



The prevalence of oral white lesions in patients referring to the Kerman (2006-2022)

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Abstract

Background: White oral mucosal lesions are among the most common lesions in dental patients. The aim of this study was to evaluate the prevalence of white mucosal lesions in patients referred to Kerman Dental School from 2006 to 2022.

Methods: This study was a retrospective cross-sectional study performed using the records of 2215 patients who referred to the oral diseases department of Kerman Dental School from 2006 to 2022. The records were reviewed, and the patients who were diagnosed with white lesions of the oral mucosa were selected. Then, a detailed history, including patient identification, complaints, duration of illness, personal habits (including addiction, past medical history, and familial history), was obtained. Patients' information, including age, sex, location of lesion, duration of lesion, clinical characteristics (including size, color, and surface specifications), and microscopic diagnosis, were extracted and were entered into the data entry forms. The collected data were analyzed using SPSS software version 20 by descriptive statistics (frequency, mean, and standard deviation), and the chi-square test was performed at a significance level of 0.05.

Results: In the present study, 463 (20.9%) patients had at least one type of white lesion. The most common white lesion was idiopathic lichen planus (ILP) with a prevalence of 57.5% (266 cases). Out of the 463 patients, 294 (63.5%) were female and 169 (36.5%) were male. There was a significant relationship between gender and lesions in ILP ($F > M$, $P = 0.001$), contact and drug lichen planus ($F > M$, $P = 0.006$), and oral cancer ($M > F$, $P = 0.006$). Finally, the most common site of involvement was the buccal mucosa.

Conclusion: The results of this study indicated that the most common lesion was lichen planus and the most commonly involved site was buccal mucosa. Also, most diagnostic concordance was found between the clinical and histopathologic diagnoses of lichen planus.

Keywords: White lesions, Oral mucosa, Lichen planus, Leukoplakia

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Introduction

The white appearance of the buccal mucosa may be caused by various factors. The buccal epithelium may be stimulated due to increased creatine production (hyperkeratosis), abnormal or benign thickening of the prickle-cell layer (acanthosis), or accumulation of intracellular and extracellular fluids in the epithelium. Microbes, in particular fungi, can produce white pseudomembranes, including exfoliated epithelial cells, fungal mycelium, and neutrophils, that are slightly attached to the buccal mucosa. A red lesion in the buccal mucosa can be caused by an atrophic epithelium, which is characterized by a decreased number of epithelial cells, increased dilation of blood vessels, or the proliferation of blood vessels.¹⁻³

Buccal mucosal lesions also appear with reticular, plaque-like, papular, or pseudomembranous tissue structures, affecting the clinical appearance of the lesions.³

Several conditions are manifested as white lesions in the mouth. Some of these conditions are considered

pre-malignant or associated with malignancy. When the etiology and diagnosis of white lesions are not clear, a definitive diagnosis requires histological examination of the lesion.⁴

Studies indicate that observing white lesions during an oral examination is not very uncommon. Most of them are practically harmless and do not require treatment, but a low percentage (approx. 4%) are probably dangerous and require follow-up and treatment. It should be ascertained whether a stimulus exists for the lesion formation or other reasons should be sought for the white lesion.^{4,5}

An accurate history should be taken during the examination, including such items as the duration of the injury, pain, history of trauma, smoking, alcohol use, non-smoking tobacco, and family and medical history. The clinical examination should also be all-inclusive, and the size, symmetry of the lesions, and the lesion site should be recorded in the patient's file.⁵⁻⁹

White lesions of the buccal mucosa are mainly important for two reasons. First, leukoplakia in this group



is the most common precancerous lesion of the buccal cavity. Second, oral white lesions are one of the clinical manifestations of oral cancer; therefore, differential diagnosis of oral white lesions is important. On the other hand, dysplastic changes may appear in the pathological appearance of oral white lesions, which is of paramount importance.^{6,10}

Therefore, considering the limited number of studies in the world, particularly in Iran, this study aimed to investigate the prevalence of oral white lesions in patients referring to Kerman Dental School from 2006 to 2022.

Materials and Methods

This cross-sectional descriptive and retrospective study aimed to evaluate the clinical-pathological features of white lesions of the buccal mucosa in patients referring to the Oral Diseases Department of Kerman Dental School from the beginning of 2006 to the end of December 2022.

First, all the files available from patients from April 2006 to the end of December 2022 in the archive of the oral diseases department in Kerman were evaluated. In this study, the sampling was done non-randomly by studying the available data and samples. To conduct this study, the existing files of patients who were clinically diagnosed with white lesions of the buccal mucosa, including leukoplakia, erythroleukoplakia, lichen planus, candida leukoplakia, etc., were selected and all the lesion and patient information was extracted.

The data collection tool consisted of three parts. Detailed history, including complaints, duration of the disease, personal habits (e.g., addiction), medical history, and family history. Moreover, patients’ information (age, gender, the involved site, duration of lesion, and clinical characteristics including size, color, and surface), along with microscopic diagnosis, were extracted from the files and entered into a form designed to collect information on the mentioned variables. All files were reviewed by a senior dental student who was provided with the necessary instructions.

The collected data were analyzed using SPSS software version 20 by descriptive statistics (frequency, mean, and standard deviation) and the chi-square test at a significance level of 0.05.

This study was performed on the archived files of patients referring to the oral diseases department and the forms were completed anonymously for all patients.

Results

In the present study, at least one type of white lesion was found in 463 (20.9%) out of 2215 files reviewed for patients referring to the department of oral diseases who were diagnosed from the beginning of 2006 to the end of 2022. Among these, 294 (63.5%) and 169 (36.5%) patients were female and male, respectively (the female to male ratio: 1.74 to 1). The mean ages of female and male

patients were 53.10 ± 11.12 and 50.27 ± 17.16 years, with an average of 51.68 ± 15.14 years, respectively. There was no statistically significant difference between the mean age of men and women (*P*=0.141). The most common causes of patients’ referral were reportedly pain and burning sensation (116 cases, 24.3%) followed by wounds and whiteness (107 patients, 22.4% each) (Table 1).

The most commonly observed oral white lesions were idiopathic lichen planus (ILP), contact and drug-induced lichen planus, and candidiasis, with prevalence rates of 57.5% (266 cases), 8.4% (39 cases), and 8.4% (39 cases), respectively. Leukoplakia and candida leukoplakia with a prevalence rate of 6.2% (29 cases) and squamous cell carcinoma (SCC) with a prevalence rate of 5.6% (26 cases) were in the next ranks.

Most lesions were more frequently seen in women than in men, and only SCC, candida, hyperplastic candida, candida leukoplakia, non-smoking tobacco keratosis, traumatic keratosis, geographic tongue, and genodermatosis were slightly more frequent in males.

The results showed a relationship between gender and lesions in ILP (*F*>*M*, *P*=0.001), contact and drug lichen planus (*F*>*M*, *P*=0.006), and oral cancer (*M*>*F*, *P*=0.006). The frequency distribution of oral white lesions in the two genders is shown in Table 2.

A comparison of the mean age of men and women for each lesion separately revealed no statistically significant difference between the mean age of patients and each type of oral white lesion in both genders (*P*>0.05).

Table 3 represents the frequency distribution of oral white lesions in different age groups. In general, the most involved age groups were the ages of 50–60 years

Table 1. Demographic characteristic of patients

Characteristic		Value
Gender, No. (%)	Male	169 (36.5)
	Female	294 (63.5)
Mean age, Mean ± SD	Male	50.27 ± 17.16
	Female	53.10 ± 11.12
Job, No. (%)	Employee	390 (84.3)
	No employee	73 (15.7)
The reason for the patient’s visit, No. (%)	Unanswered	42 (88)
	Accidental	1 (0.2)
	Refer	49 (10.3)
	Color change	16 (3.3)
	Change of taste	3 (0.6)
	Swelling	14 (2.9)
	Bleeding	3 (0.6)
	Pain and burning	116 (24.3)
	Roughness	20 (4.2)
	Wound	107 (22.4)
Whiteness	107 (22.4)	

with 122 cases (25.5%), followed by 40–50 years with 90 cases (18.8%) and 60–70 years with 79 cases (16.5%). The age groups of 10–20 years with six cases (1.3%) was the

Table 2. Relative and absolute frequency distribution of white lesions in two sexes

Diagnosis	Female		Male		Total		P value
	No.	%	No.	%	No.	%	
Fissure Tongue	11	3.4	5	3.1	16	3.5	0.06
Lichen planus (drug, contact)	28	9.5	11	6.5	39	8.4	0.006*
Habitual lips and cheek biting	4	1.4	3	1.8	7	1.5	0.12
Hyperplastic candidate	0	0	1	0.6	1	0.2	0.14
Lichen planus + dysplasia	3	1	0	0	3	0.6	0.01*
Leukoedema	3	0.8	0	0	3	0.6	0.01*
ILP	179	60.9	87	51.5	266	57.5	0.001*
SCC	6	3.6	20	6.8	26	5.6	0.006*
Smokeless tobacco keratosis	0	0	4	2.4	4	0.9	0.02*
White sponge nevus	1	0.3	0	0	1	0.2	0.05
Traumatic keratosis	1	0.3	2	1.2	3	0.6	0.05
Geographical tongue	8	2.7	9	5.3	17	3.7	0.08
Hairy tongue	4	1.3	3	1.8	7	1.4	0.07
Genodermatosis	0	0	2	1.2	2	0.4	0.01*
Candidiasis	19	18	20	11.8	39	8.4	0.21
Candida leukoplakia	2	0.7	7	4.1	9	1.9	0.001*
Leukoplakia	11	3.7	9	5.3	20	4.3	0.05

ILP, idiopathic lichen planus; SCC, squamous cell carcinoma. *P<0.05 is significant

Table 3. Frequency distribution of white lesions based on age

Diagnosis	Age range						
	10-20	21-30	31-40	41-50	51-60	61-70	>70
Fissure tongue	0 (0)	0 (0)	1 (0.2)	0 (0)	1 (0.2)	1 (0.2)	0 (0)
Lichen planus (drug, contact)	0 (0)	4 (0.8)	8 (1.6)	10 (2)	8 (1.6)	6 (1.2)	1 (0.2)
Habitual lips and cheek biting	2 (0.4)	1 (0.2)	1 (0.2)	1 (0.2)	2 (0.4)	0 (0)	0 (0)
Hyperplastic candidate	0 (0)	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	0 (0)
Lichen planus + dysplasia	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)
Leukoedema	0 (0)	0 (0)	1 (0.2)	0 (0)	1 (0.2)	0 (0)	0 (0)
ILP	3 (0.6)	18 (3.6)	42 (9.1)	58 (12.5)	70 (14)	43 (9.3)	22 (4.4)
SCC	0 (0)	1 (0.2)	2 (0.4)	2 (0.4)	7 (1.4)	5 (1)	5 (1)
Smokeless tobacco keratosis	0 (0)	2 (0.4)	1 (0.2)	0 (0)	0 (0)	0 (0)	0 (0)
White sponge nevus	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.2)	0 (0)
Traumatic keratosis	0 (0)	0 (0)	1 (0.2)	0 (0)	1 (0.2)	1 (0.2)	0 (0)
Geographical tongue	0 (0)	1 (0.2)	4 (0.8)	2 (0.4)	6 (1.2)	2 (0.4)	1 (0.2)
Hairy tongue	1 (0.2)	0 (0)	1 (0.2)	1 (0.2)	0 (0)	2 (0.4)	1 (0.2)
Genodermatosis	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)
Candidiasis	0 (0)	1 (0.2)	2 (0.4)	6 (1.2)	13 (2.6)	10 (2)	4 (0.8)
Candida leukoplakia	0 (0)	0 (0)	1 (0.2)	0 (0)	4 (0.8)	3 (0.6)	2 (0.4)
Leukoplakia	0 (0)	0 (0)	5 (1)	7 (1.4)	5 (1)	2 (0.4)	2 (0.4)

ILP, idiopathic lichen planus; SCC, squamous cell carcinoma.

least involved.

In terms of the site of lesion, the cheeks were the most commonly involved site with 50.7% (235 cases), followed by the tongue (20.5%, 95 cases) and the lips (12.9%, 60 cases). The ridge was less involved than the other areas of the mouth. The frequency distribution of lesions in different sites is shown in Table 4. The site of the lesion was not specified in 23 cases in the patient files.

The duration of lesions averaged 4.15±2.12 years (between 0.2 and 15 years).

In terms of clinical characteristics, most of the lesions (39.3%) were <2 cm and multiple (81.4%). The frequency distribution of lesions in terms of size and number characteristics is shown in Table 5.

This study showed a diagnostic agreement between clinical and histopathological diagnoses in 89.3% of the cases, and the highest rate of agreement belonged to ILP.

Among the assessed patients, 35 had hypertension and 12 had diabetes. The analyses revealed that patients with diabetes and hypertension were significantly affected by ILP lesions (P=0.01 and 0.02, respectively). Significant relationships were also found between smoking and opium use and the incidence of leukoplakia and SCC (P=0.001 and 0.0001, respectively).

Discussion

This study aimed to evaluate the clinical and histopathological findings of oral white lesions in patients referring to the department of oral diseases (in Kerman) for 16 years. This study showed a prevalence rate of 20.9% for oral white lesions. Demko et al reported white lesions

Table 4. Frequency distribution of white lesions based on location

Diagnosis	Location							
	Unknown	Ridge	Tongue	Palate	Floor of mouth	Buccal mucosa	Lip	Gingival
Lichen planus (drug, contact)	2 (0.4)	1 (0.2)	9 (1.8)	2 (0.4)	0 (0)	13 (2.6)	11 (2.2)	5 (1)
Habitual lips and cheek biting	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (1.4)	0 (0)	0 (0)
Hyperplastic candidate	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)
Lichen planus + dysplasia	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	2 (0.4)	0 (0)	0 (0)
Leukoedema	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.4)	0 (0)	0 (0)
ILP	13 (2.6)	0 (0)	33 (6.6)	8 (1.6)	2 (0.4)	158 (31.6)	37 (7.4)	20 (4)
SCC	0 (0)	2 (0.4)	18 (3.6)	0 (0)	1 (0.2)	3 (0.6)	1 (0.2)	1 (0.2)
Smokeless tobacco keratosis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0.6)	0 (0)	1 (0.2)
White sponge nevus	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.2)
Traumatic keratosis	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)	1 (0.2)
Geographical tongue	0 (0)	0 (0)	15 (3)	0 (0)	1 (0.2)	1 (0.2)	0 (0)	0 (0)
Fissure tongue	0 (0)	0 (0)	2 (0.4)	0 (0)	0 (0)	0 (0)	1 (0.2)	0 (0)
Hairy tongue	1 (0.2)	0 (0)	3 (0.6)	2 (0.4)	0 (0)	0 (0)	0 (0)	0 (0)
Genodermatosis	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)	0 (0)
Candidiasis	0 (0)	2 (0.4)	6 (1.2)	2 (0.4)	0 (0)	21 (4.2)	5 (1)	1 (0.2)
Candida leukoplakia	2 (0.4)	0 (0)	1 (0.2)	0 (0)	0 (0)	5 (1)	1 (0.2)	1 (0.2)
Leukoplakia	0 (0)	1 (0.2)	2 (0.4)	0 (0)	1 (0.2)	12 (2.4)	3 (0.6)	3 (0.6)

ILP, idiopathic lichen planus; SCC, squamous cell carcinoma.

Table 5. Frequency distribution of white lesions based on clinical characteristics

Diagnosis	Multiple	Single	> 5 cm	2–5 cm	< 2 cm
Lichen planus (drug, contact)	30 (6)	12 (2.4)	2 (0.4)	5 (1)	18 (3.6)
Habitual lips and cheek biting	7 (1.4)	0 (0)	0 (0)	0 (0)	3 (0.6)
Hyperplastic candidate	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)
Lichen planus + dysplasia	2 (0.4)	1 (0.2)	0 (0)	0 (0)	2 (0.4)
Leukoedema	2 (0.4)	0 (0)	0 (0)	0 (0)	1 (0.2)
ILP	227 (45.4)	44 (8.8)	4 (0.8)	63 (12.6)	110 (22)
SCC	20 (4)	6 (1.2)	0 (0)	6 (1.2)	13 (2.6)
Smokeless tobacco keratosis	2 (0.4)	2 (0.4)	0 (0)	3 (0.6)	1 (0.2)
White sponge nevus	1 (0.2)	0 (0)	0 (0)	1 (0.2)	0 (0)
Traumatic keratosis	2 (0.4)	1 (0.2)	0 (0)	1 (0.2)	0 (0)
Geographical tongue	14 (2.8)	3 (0.6)	0 (0)	2 (0.4)	5 (1)
Fissure tongue	2 (0.4)	1 (0.2)	0 (0)	0 (0)	0 (0)
Hairy tongue	6 (1.2)	0 (0)	1 (0.2)	0 (0)	0 (0)
Genodermatosis	2 (0.4)	0 (0)	0 (0)	0 (0)	2 (0.4)
Candidiasis	36 (7.2)	2 (0.4)	1 (0.2)	4 (0.8)	16 (3.2)
Candida leukoplakia	9 (1.8)	1 (0.2)	0 (0)	3 (0.6)	4 (0.8)
Leukoplakia	14 (2.8)	8 (1.6)	0 (0)	8 (1.6)	8 (1.6)

ILP, idiopathic lichen planus; SCC, squamous cell carcinoma.

with 36.6% as the most prevalent lesions in patients referring to dental offices.¹¹ In a study by Castellanos and Díaz-Guzmán, white and red lesions were among the most prevalent lesions of the oral cavity.¹²

Vosough Hosseini et al¹³ examined all available files in the pathology department of Tabriz Dental School from 2006 to 2011 and found 73 (9%) diagnosed cases of oral

white lesions.

White lesions included about 5% of biopsies in a study on the frequencies of white and red buccal cavity lesions in patients referring to the pathology department of Isfahan Dental School. It is noteworthy that Razavi et al studied only leukoplakia, leukoedema, lichen planus, and lichenoid lesions among the white lesions.¹⁴ Cebeci et al

reported white lesions in 2.2% of patients.¹⁵ The difference in the frequencies of white lesions in these two studies is logical as some of the white lesions were diagnosed in their clinical study without biopsy and only based on clinical presentation. Differences in studies can also result from the prevalence of lesions in each region and different predisposing factors, as well as paying enough attention to notice the lesions.

Oral white lesions are mainly important for two reasons. The first is the presence of leukoplakia as the most prevalent precancerous lesion of the buccal cavity in this group, and the second reason is that white lesions are one of the clinical manifestations of oral SCC.⁷ The World Health Organization (WHO) defines leukoplakia as a non-abrasive white plaque that does not clinically or histopathologically characterize any other disease, indicating the importance of differential diagnoses of white lesions from each other.⁷

On the other hand, different changes may be observed in the microscopic view of white lesions depending on the type of lesion. A very important microscopic change is epithelial dysplasia,⁸ which is the gold standard for the diagnosis of lesions with the potential of malignancy in the epithelium and is detectable from hyperepithelial samples in hematoxylin and eosin staining. When there is epithelial dysplasia, the pathologist usually presents a descriptive feature to express its severity.

This study disclosed that lesions with dysplasia were reported in nine patients with lichen planus and leukoplakia lesions during clinical examination for pathology.

Vosough Hosseini et al¹³ reported seven cases of dysplasia and seven cases of malignancy out of 73 white lesion cases. Six cases of dysplasia were associated with leukoplakia and only one case was due to lichen planus. In terms of location, most of the dysplastic changes were observed in the tongue, which is similar to the study of Jabber¹² and Castellanos and Díaz-Guzmán,¹⁶ in which the most dysplastic changes in oral lesions were recorded for white lesions, while mild dysplasia was the most frequent case in both studies.^{17,18} Out of the nine dysplasia cases in the present study, five and four cases were found in men and women, respectively. Vosough Hosseini et al¹³ reported five and two cases in men and women, respectively, out of seven dysplasia samples. Gurung et al¹⁷ observed 17 cases of dysplasia in men (n = 7) and women (n = 5), which is similar to the present study in terms of the men to women ratio. Abidullah et al¹⁸ detected moderate symptoms of dysplasia in seven out of 11 cases.

SCC is the most prevalent malignancy of the oral cavity that appears as an exophytic, ulcerative, and white or white-red lesion.^{2,7} Hogewind et al¹⁹ observed white lesions in nearly half of the cases of oral SCC, indicating the need for careful examination and long-term follow-up of white lesions. In this study, 20 and 6 cases out of

26 white oral cancer samples were reported in men and women, respectively. This malignancy was more prevalent in men than in women, which corresponds to the greater number of male patients⁴ versus females² reported by Vosough Hosseini et al.¹³ The most frequent site of oral carcinoma is the tongue, which is usually affected on the posterior lateral and ventral surfaces. The floor of the mouth is also involved to the same extent in men, but it is less prevalent in women. In order of decreased prevalence, other sites of involvement are the soft palate, gums, buccal mucosa, labial mucosa, and hard palate, respectively.⁷ In their study, the tongue was the most prevalent site of involvement (18 out of 26 cases), which is similar to the other studies.²⁰⁻²⁶

Jaber et al examined dysplasia of oral mucosal lesions in Western Europe and found that dysplasia was more frequent in white and white-red lesions of the tongue, the floor of the mouth, and buccal mucosa. In addition, most cases of dysplasia occurred in the 51-60 years.²⁷ The rate of epithelial dysplasia is different in multiple white lesions, and the symptoms of dysplasia are not seen in biopsies in many cases.

This study showed that the most prevalent white lesions were ILP (57.5%, 266 cases), followed by contact and drug-induced lichen planus (8.4%, 39 cases), and candidiasis (8.4%, 39 cases). The next frequent lesions were leukoplakia and candida leukoplakia with the prevalence rate of 6.2% (29 cases) and SCC with a prevalence of 5.6% (26 cases).

In a study by Lapthanasupkul et al, 123 (1.7%) out of 7,177 cases of biopsy were clinically diagnosed with leukoplakia, and hyperkeratosis with or without acanthosis (60.9%), dysplasia (10.6%), and SCC (4.9%) cases were reported in pathological assessment.²⁸ Leukoplakia lesions were the most prevalent lesion reported by Abidullah et al,¹⁸ which agrees with other studies.^{19,21,22} Cebeci et al,¹⁵ Razavi et al,¹⁴ and Vosough Hosseini et al¹³ claimed that lichen planus was the most predominant lesion. Simi et al⁹ asserted a major diagnosis of oral lesions was lichen planus, which is a chronic and relatively widespread dermatological disease often affecting the buccal mucosa.⁷ In the present study, more than half of the lichen planus cases were found in the buccal mucosa, 60% of which were women, which is similar to other studies.^{13,14} Dysplasia was detected in none of the 226 lichen planus cases. There is controversy around the potential for malignant change in lichen planus, and there are unanswered questions about the potential for malignant change in this lesion. Most of the cases reported as malignant changes are not citable. Some of the reported cases may not be true lichen planus and may actually be dysplastic leukoplakia with a secondary lichenoid inflammatory infiltrate that causes a lichenoid appearance. In addition, it can be argued that because oral SCC and lichen planus are not rare lesions, both lesions may develop at the same time in some people, while they

are not linked to each other.⁷

Although Simi et al²³ believe that oral lichen planus (OLP) without dysplasia is not a pre-malignant lesion, OLP can be tolerated through genetic pathways other than dysplasia.

Shklar and Meyer proposed three criteria for the diagnosis of OLP: parakeratosis or hyperkeratosis, hydropic degeneration of the basal cell layer, and band infiltration, such as inflammatory cells adjacent to the epithelium.²¹

Most lesions were more frequent in women than in men, but SCC, hyperplastic candida, candidal leukoplakia, non-smoking tobacco keratosis, traumatic keratosis, geographic tongue, and male genodermatosis were more prevalent in men. The results showed that there were associations between gender and lesions in ILP, contact and drug-induced lichen planus, and oral cancer. In other words, women were significantly more affected by lichen planus than men, and men suffered from oral cancer more often.

Vosough Hosseini et al¹³ reported almost equal frequencies of white lesions in men and women. However, this frequency varied depending on the presence of dysplasia and malignancy, and cases of dysplasia and malignancy were more frequent in men than women, while women showed more cases without dysplasia and malignancy. Razavi et al observed more prevalence of white lesions in women.¹⁴ In the study of Abidullah et al,¹⁸ more white lesions were observed in men than in women. These observations were similarly asserted in several other studies.^{17,24} Women suffered from more lesions in the study of Simi et al.²³

In the present study, the cheek was the most common site of involvement (50.7%, 235 cases), followed by the tongue (20.5%, 95 cases), and the lips (12.9%, 60 cases). Ridge was less involved than the other areas of the mouth. It is noteworthy that the high prevalence in the cheek was caused by the high number of lichen planus lesions mostly located in this site. Buccal mucosa was reported as the most common site in the studies of Abidullah et al¹⁸ and Gurung et al.¹⁷ Buccal mucosa and the tongue were reported as the most common sites of white lesions by Vosough Hosseini et al,¹³ which is similar to the results of Razavi et al.¹⁴ In both studies, lichen planus was the most common type of white lesion in the oral cavity.

In the present study, significant relationships were found between smoking and opium use and the incidence of leukoplakia and SSC. Tobacco and alcohol are reportedly the probable potential risk factors for oral malignancy, and 75% of patients with oral cancer are estimated to be regular smokers or alcoholics.^{17,25}

This study showed a diagnostic agreement between clinical and histopathological diagnoses in 89.3% of cases, and the highest rate of agreement belonged to ILP. Abidullah et al¹⁸ reported an agreement in 78 (78%) out

of 100 studied cases, which is more than the results of Bokor-Bratić et al.²⁶

In this research, the presence of lichen planus lesions was significant in patients with diabetes and hypertension. Abidullah et al¹⁸ found no association between lichen planus and diabetes.

Conclusion

The results of this study demonstrated that lichen planus was the most prevalent white lesion, and the cheek mucosa was the most frequent site of involvement for all lesions. There were significant relationships between ILP, contact and drug-induced lichen planus, oral cancer, and gender. In other words, women were significantly more affected by lichen planus than men, and men suffered from oral cancer more often. Pain and burning were the most common cause of patients' referral. The most common age of involvement belonged to the 50–60 years age group, and the involvement in the 10–20 years age group was less than in the other age groups.

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Competing Interests

None.

Ethical Approval

This project was approved by the Ethics Committee of the university with the code IR.KMU.REC.1397.471.

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