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Original Article

Prevalence of tongue lesions in a population of Iranian schoolchildren in 2020

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Abstract

Background: The tongue is one of the most important organs in the oral cavity, and its lesions are a health concern for healthcare providers and patients. Limited epidemiological studies have evaluated tongue lesions in children. The present study aimed to evaluate the prevalence of various lesions on the tongue in a population of Iranian students.

Methods: A total of 2051 students, aged 7–12 years, were randomly selected from elementary schools in Kerman using the random cluster sampling method from February 2020 to June 2020 for examination. The subjects' age, gender, and identified tongue lesions were recorded in datasheets. The data were analyzed with SPSS software using the chi-square test and *t* test at a significance level of $P<0.05$.

Results: Tongue lesions were identified in 29.9% of the children, and female children were affected at a higher rate than male subjects. The most frequent lesion was coated tongue, affecting 19.3% of the subjects, followed by partial ankyloglossia (3.6%) and fissured tongue (3.1%). The least frequent lesions were bifid tongue and microglossia (0.1% each). No cases of lingual thyroid were identified in the present study.

Conclusion: Tongue lesions were identified at a relatively high frequency in children, necessitating general dental practitioners' knowledge and awareness about the etiology, diagnosis, and management of these lesions.

Keywords: Children, Prevalence, Tongue

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Introduction

Tongue lesions comprise a significant proportion of the oral cavity lesions. The tongue has a role in different functions, including taste, swallowing, and speaking. Various studies worldwide have evaluated the prevalence of tongue lesions in different populations, especially adults.[1-6] Most of the epidemiological studies in children have evaluated the prevalence of common oral diseases, including dental caries and malocclusion, and only a limited number of studies are available on oral mucosal conditions. Besides, due to the paucity of standard techniques, differences in the diagnostic criteria used in studies, and the evaluation of only a few lesions in each study, precise data are not available on the frequency of tongue lesions in healthy children.[7-9]

Despite WHO's recommendations, only limited epidemiological studies have been carried out to date on children's oral mucosal lesions. Also, the symptom and signs of oral mucosal lesions in children might change with aging and be different from what they look like in adults. Therefore, epidemiological studies on the prevalence of oral lesions in children have a crucial role in identifying these differences.[10-16] Based on a search on the Internet, only limited reports have been published in reliable English journals on the prevalence and frequency of different tongue lesions in children. Therefore, the present study was undertaken to evaluate these lesions' frequency in 7–12-year-old children in Kerman, the capital of the largest province in Iran.

Methods

In the present study, 2051 students (1005 boys and 1046 girls), 7–12 years old, were selected from Kerman's schools using a random cluster sampling method from February 2020 to June 2020. From the list of existing schools, six elementary schools (three schools for each gender) were randomly selected using a random table of numbers, and from each school, one class was selected randomly from each of the six grades. A total of 2051 students distributed almost equally in all six age groups were examined. All the

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subjects submitted informed consent forms before being included in the study. All the children were examined for the presence of tongue lesions, including fissured tongue, geographic tongue, coated tongue, ankyloglossia, bifid tongue, median rhomboid glossitis, lingual thyroid, atrophic tongue, hairy tongue, crenation tongue, macroglossia, microglossia, and sublingual varicosity, based on WHO criteria.[11] The children were seated on a conventional chair and examined under natural light using disposable dental mirrors. The oral examinations were carried out by two examiners who had already been trained and calibrated by an oral disease specialist. The children's data, including gender, age, and tongue lesion type, were recorded in datasheets. The exclusion criteria consisted of a history of taking antibiotics or antifungal agents in the past three months, a medical history of systemic conditions, or the use of medications with known effects on the tongue. Besides, any subject reporting conditions, such as diabetes mellitus, anemia, allergy, or dermatologic conditions, such as psoriasis, were excluded. The data were analyzed with SPSS software (version 20) using the chi-square test and *t* test. Statistical significance was set at $P<0.05$.

Table 1. Distribution of tongue lesions according to the genders

Lesions	Girls	Boys	Total	*P* value
Coated tongue	287 (14%)	109 (5.3%)	396 (19.3%)	0.001*
Ankyloglossia	18 (0.9%)	55 (2.7%)	73 (3.6%)	0.001*
Fissured tongue	35 (1.7%)	29 (1.4%)	64 (3.1%)	0.152
Hairy tongue	32 (1.6%)	27 (1.3%)	59 (2.9%)	0.149
Geographic tongue	23 (1.1.%)	31 (1.5%)	54 (2.6%)	0.210
Atrophic tongue	12 (0.6%)	7 (0.3%)	19 (0.9%)	0.287
Crenation tongue	1 (0.1%)	7 (0.3%)	8 (0.4%)	0.003*
Median rhomboid glossitis	7 (0.3%)	0 (0%)	7 (0.3%)	0.016*
Macroglossia	0 (0%)	4 (0.2%)	4 (0.2%)	0.019*
Sublingual varicosity	1 (0.06%)	3 (0.14%)	4 (0.2%)	0.147
Microglossia	0 (0%)	2 (0.1%)	2 (0.1%)	0.138
Bifid tongue	2 (0.1%)	0 (0%)	2 (0.1%)	0.321
Lingual thyroid	0 (0%)	0 (0%)	0 (0%)	-
Total	386 (18.82%)	228 (11.11%)	614 (29.93%)	0.001

*P value <0.05.

Results

Overall, tongue lesions were identified in 614 (29.9%) of the 2051 students included in the study, of which 386 (62.9%) were female, and 228 (37.1%) were male. The overall frequency of tongue lesions was significantly higher in female subjects than males ($P=0.001$), 92% of the students had only one lesion, and two and three lesions were found in 7.7% and 0.3% of the subjects, respectively.

Coated tongue (19.3%), partial ankyloglossia (3.6%), and fissured tongue (3.1%) were the most frequent lesions in descending order. Bifid tongue and microglossia (each with 0.1% frequency) had the least frequency. No cases of lingual thyroid were found in the present study. Table 1 presents the relative frequencies of the anomalies evaluated in the two genders. A comparison of each lesion between the two genders showed that coated tongue and median rhomboid glossitis were significantly more frequent in female students than male students ($P<0.05$). Coated tongue was identified in 27.4% and 10.8% of female and male students, respectively. Median rhomboid glossitis was reported in seven female students, but there were no cases in male students. Partial ankyloglossia was identified in 5.47% of male students and 1.7% of female students ($P=0.001$). Crenation tongue and macroglossia were significantly more frequent in male students ($P<0.05$). All the ankyloglossia cases were mild, and the tongue was not completely tied to the mouth floor in any of the cases.

The relative frequencies of different tongue lesions are presented in Table 2 in terms of age. There was no significant correlation between the absence or presence of lesions and age group and mean age ($P>0.05$). The results of the *t* test in the separate evaluation of the relationship between the subjects' mean age and subjects with and without each lesion (among 2051 subjects) were significant only in terms of coated tongue, i.e., the subjects with a coated tongue (9.97 ± 1.68) had a higher mean age compared to those without it (9.01 ± 1.72) ($P=0.032$).

In the present study, seven subjects (1.1%) had both fissured tongue and geographic tongue; 13% of the students with geographic tongue exhibited fissured tongue too, and 10.2% of the students with fissured tongue had geographic tongue as well.

Discussion

Various studies have reported different prevalence rates for various tongue lesions in different geographic locations worldwide. Evaluation of previous studies reveals great diversity in the prevalence of different tongue lesions in terms of the population studied, ethnicity, age, gender, diagnostic criteria, and sampling techniques.[17-19] A search on the Internet reveals a very limited number of studies published in reliable English databases on the prevalence of tongue lesions in Iranian children.[10]

Tongue lesions were identified at a 29.9% prevalence rate in the present study. Since a higher prevalence of tongue lesions has been reported in subjects with blood disorders, diabetes, and many other systemic conditions, the present study was carried out on 2051 healthy children to avoid the effect of these conditions on the results. Studies carried out in other countries have revealed

Table 2. Distribution of tongue lesions according to the age

Lesions	7	8	9	10	11	12	Mean age	Total
Coated tongue	45 (2.2%)	72 (3.5%)	58 (2.8%)	66 (3.2%)	82 (4%)	73 (3.6%)	9.97±1.68	396 (19.3%)
Ankyloglossia	10 (0.5%)	10 (0.5%)	19 (0.9%)	14 (0.7%)	13 (0.6%)	7 (0.3%)	9.78±1.44	73 (3.6%)
Fissured tongue	6 (0.3%)	10 (0.5%)	15 (0.7%)	11 (0.5%)	11 (0.5%)	11 (0.5%)	9.60±1.68	64 (3.1%)
Hairy tongue	22 (1.1%)	5 (0.2%)	16 (0.8%)	4 (0.2%)	3 (0.1%)	9 (0.4%)	9.25±0.37	59 (2.9%)
Geographic tongue	8 (0.4%)	6 (0.3%)	10 (0.5%)	12(0.6%)	11 (0.5%)	7 (0.3%)	9.65±1.55	54 (2.6%)
Atrophic tongue	5 (0.2%)	4 (0.2%)	1 (0.05%)	4 (0.2%)	3 (0.1%)	2 (0.1%)	9.36±1.77	19 (0.9%)
Crenation tongue	2 (0.1%)	1 (0.05%)	1 (0.05%)	3 (0.1%)	0(0.05%)	1 (0.05%)	8.71±1.38	8 (0.4%)
Median rhomboid glossitis	1 (0.05%)	1 (0.05%)	1 (0.05%)	2 (0.1%)	1 (0.05%)	1 (0.05%)	9.57±1.71	7 (0.3%)
Macroglossia	1 (0.05%)	1 (0.05%)	0 (0%)	1 (0.05%)	1 (0.05%)	0 (0%)	9.0±1.82	4 (0.2%)
Sublingual varicosity	1 (0.05%)	0 (0%)	0 (0%)	2 (0.1%)	1 (0.05%)	0 (0%)	9.33±2.08	4(0.2%)
Microglossia	1 (0.05%)	1 (0.05%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7.5±0.7	2 (0.1%)
Bifid tongue	0 (0%)	0 (0%)	2 (0.1%)	0 (0%)	0 (0%)	0 (0%)	9.0±0.0	2 (0.1%)
Lingual thyroid	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-	0 (0%)
Total	92 (4.48%)	98 (4.77%)	114 (5.55%)	95 (4.63%)	115 (5.60%)	100 (4.87%)	9.55±1.67	614 (29.93%)

significant diversity. For example, tongue lesions were reported in 35.1% and 30.9% of children in Hungary[12] and Spain,[18] respectively. However, these lesions were much less frequent in children in Turkey[11] with 4.9%. Besides, tongue lesions in the present study were significantly more frequent in girls than boys; however, some previous studies have not reported any significant difference in the prevalence of these lesions between the two genders.[11,16]

In the present study, coated tongue (19.3%) was the most frequent lesion, and female students exhibited this lesion at a significantly higher rate than male students. This is different from the results of most previous studies, which have mostly reported fissured tongue as the most frequent tongue lesion in children.[12-15] The prevalence of coated tongue in children was reported only in one study in Italy at 7.2% frequency.[8] In some studies in Turkey and India, fissured tongue has been reported as the most frequent tongue lesion in adults.[2,17]

Ankyloglossia is a congenital developmental anomaly that causes tongue protrusion limitations due to a short lingual frenum. This anomaly was the second most common lesion, observed in 3.6% of the children in the present study. The prevalence of ankyloglossia in children in different communities is widely variable (0.1–3.7%).[6] Its prevalence in the present study was higher than the 1.8%, 1.3%, and 0.8% rates in children in Yemen,[6] Turkey,[11] and Hungary,[12] respectively, but close to the 3.7% prevalence rate in Spanish children.[18] In the present study, ankyloglossia was significantly more prevalent in male children than female children, which is consistent with some previous studies.[11]

Fissured tongue was reported in 64 children with 3.1% prevalence, consistent with 3.3% and 4% prevalence rates reported in studies by Unur et al[7] and Basalamah & Baroudi[6] in Turkey and Yemen, respectively. Sawyer et al,[14] Redman,[16] and Chosagk et al[19] reported lower prevalence rates of fissured tongue in children (0.8%, 1.08%, and 1.96%, respectively). The prevalence of fissured tongue in Hungarian (29.2%) and Mexican children (15.7%) was significantly higher than in children of other countries, reported in other studies.[12,13] In the present study, there was no significant relationship between fissured tongue and gender and age. However, Mexican and Israeli children exhibited significantly higher rates in males, which increased with age.[13,19] Evaluation of different studies shows different prevalence rates of fissured tongue (0.8–16%), depending on the study population.[13-16,19,20] It appears that fissured tongue has a multifactorial etiology. This anomaly possibly has a developmental nature, and factors such as diabetes mellitus, candidiasis, vitamin B deficiency, and hyposalivation might play a role in its development, explaining the difference in fissured tongue prevalence rate in different populations.[8,17]

The prevalence of hairy tongue was 2.9% in the present study, which was higher than the 0.3%, 0.5%, and 0.6% rates in children in Yemen,[6] Spain,[18] and Minnesota.[16] The prevalence of hairy tongue has been reported to be 0–11.3% in the adult population.[17] Kullaa-Mikkonen et al,[20] which evaluated subjects 3–35 years old, reported hairy tongue as the most frequent tongue lesion (8.4%) in Finnish subjects; they found that hairy tongue was significantly more frequent in older subjects. Hairy tongue is the result of the elongation of filiform papillae due to excessive production of keratin in response to infection, fever, antibiotics, tobacco, and xerostomia. The majority of the patients are asymptomatic; however, some

complain of gustatory disturbances or oral malodor.[17] It appears that ethnic diversity, diagnostic criteria, medications, oral hygiene, and individuals' general health might explain the differences in the prevalence rates in different communities.

The prevalence of geographic tongue in previous studies has been reported to range from 0.2% to 8.94%.[10] In the present study, geographic tongue was identified in 2.6% of the subjects, which is lower than the 7.8% rate reported in another study on 7–18-year-old subjects in Iran.[10] The results of studies on children in other countries have been different, with 9.9% in Italy,[8] 5.7% in Hungary,[12] 1.8% in Turkey,[11] 0.3% in Nigeria,[14] and 0.2% in Saudi Arabia.[15] In the present study, similar to previous studies, there was no relationship between this lesion and age and gender.[13-16] However, Rezaei et al[10] reported a higher prevalence of this lesion in male students in Iran. The transient nature and ethnic differences might explain the difference in different reports.

Atrophic tongue was identified in 19 (0.9%) children. Studies on Hungarian[12] and Mexican[13] children have yielded 0.7% and 0.1% prevalence rates, respectively. However, no cases were reported in Turkish[11] and Nigerian[14] children. There was no relationship between gender and age and atrophic tongue. However, Kullaa-Mikkonen et al[20] reported an increase in the prevalence of atrophic changes in the tongue with aging. Atrophic tongue is characterized by the local or extensive loss of tongue papillae. This lesion is usually related to nutritional deficiencies, xerostomia, history of local trauma, and candidiasis and might be associated with a burning sensation in some patients.[11,21]

Crenation tongue exhibited a 0.4% prevalence rate in the present study. Of all the studies on children, only a study by Vörös-Balog et al[12] in Hungary reported a prevalence rate of 0.6% for crenation tongue.

In the present study, seven cases (0.3%) of median rhomboid glossitis were identified, all in female children. No cases of this lesion have been reported in children in most studies.[11,13-15] However, in a study in Minnesota on 3611 children, a 0.1% prevalence rate was reported for this lesion.[16] Median rhomboid glossitis is a rare lesion caused by candida infections or developmental anomalies. Therefore, dentists should be able to identify this lesion and its pathogenesis and provide proper treatment if necessary.[1]

A prevalence rate of 0.2% was reported for macroglossia in the present study, with all the cases in boys. The prevalence rates of macroglossia in studies on children in Yemen and Turkey were 0.4% and 0.2%, respectively.[6,11]

The prevalence of sublingual varicosity was 0.2% in the present study. Of all the similar studies, only a study by Ugar-Cankal et al[11] in Turkey evaluated this lesion's prevalence, and no cases were reported in that study.

In the present study, bifid tongue prevalence was 0.1% in children, with no significant difference between the two genders. The prevalence of bifid tongue in studies by Ugar-Cankal et al[11] and Sedano et al[13] was 0.4% and 0.6%, with a higher prevalence in boys.

Microglossia was identified in two (0.1%) children. It is a very rare anomaly, and Ugar-Cankal et al[11] and Salem et al[15] reported no cases of microglossia in children. No cases of lingual thyroid were identified in the present study. The prevalence of lingual thyroid in children has been evaluated in a small number of studies. In a study on Mexican children, only three lingual thyroid cases were identified in 32022 children.[13] In the study by Ugar-Cankal et al, too, the prevalence of lingual thyroid was 0.1%. [11] Overall, the diversity in the prevalence of tongue lesions in children in previous studies might be attributed to differences in diagnostic criteria, sample sizes, ethnicity, geographical location, and in some cases of tongue lesions, to conditions such as candidiasis.

There were no significant differences between the mean ages of children with tongue lesions and those without these lesions in the present study. However, there are some differences in the results of previous studies. Vörös-Balog et al[12] reported a significant relationship between the prevalence of lesions and older age; however, Ugar-Cankal et al[11] reported a higher prevalence of these lesions at younger ages.

Evaluation of each lesion separately showed that only coated tongue exhibited a significant relationship with older age, with no such relationship in other lesions. Evaluation of similar studies showed that in studies by Vörös-Balog et al[12] and Sedano et al,[13] there was a significant relationship only between fissured tongue and age, with no significant relationship between age and other lesions.

Some studies have suggested a possible relationship between fissured tongue and geographic tongue.[11,12] Evaluation of Hungarian children showed that 44.82% of children with geographic tongue had fissured tongue as well, and 8.75% of children with a fissured tongue had a geographic tongue too.[12] Chosagk et al[19] reported geographic tongue in 23.8% of children with fissured tongue, and fissured tongue was observed in 48.8% of children with geographic tongue. In the present study too, 21.7% of children with geographic tongue had fissured tongue too, and 14.3% of children with fissured tongue had geographic tongue as well.

Strengths and limitations

Although the present study provided valuable data on the prevalence of different tongue lesions in a population of Iranian children, it had some limitations too. One of the most critical limitations of the present study was that complete medical tests were not used to evaluate

these children's health status and self-reports were used instead. For example, some studies have reported a high IgE level as an important etiologic factor for geographic tongue[12]; however, this criterion cannot be used without laboratory tests.

Conclusion

Overall, the present study results were almost similar to those of previous studies; however, due to the unavailability of similar studies on Iranian children, it is not possible to reach an accurate conclusion about the prevalence of different tongue lesions in this population. Further studies are suggested to evaluate tongue lesions in different populations of Iranian children.

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Authors' Contribution

Conceptualization: Mahsa Kalantari, Maryam Alsadat Hashemipour.
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Competing Interests

No conflict of interest.

Data Availability Statement

The findings of the present study are available from the corresponding author upon reasonable request.

Ethical Approval

The Ethics Committee of Kerman University of Medical Sciences approved the study protocol with the code of k.97.433.

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