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A retrospective study on the evaluation, management, and outcomes of oral mucosal lesions in patients at the Oral Medicine Clinic

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Abstract

Oral mucosal lesions (OMLs) are prevalent across different populations worldwide, with varying frequencies in different regions. This study aims to evaluate the frequency of OMLs and analyse their distribution concerning age, gender, race, and systemic conditions. A retrospective cross-sectional study was conducted on patients who attended the Oral Medicine students' polyclinic, International Islamic University Malaysia, over a period of seven years. Data from a total of 85 patients were collected and analysed using descriptive statistical methods. The analysis included patient demographics such as age, gender, race, systemic diseases, as well as the types and sites of oral mucosal lesions (OMLs). OMLs were categorized into four main groups: ulcers, white lesions, infections, and others. Among the data collected from eighty-five patients, the prevalence of oral mucosal lesions was found to be higher in females than in males. The most common lesions were ulcers (65.9%), followed by infections (19.4%), white lesions (13.6%), and others (12.6%). Ulcers were predominantly found in individuals aged 15–30 years, whereas white lesions, infections, and other types were more frequent in the 31–60 age group. No significant association was found between systemic conditions and lesion types. Ulcers commonly appeared in multiple locations (37.5%), white lesions were most frequently found on the buccal mucosa (35.7%), infections were primarily observed on the hard palate (40.0%), and other lesions occurred most often on the labial mucosa (30.7%). Ulcers were the most prevalent type of oral mucosal lesions; however, no significant correlation was found between OMLs and systemic conditions.

Keywords: *evaluation, oral mucosal lesions, management, retrospective*

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Introduction

The oral mucosa consists of three distinct parts: the masticatory mucosa, which includes the gingiva and the hard palate; the specialized mucosa covering the dorsum of the tongue; and the oral mucous membrane lining the rest of the oral cavity (Newman *et al.*, 2018). Oral mucosal lesions (OMLs) refer to any abnormal changes in the surface, colour, texture, swelling, or integrity of the oral mucosa. These lesions can impact an individual's quality of life by causing difficulties in chewing, swallowing, and speaking due to symptoms such as burning, irritation, and pain (El Toum *et al.*, 2018).

An accurate and detailed description of an oral mucosal lesion (OML) is essential for its diagnosis and management, along with a brief patient history and clinical examination. The lesion should be documented based on the following ten characteristics look :

- size (length, width and height),
- number (single, multiple),
- outline (regular, irregular),
- surface (smooth, granular, verrucous, papillomatous, pebbly, cobblestone),
- base (pedunculated, sessile, nodular, dome-shaped),
- site (mucosal, intra-bony, dental),
- colour (red, pink, white, red-white combined, blue, purple, grey, yellow, black, brown),
- consistency (soft, hard, cheesy, firm, rubbery, fluctuant),
- origin acquired, non-acquired,
- morphology or clinical appearance primary lesions, secondary lesions) (Mortazavi *et al.,* 2019).

Although many OMLs are benign and do not require active treatment, some may present with significant pathology. Of particular concern are oral potentially malignant disorders (OPMDs), which have the potential to progress into malignancy (El Toum *et al.,* 2018).

However, epidemiological studies on oral mucosal lesions (OMLs) are still fewer than those on dental caries or periodontal diseases (Katiyar *et al.,* 2021). In the literatures, the prevalence of oral mucosa lesion in general population globally varies across different countries and areas, ranging between 10.8%-81.8% (Feng *et al.,* 2015; Chauhan *et al.,* 2018; Oivio *et al.,* 2020; Kansky *et al.,* 2018). This retrospective cross-sectional study aims to determine the frequency of oral mucosal lesions (OMLs) in patients who attended the Oral Medicine (OM) students' polyclinic at Kulliyyah of Dentistry (KOD), IIUM over a seven-year period, from January 2013 to December 2019. Additionally, the study evaluates the sites, types, management, and prognosis of OMLs, while also analysing their correlation with factors such as age, gender, race, and systemic conditions. Another objective is to establish a database of OML cases among patients visiting the OM clinic at KOD, IIUM. The OMLs in this study are classified according to Neville *et al,* (2018) in the Colour Atlas of Oral and Maxillofacial Diseases (Neville *et al.,* 2018) and are categorized into four groups: ulcerations, white lesions, infections, and others.

Materials and Methods

Study design

This study is a retrospective cross-sectional study design conducted among patients attending Oral Medicine (OM) Clinic, Kulliyyah of Dentistry, IIUM, within 7 years' duration starting from January 2013 to December 2019.

This retrospective cross-sectional study design was performed on patients attending Oral Medicine (OM) Clinic, Kulliyyah of Dentistry, IIUM, Kuantan, Pahang within 7 years' duration starting from January 2013 to December 2019. Prior to data collection, ethical approval was obtained from the International Islamic University Malaysia Research Ethics Committee (ID No: IREC 2020-014).

Sample size

Patient cases from the Oral Medicine (OM) poly Clinic at KOD, IIUM, between January 2013 and December 2019 were reviewed, and relevant data were extracted from patient records. The collected information included age, gender, race, chief complaint, history of the presenting illness, past medical history, smoking and tobacco use status, as well as the type, number, and location of oral mucosal lesions (OMLs). This data was systematically recorded in a data collection sheet.

The inclusion criteria for this study required a clear clinical and/or histopathological diagnosis of OMLs. Patients with incomplete or missing relevant information in their records were excluded from the study. The

classification of OMLs followed the system outlined in Neville *et al*., 2018) in the Colour Atlas of Oral and Maxillofacial Disease.

Data and statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) 25.0 software (SPSS Inc., Chicago, IL, United States). The collected data were analysed by using descriptive statistical analysis which includes the details of the patients such as age, gender, race, systemic disease, types and sites of oral mucosal lesions.

Results

This retrospective study explores the prevalence of oral mucosal lesions (OMLs) among patients attending the Oral Medicine (OM) poly Clinic at KOD, IIUM, Kuantan, over a seven-year period. A total of 85 patient records, from an initial 105 cases, met the inclusion criteria and were analysed. Among these patients, 55 (64.7%) were female, while 30 (35.3%) were male. The age range of the patients was between 11 and 74 years, with a mean age of 33.40 ± 15.743 years.

The majority of the sample falls within the age range of 15–30 years (n=49, 57.6%), followed by the 31–60 age group (n=29, 34.1%). A smaller proportion of patients belong to the age groups of under 15 years (n=1, 1.2%) and 60 years and above (n=6, 7.1%).

Over the seven-year study period (2013–2019), a total of 105 patients with oral mucosal lesions (OMLs) attended the Oral Medicine (OM) Clinic at KOD, IIUM. However, only 85 patients met the inclusion criteria and were included in the analysis. The demographic data, medical histories, and medication histories of the patients are presented in Tables 1 and 2.

Regarding systemic conditions, 9.4% of patients reported allergies (e.g., food allergies to seafood and nuts, latex allergy), 4.7% had hypertension, 1.2% had diabetes, 5.9% had asthma, and 2.4% had blood disorders such as anaemia and G6PD deficiency. Other conditions, including bronchitis, psoriasis, and scoliosis, were observed in 4.7% of patients, while 16.5% had multiple comorbidities such as hypertension, diabetes, hypercholesterolemia, thyroid disorders, and gout (Table 2).

In terms of medication use, 4.7% of patients were on antihypertensive drugs, 1.2% on antidiabetic medications, 2.4% on vitamins, 3.5% on anti-asthmatics, and 2.4% on anti-inflammatory drugs. Additionally, 14.1% of patients were taking multiple medications, and 3.5% were using other drugs such as oral contraceptive pills (Table 2).

For analysis, the study categorized OMLs into four subgroups: ulcerative lesions, white lesions, infections, and others (Table 4). Among these, ulcerative lesions were the most common, accounting for 54.4% of cases, followed by infections (19.4%), white lesions (13.6%), and other types of lesions (12.6%) (Table 3).

The distribution of types of oral mucosal lesion according to age groups as shown in Figure 1. The analysis showed a significant statistical difference between age-ulcer groups (p=0.000) and between age-infection groups (p=0.000). Ulcers are more prevalent in 15-30 year old (82%), whereas infections mostly occur in patients aged between 30-60 year old (70%) (Table 5).

Table 1. Demographic data of the patients attending OM Clinic, KOD IIUM.

Variables		*n*=85 (100%)
Age groups	Mean ± SD years, (range)	33.40 ± 15.7 (11-74)
	<15 years old	1 (1.2%)
	15 – 30 years old	49 (57.6%)
	31 – 60 years old	29 (34.1%)
	>60 years old	6 (7.1%)
Gender	Male	30 (35.3%)
	Female	55 (64.7%)
Race	Malay	79 (92.9%)
	Indian	1 (1.2%)
	Chinese	3 (3.5%)
	Other	2 (2.4%)
Systemic disease	Presence	38 (44.7%)
	Absence	47 (55.3%)

Table 2. Patients' medical and medications history (n=85).

	Frequency	Percentage (%)
Medical history		
Allergy	8	9.4
Hypertension	4	4.7
Diabetes	1	1.2
Asthma	5	5.9
Blood disorder	2	2.4
Other diseases	4	4.7
Multiple diseases	14	16.5
Medications		
Antihypertensives	4	4.7
Antidiabetics	1	1.2
Vitamins	2	2.4
Anti-asthmatics	3	3.5
Anti-inflammatories	2	2.4
Multiple medications	12	14.1
Others	3	3.5

Table 3. Distribution of types of oral mucosal lesion.

Type of lesions	Frequency	Percentage (%)
Ulcers	56	54.4
White lesions	14	13.6
Infections	20	19.4
Others	13	12.6
Total	103	100.0

Table 4. Distribution of types of oral mucosal lesions.

Type of lesions	Frequency	Percentage (%)
Ulcers		
Minor RAU	25	24.3
Traumatic ulcer	21	20.3
Minor RAU & traumatic ulcer	10	9.8
Total	56	54.4
White lesions		
Nicotinic stomatitis	3	2.9
Geographic tongue	2	1.9
Leukoplakia	1	1.0
Lichen planus	2	1.9
Hairy tongue	1	1.0
Frictional keratosis	3	2.9
Smoker's keratosis	1	1.0
Multiple	1	1.0
Total	14	13.6
Infections		
Angular cheilitis	3	2.9
Denture stomatitis	12	11.6
Pseudomembranous candidiasis	1	1.0
Herpetic stomatitis	1	1.0
Herpes labialis	1	1.0
Multiple	3	2.9
Total	21	20.4

Others		
Reactive edematous tissue	1	1.0
Denture induced fibrous hyperplasia	4	3.8
Fibroepithelial hyperplasia	2	1.9
Fibroepithelial polyp	1	1.0
Exfoliating cheilitis	1	1.0
Allergic cheilitis	1	1.0
Multiple	2	1.9
Total	12	11.6

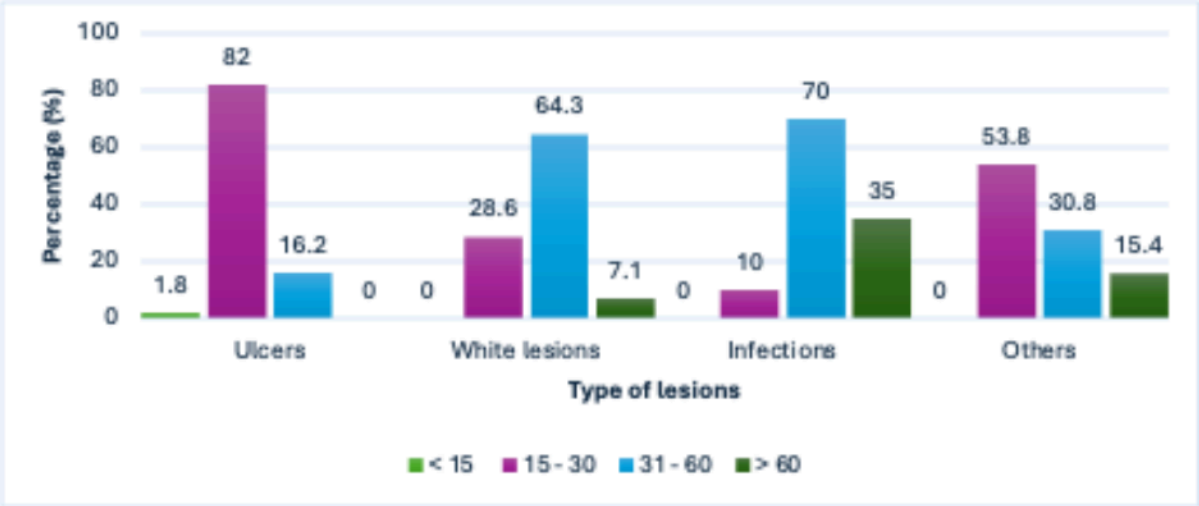

Figure 1. Distribution of types of oral mucosal lesion according to age range of patients

Table 5. Correlation between age groups and oral mucosal lesions

	Age groups *n* (%)				
	<15 years	**15-30 years**	**31-60 years**	**>60 years**	***p*-value‡**
Ulcers	1 (1.8%)	46 (82.0%)	9 (16.2%)	0	0.000
White lesions	0	4 (28.6%)	9 (64.3%)	1 (7.1%)	0.062
Infections	0	2 (10.0%)	14 (70.0%)	7 (35.0%)	0.000
Others	0	7 (53.8%)	4 (30.8%)	2 (15.4%)	1.137

The distribution of oral mucosal lesions according to gender as shown in Figure 2. The prevalence of oral mucosal lesions in relation to gender did not show a significant difference except for white lesions group (p=0.010) which male has more prevalence of presence of white lesion compared to female (Table 6).

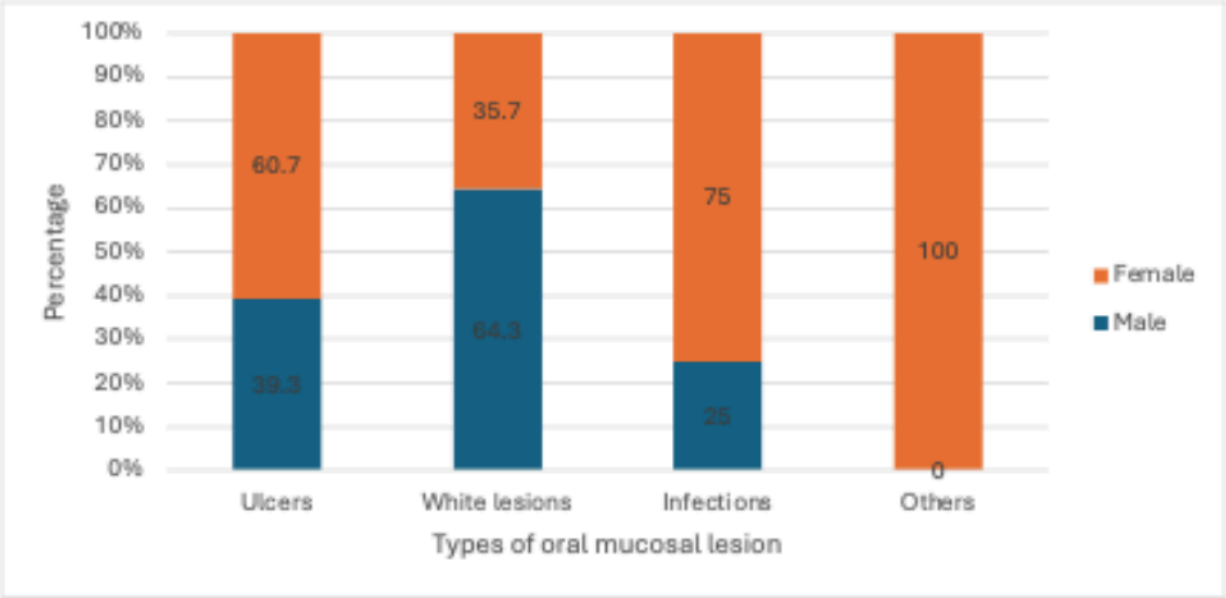

Figure 2. Distribution of types of mucosal lesion with genders.

Table 6. Correlation between gender and oral mucosal lesions.

	Gender *n* (%)		
	Male	**Female**	**p-value‡**
Ulcers	22 (39.3%)	34 (60.7%)	0.123
White lesions	9 (64.3%)	5 (35.7%)	0.010
Infections	5 (25%)	15 (75%)	0.496
Others	0	13 (100%)	0.537

‡Fisher's exact test

The correlation between OMLs and races and systemic diseases were not significant in this study because the sample does not represent the race distribution of the general population. Therefore, we did not include it in this study.

The distribution of oral mucosal lesions according to different sites of oral cavity was also recorded as shown in the table 7. Among these 4 groups of lesions, for ulcers, it mostly occurs in multiple locations about 37.5% followed by labial mucosa (17.9%) and buccal mucosa (16.0%). For white lesions the result showed that buccal mucosa is the common site to occur (35.7%) and the least to appear on hard palate and ventral of tongue (7.1%). Meanwhile, for infection group, the result showed higher percentage of occurrence on hard palate (40.0%) compared to other locations. For others, labial mucosa showed the most common site for lesion to occur which is about 30.7%.

Table 7. Distribution of oral mucosal lesions according to the locations.

		Frequency of OMLs, *n* (%)			
		Ulcers	**White lesions**	**Infections**	**Others**
Buccal mucosa		9 (16.0%)	5 (35.7%)	0	1 (7.7%)
Labial mucosa		10 (17.9%)	0	2 (10.0%)	4 (30.7%)
Hard palate		1 (1.8%)	1 (7.1%)	8 (40.0%)	2 (15.4%)
Tongue	**Dorsum**	0	3 (21.5%)	0	0
	Ventral	1 (1.8%)	1 (7.1%)	0	0
Floor of mouth		3 (5.4%)	0	0	0
Lips		5 (8.9%)	0	0	2 (15.4%)
Angle of mouth		0	0	3 (15.0%)	1 (7.7%)
Others (gingiva, alveolar ridge)		6 (10.7%)	3 (21.5%)	4 (20.0%)	2 (15.4%)
Multiple		21 (37.5%)	1 (7.1%)	3 (15.0%)	1 (7.7%)
Total		**56 (100.0%)**	**14 (100.0%)**	**20 (100.0%)**	**13 (100.0%)**

Discussion

The oral mucous membrane acts as the gateway to the human digestive system, and is often considered a reflection of both oral and general health (Goyal *et al.,*2016). Therefore, a thorough examination of the oral cavity is crucial for the early detection of various lesions that may arise. OMLs have diverse aetiologies including infections, local trauma or irritation, systemic diseases, autoimmune disorders and excessive consumption of tobacco, betel quid, and alcohol (Patel & Patel, 2011).

Understanding the prevalence and distribution of OMLs, as well as their association with factors such as age, gender, race, and systemic conditions, is essential for promoting primary prevention, effective management, and improved prognosis.

In the literature, epidemiological studies on oral mucosal lesions (OMLs) remain relatively scarce compared to reports on dental caries and periodontal diseases. In relation to general population, studies have reported the prevalence of OMLs have been reported 10.8% in China, 9.7% in Malaysia, 15.5% in Turkey, 25% in Italy 4 and 61.6% in Slovenia (Feng *et al.,* 2015; Zain *et al.,*1997; Cebeci *et al.,* 2009; Al-Mobeeriek & AlDosari, 2009). Studies have reported the presence of these lesions in 15% of dental patients in Saudi Arabia and 41.2% in India (Kovac-Kovacic & Skaleric, 2000; Mathew *et al.,* 2008).

Additionally, the prevalence of oral lesions has been documented across various countries, including Lebanon, Kashmir, and India (El Toum *et al.,* 2018; Patel & Patel, 2011). In Malaysia, population-based prevalence surveys on OMLs are limited but highly valuable, as they can provide an

accurate description of the epidemiology of OMLs in that area. While previous studies in Malaysia have been conducted, most have focused on specific groups of subjects (Taiyeb *et al.,*1995; Al-Maweri *et al.,* 2013) .To our knowledge, this is the first study to present epidemiological data on the prevalence and distribution of OMLs among the Kuantan population.

Regarding race and tobacco use, previous studies have shown a strong association between these factors and the prevalence and distribution of oral mucosal lesions (OMLs). However, in this study, the association between race, tobacco use, and the prevalence of oral mucosal lesions (OMLs) is less significant. This is primarily due to the sample size not accurately representing the racial distribution of the general population, making the findings prone to selection bias.

The majority of participants in this study were Malay (n=79, 92.9%). Out of 85 individuals, 75 (88.2%) had no history of tobacco use, while only 10 individuals (11.8%) reported either current smoking or a past smoking habit. A more extensive study with a larger population is necessary, as many studies have shown a strong positive association between smoking or tobacco use and the prevalence of oral mucosal lesions (OMLs) (Alshayeb *et al.,* 2019). One study also reported that 12.54% of total OML cases consisted of chemical burns, with 56.46% of those affected being cigarette smokers (Ain *et al.,* 2016).

The prevalence of OMLs was found to be higher among younger individuals compared to older ones, with the highest occurrence in the 15-30 age group, followed by the 31-60 age group. This trend is believed to be due to limited accessibility to dental services for older individuals in Kuantan, primarily because of physical and accommodation constraints. This result contradicts several studies. A study conducted in Lebanon found that the overall prevalence of OMLs was higher in the elderly than in younger age groups, attributing this finding to the habits of older individuals (El Toum *et al.,* 2018). Similarly, a study from Shanghai, China, supported this result (Feng *et al.,* 2015). However, a study conducted in the UAE reported no significant difference in OML prevalence based on age (Alshayeb *et al.,* 2019) . Additionally, this study found that the prevalence of OMLs was significantly higher in females than in males across all types, except for white lesions, which were more predominate in males.

Conversely, a study by (El-Hamd & Aboeldahab, 2018) found that OMLs were more common in men (52.8%) than in women (47.2%). This study attributed its findings to the higher prevalence of smoking among male participants (Ain *et al.,* 2016). While some studies reported no significant difference in the distribution of OMLs between males and females (El Toum *et al.,* 2018; Alshayeb *et al.,* 2019; Feng *et al.,* 2015), this study also found no significant relationship between systemic diseases and OML prevalence. This contradicts several previous studies that suggested a strong association between OML formation and systemic diseases (El Toum *et al.,* 2018) .This finding underscores the variability in the relationship between oral mucosal lesions (OMLs), gender, and systemic health across different populations. The absence of a significant association with systemic diseases in this study contrasts with earlier research, indicating that other factors such as genetics, lifestyle, and regional healthcare practices may have a greater influence on OML prevalence. Moreover, systemic diseases contribute to OMLs in two key ways: through direct oral manifestations of the disease and as side effects of medications prescribed for treatment. The dosage and duration of these medications should be carefully adjusted and monitored to minimize such complications. Further large-scale, well-controlled studies are essential to resolve these discrepancies and better understand the contributing factors. In this study, ulcers (54.4%) were the most common type of OML, followed by infections (19.4%), white lesions (13.6%), and other types (12.6%). Most participants had only one OML, although some exhibited multiple lesions simultaneously.

This study concluded that aphthous ulcers were the most frequently observed oral mucosal lesions, a finding supported by several previous studies (Goyal *et al.,* 2016; El-Hamd, & Aboeldahab, 2018; Amadori *et al.,* 2017; Verma *et al.,* 2019). Additionally, aphthous ulcers was found to be the most common lesions in their study, with prevalence rates of 44.5%, 14.68%, 18%, 22.4%, and 44.5%, respectively. Among all subjects diagnosed with aphthous ulcers, all cases were minor recurrent aphthous ulcers (RAU), with no instances of major or herpetiform types. Despite RAU being highly prevalent, its exact aetiology remains unknown.

Several predisposing factors have been associated with RAU, which can be categorized into three groups: antigenic sensitivity, thinned mucosa, and immune dysregulation (Neville *et al.,* 2018). Besides, a study that has been done mentioned that some possible factors associated with RAU which are allergic, local trauma, genetic, nutritional deficiencies, hematologic abnormalities, hormonal influence, infections and stress (Avci *et al.,* 2014). Furthermore, a study has identified various potential factors associated with RAU, including allergies, local trauma, genetic predisposition, nutritional deficiencies, hematologic abnormalities, hormonal influences, infections, and stress (Neville *et al.,* 2018). However, these factors have limited supporting evidence and require further investigation to establish a definitive correlation with RAU.

In this study, the majority of RAU patients were in the younger age group (15–30 years old), with prevalence decreasing as age advanced. This finding is supported by a study conducted by (Goyal *et al*., 2016). A cross-sectional study in Italy, which evaluated a large sample of adolescents and analysed the medical records of 6,374 participants (mean age 15.2 ± 1.7 years), revealed that recurrent aphthous stomatitis (RAS) was the most common type of OML observed among teenagers (n=278, 18%). The study also reported that females had a higher predisposition to RAS compared to males, aligned with our findings (Amadori *et al.,* 2017). This study showed that females have a higher predilection to RAU compared to males, a finding supported by several studies (Goyal *et al.,* 2016, Jabbar *et al.,* 2018).

The second most common lesion identified was traumatic ulcer, aligning with a study by Amadori *et al,* (2017) which reported that traumatic lesions were the second most frequently detected (14.3%), following recurrent aphthous stomatitis (RAS) (18%). Similarly, a study by Ali *et al*., (2013) found that traumatic ulcers were the most common ulcerative lesions, followed by recurrent herpes and aphthous ulcers (Ali *et al.,* 2013). Additionally, Amadori, *et al.,* reported that among 1544 adolescents, 36 types of oral mucosal lesions (OMLs) were detected, with aphthous ulcers being the most prevalent (n = 278; 18%), followed by traumatic ulcerations (n = 221; 14.3%) (Amadori *et al.,* 2017).

Neville *et al,* (2018) has also highlighted that traumatic ulcers can result from mechanical, chemical, or thermal injuries, with mechanical trauma being the most common cause. Furthermore, infections and white lesions were more frequently observed in older age groups. RAU and infections showed a higher prevalence in females, whereas white lesions were more common in males, possibly due to differences in oral hygiene habits. Notably, the incidence of RAU appeared to be lower in smokers compared to non-smokers (Jabbar *et al.,* 2018).

The third most common lesion identified was infections, specifically denture stomatitis (n=12, 14.1%). This condition was significantly more prevalent in the older age group, with the highest occurrence among individuals aged 31–60 years. It predominantly affected females, with the hard palate being the most common site.
These findings are supported by a study which reported that denture stomatitis is more common in females than in males, with a mean age of 54.00 ± 3.46 years (El-Hamd & Aboeldahab, 2018).

However, this study is limited by its retrospective nature, which may introduce information and classification biases, restricting the universality of the results. Future studies should include a larger sample size with a more diverse population to ensure more accurate and representative findings.

Conclusion

In conclusion, the prevalence of oral mucosal lesions varies depending on the general population of the studied areas and the authors' research focus. This study found that the most common type of oral mucosal lesions (OMLs) presented at the OM Clinic, KOD IIUM, were ulcerative lesions, followed by infections, white lesions, and other conditions. Ulcers were predominantly observed in younger adults, whereas white lesions, infections, and other conditions were more common in older patients. Among all these categories, ulcers were most frequently found in multiple locations within the oral cavity, including the buccal mucosa, labial mucosa, palate, tongue, and floor of the mouth.

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