

# Oral Mucosal Lesions in Turkish Adolescents Admitted to a Dermatology Outpatient Clinic-A Tertiary Hospital-Based Study: Cross-Sectional Study

## Dermatoloji Polikliniğine Başvuran Türk Adölesanlardaki Oral Mukoza Lezyonları-Bir Üçüncü Basamak Hastane Çalışması: Kesitsel Araştırma

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**ABSTRACT Objective:** Adolescence is a period of transition from childhood to adulthood, which has unique physical and psychological characteristics. This study aims to evaluate oral mucosal lesions and possible related factors in adolescents. **Material and Methods:** This study was carried out in four months duration and included 700 individuals between the ages of 10-19. Detailed oral examinations were performed, demographic characteristics and personal habits of the participants were recorded. **Results:** In this study 700 adolescents were included, 437 (62.4%) were female, 263 (37.6%) were male. A total of 26 different oral lesion types were detected. At least one oral mucosal lesion was detected in 52% (n=364) of the study population. The most common lesions were fissured tongue (19.6%), morsicatio buccarum (8%), and linea alba (7.9%), respectively. Oral aphthae were significantly more common in males, cheilitis simplex in females (p=0.027; p=0.047, respectively). Oral mucosal lesions were significantly related with drug use (p=0.010). The logistic regression analysis for the factors affecting the presence of oral mucosal lesions revealed that the drug use and age higher than 18 years increase the risk. **Conclusion:** The prevalence of oral mucosal lesions in adolescents is quite high and drug use and older age increase the risk. The most common lesions are fissured tongue, morsicatio buccarum, and linea alba. Oral aphthae are significantly more common in males, cheilitis simplex in females. The high prevalence of oral mucosal lesions in adolescents indicates the need to raise awareness for these lesions and identify probable risk factors.

**Keywords:** Adolescent; oral mucosal lesion; mucosal alteration; oral hygiene; drug use

**ÖZET Amaç:** Adölesan dönem, farklı fiziksel ve psikolojik özellikleriyle çocukluktan erişkinliğe geçiş periyodudur. Bu çalışmanın amacı, adölesan dönemdeki oral mukozal lezyonları ve olası ilişkili olduğu faktörleri değerlendirmektir. **Gereç ve Yöntemler:** Çalışma, 4 aylık sürede, yaşları 10-19 arasındaki 700 birey ile yürütüldü. Detaylı oral muayene yapıldı, hastaların demografik özellikleri ve kişisel alışkanlıkları kaydedildi. **Bulgular:** Bu çalışmada; 437'si (%62,4) kadın, 263'ü (%37,6) erkek olmak üzere 700 adölesan vardı. Toplam 26 farklı oral lezyon tipi tespit edildi. Hastaların %52'sinde (n=364) en az bir oral mukozal lezyon saptandı. En sık görülen lezyonlar sırasıyla fissürlü dil (%19,6), morsicatio buccarum (%8) ve linea alba (%7,9) idi. Oral aft erkeklerde, keilitis simpleks kadınlarda anlamlı oranda yüksekti (sırasıyla p=0,027; p=0,047). Oral mukozal lezyon varlığı ilaç kullanımıyla anlamlı oranda ilişkiliydi (p=0,010). Oral mukozal lezyon varlığını etkileyen faktörlere yönelik yapılan regresyon analizinde ilaç kullanımı ve 18 yaştan büyük olmanın lezyon olasılığını artırdığı saptandı. **Sonuç:** Oral mukozal lezyonların prevalansı adölesan dönemde oldukça yüksek olup, ilaç kullanımı ve ileri yaş bu riski artırmaktadır. En sık oral mukozal lezyonlar fissürlü dil, morsicatio buccarum ve linea albadır. Oral aft erkeklerde, keilitis simpleks kadınlarda anlamlı oranda daha sıktır. Adölesan dönemde oral mukozal lezyonların yüksek prevalansı, lezyonlar konusunda farkındalığın artmasına ve olası risk faktörlerinin belirlenmesine ihtiyaç olduğunu göstermektedir.

**Anahtar Kelimeler:** Adölesan; oral mukoza lezyonu; mukozal değişiklik; oral hijyen; ilaç kullanımı

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Peer review under responsibility of Türkiye Klinikleri Journal of Dermatology.

**Received:** 20 Sep 2021

**Received in revised form:** 09 Nov 2021

**Accepted:** 10 Nov 2021

**Available online:** 17 Nov 2021

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In epidemiological studies evaluating the prevalence of oral mucosal lesions, a wide variation was observed in the spectrum and distribution of the lesions.<sup>1</sup> Ethnic differences, personal habits, oral hygiene status, accompanying diseases, drugs and environmental factors are thought to be the factors affecting this variation.<sup>2</sup> Detecting the frequency of these lesions in the oral mucosa in general and among specific age groups, and the possible factors associated with them may contribute to establishing treatment and development and provision of national health policies for prevention.<sup>3-7</sup>

The adolescence, which represents the transition period between childhood and adulthood, is defined as between 10-19 ages by World Health Organization. This period constitutes an important stage of life with its unique physical and developmental characteristics.<sup>8,9</sup>

There are limited number of studies on the prevalence of oral mucosal lesions in this period.<sup>1</sup> The aim of this study was to evaluate oral mucosal lesions and related factors in adolescents in Turkish population.

## MATERIAL AND METHODS

This study was conducted with 700 individuals between the ages of 10-19 who admitted to the dermatology outpatient clinic of a tertiary health care institution with any complaint for 4 months duration. Adolescence period was examined in three groups as early adolescence (10-14 years), middle adolescence (15-17 years) and late adolescence (18-19 years).<sup>8,10</sup>

Power analysis was performed using the G\*Power program (version 3.1.2) to determine the appropriate size of the study population.<sup>11</sup> The prevalence of oral mucosal lesion in adolescents was estimated to be 26%, and the size of study population was calculated as 640 people with 80% power, 5% error rate and 0.05 effect.<sup>1</sup> Demographic characteristics, presence of concomitant diseases and treatment, frequency of tooth brushing, personal habits such as smoking, alcohol use and oral hygiene status of the participants were recorded. Oral hygiene status was considered to be insufficient in case of clinically detectable dental plaque on the surface of the anterior teeth during oral examination.<sup>12</sup> The frequency of

tooth brushing was evaluated in 2 categories: <2 per day and  $\geq 2$  per day.<sup>13</sup>

Before starting the study, all contributing dermatologists were educated about the detection of oral lesions for the aim of standardization. The examinations were performed according to World Health Organization criteria.<sup>14</sup> Intra-oral examinations were performed with disposable wooden spatulas in a bright room and under artificial light source. Diagnoses were based on clinical examination and histopathological confirmation was not made. In case of differences in diagnosis, the final decision for diagnosis was achieved by consensus. Patients with oral aphthae were evaluated for Behçet's disease by checking for diagnostic criteria through detailed history and physical examination. Diseases with recurrences (such as herpes labialis, aphthous stomatitis) were considered as signs only when observed during the examination. Patients with oral mucosal lesions under treatment at admission, periodontal and gingival diseases were not included in the study. After the examination, all participants were informed about their oral mucosal conditions and they were directed for treatment if necessary.

This study followed the principles of Declaration of Helsinki and was approved by the Tokat Gaziosmanpaşa University Clinical Research Ethics Committee (date: 19.10.2018, no: 83116987-517). Informed consent was obtained from individuals/parents who agreed to participate the study.

Statistical analysis was performed using commercial software (IBM SPSS Statistics 20, SPSS Inc., an IBM Co., Somers, NY, USA). Data for continuous variables were given as mean, standard deviation, and for categorical variables were given as frequency, percentage. Chi-square test was used to compare the categorical data between/among groups. A multivariate logistic regression model were implemented to determine the effects of selected covariates on the presence of oral mucosal lesion. In all analyses,  $p < 0.05$  was taken to indicate statistical significance.

## RESULTS

In this study 700 adolescents were included and among them 437 (62.4%) were female, 263 (37.6%)

were male. The mean age of the participants was  $15.72 \pm 2.97$  years and 226 (32.3%) of the participants were in the early, 220 (31.4%) were in the middle and 254 (36.3%) were in the late adolescence period. Oral hygiene status was good in 653 (93.3%) patients. Concomitant disease was present in 86 (12.3%) patients and 116 (16.6%) patients were on medication. The most common diseases were psoriasis (2.6%), asthma bronchiale (1.7%), anemia (1.4%) and psychological disorders (1.4%). The most commonly used systemic drugs were isotretinoin (7.7%), immunosuppressive drugs (1.9%), inhaled antiasthmatics (1.3%) and oral iron supplements (1.3%). The rate of concomitant diseases were similar between girls and boys ( $p > 0.05$ ) whereas drug use (such as isotretinoin, immunosuppressive drugs and oral iron supplements) were more common in girls ( $p = 0.026$ ). Some demographic features, personal habits and oral hygiene status of the participants according to gender are summarized in Table 1.

The total number of lesion types in the study population was 26. At least one oral mucosal lesion was detected in 52% ( $n = 364$ ) of the adolescents. The most common lesions were fissured tongue (19.6%), morsicatio buccarum (8%), linea alba (7.9%), angular cheilitis (7.7%) and leukoedema (4.9%). There was no significant relation between the presence of oral mucosal lesion and cigarette/alcohol use, concomitant disease, oral hygiene status or frequency of tooth brushing ( $p > 0.05$ ); however oral mucosal lesions were significantly related with drug use and specifically isotretinoin ( $p = 0.010$ ;  $p = 0.002$ , respectively) (Table 2). It was also found that oral candidiasis was significantly related with asthma ( $p = 0.039$ ) and use of inhaled antiasthmatics ( $p = 0.022$ ). A significant relation was present between geographic tongue and psoriasis ( $p = 0.006$ ); isotretinoin use and leukoedema ( $p = 0.011$ ), linea alba ( $p = 0.016$ ), angular cheilitis ( $p < 0.001$ ) and cheilitis simplex ( $p < 0.001$ ); fissured tongue and use of immunosuppressive drugs ( $p = 0.026$ ).

TABLE 1: Sociodemographic characteristics distribution by gender.

Characteristics	Female (n=437)		Male (n=263)		p value	Total		
	n	%	n	%		n	%	
Smoking	40	9.2	43	16.3	0.004	83	11.9	
Alcohol use	3	0.7	5	1.9	0.160	8	1.1	
Concomitant disease	57	13.0	29	11.0	0.431	86	12.3	
Psoriasis	14	3.2	4	1.5	0.173	18	2.6	
Asthma bronchiale	6	1.4	6	2.3	0.382	12	1.7	
Anemia	9	2.1	1	0.4	0.100	10	1.4	
Psychological disorders	7	1.6	3	1.1	0.750	10	1.4	
Others*	21	4.8	15	5.7	0.602	36	5.1	
Drug use	83	19.0	33	12.5	0.026	116	16.6	
Isotretinoin	42	9.6	12	4.6	0.015	54	7.7	
Immunosuppressive drugs	12	2.7	1	0.4	0.038	13	1.9	
Bronchodilators	5	1.1	4	1.5	0.668	9	1.3	
Iron supplements	9	2.1	0	0.0	0.016	9	1.3	
Others**	15	3.4	16	6.1	0.099	31	4.4	
Oral hygiene status	Well	426	97.5	227	86.3		653	93.3
	Poor	11	2.5	36	13.7	<0.001	47	6.7
Frequency of tooth brushing	<2 times a day	179	41.0	191	72.6		370	52.9
	At least twice a day	258	59.0	72	27.4	<0.001	330	47.1

\*This group includes familial Mediterranean fever (n=7), cardiovascular diseases (n=6), epilepsy (n=6), hypothyroidism (n=4), vitiligo (n=2), Type 1 diabetes mellitus (n=2), glucose 6 phosphate dehydrogenase deficiency (n=1), vesico ureteral reflux (n=1), Juvenil rheumatoid arthritis (n=1), morphea (n=1), polycystic ovary syndrome (n=1), scoliosis (n=1), hydrocephalus (n=1), celiac disease (n=1), systemic lupus erythematosus (n=1); \*\*This group includes antiepileptic drugs (n=6), antidepressant drugs (n=5), antibiotics (n=5), psychostimulant drugs (n=5), antiarrhythmic/antiaggregant drugs (n=4), thyroxine (n=3), insulin (n=2), antihypertensive drugs (n=1).

**TABLE 2:** Evaluation of factors associated with the presence of oral mucosal lesion.

Characteristics		Oral mucosal lesion		p value
		(+) n (%)	(-) n (%)	
Gender	Female	222 (50.8)	215 (49.2)	0.413
	Male	142 (54.0)	121 (46.0)	
Smoking		50 (60.2)	33 (39.8)	0.107
Alcohol use		5 (62.5)	3 (37.5)	0.547
Concomitant disease		44 (51.2)	42 (48.8)	0.868
	Psoriasis	8 (2.2)	10 (3.0)	0.516
	Asthma bronchiale	5 (1.4)	7 (2.1)	0.470
	Anemia	8 (2.2)	2 (0.6)	0.110
	Psychological disorders	4 (1.1)	6 (1.8)	0.533
	Others	19 (5.2)	17 (5.1)	0.924
Drug use		73 (62.9)	43 (37.1)	<b>0.010</b>
	Isotretinoin	39 (10.7)	15 (4.5)	<b>0.002</b>
	Immunosuppressive drugs	7 (1.9)	6 (1.8)	0.893
	Bronchodilators	5 (1.4)	4 (1.2)	1.000
	Iron supplement	7 (1.9)	2 (0.6)	0.180
	Others	15 (4.1)	16 (4.8)	0.680
Oral hygiene status	Well	336 (51.5)	317 (48.5)	0.282
	Poor	28 (59.6)	19 (40.4)	
Frequency of tooth brushing	<2 times a day	178 (53.9)	152 (46.1)	0.332
	At least twice a day	186 (50.3)	184 (49.7)	

In addition, cigarette smoking was associated with increased rates of morsicatio buccarum ( $p=0.021$ ) and oral candidiasis ( $p=0.004$ ) but decreased rate of oral aphthae ( $p=0.039$ ).

In this study; rate of smoking/alcohol and drug use were higher in the late adolescence whereas the rate of patients with poor oral hygiene status was lower compared to other periods of adolescence. The rate of oral mucosal lesions was significantly higher in late adolescence than early period ( $p=0.003$ ). The most common oral mucosal lesions were fissured tongue, angular cheilitis and oral aphthae in the early adolescence; fissured tongue, linea alba and morsicatio buccarum in the middle and late adolescence period.

For gender distribution of oral mucosal lesions; oral aphthae were higher in males and cheilitis simplex in females ( $p=0.027$ ;  $p=0.047$ , respectively).

The logistic regression analysis for the factors affecting the presence of oral mucosal lesions revealed that the drug use and age higher than 18 years increase the risk of oral mucosal lesions (Table 3).

## DISCUSSION

To the best of our knowledge, this is the first prospective study to evaluate the prevalence of oral mucosal lesions including all periods of adolescence. We found the prevalence of oral mucosal lesions in adolescents as 52% which is a very high rate. Fissured tongue was the most common lesion in all adolescence periods. The logistic regression analysis revealed that drug use and age higher than 18 years increase the risk of oral mucosal lesions.

It is known that the prevalence of oral mucosal lesions is affected by ethnical differences, personal

**TABLE 3:** Logistic regression analysis for the effect of factors on the presence of oral mucosal lesion.

Variables	$\beta$	p value	Odds ratio	95% Confidence interval
Oral mucosal lesion				
Gender	0.257	0.139	1.292	(0.920-1.816)
Smoking	0.116	0.661	1.123	(0.669-1.884)
Alcohol use	0.181	0.815	1.198	(0.263-5.467)
Oral hygiene status	-0.395	0.224	0.674	(0.356-1.274)
Frequency of tooth brushing	0.122	0.468	1.130	(0.812-1.573)
Concomitant disease	-0.485	0.099	0.616	(0.346-1.096)
Drug use	0.737	<b>0.006</b>	2.089	(1.235-3.534)
Period of adolescence		<b>0.017</b>		
Middle (15-17 years)	0.132	0.502	1.142	(0.775-1.681)
Late (18-19 years)	0.550	<b>0.007</b>	1.734	(1.160-2.591)

Reference categories: Females for gender; non-smokers for smoking; patients without alcohol use; poor for oral hygiene; <2 times daily for tooth brushing; none for concomitant disease and drug use; early for adolescence (10-14 years).

habits, oral hygiene status, concomitant diseases, drugs and environmental factors and increases with age.<sup>15-17</sup> The wide range of 4-64.7% observed in the prevalence studies can be explained by these factors.<sup>17-21</sup> In the study conducted by Parlak et al., the prevalence of oral mucosal lesions in the adolescents aged 13-16 years was 26.2%, and the number of lesion types was 13.<sup>1</sup> In our study, the prevalence of oral mucosal lesions was found to be quite high and we think that this may be related to the methodology of the study, sociodemographic characteristics of the population, number of lesion types evaluated and differences in clinical diagnostic criteria.

In the study of Espinosa-Zapata et al. evaluating the prevalence of oral mucosal lesions in children aged 1-16 years, 70.93% of the lesions were observed in patients with poor oral hygiene or those using dental apparatus.<sup>22</sup> However in our study, the highest oral mucosal lesion rate was observed in the late adolescence period whose oral hygiene status was better, and no relation was found between oral hygiene status, tooth brushing frequency and rate of oral mucosal lesions. There was no significant relation between the presence of oral mucosal lesion and concomitant disease, smoking or alcohol use similar to some studies in literature; differently, a significant relationship was observed with drug use and specifically isotretinoin.<sup>23,24</sup> For the relation of oral mucosal lesions with concomitant diseases; significant relation

was present between oral candidiasis and asthma; geographic tongue and psoriasis. Other than this, a significant relation was present between isotretinoin use and leukoedema, linea alba, angular cheilitis and cheilitis simplex; between immunosuppressive drugs and fissured tongue; between oral candidiasis and inhaled antiasthmatics.

In our study, no difference was found between female and male patients regarding total rate of oral mucosal lesions as in the studies of Parlak et al. and Unur et al.<sup>1,23</sup> In the literature, there are data showing that fissured tongue, rusty tongue and linea alba were observed dominantly in females; fordyce granules, leukoedema, friction keratosis, hairy tongue, oral aphthae dominantly in males.<sup>1,16,23,25,26</sup> In our study, cheilitis simplex was observed predominantly in females and oral aphthae in males. The predominance of female gender in cheilitis simplex in our study is thought to be related to the higher rate of isotretinoin use among our female patients than males.

In our study, the most common oral mucosal lesions were fissured tongue, morsicatio buccarum and linea alba similar to the study of Unur et al.<sup>23</sup> It is known that the frequency of fissured tongue, which we found as the most common lesion in adolescence, increases with age. The rate of fissured tongue in our study, was higher compared to other studies from Turkey.<sup>1,17</sup> We thought that this high rate in our study

may be due to considering small but visible fissures as positive finding.<sup>27</sup>

The second most common lesion in adolescents in our study was morsicatio buccarum, which is secondary to chronic bite of cheek or tongue. In a retrospective study, it was suggested that high rates of morsicatio buccarum in teenagers may be associated with psychological stress and intense work periods during adolescence.<sup>26</sup>

Amadori et al. defined smoking-related oral lesions as hairy tongue, smoking-associated melanosis and focal hyperkeratosis.<sup>26</sup> In our study, cigarette smoking was associated with increased rates of morsicatio buccarum and oral candidiasis but decreased rate of oral aphthae. Significant relationship between morsication buccarum and smoking can be explained by the fact that both conditions are associated with stress. Additionally, these associations support the idea that smoking can trigger the formation of different lesions in the oral mucosa by changing the oral microflora leading to fungal and chromogenic bacterial proliferation, increasing mucosal thickness and lingual papilla overgrowth.<sup>26</sup>

## LIMITATIONS

This study has some limitations. First of all, oral mucosal lesions were evaluated with a single oral examination and the history of recurrent or previous lesions, which may affect the prevalence, was not considered. Therefore, long-term studies are required. In addition, since the study population is relatively small, studies with larger series are needed for more accurate data about the prevalence and possible factors affecting oral mucosal lesions. This will help to establish criteria for better describing the high risk adolescents.

## CONCLUSION

The prevalence of oral mucosal lesions in adolescents is quite high and drug use and older age increase the risk. The most common lesions are fissured tongue, morsicatio buccarum, and linea alba. Oral aphthae are significantly more common in males, cheilitis simplex in females. The high prevalence of oral mucosal lesions in adolescents indicates the need to raise awareness for these lesions and identify probable risk factors. To be aware of prevalence and risk factors of oral mucosal lesions may be helpful in developing policies to improve oral health in adolescents. Further, our results may take the initiative for future oral mucosal lesion prevalence studies on adolescent groups in different populations.

### Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Atiye Akbayrak, Tuba Kasap; **Design:** Atiye Akbayrak, Tuba Kasap; **Control/Supervision:** Atiye Akbayrak, Tuba Kasap, Zennure Takci, Havva Yıldız Seçkin; **Data Collection and/or Processing:** Atiye Akbayrak, Zennure Takci, Havva Yıldız Seçkin, Sercan Sezgin, Cemre Yazar; **Analysis and/or Interpretation:** Atiye Akbayrak, Tuba Kasap, Osman Demir; **Literature Review:** Atiye Akbayrak, Tuba Kasap; **Writing the Article:** Atiye Akbayrak, Tuba Kasap; **Critical Review:** Tuba Kasap.

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