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## RESEARCH ARTICLE

### Knowledge and Awareness of Oral Mucosal Diseases Among Saudi Dentists

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#### Abstract:

#### Background:

Oral mucocutaneous lesions have a significant impact on patient care. Late diagnosis of oral lesions may affect patients' quality of life and prognosis. Dentists are usually the first to encounter such lesions, and many studies have explored the knowledge and management related to oral cancer. However, not many studies have examined a more comprehensive understanding and management of oral lesions, including infectious and autoimmune/immune-mediated diseases.

#### Aims:

This study aimed at evaluating dentists' knowledge and referral patterns regarding oral mucocutaneous diseases.

#### Methods:

A questionnaire-based cross-sectional study was conducted to evaluate dentists' knowledge about oral mucocutaneous diseases and referral patterns among Saudi dentists. A total of 301 participants were included in the study. It was voluntary and written informed consent was obtained from the participants. A Chi-square test was used to compare the categorical variables. A p-value of less than 0.05 was considered statistically significant.

#### Results:

A total of 301 participants responded. Significant differences were observed between genders when asked about being comfortable with treating oral mucosal lesions in their practice (p-value: .019), and males were more convenient than females. A significant difference (p-value: .011) was observed between different educational levels when the participants were asked about the management of patients with oral mucosal lesions. Overall, the majority of participants rarely or never managed oral lesions. When comparing the different groups of participants, postgraduate residents responded more accurately (p-value: .007). Approximately 60% of all participants did not or rarely managed oral lesions in their practice.

#### Conclusion:

It was found that there was a lack of knowledge among dentists regarding the detection and treatment of oral mucosal lesions. This lack of knowledge can lead to unfavorable patient care and prognosis outcomes.

**Keywords:** Oral mucosal, Disease, Autoimmune disease, Dentist, Cancer, Oral cavity.

#### Article History

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## 1. INTRODUCTION

Mucocutaneous disease involving the oral cavity is frequently encountered in dental practice. Raising both knowledge and awareness among dental practitioners regarding

different oral lesions that they may encounter will improve patient care. Common causes of mucosal disease include infectious, autoimmune/immune-mediated processes, and neoplasia. Oral mucocutaneous diseases (OMDs) triggered by underlying autoimmune/immune-mediated processes include lichen planus, pemphigus vulgaris, mucous membrane pemphigoid, and systemic lupus erythematosus, and delayed hypersensitivity processes, such as erythema multiforme [1].

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OMDs do not always involve oral sites exclusively and may include extraoral sites, such as the skin or eyes with an increased associated morbidity/mortality, indicating the importance of obtaining an early diagnosis. Malignancies are often missed in the early stages involving the oropharynx and oral cavity, leading to a poor prognosis. The benefit of raising awareness and providing oral examinations is to provide an early diagnosis of oral potentially malignant disorders/lesions (OPMD), including leukoplakia, oral submucous fibrosis, and erythroplakia [2]. Specific habits have been associated with risk factors for OPMD, including, reverse cigar-smoking, areca nut chewing, and Shamma usage in different regions of the world [3, 4]. Human papillomavirus (HPV) has been linked to oropharyngeal cancers and includes sites, such as the soft palate and base of the tongue, that may be examined in a dental clinic. Overall it is clearly evident that oral manifestations vary, and clinical examination is important, as, in many situations, it may be the initial and only sign of disease and proper diagnosis should be based on a complete history, clinical examination, and necessary lab investigations.

In 2016, a study was conducted in Riyadh, Al-Yamamah Hospital, to determine the prevalence and distribution of oral mucosal lesions among Saudi female patients. The result of the study reported that lichen planus is the third most common disease with a prevalence rate of 11.08% after pyogenic granuloma and infections. The buccal mucosa is the most common site involved and is mostly presented as a reticular pattern [5]. Another study was published in 2001 measuring the incidence of pemphigus in the southern region of Saudi Arabia, and it was found to be 2.7/100 000 of the population [6]. In 2019, a systematic review assessing the prevalence of oral cancer in Saudi Arabia reported that the majority of oral cancer in Saudi Arabia ranged from 21.6% to 68.6%, with a high prevalence in Jazan (32.1% to 62.4%). High prevalence was thought to be due to Shamma usage, and a link has been established to oral leukoplakias involving the tongue, followed by the floor of the mouth and alveolar ridge [3, 7]. Another review published in 2018 indicated that gat usage was common in southern Saudi Arabia, particularly in Jazan. The prevalence of its usage was found to be 23.1% among university students, 38.5% among males, and only 2.1% among females. A link between gat usage and oral lesions, such as hyperkeratosis and oral cancer, was suggested. However, it requires further studies [3].

In 2009, a study was conducted in Istanbul, Turkey, analyzing dentists' knowledge about oral mucosal lesions and found that 85% of dentists had difficulties diagnosing oral mucosal lesions, 62% failed to update their knowledge from literature, and 93% did not undertake biopsies or consult other practitioners. Therefore, they concluded that most dentists experienced difficulties when trying to diagnose oral mucosal lesions [8]. A recently published study assessing knowledge, attitude, and practices in relation to oral squamous cell carcinoma among health care professionals in Princess Nourah University, Riyadh, KSA, indicated that both dental and medical practitioners were knowledgeable. Practitioners recognized risk factors; however, they acknowledged that lack of training was the main barrier to conducting a comprehensive oral examination for early detection [9]. Another study

assessing the prevalence of OPMDs among 3,142 dental patients at Boston University Henry M. Goldman School of Dental Medicine between July, 2013, and February, 2014, found that although OPMDs were not common, a thorough visual screening for OPMD was still important in detecting mucosal changes [10 - 15].

Dental practitioners play an essential role in the early diagnosis and management of oral lesions to prevent systemic progression and delayed treatment. Among dental health care workers, general dentists are more likely to be the first to encounter oral lesions. Accordingly, dentists should have working knowledge in order to identify and differentiate OMD's lesions [1]. Many studies have been performed assessing knowledge and attitude regarding oral cancer but few were found to assess a thoroughly comprehensive knowledge and awareness of oral lesions related to oral mucocutaneous diseases. This study aimed to evaluate dentists' knowledge and referral patterns regarding oral mucocutaneous diseases.

## 2. MATERIALS AND METHODS

A questionnaire-based cross-sectional study was conducted to evaluate dentists' knowledge about oral mucocutaneous diseases and referral patterns among Saudi dentists. Ethical approval was obtained from the Institutional Review Board at the King Saud University Medical City (KSUMC), reference number (E-21-6058). The sample included 301 participants, the study inclusion criteria included consultants, specialists, postgraduate students, general dentists, and interns working in Saudi Arabia. Dental students, oral medicine, and oral pathology postgraduate residents and practitioners were excluded from the study. Participation in the study was voluntary and written informed consent was obtained from the participants before completing the questionnaire. A self-administered closed-ended questionnaire was constructed. An expert panel reviewed the questionnaire for the relevance of the scientific content. After incorporating the changes, a pilot was conducted with a group of 15 participants for clarity and the ability to clearly understand what was being asked. The questionnaire content was divided into three sections. The first section included five items related to general demographic data (age, gender, years of experience since graduation, professional level, and working institute). The second section had six items about practice-related questions addressing whether they asked patients about oral habits, examining patients for mucosal lesions, management practices, and/or referral to necessary specialties. The third section had seventeen items of knowledge-related questions about oral mucosal diseases. The data were entered and analyzed with SPSS Version 23. A Chi-square test was used to compare the categorical variables. A P-value of less than 0.05 was considered statistically significant.

## 3. RESULTS

The survey was sent to 350 participants and an acceptable response rate of 86% was achieved for a total of 301 participants. Out of the 301 participants, n=152 (50.5%) were males and n=149 (49.5%) were females from different levels. The participants were grouped according to professional level as follows, dental interns n=47 (16%), general dentist n=155 (40%), graduate dentist n=47 (16%), specialist n=51 (18%),

and consultants n=27 (9%) (Table 1). The participants were further divided on the basis of years of experience, less than 5 years n= 201 (67%), 5-10 years of experience n=67 (22%), and more than 10 years of experience n=31 (10%) (Table 1). The comparison of survey responses on the basis of gender was achieved by a Chi-square value of significance <0.05. A statistically, significant difference was observed between

genders when asked about being comfortable with treating oral mucosal lesions in their practice (p-value: .019), where males were found to be more comfortable as compared to females. However, all other comparisons were not statistically significant showing that both males and females exhibited similar levels of knowledge, practice, and attitude towards the treatment of oral mucosal lesions (Table 2).

**Table 1. Demographic characteristic.**

Item		Male	Female	p-Value
Are you comfortable treating oral mucosal lesions in your practice?	Always Often Sometimes Rarely Never	13% 15% 34% 26% 13%	2% 17% 32% 31% 18%	.01
All oral mucosal lesions increase the risk of developing oral cancer.	Strongly agree Agree Neutral Disagree Strongly disagree	9% 29% 19% 33% 11%	3% 25% 24% 41% 7%	.18
The risk of getting oral mucosal lesions increases with age	Strongly agree Agree Neutral Disagree Strongly disagree	9% 53% 24% 11% 3%	9% 50% 26% 15% 0%	.31
Which of the following specialties will you most likely refer a patient to?	Oral medicine specialist Oral pathologist Periodontist Oral maxillofacial surgery Dermatologist Other ( )	63% 22% 6% 8% 0% 1%	56% 32% 6% 8% 1% 1%	.38
What do you think is the most likely cause of multiple persistent ulcers in different locations lasting for more than 2 weeks (with no obvious cause)?	Oral cancer Trauma Infection Autoimmune/Immune-mediated I do not know	25% 13% 16% 38% 8%	30% 11% 14% 34% 12%	.73
What do you think is the most likely cause of chronic multiple lesions in the oral cavity for a patient with a history of taking multiple medications?	Oral potentially malignant disorder Trauma Infection Autoimmune/Immune-mediated I do not know	10% 2% 13% 60% 16%	7% 3% 21% 55% 14%	.34
When is it necessary to request diagnostic investigations for a lesion?	At First Visit After 1 week After 2 weeks I do not know	27% 13% 52% 8%	17% 11% 64% 8%	.23
What do you think is the most likely cause of multiple recurrent ulcers involving multiple sites of the oral cavity in addition to crusting of the lips:	Oral potentially malignant disorder Trauma Infection Autoimmune/Immune-mediated I do not know	17% 10% 25% 34% 14%	11% 17% 21% 33% 18%	.38
A patient presented with multiple blistering oral ulcers in association with conjunctival and skin involvement, what is the most likely diagnosis:	Pemphigus vulgaris Mucous membrane pemphigoid Lichen planus Erythema multiforme I do not know	22% 17% 13% 25% 22%	17% 29% 11% 22% 21%	.31
Lack of confidence is a barrier to managing oral lesions:	Strongly agree Agree Neutral Disagree Strongly disagree	42% 34% 17% 3% 3%	40% 42% 14% 4% 0%	.24

Table 2. Comparison based on gender.

Item		Dental Intern	General Dentist	Postgraduate Student	Specialist	Consultant	p-Value
Do you examine all your patients for oral mucosal lesions at every visit?	<b>Always</b> <b>Often</b> <b>Sometimes</b> <b>Rarely</b> <b>Never</b>	29% 22% 22% 24% 2%	26% 11% 39% 20% 4%	21% 29% 24% 21% 6%	46% 20% 22% 10% 2%	49% 17% 30% 0% 4%	0.05
If yes, then which of the following habits do you ask about?	<b>Smoking</b> <b>Alcohol</b> <b>Smokeless tobacco</b> <b>Shamma</b> <b>Gat</b> <b>Other</b>	90% 0% 8% 3% 0% 0%	89% 1% 4% 0% 1% 4%	88% 3% 3% 3% 0% 3%	80% 0% 5% 0% 0% 15%	83% 0% 4% 0% 0% 13%	.44
Do you manage patients with oral mucosal lesions?	<b>Always</b> <b>Often</b> <b>Sometimes</b> <b>Rarely</b> <b>Never</b>	12% 7% 32% 29% 20%	2% 14% 43% 18% 23%	9% 12% 18% 44% 18%	19% 5% 21% 40% 14%	9% 17% 30% 26% 17%	.01
All oral mucosal lesions increase the risk of developing oral cancer.	<b>Strongly Agree</b> <b>Agree</b> <b>Neutral</b> <b>Disagree</b> <b>Strongly Disagree</b>	5% 29% 32% 32% 2%	8% 29% 17% 34% 12%	6% 15% 32% 41% 6%	7% 36% 12% 33% 12%	0% 9% 13% 65% 13%	.05
What do you think is the most likely cause of multiple persistent ulcers in different locations lasting for more than 2 weeks (with no obvious cause)?	<b>Oral Cancer</b> <b>Trauma</b> <b>Infection</b> <b>Autoimmune/Immune-mediated</b> <b>I do not know</b>	51% 10% 10% 22% 7%	26% 15% 2% 29% 8%	15% 6% 6% 59% 15%	26% 7% 12% 40% 14%	22% 13% 4% 52% 9%	.0
When is it necessary to request diagnostic investigations for a lesion?	<b>At First Visit</b> <b>After 1 week</b> <b>After 2 weeks</b> <b>I do not know</b>	15% 15% 66% 5%	26% 10% 54% 9%	18% 15% 62% 6%	38% 12% 48% 2%	4% 4% 74% 17%	.07
Which of the following conditions is desquamative gingivitis (erythematous, epithelial desquamation, and blister formation on the gingiva) associated with? (choose all that applies)	<b>Lichen planus</b> <b>Pemphigus vulgaris</b> <b>Mucous membrane pemphigoid</b> <b>Erythema multiforme</b> <b>I do not know</b>	16% 24% 15% 15% 30%	14% 23% 12% 25% 26%	16% 24% 15% 15% 30%	16% 24% 15% 15% 30%	16% 24% 15% 15% 30%	.01
A patient presented with multiple blistering oral ulcers in association with conjunctival and skin involvement, what is the most likely diagnosis:	<b>Pemphigus vulgaris</b> <b>Mucous membrane pemphigoid</b> <b>Lichen planus</b> <b>Systemic lupus erythematosus</b> <b>I do not know</b>	20% 46% 2% 24% 7%	18% 11% 17% 28% 26%	29% 29% 3% 12% 26%	17% 17% 24% 21% 21%	22% 22% 0% 26% 30%	.0
The frequent use of Shammah contributes to increased cases of oral cancer in Saudi Arabia?	<b>Strongly Agree</b> <b>Agree</b> <b>Neutral</b> <b>Disagree</b> <b>Strongly Disagree</b>	29% 37% 17% 17% 0%	29% 41% 20% 5% 5%	56% 32% 9% 0% 3%	48% 36% 14% 2% 0%	22% 57% 17% 4% 0%	.01

The comparison of survey responses on the basis of participants' qualifications/work designations showed a statistically significant difference when the participants were asked about the management of patients with oral mucosal lesions (p-value: .011), to which specialists responded 'always' higher than the other sub-groups. Significant differences were also seen when the participants were asked about the most likely cause of multiple persistent ulcers in different locations lasting for more than 2 weeks (with no obvious cause), to which 15% of the postgraduates responded with 'I don't know'

and was the highest when compared to other sub-groups (p-value: .007). Moreover, statistically significant differences were also seen when the participants were asked about the association of desquamative gingivitis with various oral mucosal lesions (p-value: .018), diagnosis of a patient with multiple blistering oral ulcers (p-value: .000), and whether frequent use of Shammah contributes to increased cases of oral cancer in Saudi Arabia (p-value: .018). The remaining questions did not show any statistically significant differences as their p-values exceeded 0.05 (Table 3).

**Table 3. Comparison based on professional level.**

Variables	Levels	Total N (%)
Gender	Male	152 (50.5)
	Female	149 (49.5)
Professional level	Dental intern	47 (16)
	General dentist	155 (40)
	Postgraduate student	47 (16)
	Specialist	51 (18)
	Consultant	27 (9%)
Years of Experience	Less than 5 years	201 (67)
	5-10 years	67 (22)
	More than 10 years	31 (10)

**4. DISCUSSION**

This study aimed to determine the knowledge of Saudi dental practitioners about lesions associated with the oral mucosa and to correctly apply knowledge while referring patients for treatment. It was noticed from our findings that approximately 30% of dentists always examined patients for oral lesions, which raised concern as a late diagnosis will ultimately lead to increased morbidity/mortality in many cases. Additionally, the majority of all our participants responded to never or rarely managing oral lesions. The main barrier to performing examinations and managing lesions was found to be a lack of training and knowledge, followed by a lack of confidence. Hashim *et al.* (2018) conducted a similar study and also found that dentists might avoid performing mucosal screening and reported that lack of training and confidence were also considered obstacles. These findings further support the need of providing more effective post-graduate scientific activities, such as hands-on workshops and web-based seminars. It is expected that dental practitioners will become more confident and provide a more comprehensive oral examination if they were competent in using adjunctive diagnostic methods, in addition to an improved understanding of associated conditions of oral disease. The combined knowledge and skill should lead to a constructive initial working differential diagnosis for oral lesions.

Overall, no differences were found between males and females in detecting oral mucosal lesions except males were found to be more comfortable in the diagnosis. Similar to our findings, another study reported that females were found to have lower confidence levels in diagnosing and treating oral mucosal lesions [16]. Moreover, specialists were found to be more willing to manage oral mucosal lesions as compared to consultants. This may be attributed to the fact that they recently graduated and still retain knowledge from undergraduate education and residency training in comparison to consultants who have been practicing within an area of expertise and would not feel comfortable managing lesions that are out of their scope of practice. Furthermore, when the participants were asked about the most likely cause of ulcers persisting for more than 2 weeks, postgraduate students reported more accurate responses compared to other groups. Approximately 30% of all participants did not know the possible causes of desquamative gingivitis. Since the oral cavity may be the first sign of many systemic diseases, including autoimmune/immune-mediated diseases, before progressing to

other extraoral sites, the delay may lead to an unfavorable diagnosis affecting patient prognosis and quality of life [17]. A study completed in Lebanon to evaluate the knowledge and behavior of dentists toward oral lichen planus found that 56.5% of dentists did not know diagnostic criteria and that it may affect other parts of the body like skin and nails [18]. Continuous education activities would be an effective method of narrowing the gap between the different groups by serving as refresher courses of already learned information during undergraduate years and lead to improved differential diagnosis and management.

As previously mentioned, we found that approximately 30% of our participants always examined the oral cavity for mucosal lesions, and around 55% of dentists revealed that they always asked their patients about habits related to tobacco, alcohol, or Shamma, which is much lower than the study that was done by Khatri *et al.* (2015). Their study reported that among the subjects, approximately 58% of dentists performed comprehensive oral examinations of the oral cavity even if the patient requested specific treatment. Among patients with suspicious oral lesions, 80.8% of dentists asked about oral habits, tobacco use, alcohol intake, and lifestyle, and advised the patients to seek help if they were addicted. As for oral cancer detection, 83.84% of respondents were aware that it could be seen as a painless nonhealing mouth ulcer or white or red-colored lesion/patch [12].

Our study results found that there was no difference observed between genders regarding knowledge and the ability to diagnose oral mucosal lesions, although a comparison between interns' and general dentists' responses showed that interns answered more correct answers than general dentists to questions related to the diagnosis of oral mucosal lesions. Similar results were reported in a study that was conducted at Ajman University; the results revealed that among interns as well as general practitioners, there were no differences between males and females in their capacity to identify and detect correct answers, while according to educational level, dental interns gave the highest proportion of correct responses (52.5%), followed by general dentists (51.9%) and final year students (44.1%). This may be attributed to the difference in clinical settings where final year students usually manage patients in a limited specialty-oriented manner, while interns manage patients in a more comprehensive manner. When comparing interns to general dentists, interns are more likely to have more retained information than general dentists who are

likely to forget fundamental knowledge with time. In addition, interns will be more likely to study for licensing exams that require intensive studying. These findings further highlight the need for continuous education activities. Moreover, the authors of their study concluded that the respondents did not have capable diagnostic abilities in identifying mucosal changes in relation to clinical appearances [13].

Another study found that the majority of participating dentists had low to moderate scores concerning expertise regarding diagnostic criteria and risk factors of oral cancer. Conversely, they were found to be more well-informed about risk factors than diagnostic criteria. Recently, graduated dentists have shown a higher level of knowledge about risk factors whereas those with more experience exhibited the highest score of overall knowledge. Even though nearly all the dentists approved that oral cancer assessment is useful in early detection, the majority did not apply it, and around 25% of them did not know how to do it [14]. However, in our study, participants' knowledge was significantly higher among experienced dentists as compared to fresh graduates.

Another study that was done in Al-Kharj revealed that males had slightly superior knowledge when compared to females, but this difference was negligible. They also reported that the time of graduation and dentists' age had no considerable effect on their level of knowledge in contrast to our findings. Their research reported that the majority of dentists were unaware of common etiologic factors, high-risk sites, and what to investigate in the course of a regular checkup [15]. Overall, this study found that clinical findings associated with all types of oral lesions may go unnoticed by the clinician.

Limitations of this study included that survey studies are sometimes associated with participants being unconfident in providing answers. Second, the study subjects may not be fully aware of their reasons for any given answer because of a lack of memory of the subject.

## CONCLUSION

The overall level of knowledge among dentists regarding the detection of oral mucosal lesions is not limited to oral cancers only; it includes other oral lesions, such as immune-mediated diseases. This lack of knowledge can affect patient care and late diagnosis. Hence, it is critical to improve knowledge through continuing education courses and workshops covering oral lesions to provide a better clinical outcome and patient care.

## LIST OF ABBREVIATIONS

- OPMD** = Oral Potentially Malignant Disorders  
**HPV** = Human Papillomavirus

## ETHICAL STATEMENT

The ethical approval was obtained from the Institutional Review Board at the King Saud University Medical City (KSUMC), reference number (E-21-6058).

## CONSENT FOR PUBLICATION

Informed consent has been obtained from the participants involved.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

Not applicable.

## FUNDING

None.

## CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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Declared none.

## SUPPLEMENTARY MATERIAL

Supplementary material is available on the Publisher's website.

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