GRADUATION PROJECT

Degree in Dentistry

SURVEY OF KNOWLEDGE ON EARLY DIAGNOSIS OF ORAL CANCER ALON TEACHERS AND STUDENTS

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RESUMEN

Introducción: El cáncer oral sigue siendo un importante problema de salud pública, cuyo pronóstico depende en gran medida del diagnóstico precoz. Los odontólogos desempeñan un papel clave en la detección temprana de lesiones sospechosas; **Objetivos:** Evaluar y comparar el nivel de conocimiento y concienciación sobre el diagnóstico precoz del cáncer oral entre estudiantes y profesores de odontología; **Material y métodos:** Se realizó un estudio transversal mediante un cuestionario online anónimo distribuido en inglés y español. El cuestionario evaluó el conocimiento sobre factores de riesgo, signos clínicos precoces, el nivel de confianza en la identificación de lesiones sospechosas y la influencia de la formación académica. Solo se incluyeron las respuestas de los participantes que otorgaron su consentimiento informado; **Resultados:** Los participantes mostraron un buen nivel de conocimientos teóricos, especialmente en relación con los principales factores de riesgo y los signos clínicos precoces. Sin embargo, se identificaron algunas lagunas en el reconocimiento de lesiones precancerosas y en la confianza para manejar casos sospechosos. La experiencia clínica parece influir en la capacidad diagnóstica; **Conclusiones:** Aunque el nivel de conocimiento es globalmente satisfactorio, los resultados destacan la necesidad de reforzar la formación práctica y la exposición clínica para mejorar la detección precoz del cáncer oral.

PALABRAS CLAVE

Odontología; cáncer oral; diagnóstico precoz; estudiantes de odontología; conocimiento; prevención

ABSTRACT

Introduction: Oral cancer remains a major public health concern, and its prognosis largely depends on early diagnosis. Dentists play a key role in the early detection of suspicious lesions; **Objectives:** To evaluate and compare the level of knowledge and awareness regarding the early diagnosis of oral cancer among dental students and teachers; **Material and Methods:** A cross-sectional study was conducted using an anonymous online questionnaire distributed in English and Spanish. The survey assessed knowledge of risk factors, early clinical signs, confidence in identifying suspicious lesions, and the impact of academic training. Only responses from participants who provided informed consent were included; **Results:** Participants demonstrated a generally good level of theoretical knowledge, particularly regarding major risk factors and early clinical signs. However, some gaps were identified in the recognition of precancerous lesions and in the level of confidence in managing suspicious cases. Clinical exposure appeared to influence confidence and diagnostic ability; **Conclusions:** Although knowledge was overall satisfactory, the results highlight the need to strengthen practical training and clinical experience to improve early detection of oral cancer.

KEYWORDS

Dentistry ; oral cancer; early diagnosis; dental students; knowledge; awareness; screening

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1. INTRODUCTION

1.1. General context

1.1.1 Definition of cancer

Cancer is a group of disease characterized by the uncontrolled proliferation and loss of normal growth, regulation, leading to tissue invasion and metastasis (1,2) . It result from genetic and environmental interactions causing alterations in the cell cycle and DNA repair mechanisms (1). Cancer develops at the molecular level through the accumulation of mutation in genes that control cell division and DNA repair. These changes make the genome unstable and take away normal ways for cells to control themselves (2).

Environmental carcinogens, including tobacco, alcohol and viral infections, exacerbate these genetic modifications (3).

Cancer is a major public health issue, responsible for millions of deaths worldwide, particularly in regions with limited access to healthcare (4).

If not found and treated early, these abnormal cells can turn into tumors that invade nearby structures and damage the function of important organs, which can lead to death and illness (1).

1.1.2 Definition and classification of oral cancer

Oral cancer includes malignant neoplasms originating in the oral cavity, mainly the tongue, floor of the mouth, mucosa, gingiva, palate and lips (3). More than 90% are squamous cell carcinomas arising from epithelial transformation (1).

Histologically, oral cancers are classified according to their tissue of origin. The vast majority, around 95%, are squamous cell carcinomas derived from the stratified squamous epithelium go the oral mucosa (1). Less frequent histologic variants include adenocarcinomas, lymphomas, melanomas, and sarcomas depending on the tissue of origin (1).

Oral carcinogenesis is a multistep process that evolves from normal epithelium to dysplasia, carcinoma in situ, and finally invasive carcinoma (1).

Despite easy clinical access to the oral cavity, many cases are diagnosed at advanced stages, when prognosis is poor and treatment options are limited, highlighting a gap between early detection potential and clinical practice (5).

1.1.3 Epidemiology and worldwide spread

Oral cancer represent a significant global public health issue with more than 370 000 new cases and about 180 000 deaths each year (4). The incidence and mortality rates differ significantly among regions (3).

Oral cancer ranks among the top 10 most common cancers worldwide. Its global distribution shows strong geographical and cultural variations. In countries such as India, Sri Lanka, and Bangladesh, it accounts for up to 25 % of all cancer cases, whereas in Western Europe it remains under 5 % (3). These differences are primarily due to variations in risk exposure, notably tobacco, alcohol, and betel-quid consumption.

Due to cultural practices like chewing tobacco, using betel quid, and eating areca nuts, oral cancer is one of the most common cancers in South and Southeast Asia (3). Conversely, in Europe and North America, lifestyle-related risk factors, including alcohol consumption and human papillomavirus (HPV) infection, are the primary contributors. (6)

Men are generally more affected than women, particularly between the ages of 50 and 70, however, the incidence among younger individuals has increased over the past decades, largely due to early initiation of smoking and alcohol use (5). Socioeconomic status significantly influences health outcomes, populations with restricted access to preventive dental care and health education demonstrate elevated incidence and mortality rates (7).

1.1.4 Prognosis and significance of early detection

The stage at which oral cancer is diagnosed has a big impact on how long people live. The five-year survival rate can be as high as 80% if the disease is found early, before it spreads. If it is found late, the survival rate drops to less than 40% (1). The primary difficulty is that early-stage oral cancers frequently present as asymptomatic or resemble benign lesions, leading to oversight by both patient and clinicians (8)

So, finding cancer early not only helps people live longer, but it also means they don’t have to go through long surgeries, radiation and chemotherapy, which can cause disfigurement, functional impairment and emotional distress (1)

1.1.5 The role of dentistry and public health

Dentists are among the few healthcare professionals who regularly examine the oral mucosa, providing them with a distinctive opportunity to identify precancerous or malignant lesions at an early stage (3,9). Nonetheless, numerous studies indicate that systematic screening has yet to be integrated into routine dental practice (1). Late detection results in considerable morbidity, patients may experience speech impediments, dysphagia, facial deformities and social isolation post-treatment (1). Because of this, early detection and education are seen as the most important parts of modern preventive dentistry (3).

1.2 Risk factors and pathophysiology

1.2.1 Major risk factors

The causes of oral cancer include genetic, environmental and behavioral factors (1).
Smoking and chewing tobacco is still the biggest risk factor of OSCC, causing almost 80% of cases around the world (3).
Tobacco smoke contains carcinogens like nitrosamines and polycyclic hydrocarbons that damage DNA and make it harder for cells to fix themselves (5).
Ethanol increase mucosal permeability, which can make it easier for carcinogens to get through (2).
People who smoke and drink have a 30-40 times higher chance of getting oral cancer than people who don’t smoke or drink (6). Chronic irritation stemming from inadequate restorations or sharp teeth may also play a role in mucosal dysplasia (9).

1.2.2 Viral and environmental factors

Human papillomavirus (HPV) infection, particularly genotype 16 and 18, has become a significant etiological factor (10). Dental professionals still don’t know much about HPV’s role in oral cancer. Alsalhani et al.(2024) discovered that fewer than half of dental students in Saudi Arabia acknowledged the association between HPV and oral cancer, and only a limited number comprehended its modes of transmission or prevention strategies (10). Exposure to ultraviolet radiation raises the risk of lip cancer, especially in outdoor workers (9). Nutritional deficiencies,

particularly in vitamins A,C and E diminish antioxidant protection, rendering epithelial cells more susceptible to carcinogens (11).
Cultural practices, including the chewing of betel quid and khat, significantly contribute to oral submucous fibrosis, a precancerous conditions commonly found in Asia and Middle East (3,6).

1.2.3 Pathophysiological mechanisms

From a biological perspective, oral carcinogenesis is a gradual process that advances from dysplasia to carcinoma in situ, culminating in invasive carcinoma (1). Leukoplakia, Erythroplakia and Erytholeukoplakia are the most common potentially malignant disorders, Eythroleukoplakia has the highest chance of becoming cancerous. (5)
At the molecular level, oral cancer develops due to genetic and epigenetic modifications, including mutations in tumor-suppressor gene like TP53 and RAS, the activation of oncogenic pathways; and the inhibition of apoptosis (2). Socioeconomic factors significantly influence outcomes, as individuals from lower- income backgrounds encounter heightened exposure to risk behaviors and restricted access to preventive care (7,12).

1.3 Early detection, symptoms and diagnostic difficulties

1.3.1 Importance of early detection

The best way to improve survival and lower morbidity is to find oral cancer early (1). When lesions are found early, treatments is less invasive, survival rates go up a lot and quality of life stays the same (1). Nevertheless, numerous instances remain unrecognized until later stages, initial lesions frequently exhibit no pain and present non-specific characteristics (13). People don’t know much about the signs or oral cancer, which makes it harder to get a diagnosis (4). From a clinical point of view, not enough screening during regular dental visits is still a big problem (9).

1.3.2 Clinical signs

The initial manifestations of oral cancer are often insidious, encompassing non-healing ulcers, mucosal thickening, erythematous and leukoplakic lesions or indeterminate nodules (1). People often think these kinds of lesions are harmless, like trauma or candidiasis, which makes them

less likely to be serious (8). Persistent pain, bleeding, dysphagia and alterations in speech typically manifest only in the advanced stages of the disease (1). Visual and tactile assessments are crucial for detecting early anomalies prior to their advancement (1).

1.3.3 Problems with diagnosis

Delay in diagnosis arise from both patient- related and professionals factors (13). Patient frequently delay seeking medical attention due to fear, financial constraints or insufficient awareness of cancer warning signs (4). Many dentists don't regularly check soft tissue or are unsure about sending suspicious lesions for biopsy (9). Biopsy is still the best way to confirm cancer, but it is often only when symptoms get worse (2). Regular opportunistic screening during dental check-ups could greatly improve the number of cases that are found early (1). Nonetheless, research demonstrates that preventive protocols are applied inconsistently in routine practice (12).

1.4 The dentist's role in early detection

1.4.1 Professional responsibility and clinical practice

Dentists are uniquely positioned to recognize oral-mucosa changes because of their routine visual access to the mouth (3). Their early diagnosis of suspicious lesion can drastically reduce diagnostic delays and improve survival (9). However studies reveal that many practitioners don't systematically examine oral mucosa during routine appointments (1). Buelvas (2009) argued that every dental visit should include a complete soft-tissue inspection to identify precancerous lesion at an early stage (3).

1.4.2 Barriers to screening

The lack of formal screening protocols and insufficient confidence in diagnostic capabilities persist as significant obstacles (9). Even dentists who have been doing it for a long time sometimes avoid referring asymptomatic lesions due to uncertainty or fear a-of alarming the patient unnecessarily (9). Silva et al. (2025) emphasized that inadequate undergraduate and postgraduate training contributes to this hesitation (2). Professional workload and time constraints also discourage comprehensive screening during short consultation (12).

1.4.3 Patient education and communication

Dentists are important for finding oral cancer and teaching patients but the things that can increase their risk (1). Talking to people about quitting smoking, drinking alcohol and getting the HPV vaccine can stop a lot of cases (2).

Buelvas (2009) highlighted that patient awareness campaigns delivered through dental clinics can significantly increase self-referrals (3).

Thus, the dentist's mission extend from clinical detection to community-level prevention and health promotion (1).

1.5 Student's and teacher's knowledge and awareness

1.5.1 General knowledge gaps

Dental students and teachers at different universities and in different countries have very different levels of knowledge about oral cancer (11).

Tunç et a. (2024) found that most students know that tobacco and alcohol are big risks factors, but they don't know about HPV and chronic irritation (6).

Rageh et al. (2025) discovered that numerous dental students are unable to accurately identify early oral cancer lesions or delineate diagnostic procedures (5). Because of this lack of knowledge, early detection is a risk because dentists are often the first line of defense (1)

1.5.2 Confidence and clinical application

Student's ability to use what they know in clinical setting is limited by low self-confidence, even when they know a lot about it (5). Altindal and Acun Kaya (2025) observed that educators typically exhibit a more robust theoretical comprehension yet frequently struggle to apply this effectively in clinical instruction (12).

The gap between knowing and doing gets bugger when there isn't any reinforcement during clinical rotation (7).

1.5.3 Training and exposure

Golburean et al. (2025) found that only about half of Moldovan dental students had received structured training in how to find oral cancer early (7). Individuals who underwent this training

achieved markedly superior scores in knowledge evaluations and demonstrated enhanced confidence (11).

Silva et al. (2025) proposed that incorporation of case-based learning, photography and workshops into dental curricula would address this deficiency (2).

Repeated exposure to clinical examples strengthens both knowledge and diagnostic intuition, equipping students to recognize early lesions in practice (6).

1.6 Education and ongoing training

1.6.1 Undergraduate curriculum

Education is the basis of good oral cancer prevention (11). Dental curricula must integrate theoretical and clinical experiences to furnish students with the requisite skills for early diagnosis (2). Research indicate that conventional didactic instruction alone is inadequate for guaranteeing diagnostic proficiency (6).

Silva et al. (2025) suggested a longitudinal method for disseminating oral cancer content across several academic years, incorporating repetition and case-based learning to engine comprehension (2).

Incorporating oral-oncology subjects into pathology, oral medicine, and prevention dentistry courses several academic years, incorporating repetition and case-based to enhance comprehension (1). Interactive teaching methods, like using visual aids, learning through simulations, and talking about real patients, have been shown to help students remember things better and make more accurate diagnoses (11).

1.6.2 Clinical training and competence

Clinical exposure is essential for reinforcing knowledge of early detection (5). Students engaged in oral medicine rotations and screening programs exhibit superior diagnostic capabilities and heightened awareness of high-risk lesions (7).

Hertrampf et al. (2022) emphasized that confidence in performing mucosal examinations increases when students are supervised by experienced clinicians (1).

However, many dental programs still dedicate insufficient time to these activities, focusing more on restorative and surgical competencies than on prevention (12).

Providing structured mentorship and opportunities for observation of real cases is therefore essential to prepare future dentists for their preventive role (2).

1.6.3 Communication and behavioral training

Knowledge tends to diminish rapidly without ongoing education (1). Postgraduate refresher courses and workshops on oral cancer screening can assist practitioners in maintaining diagnostic vigilance (2).

Despite this, only a minority of practicing dentists regularly attend professional-development activities related to oral cancer (12)

Online platforms, webinars and national dental associations could all help people learn more about lifelong learning and encourage screening based on evidence (6). Continuing education should also stress the dentist's role as a health promoter and how to use communication strategies in clinical practice (4).

1.6.4 Communication in clinical practice

Beyond clinical knowledge, dentists must develop interpersonal and behavioral skills to communicate effectively about oral-cancer risks (4).

Discussing sensitive issues such as tobacco addiction, alcohol use, or HPV vaccination requires empathy, professionalism, and cultural sensitivity (2).

Hertrampf et al. (2022) noted that patient-centered communication significantly increases compliance with preventive recommendations (1).

Training dental students in motivational interviewing and preventive counseling can enhance their ability to promote healthy habits among patients (11).

1.7 Research rationale

Even though research and education about oral cancer have come a long way, the disease is still found late in many countries, even in developed ones (1). Multiplies studies indicate that although dental professionals are cognizant of oral cancer risk factors, this awareness is not consistently manifested in everyday clinical practice (6). This disconnect suggests that awareness alone is not sufficient; practical training and behavioral reinforcement are equally necessary (2).

Moreover, there is limited research comparing the levels of knowledge and awareness between dental students and educators (7). Teachers significantly influence the professional habits of future generations of dentists due to their critical role in shaping these habits (12). If instructors themselves lack consistency in screening habits, students are unlikely to adopt them in their professional practice (11).

Consequently, this study seeks to evaluate and contrast the knowledge and awareness regarding early oral cancer diagnosis among students and professors.

The outcomes are anticipated to identify educational strengths and weaknesses that could guide curriculum improvements and promote earlier detection in clinical practice (1,2).

2. OBJETIVE

GENERAL OBJECTIF: To evaluate and compare the knowledge and awareness regarding early diagnosis among dental students and teachers

SPECIFIC OBJECTIVES :

- To determine the level of knowledge about oral-cancer risk factors and early clinical signs among dental students and teachers
- To compare awareness and attitudes toward early diagnosis between students and professors
- To evaluate confidence levels in identifying and managing suspicious lesions
- To assess how academic training and clinical experience influence awareness of early detection
- To propose educational strategies to strengthen oral-cancer detection training in the dental curriculum

3. MATERIAL AND METHODS

3.1. Study Design

This research was carried out as a cross-sectional descriptive study at the Faculty of Dentistry of the European University of Madrid.
The aim was to evaluate and compare the knowledge and awareness regarding the early diagnosis of oral cancer among dental students and teachers.
A quantitative approach was selected because it allows standardized data collection and objective comparison between groups.

3.2. Population and Sampling

The target population included 4th- and 5th-year dental students and university professors from the Faculty of Dentistry.
These groups were chosen because they represent different stages of academic formation and clinical responsibility.

All eligible students and professors were invited to participate.
At the beginning of the study, the estimated population consisted of:

- Approximately 50-60 students enrolled in the 4th and 5th years
- Around 10 professors and clinical instructors

The final sample size depended on the number of participants who completed the questionnaire, since participation was voluntary.

Inclusion criteria

- Being a 4th- or 5th-year dental student, or a professor at the Faculty of Dentistry
- Being enrolled or employed during the academic year of data collection
- Accepting to participate voluntarily

Exclusion criteria

- Students from earlier academic years
- Incomplete or invalid questionnaires

3.3. Data Collection Instrument

Data were obtained using a structured, self-administered online questionnaire designed specifically for this study.
The survey consisted of 17 multiple-choice questions divided into four thematic sections:

1. **Demographic characteristics**
2. **Knowledge of oral cancer risk factors**
3. **Recognition of early clinical signs and potentially malignant disorders**
4. **Attitudes and awareness regarding early diagnosis**

Most items had a single correct answer.
The questionnaire was written in English and Spanish.

3.4. Procedures

Before distribution, the study protocol was reviewed and approved by the Ethics Committee of the European University of Madrid**.**
An invitation containing the survey link and a brief explanation of the study was sent.

Participants accessed the questionnaire through Google Forms.
The survey was completely anonymous, and no personal identifiers were recorded.
Participants were informed that they could withdraw at any time without providing a reason.

All responses were automatically stored in a secure database accessible only to the research team.

3.5. Data Analysis

Data were collected using anonymous online questionnaire created through Microsoft forms. The questionnaire was distributed electronically to dental students and teachers. To facilitate participation, the survey was made in English and Spanish, with identical questions and answer options in both versions. The questionnaire consisted of multiple-choice questions designed to evaluate participants knowledge and awareness regarding the early diagnosis of oral cancer, including risk factors, precancerous lesions and clinical signs. Participation was voluntary, and response were automatically recorded through the online platform. Only responses from participants who provided informed consent were included in the analysis

3.6. Ethical Considerations

All participants provided informed consent prior to completing the questionnaire. The study respected confidentiality, anonymity, and voluntary participation at all stages. Data were used exclusively for academic and research purposes and were stored securely in accordance with university regulations.

This study was approved by the Ethics Committee Codigo CI: 2026-168, Codigo departamento: OD.044/2526

3.7. Limitations

As a cross-sectional study, the design does not allow establishing causal relationships. Responses were self-reported, which may lead to overestimation or underestimation of knowledge.

Because data were collected within a single institution, the findings may not fully reflect the situation in other universities or regions.

4. RESULTS

4.1 Participants

A total of 68 participants took part in the survey, and all provided their consent to participate. Among the participants, 30 (44.1%) were the 5th-year dental students, 29 (42.6%) were 4th-year students and 9 (13.2%) were teachers. Participants who did not give consent were automatically excluded from the questionnaire.

4.2 Clinical experience

When asked whether they had previously examined a patient with a suspicious oral lesion, 40 participants (58.8%) answered yes, while 27 participants (39,7%) reported that they had not.

4.3 Knowledge of Oral Cancer

Regarding precancerous lesions, 51.1% of participants correctly identified leukoplakia as the most common lesion. (Figure 1)

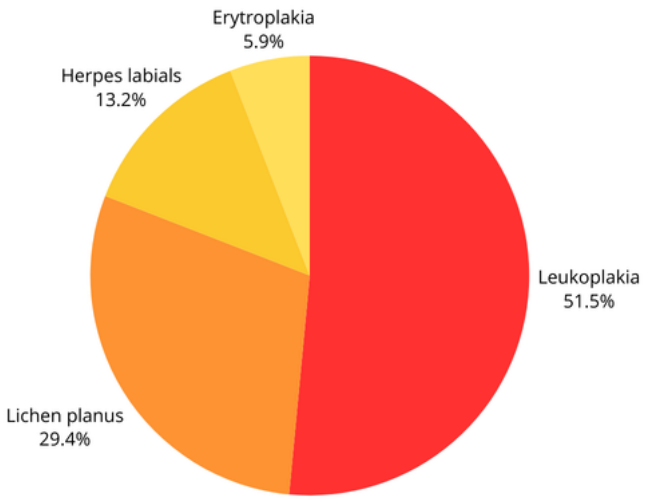


Figure 1. Knowledge of the most common precancerous oral lesion.

Most respondents (79.4%) correctly identified oral squamous cell carcinoma as the commonest type of oral cancer. (Figure 2)

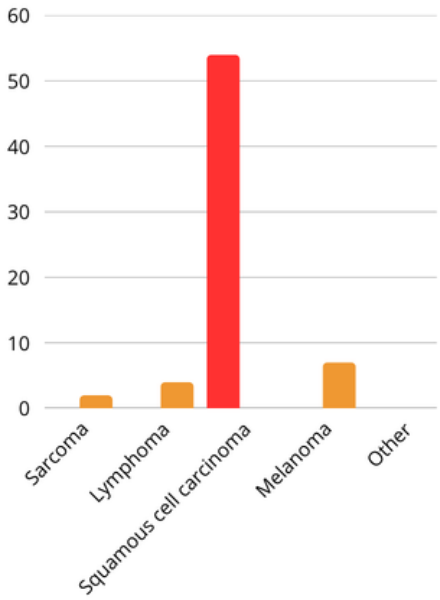


Figure 2. Knowledge of the most common type of oral cancer

Most participants (85.3%) correctly identified lupus erythematosus as an autoimmune disease associated with precancerous oral lesions. (Figure 3)

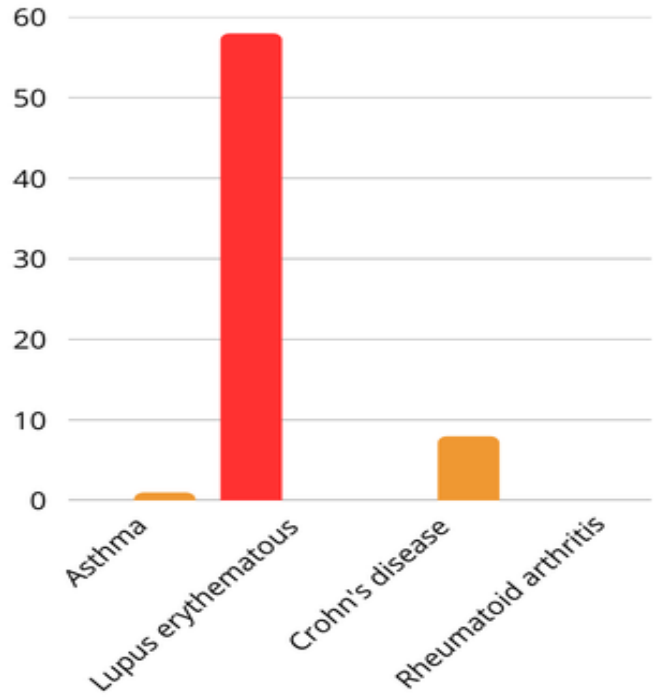


Figure 3. Autoimmune disease associated with oral lesions

Similarity, 83.8% correctly identified the lateral border of the tongue as the site most associated with oral cancer. (Figure 4)

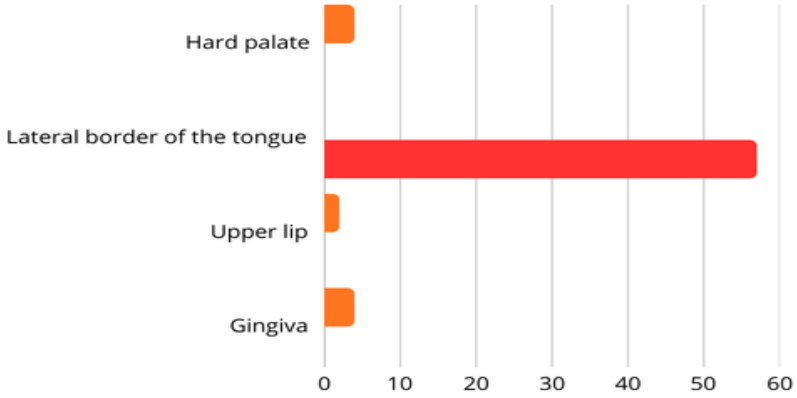


Figure 4. Commonest site of oral cancer

However, knowledge was lower regarding the population most at risk of developing oral cancer, with only 39.7% identifying men as the group at higher risk

4.4 Knowledge of risk factors

Most respondents (82.4%) correctly identified tobacco as a risk factor for oral cancer. (Figure 5)

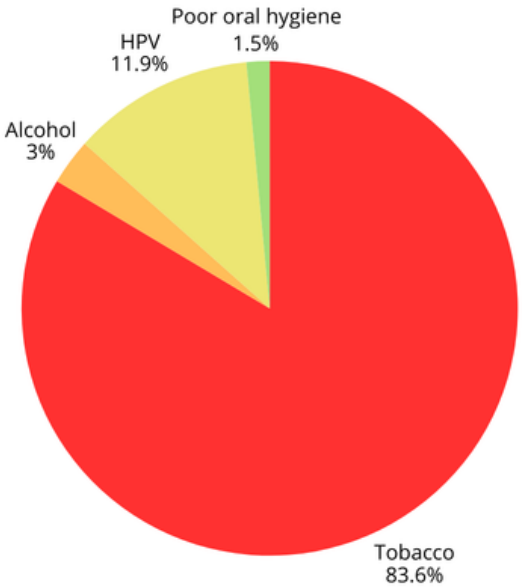


Figure 5. Risk factor for oral cancer

In addition, 67,6% correctly identified HPV as the virus associated with oral and oropharyngeal cancer. (Figure 6)

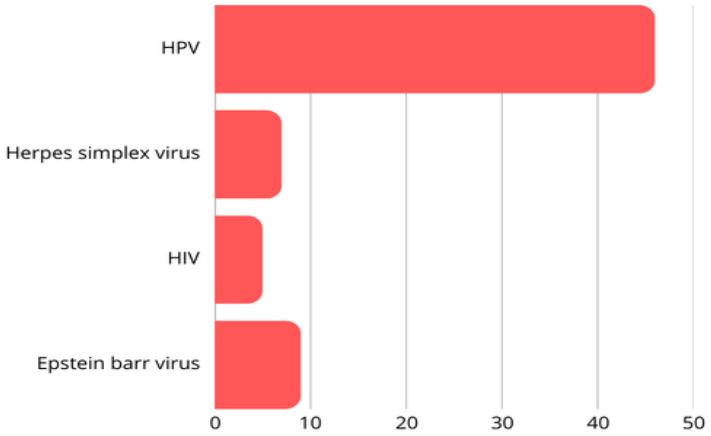


Figure 6. Virus associated with oral cancer

4.5 Early detection

Most participants (94.1%) correctly identified a painless ulcer lasting more than two weeks as an early warning sign of oral cancer. (Figure 7)

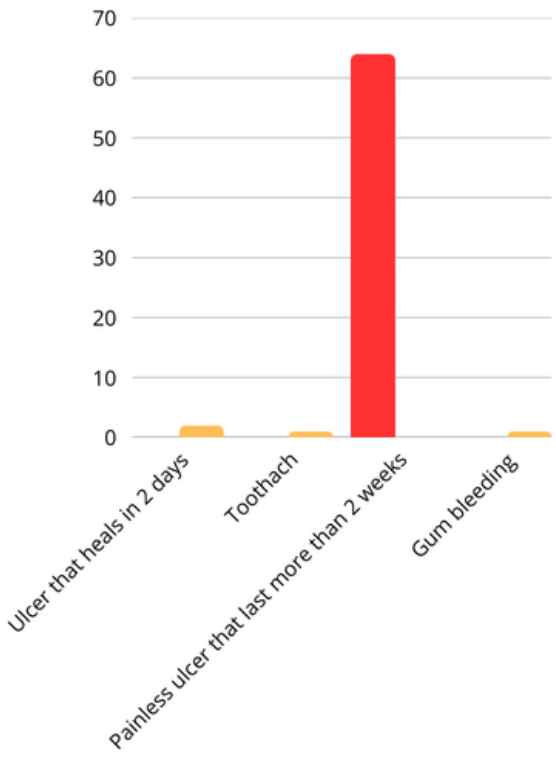


Figure 7. Early warning sign of oral cancer

Similarly, 95.6% reported that a lesion persisting after two weeks should be referred for biopsy or specialist evaluation. (Figure 8)

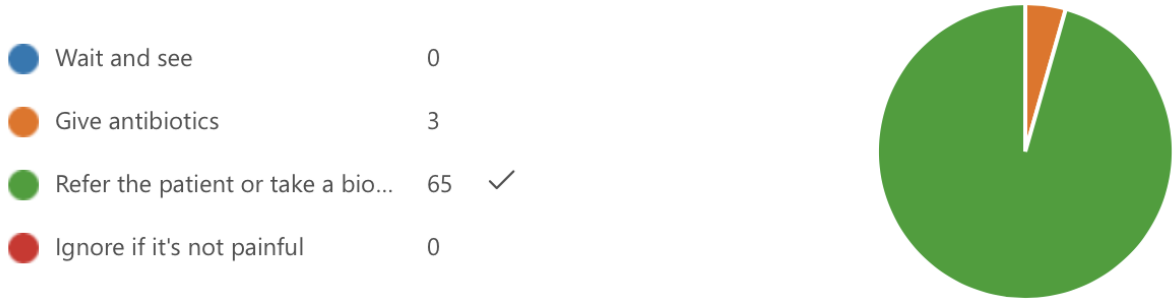


Figure 8. Management of persistent lesion

Most respondents (94.1%) indicated that early detection improves survival rates

Finally, 69.1% correctly identified an approximate survival rate of 80% when oral cancer is detected early

4.6 Clinical practice and training

Most of participants routinely examine the oral mucosa during dental examination, with 58.8% indicated that they always perform this examination and 30.9% reporting that they do so often. Regarding confidence in identifying suspicious soral lesions, most respondents feel confident but not completely sur (64.7%), while 26.6% indicated low confidence, and 7.4% reported feeling very confident.

Most participants (80.9%) identified dentist as the main professionals responsible for the early detection of oral cancer.

Regarding training 79.4% reported having received theoretical training on oral cancer detection, while a smaller proportion indicated receiving both theoretical and practical training.

Finally, 48.5% of respondents believed that the education they received about oral cancer was not sufficient, while 25% considered it sufficient and 26.5% were unsure.

5. DISCUSION

The present study aimed to evaluate the level of knowledge and awareness regarding the early detection of oral cancer among dental students and teachers. This study shows a good level of theoretical knowledge among participants regarding oral cancer, particularly concerning the main risk factors, early clinical signs and the importance of early diagnosis. At the same time, the results also revealed some important weaknesses, particularly in the identification of precancerous lesions and in the confidence to manage suspicious lesions in the clinical practice. These findings are relevant because oral cancer continues to be diagnosed too late in many cases, despite the fact that the oral cavity is easily accessible during routine examinations (1,3). One of the most positive findings of the present study was the most participants correctly identified oral squamous cell carcinoma as the most common type of oral cancer. This result is consistent with the literature, since oral squamous cell carcinoma account for the vast majority of oral malignancies (1). Likewise, most respondents were able to identity the tongue as the site most associated with oral cancer. This is also in agreement with previous studies describing the tongue, especially its lateral border, as one of the most frequently affected anatomical locations (5). These findings suggest that the basic epidemiological and pathological features of oral cancer are relatively well understood by the participants.

Knowledge

Regarding risk factors, most of participants correctly identified tobacco use as the main risk factor for oral cancer. This result is consistent with the work of Jafer et al. (2022), which shows that tobacco use remains one of the most important determinants in the development of oral squamous cell carcinoma (3,9). Furthermore, a significant proportion of participants also recognized the association between human papillomavirus (HPV) and certain oropharyngeal cancers, which aligns with the findings of Hertrampf et al. (2022). This is an encouraging result, as HPV has become increasingly important in the epidemiology of head and neck cancers.

However, the level of knowledge about HPV was still lower than that observed for tobacco, which mirrors the findings of Alsalhani et al. (2024), who reported that awareness of HPV-related oral cancer among dental students remained incomplete. This difference may reflect the fact that tobacco is traditionally emphasized in dental education, while HPV is often perceived as a newer or less familiar risk factor.

Despite these positive aspects, the present study also showed clear gaps in knowledge. One of the most relevant was related to potentially malignant oral disorders. Although leukoplakia was the most frequently selected answer, a substantial proportion of participants chose incorrect alternatives such as lichen planus of herpes labialis. This result is important because the

recognition of precancerous e-lesions is a central part of early detection. If dental students and potentially malignant disorders, suspicious cases may be overlooked and managed too late. Similar findings were reported by Celebi et al. (2024), who observed that dental students often had acceptable general knowledge of ran cancer but showed uncertainty when questions became more specific and clinically oriented.

Another important point concerns the recognition of early warning signs. In the present study, most participants correctly identified a painless ulcer lasting more than two weeks as a possible warning sign of oral cancer. This finding of clinically significant because persistent ulceration is one of the most relevant signs that should alert dentists during routine examination (13). In the same way, most respondents also knew that a lesion persisting after two weeks should be referred for biopsy or specialist evaluation. This suggests that, at least on a theoretical level, participants were aware of the correct clinical approach. However, as pointed out by McGurk and Scott (2010), knowing the correct answer in a questionnaire is not always equivalent to acting rapidly and confidently on a real practice. This distinction is important and should be considered when interpreting the results.

A particularly interesting finding in the study is the difference between knowledge and confidence. Even though most participants answered many theoretical questions correctly, confidence in identifying suspicious oral lesions was lower. Many respondents described themselves as only partially confident, rather than fully confident. This suggests that theoretical learning may not be sufficiently reinforced by clinical experience. Silva et al. (2025) reported a similar discrepancy, showing that students may know the basic concepts or oral cancer but still feel insecure when they are required to apply knowledge in a real clinical setting. In other words, knowledge without practice may remain fragile and difficult to translate into action.

This point is closely related to education and training. In this study, most participants reported having received mainly theoretical instruction, while a smaller proportion reported both theoretical and practical training. This imbalance may help explain the previously mentioned lack of confidence. Tunç et al. (2024) emphasized that oral cancer education should not rely only on lectures and theoretical information, but should also include practical workshop, clinical observation, case-based learning, and repeated exposure to suspicious lesions. Likewise, Golburean et al. (2025) found that students who received more structured educational exposure to oral cancer performed better in knowledge-based assessments. Therefore, the issue may not be that oral cancer is absent from the curriculum, but rather that it is not always taught in a sufficiently applied and clinically meaningful way.

The role of teachers is also worth discussing. In this study, teachers and students were analyzed together because the questionnaire was distributed in two languages but contained the same

content. Even so, the inclusion of teachers is important because they influence how students perceive the relevance of oral cancer screening in dental practice. If educators emphasize routine oral examination, early referral, and preventive vigilance, students are more likely to adopt these habits later in their professional life. On the contrary, if oral cancer is thaught mainly as a theoretical pathology topic rather than as a daily clinical responsibility, students may underestimate their role in early detection. This concern has been raised in previous studies showing that awareness does not always translate into systematic screening behavior in dental settings (12).

From a broader perspective, these findings have important implications for public health. Oral cancer still carries a poor prognosis when diagnosed late, and this late diagnosis remains common in many healthcare systems (4). Since dentists examine the oral cavity on a regular basis, they are in a privileged position to detect suspicious lesions early. For this reason, strengthening undergraduate training and reinforcing screening habits could have a direct impact on earlier diagnosis, lower morbidity, and improved survival. Hertrampf et al. (2022) highlighted that dentists should not be seen only as clinicians who treat dental disease, but also as healthcare professionals with an essential role in cancer prevention and early detection. The present study supports that idea, as most participants recognized dentists as the main professionals responsible for early identification of oral cancer.

At the same time, the results suggest that early detection should not depend only on individual knowledge, but also on educational and institutional support. If universities want future dentists to be more effective in detecting oral cancer, then teaching strategies must go beyond memorization. Practical teaching, exposure to clinical images, supervised examinations, discussions of real cases, and repeated reinforcement throughout the curriculum may all help transform theoretical knowledge into clinical competence. This may be especially important in final-year students, who are closer to entering independent clinical practice and need to feel able not only to recognize lesions, but also to take appropriate action.

The present study provides useful insight into the current level of knowledge and awareness regarding early oral cancer diagnosis among dental students and teachers. The results suggest that basic theoretical knowledge is generally satisfactory, but they also show that important gaps remain in more clinically specific areas, especially in lesion recognition and confidence in decision-making. These findings support the need for stronger practical training, more clinical exposure, and a greater emphasis on prevention and screening in dental education. Improving

these aspects may help future dentists feel more prepared and may ultimately contribute to earlier diagnosis and better outcomes for patients with oral cancer.

6. CONCLUSIONS

- Participants demonstrated a generally good level of knowledge regarding major oral cancer risk factors and early clinical signs, although some gaps remain, particularly in the identification of precancerous lesions.

- Awareness of the importance of early diagnosis was high among participants, but some variability in attitudes suggests differences in perception between individuals.

- Confidence in identifying and managing suspicious oral lesions was moderate, highlighting a gap between theoretical knowledge and clinical application.

- Academic training appears to be mainly theoretical, and limited clinical exposure may negatively influence confidence and diagnostic ability.

- There is a clear need to strengthen dental education by increasing practical training, clinical experience, and case-based learning to improve early detection of oral cancer.

7. SUSTAINABILITY

Oral cancer prevention and early detection are closely linked to public health and long-term sustainability. By improving awareness and promoting routine oral examinations, dentists can contribute to reducing the burden of advanced cancer cases. Early diagnosis not only improves survival rates but also decreases the need for invasive treatments, reducing healthcare costs and improving patient's quality of life. Strengthening education in oral cancer detection therefore supports a more preventive, efficient and sustainable healthcare system.

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9. ANNEXES

Annex 1. Questionary (English version)

Do you give your consent to participate in the survey as a volunteer for the results to be used in the Final Degree Project KNOWLEDGE ON DIAGNOSIS OF DETECTION OF ORAL CANCER AMONG TEACHERS AND STUDENTS?

Yes/No

2. Status

4th year student

5th year student

Teachers

3.Did you already examine a patient with a suspicious oral lesion?

Yes

No

4.What is the most common precancerous oral lesion?

Erythroplakia

Leukoplakia

Lichen planus

Herpes labialis

5.What is the most common type of oral cancer?

(1 point)

Sarcoma

Lymphoma

Squamous cell carcinoma

Melanoma

Other

6.Which autoimmune disease is associated with precancerous oral lesions?

Asthma

Lupus erythematosus

Crohn's disease

Rheumatoid arthritis

7.Which site is the most commonly associated with oral cancer?

Hard palate

Lateral border of the tongue

Upper lip

Gingiva

8.Who is more at risk of developing an oral cancer?

Men

Women

Equally

9.Which is risk factor for oral cancer?

Tobacco

Alcohol

Human papillomavirus

Poor oral hygiene

Other

10.Which virus is associated with oral and oropharyngeal cancer?

Human papillomavirus

Herpes simplex virus

HIV

Epstein barr virus

11.Which sign is an early warning of oral cancer?

Ulcer that heals in 2 days

Toothach

Painless ulcer that lasts more than 2 weeks

Gum bleeding

12.What should do a dentist if a lesion persist after 2 weeks

Wait and see

Give antibiotics

Refer the patient or take a biopsy

Ignore if it's not painful

13.Early detection of oral cancer can

Improve survival rates

Make no difference

Increase the cost of treatment

Prevent all cancers

14.What is the approximate survival rate when an oral cancer is found early?

30%

50%

80%

100%

15.Do you routinely check the oral mucosa during dental exams?

Never

Sometimes

Often

Always

16.Do you feel confident identifying a suspicious oral lesion?

Yes, very confident

Yes, but not sure

Not really

Not at all

17.Who do you think is mainly responsible for detecting oral cancer early?

Medical doctors

Patient themselves

Dentists

Nurses

18.Have you received any training about oral cancer detection?

Yes, theory and practice

Yes, theory

No

19.Do you think the education you received about oral cancer is enough?

Yes

No

Not sure

Annex 2. Questionary (Spanish version)

1.Da su consentimiento para participar en la encuesta como voluntario para que los resultados sean utilizados en el Trabajo Fin de Grado CONOCIMIENTOS SOBRE DIAGNÓSTICO Y DETECCIÓN DE CÁNCER ORAL EN PROFESORADO Y ALUMNADO?

SI

NO

2.ESTADO

Alumno de 4to año

Alumno de 5to año

Profesores

3.Ya has examinado a un paciente con una lesión oral sospechosa?

Si

No

4.Cuál es la lesión oral precancerosa más común?

Eritroplasia

Leucoplasia

Liquen plano

Herpes labial

5.Cuál es el tipo más común de cáncer bucal?

Sarcoma

Linfoma

Carcinoma de células escamosas

Melanoma

Otra

6.Qué enfermedad autoinmune está asociada con lesiones orales precancerosas?

Asma

Lupus eritematoso

Enfermedad de Crohn

Artritis reumatoide

7.Cuál es el sitio más comúnmente asociado con el cáncer oral?

Paladar duro

Borde lateral de la lengua

Labio superior

Encía

8.Quién tiene mayor riesgo de desarrollar cáncer bucal?

Hombres

Mujer

Igualmente

9.Cuáles son los factores de riesgo del cáncer bucal?

Tabaco

Alcohol

Virus del papiloma humano

Mala higiene bucal

Otra

10.Qué virus está asociado con el cáncer oral y orofaríngeo?

Virus del papiloma humano

Virus del herpes simple

VIH

Virus de Epstein-Barr

11.Qué signo es una alerta temprana del cáncer bucal?

Úlcera que cicatriza en 2 días

Dolor de muelas

Úlcera indolora que dura más de 2 semanas

Sangrado de encías

12.Qué debe hacer un dentista si la lesión persiste después de 2 semanas?

Espera y verás

Administrar antibióticos

Remitir al paciente o tomar una biopsia

Ignorar si no es doloroso

13.La detección temprana del cáncer bucal puede

Mejorar las tasas de supervivencia

No hagas ninguna diferencia

Aumentar el coste del tratamiento

Prevenir todos los cánceres

14.Cuál es la tasa de supervivencia aproximada cuando se detecta tempranamente un cáncer bucal?

30%

50%

80%

100%

15.¿Revisas rutinariamente la mucosa oral durante los exámenes dentales?

Nunca

A veces

A menudo

Siempre

16.Se siente seguro al identificar una lesión oral sospechosa?

Si muy seguro

Si pero no estoy seguro

No precisamente

De nada

17.Quién cree usted que es el principal responsable de detectar precozmente el cáncer bucal?

Médicos

Los propios pacientes

Dentistas

Enfermeras

18.Ha recibido alguna formación sobre la detección del cáncer bucal?

Sí, teoría y práctica.

Sí, teoría

No

19.Crees que la educación que has recibido sobre el cáncer bucal es suficiente?

SI

No

No estoy seguro