of questionnaire content: To develop the questionnaire, the studies by Dib (8) and Carter and Ogden (9), who developed instruments for this purpose, were as references. For content validation, the methodology proposed by Rose Júnior (10) was adopted, in which six dental surgeons participated in the validation process, four of whom were professors specializing in one of the following areas: oral pathology and radiology, biosafety, dentistry, and two who work in Primary Health Care. After a period of seven days, the questionnaire was returned to the same professionals for verification and evaluation of the proposed modifications. Based on their feedback, the final version of the instrument was developed.

Stage 2: Once the new instrument had been defined, it was presented to full-time and evening students of the Dentistry course at UFPE, who were enrolled in subjects belonging to the 1st, 5th, and 10th periods of the course. Each period included 55 full-time students and 22 night students, making a total of 77 students per period, with the prospect of a maximum final sample of 231 respondents. Participants were divided into three groups (A, B, and C) according to the period they were enrolled in. Group A consisted of first-semester students; group B consisted of students who were halfway through the course in their fifth semester; and finally, group C consisted of students completing the course in their tenth semester.

The selection of these semesters was made in order to compare the knowledge of students who had just entered the course (1st semester), with limited exposure to professional content; those in the 5th semester, who are chronologically halfway through their academic career and have greater contact with curricular components related to the diagnosis of oral diseases, and finally, students in the 10th semester who are in the process of completing the course and have accumulated extensive knowledge in the field.

All students regularly enrolled in the undergraduate Dentistry course at UFPE, and attending at least one course corresponding to the periods mentioned in each group, were included in the survey. Students who requested suspend their enrollment in the course and/or were under 18 years of age were excluded from the survey. The invitation to participate in the study was sent via email and/or made available on the classroom bulletin board or virtual classrooms. Each student who was invited and agreed to participate in the research voluntarily signed the Free and Informed Consent Form (FICF).

Descriptive statistics were used to analyze the collected data, establishing means, medians, and standard deviations. To study the associations between the variables and the academic periods of the course, inferential statistics were applied using Pearson's chi-square test or Fisher's exact test, with a significance level of 5%. SPSS software, version 23, was used for analysis.

RESULTS

A total of 212 undergraduate Dentistry students at UFPE responded to the questionnaire, of whom 70 were from the 1st semester, 71 from the 5th semester, and 71 from the 10th semester. Analysis of the results showed that most of the students interviewed were female (n = 152; 71.7%), with a mean age of 22.8 years and a standard deviation of 3.44.

Regarding the correlations between the interviewees' course period and their attitude towards oral cancer diagnosis, group A responded mostly with "not applicable," "no," or "insufficient" to the questions. In terms of self-assessment of knowledge about oral cancer, 7 (9.9%) of the students in group C answered "insufficient" to this question. Regarding the identification of risk factors and performing clinical examinations for the purpose of screening for oral cancer at their patients' first consultation, as well as the reasons for not performing this examination, there were statistically significant differences between groups B and C, with a greater number of students admitting to not identifying risk factors and performing such an examination in group C and citing lack of time (5.0-7.4%) and not knowing how to perform this targeted examination (9.0-5.9%) as the main reasons (Table 1). Most students in group B (49.0-69.0%) and group C (36.0-50.7%) do not advise patients on how to identify abnormalities in the mouth. When asked about their ability to identify malignant lesions in patients, 38 (53.5%) of group B and 14 (19.7%) of group C ($p < 0.05$) responded that they did not feel competent in this skill and that they would refer the case to a stomatology specialist or dental school or referral hospital for cancer treatment (Table 1).

Table 1. Correlation between factors related to attitudes toward oral cancer diagnosis and interview periods.

Variable	Category	Group A		Group B		Group C		p*
		n	%	n	%	n	%	
Self-assessment of level of knowledge	Good	1	1.4	34	47.9	39	54.9	p < 0.05 (a ≠ b, c)
	Regular	7	10	30	42.3	21	29.6	
	Insufficient	61	87.1	5	7	7	9.9	
	Excellent	1	1.4	2	2.8	4	5.6	
Risk factors for oral cancer were identified through the anamnesis	Yes	0	0	43	60.6	70	98.6	p < 0.05 (a ≠ b ≠ c)
	No	0	0	1	1.4	1	1.4	
	Not applicable	70	100	27	38	0	0	
Do you perform oral cancer screening during the first consultation?	Yes	0	0	41	57.7	61	85.9	p < 0.05 (a ≠ b ≠ c)
	No	1	1.4	1	1.4	10	14.1	
	Not applicable	69	98.6	29	40.8	0	0	
Reason for not performing	Performs	0	0	37	52.9	58	85.3	p < 0.05 (a ≠ b ≠ c)
	Do not know how	2	2.9	4	5.7	4	5.9	
	Do not receive fees	0	0	0	0	0	0	
	Lack of time	0	0	0	0	5	7.4	
	Not applicable	68	97.1	29	41.4	1	1.5	
Do you advise patients on how to identify abnormalities in the mouth?	Yes	1	1.4	22	31	35	49.3	p < 0.05 (a ≠ b, c)
	No	69	98.6	49	69	36	50.7	
Do you feel capable of identifying malignant lesions?	Yes	0	0	33	46.5	57	80.3	p < 0.05 (a ≠ b ≠ c)
	No	70	100	38	53.5	14	19.7	
To whom you refer?	Performs the exam	0	0	1	1.4	10	14.1	p < 0.05 (a ≠ b ≠ c)
	Specialist in Stomatology	0	0	28	39.4	47	66.2	
	Physician	0	0	1	1.4	0	0	
	Dentistry Faculty	1	1.4	4	5.6	11	15.5	
	Tertiary care hospital	1	1.4	7	9.9	3	4.2	
	Not applicable	68	97.1	30	42.3	0	0	

* Pearson's chi-square test; n = 212.

Theoretical knowledge about oral cancer was assessed through questions about the most common histological type of oral cancer; the anatomical region most frequently affected; the most frequent primary lesion; the age group most affected; characteristics of metastatic lymph nodes; clinical staging of Brazilian patients at the time of diagnosis; and the lesion with the most frequent potential for malignancy. As expected, group A presented results that were discrepant and statistically different from groups B and C (Table 2).

Regarding the most common type of oral cancer, 65 (91.5%) students in group B and 61 (85.9%) in group C identified squamous cell carcinoma as the most frequent type of cancer. Concerning the most frequently affected anatomical location, both group B and group C correctly identified the tongue and floor of the mouth with scores above 80%, as well as the most common aspect of the fundamental lesion (scores above 70% in both groups for painless ulcer) and the most prevalent age group, with more than 80% correct answers in these two groups (Table 2).

For the clinical aspect of lymph nodes affected by metastasis, a decrease in the percentage of correct answers was observed; 48 (68.6%) and 54 (76.1%) for groups B and C, respectively. Most students in groups B and C demonstrated knowledge about the advanced clinical staging of patients with oral cancer at the time of diagnosis, although among these groups the results had statistically significant differences in favor of group C. Regarding the lesion most commonly associated with malignant potential, most respondents answered correctly, with no statistical difference between students in groups B and C (Table 2).

Table 2. Correlation between oral cancer knowledge and academic periods of respondents

Variable	Category	Group A		Group B		Group C		p*
		n	%	n	%	n	%	
Most common cancer	Correct squamous cell carcinoma	9	12.9	65	91.5	61	85.9	
	Incorrect	2	2.9	4	5.6	10	14	$p < 0.05$ (a ≠ b, c)
	Do not know	59	84.3	2	2.8	0	0	
Most frequent region	Correct (Tongue/ Floor of the mouth)	10	14.5	61	85.9	61	85.9	
	Incorrect	7	10.1	4	5.6	10	14.1	$p < 0.05$ (a ≠ b, c)
	Do not know	52	75.4	6	8.5	0	0	
Most common aspect	Correct (Painless ulcer)	6	8.6	50	70.4	52	73.2	
	Incorrect	8	11.5	15	21.1	19	26.8	$p < 0.05$ (a ≠ b, c)
	Do not know	56	80	6	8.5	0	0	
Most common age group	Correct (>40 years old)	6	8.6	63	88.7	59	83.1	
	Incorrect	4	5.7	5	7	11	15.5	$p < 0.05$ (a ≠ b, c)
	Do not know	60	85.7	3	4.2	1	1.4	
Cervical metastasis appearance	Correct (volume increased, hard, and painless)	4	5.7	48	68.6	54	76.1	
	Incorrect	5	7.1	9	12.9	14	19.7	$p < 0.05$ (a ≠ b, c)
	Do not know	61	87.1	13	18.6	3	4.2	
Diagnostic stage in Brazil	Correct (Advanced)	11	15.7	49	69	62	87.3	
	Incorrect	3	4.3	13	18.3	8	11.3	$p < 0.05$ (a ≠ b ≠ c)
	Do not know	56	80	9	12.7	1	1.4	
Precursor lesion	Correct (Leukoplakia)	2	2.9	61	85.9	62	87.3	
	Incorrect	4	5.8	4	5.6	8	11.2	$p < 0.05$ (a ≠ b, c)
	Do not know	64	91.4	6	8.5	1	1.4	

* Pearson's chi-square test; n = 212.

Regarding the correlation between the academic groups interviewed and their knowledge of oral cancer risk factors, the students generally demonstrated awareness of the main risk factors presented, particularly with respect to alcohol and tobacco use. Participants in groups B and C confirmed the importance of smoking and alcohol consumption in the development of oral cancer in 100% of the responses, and most of them (scores higher than 90%) correctly identified that sun exposure is also a risk factor. Poorly maintained teeth and inadequate oral hygiene were reported, particularly by group C, as risk factors to be considered. A statistically significant difference was observed between the groups (Table 3).

Table 3. Correlation between risk factors for the development of oral cancer and academic periods of respondents

Variable	Category	Group A		Group B		Group C		p*
		n	%	n	%	n	%	
Injectable drugs	Correct (no)	13	18.6	44	62	36	50.7	p < 0.05 (a ≠ b, c)
	Incorrect	57	81.4	27	38	35	49.3	
Previous cancer	Correct (yes)	55	78.6	63	88.7	62	87.3	
	Incorrect	15	21.4	8	11.3	9	12.7	
Alcohol consumption	Correct (yes)	58	82.9	71	100	71	100	p < 0.05 (a ≠ b, c)
	Incorrect	12	17.1	0	0	0	0	
Tobacco use	Correct (yes)	66	94.3	71	100	71	100	
	Incorrect	4	5.7	0	0	0	0	
Family history	Correct (Yes)	61	88.4	64	90.1	66	93	
	Incorrect	8	11.6	7	9.9	5	7	
Emotional stress	Correct (no)	17	24.3	29	40.8	30	43.5	
	Incorrect	53	75.7	42	59.2	39	56.5	
Low consumption of fruits and vegetables	Correct (no)	19	27.1	23	32.4	33	46.5	
	Incorrect	51	72.9	48	67.6	38	53.5	
Oral sex	Correct (no)	19	27.1	17	23.9	13	18.3	
	Incorrect	51	72.9	24	76.1	58	81.7	
Poorly fitted prostheses	Correct (no)	18	27.7	31	43.7	32	45.1	p < 0.05 (a ≠ b, c)
	Incorrect	52	74.3	40	56.3	39	54.9	
Poorly maintained teeth	Correct (no)	14	20	32	45.1	46	65.7	p < 0.05 (a ≠ b ≠ c)
	Incorrect	56	80	39	54.9	24	34.3	
Spicy foods	Correct (no)	28	40	25	35.2	34	47.9	
	Incorrect	42	60	46	64.8	37	52.1	
Poor oral hygiene	Correct (no)	13	18.6	14	19.7	35	49.3	p < 0.05 (a = b ≠ c)
	Incorrect	57	81.4	57	80.3	36	50.7	
Direct contagion	Correct (no)	53	75.7	63	90	63	88.7	
	Incorrect	17	24.3	7	10	8	11.3	
Sun exposure	Correct (yes)	32	45.7	69	97.2	65	91.5	p < 0.05 (a ≠ b, c)
	Incorrect	38	54.3	2	2.8	6	8.5	
Hot food and beverages	Correct (no)	42	60	52	73.2	56	78.9	p < 0.05 (a ≠ b, c)
	Incorrect	28	40	19	26.8	15	21.1	
Obesity	Correct (no)	34	48.6	32	45.1	37	52.1	
	Incorrect	36	51.4	39	54.9	34	47.9	

* Pearson's chi-square test; n = 212.

Some correlations can be observed between the groups interviewed and the students' perception, learning, interest, and self-confidence regarding the patients treated and the diagnosis of oral cancer. Concerning the knowledge acquired in the undergraduate course, 40 (56.3%) of students in groups B and C stated that it was satisfactory. Regarding training or practical classes for oral cancer detection, there was greater divergence in the responses. In group B, only 25 (35.2%) of the respondents considered it satisfactory, and in group C, 28 (39.4%). In terms of self-confidence to perform diagnostic procedures, 48 (67.6%) of the subjects in group B and 37 (52.1%) of the students in group C considered themselves to have low self-confidence. The vast majority of students interviewed considered that dental surgeons play a highly relevant role in the prevention of oral cancer (Table 4).

Table 4. Risk factors for the development of oral cancer of interest regarding knowledge of oral cancer.

Variable	Category	Group A		Group B		Group C		p*
		n	%	n	%	n	%	
Participation in injury diagnosis activities	Yes (projects)	0	0	12	16.9	27	38	p < 0.05 (a ≠ b, c)
	Yes (events)	3	4.3	35	49.3	28	39.4	
	Other courses	0	0	2	2.8	0	0	
	No	67	95.7	22	31	16	22.5	
Are patients informed about oral cancer?	Yes	0	0	4	5.6	7	9.9	p < 0.05 (a ≠ b, c)
	No	70	100	66	93	57	80.3	
	Do not know	0	0	1	1.4	7	9.9	
	Not applicable	0	0	0	0	0	0	
Is the knowledge acquired in undergraduate studies about oral cancer satisfactory?	Yes	5	7.1	40	56.3	40	56.3	p < 0.05 (a ≠ b, c)
	No	6	8.6	13	18.3	29	40.8	
	Do not know	59	84.3	18	25.4	2	2.8	
Is the training acquired during undergraduate studies sufficient to detect oral cancer?	Yes	0	0	25	35.2	28	39.4	p < 0.05 (a ≠ b, c)
	No	0	0	20	28.2	33	46.5	
	Do not know	4	5.7	9	12.7	3	4.2	
	Did not receive training	66	94.3	17	23.9	7	9.9	
Level of confidence in performing diagnostic procedures	High	1	1.4	7	9.9	30	42.3	p < 0.05 (a ≠ b, c)
	Low	14	20	48	67.6	37	52.1	
	Do not know	55	78.6	16	22.5	4	5.6	
Time since last oral cancer course	Last year	1	1.4	17	23.9	18	25.4	p < 0.05 (a ≠ b, c)
	2-5 years	3	4.3	8	11.3	33	46.5	
	More than 5 years	0	0	0	0	1	1.4	
	Never	57	81.4	27	38	16	22.5	
	Do not remember	9	12.9	19	26.8	3	4.2	
Interest in attending an oral cancer course	Yes	60	87	65	91.5	63	88.7	
	No	1	1.4	1	1.4	4	5.6	
	Do not know	8	11.6	5	7	4	5.6	
Role of dental surgeons in oral cancer prevention	High	68	97.1	69	97.2	70	100	
	Medium	1	1.4	0	0	0	0	
	Fair	0	0	2	2.8	0	0	
	Low	0	0	0	0	0	0	
	None	1	1.4	0	0	0	0	

* Pearson's chi-square test; n = 212.

DISCUSSION

Almost 10% of the students who completed the course (group C) reported insufficient knowledge about oral cancer, which may reflect flaws in the learning process, such as a tendency toward dental technicality and a lack of cross-curricular content with other subjects studied. Other studies conducted with the same population in various regions of Brazil and Turkey have found similar results (4, 5, 11, 12).

Another important factor is the limited time devoted to actively screening for oral cancer during clinical practice, especially when there is an emphasis on performing procedures within a restricted time frame, which may be related to the fact that some students reported a "lack of time" to identify risk factors and perform clinical examinations for the purpose of screening for oral cancer during their patients' first consultation (6, 9, 11). It should be the responsibility of dentistry courses to reinforce the approach to this topic during training and encourage continuing education throughout the professional career, in order to shape professionals with a generalist profile capable of diagnosing, treating, and preventing various oral alterations (4, 11, 13, 14).

Several studies have assessed students' knowledge and skills regarding the diagnosis of oral cancer. The results obtained by these researchers are consistent with the findings of this study regarding the high level of correct answers related to knowledge on the subject, but differ in the proportion of correct answers among students from different academic periods. Those studies reported higher accuracy among students in the last academic period (15-17).

The main locations of oral cancer are the tongue and floor of the mouth, and the most prevalent age group is the third and fourth decades of life (9, 14, 15). Most of the respondents answered these questions correctly, as observed in previous studies in the literature (9, 15) with similar methodology involving dental students.

Unfortunately, the highest percentage of oral cancer diagnoses in Brazil occurs in the advanced stages of the disease, which reduces the chances of survival and leads to a worse prognosis. This may be related to several factors, such as poor professional training (18, 19). In the present study, most respondents correctly identified the advanced stage as the most common at diagnosis. In addition, the undergraduates correctly recognized that the most frequent lesion with malignant potential is leukoplakia, corroborating findings from other authors (15, 20).

The main risk factors involved in oral cancer are alcohol and tobacco use, as well as sun exposure. The students evaluated in this study demonstrated good knowledge of the primary risk factors, corroborating other studies in the literature (7, 11, 20, 21). However, there are studies that have observed that most students were unaware of alcohol consumption and sun exposure as potential risk factors for the development of this cancer (12, 22). There are still theories and beliefs regarding the direct association between oral cancer and factors such as family history, emotional stress, low consumption of fruits and vegetables, poorly maintained teeth, spicy foods, poor oral hygiene, and obesity.

The students interviewed considered their practical training received during undergraduate studies inadequate to feel confident in diagnosing malignant lesions. However, almost half reported being satisfied with the theoretical knowledge acquired. Therefore, it is worth emphasizing the need for continuing education measures throughout the Dentistry course on this subject (5-7, 12, 22).

Studies conducted amongdental students in countries with high oral cancer rates, such as India, Yemen, Jordan, Turkey, Malaysia, Spain, and Brazil, show similar results indicating that a considerable portion of this population does not feel confident in performing oral cancer diagnostic procedures, such as biopsies (5-7, 12, 14, 17, 23, 24). This underscores the need for clinical practice settings to incorporate oral cancer diagnostic procedures into their routines.

The results presented reflect the reality of a single federal higher education institution in northeastern Brazil, representing a limitation of this study, as the sample was convenience-based. This may result in limited representativeness of students, increasing the risk of generalization and bias. A multicenter study involving both public and private Dentistry courses would be important to find more reliable results on this subject.

CONCLUSIONS

The interviewed students of the Dentistry program at UFPE, particularly those in the 5th and 10th academic periods, demonstrated good knowledge of oral cancer and its main risk factors. Dental students are the future workforce and are responsible for diagnosing oral cancer and educating patients about the subject. Therefore, it is of vital importance to conduct studies that assess the dental students' knowledge, verifying their preparedness and qualifications.

Conflict of interest:
The authors declare no conflict of interest.

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Author contributions:
ACPO, AFCJ: data collection, analysis, and interpretation.
ACLSL: statistical analysis.
JKPS, TMOF, ECS: manuscript preparation or review.
EJAC: study conception and design, data collection, analysis, and interpretation, manuscript preparation or review, final version approval, and public responsibility for the article's content.

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