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OPEN ACCESS CASE REPORT

Dental Student Knowledge of the Role of Early Detection of Oral Cancer: Multi Center Cross Sectional Study

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ABSTRACT

Background: Oral cancer is a major global health issue, where early detection is essential for enhancing survival rates. Dental students, as the next generation of practitioners, have an important role in detecting oral potentially malignant disorders (OPMDs).
Objective: This study seeks to evaluate the knowledge and awareness of Yemeni dental students about OPMDs and strategies for early detection.
Methods: A cross-sectional study was carried out among 323 dental students from various Yemeni universities. An online questionnaire evaluated students' understanding of oral cancer risk factors, clinical features, diagnostic tools, and screening practices. Data analysis was conducted using SPSS version 21, applying chi-square tests to explore relationships between demographic factors and oral cancer awareness.
Results: The results indicated significant knowledge gaps, with only 28.1% of students accurately identifying the OPMD with the highest malignant transformation rate and 27.2% acknowledging oral cancer risk factors. Awareness of regular oral cancer screenings was particularly low (16.5%). Female students displayed greater awareness regarding the importance of screening ($p = 0.004$), while students with 0–5 years of experience showed better knowledge of diagnostic tools ($p = 0.023$). These findings emphasize the necessity for improved educational initiatives in oral cancer detection.
Conclusion This study highlights the need for focused educational programs to enhance dental students' understanding of oral cancer and OPMDs. Tackling these knowledge gaps through enhancements to the curriculum and ongoing education initiatives can empower future dentists to play a more effective role in early detection and prevention, ultimately alleviating the burden of oral cancer in Yemen.

Keywords: Oral cancer, early detection, dental students, oral potentially malignant disorders, risk factors, screening, Yemen.

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INTRODUCTION

Oral cancer is a major global health concern, claiming the lives of over 120,000 people annually, with over 275,000 new cases diagnosed each year (1). Early detection through routine oral screenings and clinical examinations is crucial for effective treatment (2). Despite the accessibility of the oral cavity for examination, oral cancer remains a highly lethal and disfiguring disease (3).

General practitioners, including those in medicine and dentistry, often encounter patients with oral lesions, allowing them to detect possible oral cancers early. Studies have assessed dentists' understanding of oral cancer (4-6). While Yemeni dental students receive education on oral cancer prevention and detection, there are currently no specific continuing education programs for practicing dentists in the country (7).

This study aims to evaluate the knowledge and awareness of oral potentially malignant disorders (OPMDs) among Yemeni dental students. By identifying knowledge gaps, we can develop targeted educational programs to improve early detection and management of OPMDs in Yemen. Early identification of oral potentially malignant disorders (OPMDs) is important for educating patients, monitoring health, and reducing the risk of cancer (8). There is limited understanding of OPMDs in many areas, including Yemen, where research methods are not standardized. There is a significant lack of information about how common OPMDs are and their features in different groups in Yemen (7). This lack of data hinders the development of effective prevention and intervention strategies for OPMDs in the country. Key risk elements for OPMDs consist of the use of tobacco, the intake of alcohol, chewing of betel quid and areca nut, and infection with human papillomavirus. These elements can either independently or in combination cause genetic and epigenetic changes in the oral mucosa, resulting in dysplasia and cancer (7).

Leukoplakia is a condition marked by white patches in the mouth, found in 1.5% to 2.6% of people, often in older men. It can be homogeneous or non-homogeneous, with the latter having a higher cancer risk (9). Oral lichen planus (OLP) mainly affects women and individuals over 40, with a 1.4% chance of becoming cancerous, treated using corticosteroids and immunomodulators (10).

Oral submucous fibrosis (OSMF) affects 2-5% of people, particularly those under 20, and is linked to areca nut use (11). Oral erythroplakia has a high malignancy risk of 14% to 85% and requires biopsy and surgical removal (12). Early detection and tailored treatment are essential to prevent cancer and improve patient outcomes (2).

This study seeks to evaluate the awareness and knowledge of oral potentially malignant disorders (OPMDs) among dentists in Yemen. By recognizing gaps in knowledge and obstacles to early detection, this research will aid in creating focused educational initiatives to enhance the early detection and management of OPMDs in Yemen. A thorough comprehension of dentists' awareness of OPMDs is essential for enhancing patient outcomes. By tackling these knowledge deficits through customized educational initiatives, we can enable dental practitioners to assume a more proactive role in early detection and referral, thereby lessening the impact of oral cancer and boosting patient survival.

METHODOLOGY

This was a cross-sectional study conducted among dental students from several universities in Yemen, including:

University of Science and Technology Aden
University of Science and Technology, Taiz
Aden University
National University
German University
AlJanad University
Al-Reyada University

The study was carried out at the participating institutions' dental departments between November 2024 and February 2025.

Ethical Consideration

The institutional review board granted ethical clearance at University of Science and Technology, Aden, Yemen, as evidenced by the ethics certificate number MEC/AD035. Each participant was chosen using a randomized selection technique, and they all gave their online informed consent.

Population of Study

Two hundred and twenty-four dental students from the aforementioned universities participated in the study. An online questionnaire intended to gauge dentistry students' awareness and understanding of oral cancer was used to gather the data. Google Forms

(Google, Inc., Mountain View, CA, USA) was used to disseminate the survey. As seen in Table 1, the questionnaire has fifteen questions broken up into three sections.

Statistical Analysis

Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) version 21 were used to analyze the data. Demographic information and answers to knowledge-based questions were compiled using descriptive statistics. To compare categorical variables and evaluate correlations between demographic characteristics (gender and years of experience) and oral cancer knowledge, the chi-square test was utilized.

Results

The study primarily captured young dental students aged 20–29 (94.6%), with a balanced gender distribution (54% female, 46% male). Most participants (79.5%) had limited clinical experience (0–5 years), while only 8.9% had over 20 years of practice. This suggests the findings mainly reflect early-career perspectives, potentially limiting generalizability to experienced Yemeni dental professionals (Table 1).

Table 1: Demographic Characteristics of Participants

Category	Subcategory	Count	Percentage (%)
Age	20-29	212	94.7%
	30-39	11	4.9%
	40-49	1	0.4%
	50-59	0	0.0%
Gender	Male	103	46%
	Female	121	54%
Years of Experience	0-5	178	79.5%
	6-10	16	7.1%
	11-15	6	2.7%
	16-20	4	1.8%
	+20	20	8.9%

The study revealed critical deficiencies in oral cancer knowledge among Yemeni dental students, with only 27.2% correctly identifying risk factors (e.g., tobacco, HPV) and 28.1% recognizing high-risk OPMDs like erythroplakia. Alarmingly, just 16.5% understood regular screening importance, though students showed better grasp of early detection significance (68.8%) and oral submucous fibrosis (60.7%) (Table 2).

Table 2: Knowledge and Awareness of Oral Cancer

Category	Correct Responses	Incorrect Responses	Percentage of Correct Responses
Risk Factors for Oral Cancer	61	163	27.2%
OPMD with Highest Malignant Transformation	63	161	28.1%
Importance of Early Detection	154	70	68.8%
Essential Diagnostic Tools	114	110	50.9%
Regular Oral Cancer Screening	37	186	16.5%
Common Complications of Treatment	124	100	55.4%

Non-Preventive Measures for Oral Cancer	29	129	42.2%
Characteristic Feature of Lichen Planus	115	109	51.3%
Oral Submucous Fibrosis Association	136	88	60.7%

Female students outperformed males in screening awareness (p=0.004) and early detection challenges (p=0.008), suggesting gender influences preventive care approaches. However, no gender disparities existed in other knowledge areas, indicating systemic educational gaps affecting all students (Table 3).

Table 3: Gender-Based Associations in Knowledge and Awareness

Category	**Male (Correct Responses)**	**Female (Correct Responses)**	**P-Value**
Knowledge of Early Detection	78	19	0.517
Challenges in Early Detection	49	54	0.008
OPMD with Highest Malignant Transformation	27	76	0.557
Risk Factors for Oral Cancer	29	74	0.775
Essential Diagnostic Tools	51	52	0.703
Regular Oral Cancer Screening	25	78	0.004
Common Complications of Treatment	52	51	0.176
Non-Preventive Measures for Oral Cancer	35	68	0.108

Early-career students (0-5 years) demonstrated superior knowledge of screening (p=0.023) and prevention measures (p=0.041) compared to experienced clinicians (>20 years), highlighting either: (1) curriculum improvements in recent years, or (2) knowledge attrition among practicing dentists without continuing education. The persistent gaps across all experience levels underscore fundamental deficiencies in oral cancer education (Table 4).

Table 4: Associations with Years of Experience

Category	**0-5 Years**	**6-10 Years**	**11-15 Years**	**16-20 Years**	**+20 Years**	**P-Value**
Knowledge of Early Detection	136 (82.4%)	10 (6%)	5 (3%)	1 (0.6%)	13 (7.9%)	0.105
Challenges in Early Detection	102 (79.7%)	8 (6.3%)	4 (3.1%)	1 (0.8%)	0 (0.0%)	0.601
OPMD with Highest Malignant Transformation	49 (77.8%)	3 (4.8%)	2 (3.2%)	1 (1.6%)	8 (12.7%)	0.695
Risk Factors for Oral Cancer	51 (83.6%)	4 (6.2%)	1 (1.6%)	1 (1.6%)	4 (6.2%)	0.895
Essential Diagnostic Tools	91 (79.8%)	10 (8.8%)	2 (1.8%)	2 (1.8%)	9 (7.9%)	0.757
Regular Oral Cancer Screening	29 (78.4%)	2 (5.4%)	0 (0%)	3 (8.1%)	3 (8.1%)	0.023
Common Complications of Treatment	102 (82.3%)	6 (4.8%)	5 (4%)	2 (1.6%)	9 (7.3%)	0.272
Non-Preventive Measures for Oral Cancer	83 (87.4%)	7 (7.4%)	1 (1.1%)	0 (0%)	4 (4.2%)	0.041

DISCUSSION

The findings of this study reveal significant insights into the knowledge, awareness, and challenges related to the early detection of oral cancer among Yemeni dental students. The results highlight critical gaps in knowledge, gender-based differences, and the influence of years of experience on awareness. Below is a unified discussion of the key findings:

Significant information gaps about oral cancer risk factors, oral potentially malignant disorders (OPMDs), and preventative strategies were found by the study. Just 28.1% of respondents recognized the OPMD with the greatest malignant transformation rate, and only 27.2% correctly identified the risk factors for oral cancer. These results are in line with a study conducted in India that found that a major knowledge gap and lack of awareness of the risk factors and symptoms of oral cancer are the primary causes of the rising oral cancer (OC) burden in that country (7, 13). These results are alarming since the capacity of dental practitioners to recognize risk factors and suspicious lesions during routine examinations is crucial for the early detection of oral cancer.

The need for better education and training is further highlighted by the poor awareness of routine oral cancer screening (only 16.5% acknowledged its significance). These findings are consistent with a study of dentists that discovered a lack of knowledge on mouth cancer screening and diagnosis (14, 15). Since early discovery is essential for successful treatment and higher survival rates, this ignorance may lead to delayed diagnoses and worse patient outcomes.

Certain facets of knowledge and awareness were significantly influenced by gender. Women were more conscious of the significance of routine oral cancer screening ($p=0.004$) and reported substantially greater difficulties with early detection ($p=0.008$). These results align with a study of dentists who found that women are more aware of early detection of mouth cancer (16). This implies that female dentistry students might be better aware of the difficulties associated with early identification and the necessity of taking preventative action.

However, there were no significant gender differences in other areas, such as knowledge of risk factors or diagnostic tools. This indicates that while females may be more aware of certain aspects, overall knowledge gaps persist across both genders (7).

Years of experience also influenced awareness levels. Respondents with 0-5 years of experience demonstrated better understanding of regular oral cancer screening ($p=0.023$) and non-preventive measures ($p=1$). This could be attributed to recent graduates having more exposure to updated curricula and modern diagnostic techniques during their training.

In contrast, those with extensive experience (over 20 years) displayed less awareness in these domains, indicating that ongoing education initiatives might be essential to ensure practicing dentists are informed about the most recent developments in oral cancer detection and prevention. These findings are reinforced by a study conducted in the United Arab Emirates (UAE), which found significant gaps in the knowledge of dentists in the UAE concerning the early identification of oral cancer (17).

The results underscore the immediate necessity for specialized educational programs to tackle the acknowledged knowledge deficiencies. These programs should emphasize Risk factors: Teaching dental students about the significant risk factors associated with oral cancer, including the use of tobacco, alcohol intake, betel quid use, and HPV infection. OPMDs: Enhancing awareness of oral potentially malignant disorders and their capacity for becoming malignant. Screening practices: Emphasizing the importance of regular oral cancer screening and providing training on the use of diagnostic tools.

Preventive measures in oral cancer focus on distinguishing between what prevents the disease and what does not. Ongoing education for dentists is essential to keep them updated on the latest in oral cancer detection and treatment. Dental students often have a limited understanding of oral cancer risks and screening, which affects public health. Dentists are usually the first to see patients with oral issues, so their ability to spot dangerous lesions early is crucial for positive outcomes. Addressing these knowledge gaps can help dentists in Yemen play a more active role in reducing the impact of oral cancer.

Limitations of the Study

While this research offers important insights, it does possess certain limitations. The size of the sample

was comparatively small, and the research was carried out in just one institution, which could restrict the applicability of the results. Subsequent studies ought to incorporate a broader, more varied sample to confirm these findings.

CONCLUSION

This research emphasizes notable deficiencies in understanding and awareness of oral cancer among dental students in Yemen. Gender and levels of experience were determined to affect specific facets of awareness, with female and less experienced participants demonstrating higher awareness in particular aspects. Immediate implementation of focused educational initiatives and ongoing education programs is required to tackle these deficiencies and enhance the early identification and treatment of oral cancer in Yemen. By equipping dental practitioners with essential knowledge and competencies, we can alleviate the impact of oral cancer and enhance patient results.

Conflict of interest

The authors declare that no conflict of interest.

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