Original Article

Prevalence of Oral Lesions and Normal Variants of the Oral Mucosa in 12 to 15-year-old Students in Tehran, Iran

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Abstract

Objectives: There are relatively few systematic studies, documenting the prevalence of mucosal disorders in children and adolescents. The purpose of this study was to determine the prevalence of oral lesions in 12- to 15-year olds living in Tehran and to assess the possible relationship between the occurrence of these lesions and gender.

Methods: A cross-sectional study was designed in which 1020 adolescents were participated. The sample size was based upon an expected oral lesion prevalence of 25%, a precision of 0.05 and a confidence level of 99. Epi-info version 6.0 was used for statistical analysis.

Results: Two hundred eighty-six adolescents (28.0%) were diagnosed with at least one oral mucosal lesion at the time of the examination. The prevalence of any oral mucosal lesion was 29.2% among the boys and 26.9% among the girls. With the exception of melanotic macules, there were no statistically significant differences in oral mucosal lesion prevalence by gender.

Conclusion: More than 28% of the adolescents were found to have at least one oral mucosal lesion. Melanotic macule was found to be proportionally more common in boys than girls.

Keywords: Adolescents, mouth, oral lesions, prevalence

Cite this article as: Jahanbani J, Morse DE, Alinejad H. Prevalence of Oral Lesions and Normal Variants of the Oral Mucosa in 12 to 15-year-old Students in Tehran, Iran. *Arch Iran Med*. 2012; **15(3):** 142 – 145.

Introduction

The diagnosis of oral mucosal lesions and normal variants of the oral mucosa is an essential aspect of dental practice, and traditionally, the mucosal membrane of the oral cavity has been looked upon as a mirror of general health. The prevalence of oral lesions varies by geographic region, and it has been reported that diseases of the oral mucosa can affect 25% – 50% of individuals, depending on the population studied.[1]

Studies of the prevalence of oral mucosal lesions in adult populations may have limited applicability to children,[2] and there are relatively few systematic studies documenting the prevalence of mucosal disorders in children and adolescents.[2–11] This is a critical deficiency because appropriate diagnosis and treatment requires knowledge of the relative frequency or probability of possible lesions.[2]

Adolescents are at the crossroads between childhood and adulthood, and it is unclear whether the pattern of oral diseases in this group resembles that of children, that of adults, or some other unique pattern.[10]

Although a limited number of studies have attempted to document the prevalence or incidence of oral mucosal lesions in the general Iranian population,[12] and among referred adult patients,[13] to our knowledge there are no published studies that estimate the prevalence of oral mucosal lesions in Iranian adolescents.

This study aims to determine the prevalence of oral lesions and normal variants of oral mucosa in 12 to 15-year olds living in Tehran and to assess the possible relationship between the occurrence of these lesions and gender.

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Accepted for publication: 26 October 2011

Materials and Methods

In this cross-sectional study, adolescents aged 12 to 15 years who lived in Tehran comprised the study population. According to data obtained from the Ministry of Education, there were a total of 312,129 adolescents who met the age and residence requirements at the time of the study. The sample size was based upon an expected oral lesion prevalence of 25%, a precision of 0.05 and a confidence level (CI) of 99%. Using Epi-info 6.0, the calculated study size requirement was 1020. Tehran was separated into twenty-six regions according to data obtained from the municipal office. Thirty-four schools, randomly selected as clusters from a total of 1184 schools (607 boys schools and 577 girls schools), saturated our needed sample size (1020: boys = 510, girls = 510). The sample size was stratified by sex and school population by region. In the first stage, the number of students from each school was obtained according to the proportion of 12 to 15-year olds living in that region, and in the second stage according to the male/female ratio. At each school, students were selected through a systematic random sampling method using the table of random numbers.

Permission was obtained from the Ministry of Education and after receiving the approval of the Ethical Committee within the Research Unit of the Dental School of Tehran Islamic Azad University, informed consent was obtained from all subjects and their parents. Ethical principles, including the rules of the Declaration of Helsinki, were followed. Exclusion criteria were: refusal, absence on the day of examination, and failure to return consent forms.

Mouth mirrors, disposable retractors, and natural and/or artificial light were used to examine the students, and all examinations were carried out by the same examiner who had 15 years experience as an oral pathologist at the time of the examinations. Clinical criteria for oral soft tissue lesions and normal variants of oral mucosa were based on World Health Organization (1980) recommendations

and limited to visual examinations. Histopathologic confirmation was not used in this study. Recurrent herpetic lesions and aphthous stomatitis were recorded only if observed at the time of examination. Diagnostic charts were used to record personal data and record oral lesions. Dental caries and periodontal disease were not included in the examination.

The statistical analysis was performed using standard statistical methods. Epi-info version 6.0 was used to test for statistically significant differences in the prevalence of a given oral lesion by gender. $P < 0.05$ was considered statistically significant.

Results

Examinations were performed on 1020 individuals aged 12 to 15 years, 510 boys and 510 girls. The mean age was 13.2 years with a standard deviation of 0.9. A total of 303 lesions were identified, 157 among the boys and 146 among the girls.

Table 1 presents the total and gender-specific prevalence of one or more oral lesions. Two hundred eighty-six adolescents (28.0%) were diagnosed with at least one oral mucosal lesion at the time of the examination. The prevalence of any oral mucosal lesion was 29.2% among the boys and 26.9% among the girls. The corresponding prevalence odds ratio was 1.12 (95% CI: 0.85 – 1.49), indicating that the odds of having an oral mucosal lesion were 1.12 times higher among boys than girls, but not statistically significant. Seventeen of the 1,020 adolescents examined (1.6%) had more than one oral lesion.

Fourteen different mucosal lesions were diagnosed, of which the most common were: linea alba (7.8%), angular cheilitis (6.5%), physiologic hyperpigmentation (4.0%), and fissured tongue (3.1%).

Table 1 also presents the prevalence of the various oral lesions observed by gender. With the exception of melanotic macules, which were found in 2.5% (13/510) of the boys and only 0.8% (4/510) of the girls (OR = 3.31, 95% CI: 1.01 – 14.01, $P = 0.028$), there were no statistically significant differences in oral mucosal lesion prevalence by gender (Table 1).

Discussion

The overall prevalence of oral mucosal lesions in this study of Tehran students aged 12 to 15 years was 28.0%, and neither clinically nor statistically different by gender. The most frequently observed oral mucosal lesions and variants were linea alba, angular cheilitis, and physiologic hyperpigmentation.

In previous reports, prevalence rates for oral mucosal lesions have shown wide variation, and may be a function of underlying differences in the geographic areas studied, socio-demographic characteristics of the examined population, the research methodologies used, and the diagnostic criteria employed.

Linea alba, a normal variation of oral mucosa, is described as a slightly raised, usually bilateral, whitish line traversing the corner of the mouth as far posterior as the last molar tooth.[14] In the current study, linea alba was the most common finding with a prevalence rate of 7.8%. Parlak et al. reported it to be the second most common lesion in Turkish adolescents, with a prevalence of 5.3%.[10]

Angular cheilitis, an acute or chronic inflammation of the skin and contiguous labial mucous membrane at the angles of the mouth, was the second most common lesion in our study with a prevalence of 6.5%. By comparison, in a study of black South African preschoolers, angular cheilitis was the most frequently observed oral mucosal alteration, with a prevalence of 15.1%.[15] Most cases of angular cheilitis result from mechanical, infective, or immune defects. Nutritional deficiencies such as riboflavin, folate, iron, and general protein malnutrition may be causative factors.[16] In a study from Argentina, Crivelli et al. reported that angular cheilitis was most commonly observed in people of low socioeconomic status.[17] Our study did not investigate etiological factors for angular cheilitis; however, nutrition may have played a role in that relatively recent studies have reported evidence of nutritional deficiencies in Iran and other Middle-Eastern countries.[18,19]

Physiologic melanin pigmentation (racial pigmentation) of the oral mucosa varies in prevalence among different races and ethnic groups. In a study of Israeli children in the early 1970s, the estimated prevalence was 13.5%.[20] In a more recent investigation conducted in the Turkish population, the reported prevalence of oral melanin pigmentation was 6.9%; however, no such entities were identified among the 269, 5 to17- year olds examined.[21] Among the Iranian adolescents examined in the present study, the prevalence of physiologic pigmentation was 4%.

Fissured tongue was found in 3.1% of our study participants. With the exception of a high reported prevalence rate of 29.2% in Hungarian children by Voros-Balog et al.,[22] other studies of children and adolescents have reported much lower rates that are comparable to our findings. Crivelli et al. reported a prevalence of 2.0% in Argentinean school children,[17] Bessa et al. observed a prevalence of 2.8% in 5 to 12-year old Brazilian children,[23] Sawyer et al. found fissured tongue in 8% of examined Nigerian children,[3] and in separate studies of Turkish school children and residents, Parlak et al. reported a rate of 2.8% and Mumcu et al. reported prevalence of 3%.[10,21]

Macroglossia was observed in 1.8% of our study population. To our knowledge, there are no previous reports on the prevalence rate of macroglossia in adolescents.

The presence of a melanotic macule was diagnosed when a solitary, flat, pigmented lesion was observed and could not be determined to be a physiologic pigmentation or manifestation of systemic disease. In our study, 1.7% of the examined adolescents were diagnosed with a melanotic macule, a percentage of the same general magnitude (2.5%) as reported in a study of Brazilian school children.[23] It is noteworthy that while the prevalence of all other lesions diagnosed in our study was similar by gender, melanotic macule was more prevalent in boys than girls. This difference was statistically significant ($P < 0.05$), a finding not previously reported for other geographic regions.

As reported in the literature, the prevalence of a positive history of aphthous ulcerations has ranged between 6% and 66%,[5] and varies across populations. Axell et al. reported the prevalence of aphthous ulcerations as 11.1% in outpatients in Malaysia[24] and 2% in a Swedish adult population,[25] while Kleinman et al. reported the rate to be 1.6% in 12 to 17-year old school children in the United States.[6] We recorded aphtous ulcers only at the time of examination and because of the methodology employed, it was not surprising that we observed a point prevalence of only 0.9%. Due to concerns regarding the validity of self-reports of previous aphthous ulcers by our adolescent study participants, we did not obtain estimates of lifetime prevalence.

Median rhomboid glossitis (central papillary atrophy) is a

Table 1. The total and gender-specific prevalence (95% CI) of oral lesions among 12 to 15-year olds living in Tehran, Iran.

Oral lesion	Total (n = 1,020)		Boys (n = 510)		Girls (n= 510)		*P*-value**
	n	Prevalence* (95% CI)	n	Prevalence* (95% CI)	n	Prevalence* (95% CI)	
Any lesion	286	28.0 (25.3–30.9)	149	29.2 (25.3–33.4)	137	26.9 (23.1–30.9)	0.40
Linea alba	79	7.8 (6.1–9.5)	33	6.5 (4.5–8.9)	46	9.0 (6.5–11.5)	0.13
Angular cheilitis	66	6.5 (5.0–8.1)	33	6.5 (4.5–8.9)	33	6.5 (4.5–8.9)	1.00
Physiologic pigmentation	41	4.0 (2.9–5.4)	18	3.5 (2.1–5.5)	23	4.5 (2.7–6.3)	0.43
Fissured tongue	33	3.1 (2.1–4.4)	14	2.7 (1.5–4.5)	19	4.0 (2.3–5.7)	0.38
Macroglossia	19	1.8 (1.1–2.8)	13	2.5 (1.3–4.3)	6	1.1 (0.4 –2.5)	0.11
Melanotic macule	17	1.7 (1.0–2.6)	13	2.5 (1.3–4.3)	4	0.8 (0.0–1.5)	0.03
Aphtous ulcers	9	0.8 (0.4–1.6)	6	1.1 (0.4–2.5)	3	0.6 (0.1–1.7)	0.51***
Median rhomboid glossitis	7	0.7 (0.3 – 1.4)	3	0.6 (0.1 – 1.7)	4	0.8 (0.2 – 2.0)	1.00***
Geographic tongue	5	0.5 (0.1 – 1.1)	4	0.8 (0.2 – 2.0)	1	0.2 (0.0 – 0.1)	0.37***
Ankyloglosis	5	0.5 (0.1 – 1.1)	4	0.8 (0.2 – 2.0)	1	0.2 (0.0 – 0.1)	0.37 ***
Herpes labialis	4	0.4 (0.1 – 1.0)	3	0.6 (0.1 – 1.7)	1	0.2 (0.0 – 0.1)	0.62 ***
Fordyce spots	3	0.3 (0.0 – 0.8)	1	0.2 (0.0 – 0.1)	2	0.3 (0.0 – 1.0)	1.00 ***
Bifid uvula	1	0.1 (0.0 – 0.5)	1	0.2 (0.0 – 0.1)	0	0.0 (-)	1.00 ***
Partial palatal cleft	1	0.1 (0.0 – 0.5)	1	0.2 (0.0 – 0.1)	0	0.0 (-)	1.00 ***

* = Point prevalence (per 100); ** = *P*-value comparing prevalence among boys vs. girls based on Pearson's chi-square unless otherwise noted; *** = *P*-value based on Fisher's exact test (2-sided).

rounded or roughly lozenge – shaped raised area that occurs in the midline of the tongue dorsum just anterior to the vallate papillae. The affected area is devoid of filiform or other papillae. In recent years, considerable debate has centered on the role of chronic candidiasis in median rhomboid glossitis.[26] The prevalence of median rhomboid glossitis was reported to be 0.14% in US school children living in Minnesota,[27] while Yarom et al. found it to be 2.4% among Israeli adults of different ethnic origins.[28] In the present study, we found the prevalence of median rhomboid glossitis to be 0.7%, which was similar to the reported rate of 0.78% in Hungarian children.[22]

Benign migratory glossitis, or geographic tongue, is usually an asymptomatic inflammatory disorder of unknown etiology that affects the epithelium of the tongue. The prevalence of geographic tongue has been reported to vary between 0.3% and 14.4%, but most surveys show a range between 1.0% and 2.5%.[29] In the current study, the prevalence of benign migratory glossitis was 0.5%, which comprised the lower range. Differences in sampling, diagnosis, and type of examination may explain the wide range in the reported rates of geographic tongue. Some studies have shown that it is more common in women, whereas others reported similar rates regarding sex.[29] There was no statistically significant difference between boys and girls in our study regarding benign migratory glossitis.

The prevalence of ankyloglossia in the present study was 0.5%, which is somewhat lower than the reported figures for Mexican children (0.8 %)[4] and Hungarian children (0.88%)[22] but slightly higher than the reported prevalence among the Turkish population (0.3%).[21]

Herpes labialis prevalence is related to herpes virus infection (which is cumulative) so that adults have a greater likelihood of being infected than children. Thus, studies of adult populations, however valid, may have limited applicability to children.[2] In our study involving adolescents, the point prevalence of herpes labialis was 0.4%, a lower rate than that reported in previous prevalence studies of herpes labialis in Europe, Brazil and the United States.[6,8,23,30,31] In a large national survey of US school children and youth conducted in the 1980s, the reported prevalence of herpes labialis was 0.78%.[6] Also in the United States, Shulman reported a point prevalence of 1.42% and found that race-ethnicity was a risk factor for recurrent herpes labialis point prevalence, annual prevalence, and HSV-1 seropositivity.[8] A high point prevalence rate of 2.9% was reported by Parlak et al. in a study based on 13 to 16-year old students in an earthquake-stricken region of Turkey.[10]

The reported prevalence of herpes simplex varies in different geographic settings,[32] and is a function of the case definition and assessment methodology. For example, in a study of adult Germans, Reichart[31] showed a prevalence of 20% based upon a positive history, which decreased to as low as 1.4% when only herpetic lesions present at the time of the study were considered. The highest lifetime prevalence was observed in North America (close to 40%), followed by South America and Asia (under 20%).[32] Data from Europe suggest that the prevalence of recurrent labial herpes has decreased over time and vary by geographic region, ranging from 0.6% in Swedish adults[33] to 1.3% in Spanish 6-year olds.[30]

Fordyce granules are ectopic sebaceous glands in the oral mucosa, usually found in the buccal mucosa but also frequently observed in the retro molar area and lips.[34] Prevalence rates of 0.96% in Spanish preschool children[30] and 0.65% in 5 to 12-year old Brazilian children[23] have been reported. In the present study, 0.3% of examined adolescents exhibited Fordyce granules.

Other lesions encountered in this survey, but with a very low prevalence, were bifid uvula (0.1%) and partial palatal cleft (0.1%).

Conclusion

This study is the first epidemiologic study in Tehran concerning oral mucosal lesions in adolescents. More than 28% of adolescents

were found to have at least one oral mucosal lesion. Linea alba, angular cheilitis, and physiologic hyperpimentation were the most commonly encountered lesions in adolescents, and there were no statistically significant differences in the prevalence between boys and girls. Melanotic macule was found to be proportionally more common in boys rather than the girls and this difference was statistically significant.

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