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## The prevalence correlation between oral mucosal lesions and systemic diseases in the elderly Libyan population: A single-centre study

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### Abstract

**Background:** Age has an important influence on the prevalence of oral mucosal lesions (OMLs). OMLs could be due to infection, local trauma or cultural and lifestyle factors such as tobacco, betel quid, or alcohol consumption. The prevalence of OMLs is an important parameter for evaluating the oral health of any population.

**Objective:** This study aimed to evaluate the prevalence of the correlation between OMLs and systemic diseases (SDs) in the sample of the elderly Libyan population.

**Material and Methods:** A descriptive cross-sectional study was conducted with a random sample of 232 geriatric Libyan patients. Intraoral mucosal clinical examination was performed on new patients seen in the period from June 2024 to February 2025. The collected data were processed by Statistical Package for Social Sciences (SPSS®, version 24.0, IBM®) and Stata/SETM 11.1 statistical software.

**Results:** The prevalence of OMLs was 71.1%, and the most common OML was fissured tongue (FT). The most common systemic disease (SD) was diabetes mellitus (DM). A burning sensation was observed in 20 cases (12.1%). There was a significant association between OMLs and SDs.

**Conclusion:** The prevalence of OMLs was notably high. The most common OML identified was FT, followed by angular cheilitis (AC), which decreased with age. The most prevalent SD was DM. A significant association exists between OMLs and SDs.

**Keywords:** Prevalence correlation, oral mucosal lesions, burning sensation, systemic diseases, elderly Libyan population

### Introduction

The oral mucosa acts as a barrier to trauma, infections, and carcinogenic substances [1]. The oral mucosa undergoes epithelial and connective tissue changes with age, which can lead to neoplastic and non-neoplastic diseases in the oral cavity [2]. Historically, the World Health Organization (WHO) has defined the elderly in developing countries as those aged 60 years or older [3]. The UN's World Social Report 2023 predicts that the population aged 65 and over will grow from 761 million in 2021 to 1.6 billion by 2050 [4]. The fast growth of this portion of people will impact the practice of dentistry [5].

Previous studies show that OMLs affect 10.8% and 81.3% of the general population [6]. The incidence of OMLs is greater in older persons than younger ones [7]. The prevalence of OMLs varies globally based on factors like skin colour, sex, oral cancer risk exposure, general health, and diagnostic criteria [8]. OMLs had a greater impact on women than on men [9]. Infections, local trauma [10], and lifestyle variables such as tobacco, betel quid, or alcohol intake can all lead to OMLs [11]. OMLs are most commonly associated with denture-related lesions such as stomatitis, AC, ulcers, and hyperplasia [12]. Additionally, a variety of medical conditions and drugs aggravate the damage and have negative impacts on oral health and functions [13].

As individuals age, they become more susceptible to common diseases such as DM, hypertension, rheumatoid arthritis, Alzheimer's disease, Parkinson's disease, and depression [14]. Elderly individuals' lifestyles and quality of life are directly impacted by their general and oral health [15].

Recognition and management of these OMLs are essential to complete oral health care for the elderly [16]. Dentists and healthcare professionals face challenges in treating and diagnosing older patients with systemic and oral disorders [17]. OML prevalence is crucial for assessing community oral health and planning oral health care strategies [18]. However, few studies still deal with the diagnosis and prevalence of OMLs in geriatric dental patients [19].

**Material and Method**

This cross-sectional study was conducted on elderly individuals at Dar-Alferdous Dental Clinic in Tripoli, Libya, from July 2024 to March 2025. Ethical clearance and informed written consent were obtained from all participants. Each participant underwent a thorough assessment of their medical history, dental history, age, and gender. The oral mucosa was examined for oral OMLs by two oral medicine specialists according to WHO guidelines to establish a final diagnosis. Descriptive statistics for OMLs and demographic variables were analyzed using IBM SPSS version 26. A Chi-square test was used to evaluate the relationship between OMLs and factors such as age, gender, burning symptoms, and associated systemic diseases. A *p*-value of less than 0.05 was considered statistically significant.

**Results**

The study was conducted on 232 geriatric Libyan participants, of whom 105 (45.3%) were males and 127 (54.7%) were females (Fig 1).

The elderly participants in this study ranged in age from 64 to 102 years, with an average age of 67.4 years and a standard deviation of 7 years. Based on their ages, the participants were divided into three groups: <70s, 70s, and > 79 years old. 165 cases (71.1%) of the 232 geriatric subjects in the study sample exhibited OMLs. FT 137 cases (83%) were the most common OMLs, followed by AC 35 cases (21.2%). The study found other miscellaneous OMLs among the participants. Specifically, there were 8 cases of gingivitis (4.8%) and 7 cases of median rhomboid glossitis (MRG) (4.2%). Traumatic ulcer (TU) and hairy tongue (HT) were reported in 5 cases each (3%). Additionally, there were 4 cases of each recurrent aphthous ulcer (RAU) and leukoplakia (2.4%), and 2 cases of benign migratory glossitis (BMG) and oral lichen planus (OLP) (1.2% each). Finally, fibroma, epithelial polyp (EP), Fordyce’s granules (FGs), candidiasis, tongue tie (TT), and sublingual varices (SLV) were each observed in 1 case (0.6%) (Table 1). It is worth noting that some participants were affected by more than one condition.

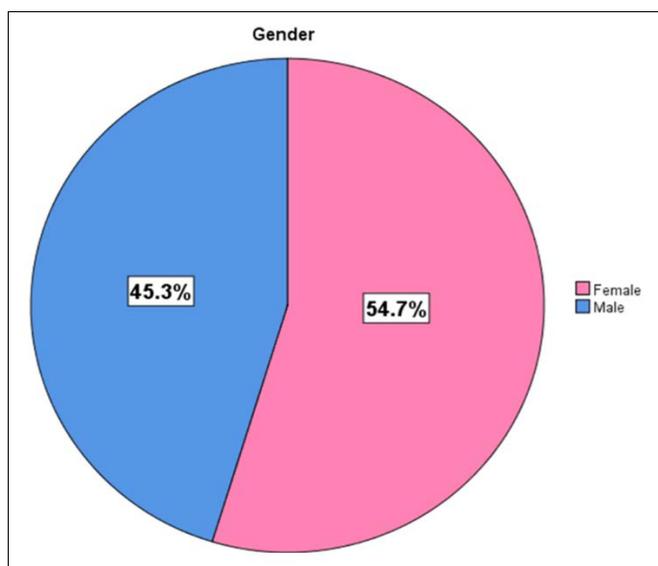
In the current study, there were 91 cases (55.2%) of OMLs observed in females and 74 cases (44.8%) in males, suggesting that females were more frequently affected by OMLs *p*-value 0.186 (Fig 2). The male-to-female ratio among individuals with OMLs in the sample was approximately 1:1.2.

In this study sample, the association between OMLs and age groups revealed that the most affected age group was those < 70 years old, accounting for 65.4% of cases. This was followed by individuals in their 70s, who represented 26.3%, and those aged 80 years or older, comprising 8.3%. (Fig. 3).

An association between OMLs and burning sensation (BS) symptoms was identified in 20 cases (12.1%). The BS most frequently associated with FT conditions in 16 cases (9.7%), followed by AC in 6 cases (3.6%), with a *p*-value of 0.105 (Table 2).

Out of 165 geriatric participants with OMLs, 129 individuals (78.2%) were found to have SDs. The most prevalent SD was DM, affecting 111 cases (67.3%). This was followed by hypertension in 57 cases (34.5%), heart diseases (HD) in 22 cases (13.3%), hypothyroidism in 4 cases (2.4%), and asthma in 1 case (0.6%) (Table 3).

A higher percentage of patients with SDs presented with FT. FT showed 94 cases of DM, 48 cases of hypertension and 17 cases of HD. AC reported 32 cases of DM, 10 cases of hypertension, and 6 cases of HD. Furthermore, other OMLs were observed, demonstrating 26 cases of DM, 11 cases of hypertension, and 5 cases of HD. (Table 4).



**Fig 1:** Pie chart illustrating the percentages of males and females in the entire study sample.

**Table 1:** Demonstrates the distribution and percentages of oral mucosal lesions

Oral Mucosal Lesions	Responses		Percent of Cases
	Number	Percent	
Fissured tongue	137	63.7%	83.0%
Angular cheilitis	35	16.3%	21.2%
Gingivitis	8	3.7%	4.8%
Median rhomboid glossitis	7	3.3%	4.2%
Traumatic ulcer	5	2.3%	3.0%
Hairy tongue	5	2.3%	3.0%
Fordyce's granules	1	0.5%	0.6%
Leukoplakia	4	1.9%	2.4%
Fibroma	1	0.5%	0.6%
Epithelial polyp	1	0.5%	0.6%
Candidiasis	1	0.5%	0.6%
Benign migratory glossitis	2	0.9%	1.2%
Recurrent aphthous ulcer	4	1.9%	2.4%
Tongue tie	1	0.5%	0.6%
Lingual varices	1	0.5%	0.6%
Lichen Planus	2	0.9%	1.2%

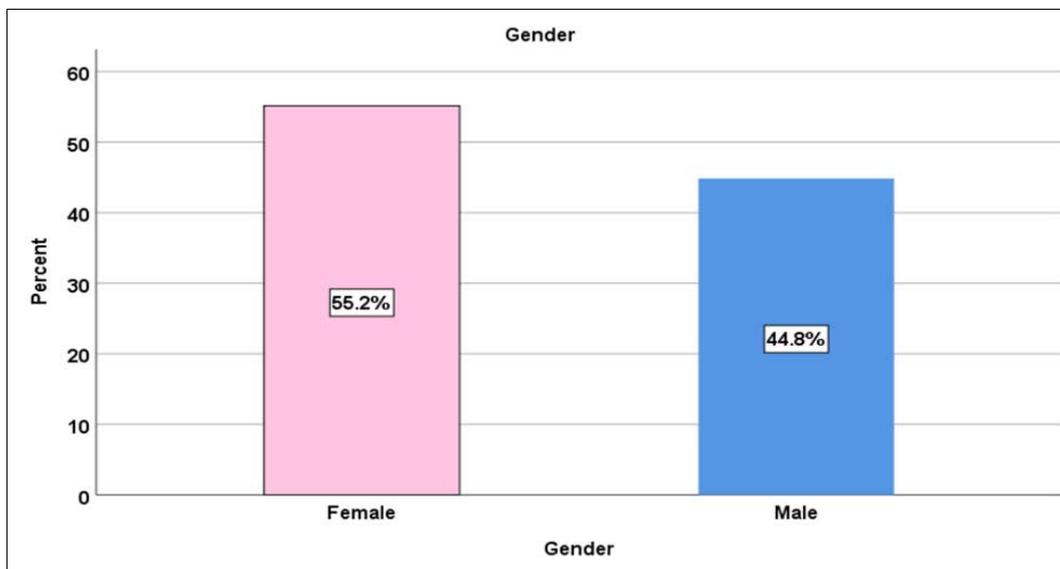


Fig 2: Bar graph demonstrates the prevalence of various oral mucosal lesions categorized by participant gender

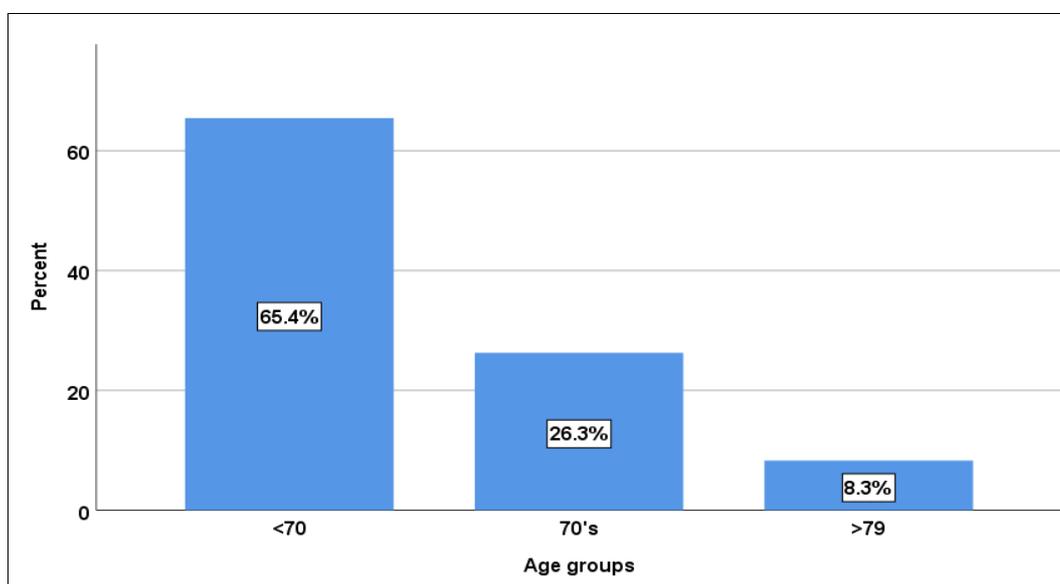


Fig 3: Bar graph shows the percentages of different oral mucosal lesions according to the age groups of the subjects

Table 2: Demonstrates Cross-tabulation of oral mucosal lesions with the absence and presence of burning sensation symptoms in the entire study sample

Oral mucosal lesions	Count & %	Symptoms		Total
		No	BS	
Fissured tongue	Count	121	16	137
	% of Total	73.3%	9.7%	83.0%
Angular Cheilitis	Count	29	6	35
	% of Total	17.6%	3.6%	21.2%
Gingivitis	Count	8	0	8
	% of Total	4.8%	0.0%	4.8%
Median rhomboid glossitis	Count	5	2	7
	% of Total	3.0%	1.2%	4.2%
Traumatic ulcer	Count	2	3	5
	% of Total	1.2%	1.8%	3.0%
Hairy tongue	Count	5	0	5
	% of Total	3.0%	0.0%	3.0%
Fordyce's granules	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%
Leukoplakia	Count	3	1	4
	% of Total	1.8%	0.6%	2.4%
Fibroma	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%
Epithelial polyp	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%

Candidiasis	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%
Benign migratory glossitis	Count	2	0	2
	% of Total	1.2%	0.0%	1.2%
Recurrent aphthous ulcer	Count	2	2	4
	% of Total	1.2%	1.2%	2.4%
Tongue tie	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%
Sublingual varices	Count	1	0	1
	% of Total	0.6%	0.0%	0.6%
Lichen Planus	Count	1	1	2
	% of Total	0.6%	0.6%	1.2%
Total	Count	145	20	165
	% of Total	87.9%	12.1%	100.0%

**Table 3:** Displays frequencies and percentages of systemic diseases in the study sample

Systemic diseases	N & %		Percent of Cases
	N	Percent	
No	36	15.6%	21.8%
Diabetes Mellitus	111	48.1%	67.3%
Hypertension	57	24.7%	34.5%
Cardiac patient	22	9.5%	13.3%
Hypothyroidism	4	1.7%	2.4%
Asthma	1	0.4%	0.6%
Total	231	100.0%	140.0%

**Table 4:** Demonstrates a significant correlation between oral mucosal lesions and systemic diseases *p*-value = 0.020

Systemic diseases	Oral mucosal lesions		
	Fissured tongue	Angular Cheilitis	Other oral mucosal lesions
	Count	Count	Count
No	29	2	11
Hypertension	48	10	11
Diabetes Mellitus	94	32	26
Heart disease	17	6	5

**Discussion**

This study aimed to evaluate the prevalence of OMLs and their correlation to SDs in the elderly Libyan population. The elderly population exhibited a high prevalence of OMLs [20]. Our study found that the prevalence rate of OMLs was 71%. This result is similar to that of Al-Maweri *et al.* (2015) [21], who conducted a study on 310 elderly Yemeni patients and reported a prevalence of 77.1% for OMLs. However, our findings differ from those of Rastogi *et al.* (2015) [22], who found that 58% of 400 elderly participants had OMLs, and our finding was also inconsistent with Choufani *et al.* (2020) [23], who reported that OMLs among 526 elderly Lebanese was 22.8%. The differences in prevalence may be influenced by geographic factors, age, gender, habits, medication use, and the denture wearer.

In the geriatric population, males are far more likely to experience OMLs than females [22]. In the current study, the gender distribution indicated that OMLs were more common in females (55.2%) than in males (44.8%), with no statistical significance, as the *p*-value was 0.186. This finding was consistent with Mujica *et al.* (2008) [9], who conducted a study on 340 patients and reported that 67% of the OMLs were in females and also was in line with Kaomongkolgit *et al.* (2019) [15] who conducted a study on 300 elderly dental patients and observed that the majority of the patients were female (52%), Female predominance might be attributed to more health awareness among women compared to men. Conversely, our finding was inconsistent with Yadav *et al.* (2018) [24], who conducted a study on 464 subjects and found that OMLs were more common among men (65%) than women and also inconsistent with Patil *et al.* (2015) [25], who reported a slight male preponderance, The higher prevalence

of bad oral habits among males compared to females may be a contributing factor.

Age significantly impacts the prevalence of OMLs in the elderly population [7]. Our research identified that individuals < 70 were the most affected, constituting 65.4% compared to the other age categories. OMLs were significantly different with the <70s age group *p*-value = 0.001. This finding was in agreement with Souza *et al.* (2015) [19], who found the most affected age group as those aged 60 to 68 years old and was also in agreement with Saintrain *et al.* (2011) [20], who found that the prevalence of OMLs was highest in the age group of 60 to 64 years old. Our finding was in disagreement with Bozdemir *et al.* (2019) [7], who reported that some of the OMLs have been identified in the 65-74 years age group in Germany and in disagreement with Rohini *et al.* (2020) [1], who reported that OMLs were more common in those aged 55 to 70 years. However, the current study indicated that the prevalence of OMLs generally decreases with advancing age. This decline may be related to lowered stress levels experienced during the late stages of older adulthood.

The BS symptom in the mouth commonly affects the tongue, particularly the tip and lateral borders, as well as the lips and palate [26]. In our study, the BS symptoms were observed in 12.1% of cases with OMLs and most commonly associated with FT at 9.7%, followed by AC at 3.6%, and statistically was not significant as indicated with a *p*-value of 0.105. These findings were supported by McCreary, Ríordáin (2011) [27], who noted that OMLs and orofacial pain can significantly impact older patients. This was similar to Sun *et al.* (2013) [26], who reported a 12% to 18% prevalence among elderly women experiencing a BS. In contrast, Ghalwash *et al.* (2024) [28] found a prevalence rate of 7.9% and stated that it occurs

more frequently in females aged 50 years and older.

Compromised oral health has been recognized as a risk factor for various systemic disorders [29]. In the current study, SDs represented 78.2% of patients with OMLs. DM was the most common SD, representing 67%, followed by hypertension at 34.5% and HD at 13.3% of the subjects with OMLs. This finding is in line with Madathil *et al.* (2020) [30], who reported that the prevalence of OMLs was significantly higher in patients with type 2 DM and This was inconsistent with Jadhav, Renukaradhya (2024) [31], who found that hypertension was the most common SD, followed by DM & HDs and was also inconsistent with Omidpanah *et al.* (2021) [32], who reported that the most common SD was hypertension. OMLs may indicate the initial presence of a SD or signify a recurrent or refractory disorder [33]. The present study revealed a statistically significant correlation between OMLs and SDs, shown by a *p*-value of 0.020. This finding was in line with Bozdemir *et al.* (2019) [7], who conducted a study on 709 patients and identified a highly significant relationship between the presence of OMLs and SDs (*P*=0.01). The study we conducted revealed that a higher percentage of patients with DM exhibited FT and AC, followed by hypertension about the same OMLs. This was in line with Madathil *et al.* (2020) [30], who found that FT was more prevalent in diabetic patients than non-diabetics when evaluating 800 participants. This might be explained by the increased prevalence of xerostomia in older diabetics.

AC is a prevalent form of candidal infection amongst elderly people [34]. Our finding demonstrated that Ac was the most common second OML in diabetic patients of the study sample, which was confirmed by Pandarathodiyil *et al.* (2021) [35], who stated that AC is frequently seen in diabetic patients, also consistent with Rahmi *et al.* (2019) [36], who observed that AC is common in elderly patients with DM with no previous experience of denture wearing.

## Conclusion

The study revealed a significant prevalence of OMLs among the elderly Libyan population, with FT and AC being the most frequent. Females were more likely to have OMLs, which decreased in occurrence with age. DM was the most prevalent SD among the elderly. The study found a significant association between OMLs and SDs in the elderly Libyan population, emphasizing the necessity for additional studies to detect and treat common oral and systemic concerns.

The study, the first of its type in Libya, focuses on the elderly's oral and SDs, intending to improve their overall health and quality of life.

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