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## Prevalence and distribution of oral mucosal lesions in an adult turkish population

Ali-Rıza-İlker Cebeci <sup>1</sup>, Ayşe Gülşahı <sup>2</sup>, Kıvanç Kamburoğlu <sup>1</sup>, Büyük-Kaan Orhan <sup>1</sup>, Bengi Öztaş <sup>1</sup>

<sup>1</sup> Department of Oral Diagnosis and Radiology, Faculty of Dentistry, Ankara University

<sup>2</sup> Department of Oral Diagnosis and Radiology, Faculty of Dentistry, Baskent University

*Correspondence:*

Department of Oral Diagnosis and Radiology,  
Faculty of Dentistry,  
Ankara University, Turkey  
dtkivo@yahoo.com

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### Abstract

**Objectives:** The purpose of this study was to assess the prevalence and distribution of oral mucosal lesions in a Turkish adult population.

**Material and methods:** Five thousand consecutive patients were examined during routine dental treatment. Some of the mucosal changes were diagnosed solely by clinical examination. When clinical features were not diagnostic, a biopsy was undertaken. Chi-square test was used to analyze the data.

**Results:** The overall incidence of oral mucosal changes or lesions was 15.5%. The lesions were classified as anatomic changes, ulcerated lesions, tongue lesions, white lesions, benign lesions, color alterations, and malignant lesions. Anatomic changes (7%), ulcerated lesions (6.6%), and tongue lesions (4.6%) were the most common lesions. White lesions were observed in 2.2% of all patients. Among the white lesions, leukoplakia was identified in men 4 times more frequently than it was in women. Benign lesions and color alterations were identified in 1.6% and 1.2% of all patients, respectively. In addition, 3 patients (0.06%) were diagnosed as having squamous cell carcinoma, and 1 patient (0.02%) was diagnosed as having adenocarcinoma. There was a statistically significant relation between smoking and the occurrence of mucosal lesions whereas no relation was found between alcohol consumption and mucosal lesion occurrence. Besides, no relation was found between systemic diseases and oral mucosal lesion occurrence.

**Conclusions:** This study has provided information about the epidemiologic aspects of oral mucosal lesions that may prove valuable in planning of future oral health studies.

**Keywords:** Epidemiology, oral mucosal lesions, prevalence, Turkey.

## Introduction

Oral health is important to the quality of life of all individuals. Oral lesions can cause discomfort or pain that interferes with mastication, swallowing, and speech, and they can produce symptoms such as halitosis, xerostomia, or oral dysesthesia, which interfere with daily social activities (1). Among the broad spectrum of causes leading to changes in the oral mucosa are infections from bacteria, fungi, viruses, parasites, and other agents; physical and thermal influences, changes in the immune system, systemic diseases, neoplasia, trauma and other factors, some of which are issues of aging (2,3). In particular, long-term habits such as using tobacco or alcohol can cause precancerous or cancerous lesions. Dental factors (poor oral hygiene, edentulism, sharp teeth, electrogalvanism, the use of mouthwashes, or improperly fitting dentures) have been thought to play a role in the occurrence of oral precancerous and cancerous lesions, but no definitive evidence supports that theory in the current literature (2,4).

Epidemiologic studies provide information important to understanding the prevalence, incidence, and severity of oral disease in a specific population, but the results of such studies (including those on the established variety of changes that can occur in the oral mucosa) have rarely been published worldwide (5,6). Because earlier epidemiologic studies of the oral health status of the general population in Turkey provided a paucity of information about oral mucosal lesions (7-10), the current study sought to clarify the prevalence of oral mucosal lesions in 5000 Turkish adults.

## Material and Methods

This study consisted of 5000 patients (2925 [58.5%] women and 2075 [41.5%] men; age range, 17-85 years) who had been referred to the Ankara University Faculty of Dentistry between June 2004-September 2005. There were no exclusion criteria. The patients were examined by the same researchers (1 research associate and 3 research assistants) at the Ankara University Faculty of Dentistry, Oral Diagnosis and Radiology Department. The researchers were calibrated by a professor of oral pathology for use in systematic screening and for the detection of oral mucosal lesions. Both a dental and a general

medical history of the patients were obtained, and a questionnaire was completed by each patient, after which a clinical examination was performed. Some of the mucosal changes were diagnosed solely by clinical examination (e.g. linea alba, fissured tongue, etc.). When clinical features were not diagnostic, a biopsy was undertaken. By the study's end, 1170 pathologic or mucosal changes had been detected in 776 patients (15.52%). Clinical examinations were performed according to the WHO guideline (11) and the color atlas of oral lesions (12). The lesions that could not be diagnosed by clinical examination alone were analyzed histopathologically. In those patients, an initial incisional biopsy was obtained, but if the specimen was not enough to ensure an accurate diagnosis, use of immunofluorescence or other techniques was considered. However, at the completion of the clinical examination, if the lesion was considered to be lichen planus or pemphigus, initial evaluation by immunofluorescence was preferred. In some patients, biochemical tests were performed in addition to a histopathologic evaluation. Data were analyzed using the SPSS software program (Statistical Package for the Social Sciences, version 10.0, SSPS Inc, Chicago, Ill, USA). Chi-square test was used to analyze the data.

This study was approved by the Ethical Committee of the Ankara University Dentistry Faculty. All patients provided written informed consent.

## Results

Five thousand patients, 776 (15.5%) of whom exhibited 1 or more mucosal changes and/or lesions, participated in this clinical study. No mucosal changes or lesions were detected in 4224 patients (84.5%). Lesions were classified according to the following 7 categories: those considered to be an anatomic changes, ulcerated lesions, tongue lesions, white lesions, benign lesions, color alterations, and malignant lesions. Anatomic changes were observed in 7% of the patients. Linea alba was observed in 4.2% of all patients, and Fordyce's spots were diagnosed in 2.8%. The most common oral lesions after those considered to be anatomic changes were ulcerated lesions (6.6%) including aphthous ulcers (2.3%), secondary herpes lesions (2.1%), traumatic ulcers (0.9%), morsicatio buccarum (0.7%), and other types (0.6%) (Table 1).

**Table 1.** Distribution of ulcerated lesions, white lesions, benign lesions, color alterations and malignant lesions according to the patients' sex and age .

<sup>1</sup> Chemical burn, denture stomatitis, ragged, nonspecific ulceration, stomatitis medicamentosa, benign mucous membrane pemphigoid, radiation stomatitis.

<sup>2</sup> Nicotine stomatitis, leukoedema, white sponge nevus, lupus erythematosus, psoriasiform epithelial dysplasia.

<sup>3</sup> Fibroepithelial hyperplasia, epulis fissuratum, traumatic hyperplasia.

<sup>4</sup> Lymphangioma, gingival fibromatosis, fibrolipoma, giant cell granuloma, fibroadenoma, peripheral ossifying fibroma, pyogenic epulis, mucocele, ranula.

<sup>5</sup> Nevus, melanoacanthoma, melanotic macula.

Ulcerated Lesions	Sex	Age (y)						Subtotal	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Morsicatio buccarum	Female	9	7	3	2	1	2	24	36
	Male	3	3	2	1	2	1	12	
Secondary herpes	Female	17	15	16	15	4	1	68	102
	Male	3	9	7	8	4	3	34	
Apthous ulcer	Female	26	20	15	16	6	1	84	116
	Male	4	14	6	6	1	1	32	
Traumatic ulcer	Female	3	9	7	5	1	0	25	46
	Male	4	2	3	7	2	3	21	
Other <sup>1</sup>	Female	2	2	2	3	6	5	20	31
	Male	0	2	1	4	2	2	11	
<b>Total</b>	Female	57	53	43	41	18	9	221	<b>331</b>
	Male	14	30	19	26	11	10	109	
White Lesions	Sex	Age (y)						Subtotal	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Frictional keratosis	Female	0	0	4	4	2	1	11	29
	Male	3	1	3	4	7	0	18	
Candida	Female	0	1	1	0	2	0	4	11
	Male	0	2	0	5	0	0	7	
Lichen planus	Female	2	3	3	6	2	4	20	40
	Male	0	1	5	5	7	2	20	
Leukoplakia	Female	0	0	2	1	1	0	4	20
	Male	0	1	5	8	2	0	16	
Other <sup>2</sup>	Female	0	1	1	0	0	0	2	9
	Male	0	0	2	3	2	0	7	
<b>Total</b>	Female	2	5	11	11	7	5	41	<b>109</b>
	Male	3	5	15	25	18	2	68	
Benign Lesions	Sex	Age (y)						Subtotal	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Fibroma	Female	0	1	1	3	1	0	3	13
	Male	0	0	1	2	3	1	5	
Papilloma	Female	1	1	1	0	0	0	3	6
	Male	0	0	0	1	1	1	3	
Fibroepithelial Hyperplasia <sup>3</sup>	Female	1	4	0	5	4	5	19	29
	Male	0	0	0	1	8	1	10	
Arterial lesions	Female	0	1	0	2	1	1	5	10
	Male	0	0	0	1	1	3	5	
Traumatic hyperplasia	Female	1	4	0	1	0	0	6	9
	Male	0	0	0	0	3	0	3	
Other <sup>4</sup>	Female	0	3	4	5	0	2	17	22
	Male	0	1	4	1	1	1	10	
<b>Total</b>	Female	2	10	6	15	6	8	47	<b>79</b>
	Male	0	1	5	6	13	7	32	
Color Alteration	Sex	Age (y)						Total	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Increased physiologic melanin pigmentation <sup>5</sup>	Female	0	2	5	2	1	0	10	24
	Male	3	0	4	1	5	1	14	
Melanin pigmentation of lesions	Female	1	1	3	1	1	1	8	15
	Male	1	1	1	1	2	1	7	
Petechiae	Female	0	1	1	1	1	2	6	8
	Male	0	0	0	0	2	0	2	
Amalgam tattoo	Female	1	0	1	5	1	2	10	15
	Male	0	0	1	0	2	2	5	
<b>Total</b>	Female	2	4	10	9	4	5	34	<b>62</b>
	Male	4	1	6	2	11	4	28	
Malignant Lesions	Sex	Age (y)						Subtotal	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Squamous cell carcinoma	Female	0	0	0	0	2	1	3	3
	Male	0	0	0	0	0	0	0	
Adenocarcinoma	Female	0	0	0	0	0	1	1	1
	Male	0	0	0	0	0	0	0	
<b>Total</b>	Female	0	0	0	0	2	2	4	<b>4</b>
	Male	0	0	0	0	0	0	0	

**Table 2.** Tongue lesions according to the patients' sex and age .

Tongue Lesions	Sex	Age (y)						Subtotal	Total
		17-24	25-34	35-44	45-54	55-64	65+		
Coated tongue	Female	5	7	7	8	6	4	37	107
	Male	8	11	14	20	13	4	70	
Geographic tongue	Female	2	3	3	3	0	1	12	14
	Male	0	0	1	1	0	0	2	
Fissured tongue	Female	2	5	3	6	2	8	26	48
	Male	2	4	4	7	3	2	22	
Atrophic papillae	Female	0	5	1	3	2	6	17	25
	Male	2	2	1	3	0	1	8	
Other*	Female	4	2	3	6	3	6	24	37
	Male	2	1	1	2	4	3	13	
Total	Female	13	22	17	26	14	25	116	231
	Male	14	18	21	33	20	9	115	

\*Varicose, papillitis, hairy tongue, burning tongue, macroglossia, ankyloglossia, median rhomboid glossitis, tonsilla lingualis, papillary hyperplasia, crenated tongue.

Table 2 shows the distribution of tongue lesions (4.6%), the most common of which was coated tongue (2.1%), followed in descending order by fissured tongue (1%), atrophic papillae (0.5%), geographic tongue (0.3%), and other tongue lesions (0.7%).

White lesions, which were observed in 2.2% of all patients (Table 1), were identified as follows: lichen planus (0.8%), frictional keratosis (0.6%), leukoplakia (0.4%), Candida (0.2%), and others (0.2%). Among the white lesions, leukoplakia was identified in men 4 times more often than in women.

Benign lesions, which were diagnosed in 1.6% of the study population (Table 1), included fibroepithelial hyperplasia (0.6%), fibroma (0.3%), arterial lesions (0.2%), traumatic hyperplasia (0.2%), papilloma (0.1%), and other types (0.4%).

Color alterations were detected in 62 patients (1.2% of all patients) (Table 1). Increased physiologic melanin pigmentation (0.5%), including nevus, melanoacanthoma, and melanotic macula, was the most common color alteration. The next most common lesions were melanin pigmentation (0.3%), amalgam tattoos (0.3%) and petechiae (0.1%).

Malignant lesions (including squamous cell carcinoma and adenocarcinoma) were the least observed lesions (0.08%) (Table 1).

There was a statistically significant relation between smoking habit and oral mucosal lesion occurrence ( $p < 0.001$ ) whereas no relation was found between alcohol consumption and oral mucosal lesion existence ( $p > 0.05$ ). In addition, no relation was found between systemic diseases, medication use or dental prosthesis and oral mucosal lesion occurrence ( $p > 0.05$ ).

## Discussion

Oral mucosal conditions and diseases may be caused by local diseases (bacterial or viral), systemic diseases (metabolic or immunologic), drug-related reactions, or lifestyle factors such as the consumption of tobacco, betel quid, or alcohol (13). The prevalence of oral mucosal disease has been found to be higher in older patients than in younger individuals (3,14,15). Associations have been reported between oral mucosal disorders and aging (16). However age is not the only factor correlating with diseases of the oral mucosa; other factors such as trauma, the effects of medications, and oral and denture hygiene also play a role (3).

The methods of recording the incidence and prevalence of oral mucosal disease vary. Most population-based surveys correlate oral mucosal disease with oral cancer and precancerous conditions, but few authors have recorded overall oral mucosal lesions or mucosal changes. For example, Axell reported 60 different oral mucosal lesions in his survey of a Swedish population (17,18). Field et al. (19) also reported all premalignant and benign lesions found on screening, and nearly 50% of their reported lesions were diagnosed as frictional keratosis. Other authors have reported on a few types of lesions (20). Recording all oral mucosal lesions detected during a physical examination clearly results in a high prevalence of oral mucosal disease. Campisi et al. (4) identified various oral mucosal lesions in 81.3% of their study patients. The most common types of lesion noted were coated tongue (51.4%), leukoplakia (13.8%), traumatic lesions (9.2%), and actinic cheilitis (4.6%). There has been no broad population-based prevalence study in Turkey with which to compare the current data on the prevalence of oral mucosal lesions. Of the three studies

on oral mucosal lesions in Turkey, one assessed only older persons (10), one evaluated only tongue lesions (8), and the remaining study had a small sample size (9). In our survey, 5000 patients were examined, and their oral lesions were categorized into 7 different groups: lesions considered an anatomic changes, ulcerated lesions, tongue lesions, white lesions, benign lesions, color alterations, and malignant lesions. The prevalence of mucosal changes or lesions was 15.5%, a result comparable with that in a study by Harris et al. (13) but lower than that in other studies (4,6).

In our study, the examiners were calibrated for the detection of oral mucosal lesions. It was possible to differentiate healthy mucosa from areas of alterations in color or consistency of the mucosal lining, and those differences were then used to classify the respective sites of oral disease. It was regarded as impractical to recall any of the patients to the examination center for the sole purpose of confirming the accuracy of their evaluation. Therefore, the diagnosis given by the examining dentist was considered correct in all patients.

The most common mucosal changes or lesions were those considered to be an anatomic change (7%). This finding agreed with studies by Kovac-Kovacic et al. (6) in which the most common lesions were those characteristic of Fordyce's spots. Dos Santos et al. (21) showed that the most common lesion was fissured tongue. However, other authors have found that the most common lesions were melanin pigmentation (9), varices (3), fibrous dysplasia (22), and coated tongue (4).

Ulcerated lesions were found in 6.6% of our study patients, a percentage comparable to that in some studies (4,10,21) but lower than that in other reports (3). Epidemiologic studies have shown that tongue lesions account for a considerable proportion of oral mucosal lesions, and their prevalence rate varies in different parts of the world (3,4,8,23,24). In our study, tongue lesions were observed in 4.6% of the study patients, and coated tongue was the most common tongue lesion. This result supports the findings of Campisi et al. (4), but conflicts with the conclusions of other authors (3,6,21).

In our study, white lesions (including lichen planus, frictional keratosis, leukoplakia, and Candida) were observed in 2.2% of the patients. The most common white lesion was lichen planus (0.8%). The worldwide prevalence of oral lichen planus in the general population has been estimated to range from 0.1% to 2.2% (25). Our result supports some data in the literature (2,26), but our percentage is lower than that of several other studies (6,15). We found that contrary to information in the literature, there was no sex-related effect with regard to lichen planus. The other white lesion found in the present study was leukoplakia, and the prevalence of leukoplakia was found 0.4% of the population, which is in the lower-than-expected range of 1% to 5% (15,26).

In the current study, leukoplakia was detected 4 times more often in men than in women.

The prevalence of oral melanin pigmentation was the most common oral mucosal lesion in a 2003 study of the Turkish population (9), but in our study, melanin pigmentation was the sixth most common oral lesion (0.8% of all patients).

The oral cavity is one of the most suitable locations for the development of oncologic disease. Most oral cancers, especially palpable squamous cell carcinomas involving the mucosal tissue, are usually evident (4,16). However, all potentially malignant epithelial oral lesions should be diagnosed via microscopic analysis, because of evident discrepancies between clinical and histological diagnosis. In the present study, 3 patients (0.06%) were diagnosed as having squamous cell carcinoma, and 1 patient (0.02%) was diagnosed as having adenocarcinoma. Interestingly, all malignant lesions were observed in female patients. Campisi et al. (4) found that of 180 patients, only 1 had squamous cell carcinoma (0.9%). In another study, 1 case of oral cancer was observed (21). However, other investigators have shown that no case of malignant lesions was observed in a population in Slovenia (6) and in Greece (1).

In a similarly designed study, a representative sample was selected from among the 6-year-old children in Oviedo, Spain (n= 786), involving a protocol developed for pediatric oral diseases in order to show the prevalence of the lesions of the oral mucosa. A total of 344 lesions were detected in 243 children. The most common disorder was saburral tongue (16.02%), followed by traumatism (12.17%) and geographic tongue (4.48%). The prevalence of aphthous stomatitis was 2.24% and herpes labialis was 1,6%. Ankyloglossia was observed in 2.08% of cases, and a hypertrophic lip frenulum in 1.28% (27).

Prevalence of oral lesions in 13 to 16 year old 260 students in Düzce, Turkey was investigated. More than 26% of adolescents were found to have at least one oral mucosal lesion. Angular cheilitis, linea alba, and aphthous ulcerations were the most commonly encountered lesions in Turkish adolescents without any significant difference between boys and girls. The correlation between occurrence of mucosal lesions and sex was not statistically significant ( $p>0.05$ ). Statistical evaluation of the data revealed a significant relationship only between the presence of angular cheilitis and anemia ( $p<0.05$ ) (28).

Oral mucosal conditions were recorded in 40.7% of the study sample 700 patients > 60 years old. The logistic regression model revealed that male gender, length of denture use, smoking habit, and being a former smoker increased the probability of having an oral mucosal condition. Smoking habit also increased the risk of having leukoplakia. The denture-related lesions accounted for 36.4% with the

length of denture use and diabetes mellitus being significant risk factors for denture stomatitis and denture hyperplasia. The model for traumatic ulcer included medication use as a significant risk factor. The results of the study regarding an elderly Turkish sample support the studies of other populations where the prevalence of oral mucosal conditions was related to length of denture use, smoking, and gender. Some important associations between denture-related lesions, systemic diseases, and medication use which require further investigation were also observed (29).

In conclusion, our study has provided information about the epidemiologic aspects of oral mucosal lesions that may prove valuable in the planning of future oral health studies in Turkey. Anatomic changes, ulcerated lesions, and tongue lesions were the most common types of oral mucosal disease in our study population. There was a statistically significant relation between smoking and the occurrence of mucosal lesions whereas no relation was found between alcohol consumption and mucosal lesion occurrence. Besides, no relation was found between systemic diseases and oral mucosal lesion occurrence.

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