

## Tongue lesions and anomalies in a sample of Yemeni dental patients: A cross-sectional study.

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**Abstract:** Background: Tongue examination helps considerably in diagnosing the underlying health state of the patient, especially in the cases of chronic diseases. The aim of this study is to determine the prevalence and association of tongue lesions with risk factors among Yemeni dental patients. Materials and methods: An oral medicine specialist examined all 713 patients attending the dental polyclinics at the University of Sciences and Technology (Sana'a, Yemen). The examination sheet was designed to include information related to patient characteristics, medical history, dental history, habits, and tongue lesions. Results: The prevalence of tongue lesions among the examined participants was 76.5%. The prevalence rate was 83.4% for males and 69.2% for females. Fissured tongue was the most common condition. Logistic regression analysis indicated that older age ( $p < 0.001$ ), gender ( $p = 0.007$ ), khat chewing ( $p < 0.001$ ), and smoking ( $p = 0.001$ ) were associated with fissured tongue; gender ( $p < 0.001$ ), khat chewing ( $p < 0.001$ ), and smoking ( $p < 0.001$ ) were associated with hairy tongue; and older age ( $p < 0.001$ ), khat chewing ( $p = 0.001$ ), and smoking ( $p = .021$ ) were associated with coated tongue. Conclusion: The prevalence of tongue lesions among this sample of Yemeni population was 76.5%; fissured tongue and hairy tongue were the most prevalent lesions. Khat chewing, smoking, and older age were the associated risk factors for many of studied lesions and anomalies.

**Keywords:** Prevalence, dental patients, fissured tongue, hairy tongue, khat chewing.

### INTRODUCTION.

The human tongue is considered a highly muscular complex organ anatomically located in the oropharynx, it is considered as the strongest muscular organ in the body with extremely dense and complex innervation.<sup>1-4</sup> The tongue is covered by specialized epithelium and is involved in important functions including general sensations, taste, speaking, chewing, swallowing, suckling, and plays a role in jaw development.<sup>1,5</sup>

Tongue examination helps considerably in diagnosing the underlying health state of the patient, especially in the context of chronic diseases.<sup>6</sup> It has been considered a good indicator of systemic diseases. Tongue lesions were classified into: injury (physical, chemical and thermal), infections (bacterial, viral, fungal), developmental disturbances (geographic tongue, hairy tongue, fissured tongue, median rhomboid glossitis, macroglossia), nutritional deficiency, premalignant tumors, immunological, and miscellaneous.<sup>1</sup>

Fissured tongue (FT), also termed scrotal tongue, grooved ton-

gue, and lingua fissurata, is a common benign lesion, its etiology is unknown and it is a frequent finding in healthy people.<sup>7</sup> Clinically it is seen as horizontally and vertically oriented fissures or cracks on the tongue dorsum, involving the entire dorsal surface of tongue, or may occur in separate areas, often with multiple branch fissures extending laterally or in all directions.<sup>8,9</sup>

Geographic tongue (GT) was first described as a wandering rash of the tongue by Rayer in 1831,<sup>10</sup> and it is also known as benign migratory glossitis or glossitis areata migrans, an inflammatory disorder of unknown causes, manifested as a loss of filiform papillae in some areas of the dorsal surface of the tongue.

Black hairy tongue (BHT) is manifested as an elongation and hypertrophy of filiform lingual papillae with a carpet-like appearance of the dorsum of the tongue with brown or black discoloration. It is considered a benign self-limiting medical condition.<sup>11</sup> Authors have mentioned that smoking, chewing tobacco, excessive coffee/black tea consumption, poor oral hygiene, general debilitation, xerostomia, and using peroxide containing mouth washes and drugs like steroids, tetracycline are the predisposing factors.<sup>11</sup> BHT is usually symptomatic with patients complaining of nausea, halitosis, dysguesia and tickling of the tongue.<sup>12</sup> Some authors propose BHT, HT and FT as causes of burning mouth syndrome.<sup>13,14</sup>

Ankyloglossia is defined as a minor developmental anomaly of the tongue resulting from a congenital short, thick lingual frenulum, ranging from severe, in which the tongue may be fused with the floor of the mouth to a mild type that occurs in 2–4% of newborns.<sup>4</sup>

Tongue papillary atrophy is the loss of papillary tissue of the dorsal surface, often accompanied by erythema. It is associated with anaemias, including vitamin B group, iron and folate deficiencies. The pain in the cases of burning mouth syndrome may be confined to the tongue (glossodynia) or associated with other tongue symptoms including dryness, paraesthesia and altered taste.<sup>14,15</sup>

The baseline data on tongue lesions is important for oral health planning and educational programs and is of clinical and therapeutic importance for oral health care providers. Despite the abundance of worldwide surveys on the prevalence of tongue lesions, reviewing the literature revealed a lack of studies that explored whether the

affected subjects were aware of the existence of their tongue lesions.<sup>16</sup> Moreover; estimating the prevalence of tongue lesions worldwide proves to be an arduous task.<sup>17</sup> The extracted data from these oral health surveys are essential for preparing health strategies in the community.<sup>18</sup>

Tongue lesions have been studied worldwide because the tongue is an important indicator of oral and general health. In Yemen the level of the awareness among the population about the oral health is low and many social habits are common among male, female, the young as well as adults. Currently, there was no study on the prevalence and risk factors of tongue lesions among the Yemeni population, and there is a low level of awareness regarding oral mucosal lesions among senior dentistry students who are the future dentists in Yemen.<sup>19</sup>

The aim of this study is to determine the prevalence and association of tongue lesions with their risk factors among Yemeni dental patients.

## MATERIALS AND METHODS.

### Study design

This study utilized a cross-sectional study design.

### Sampling and patient selection

The Faculty of Dentistry at University of Science and Technology is the oldest and the largest dental clinic in Yemen, which provides dental treatments for the patients from all over the country. The study sample were conveniently selected from male and female branches of the dental college to insure representativeness. All patients attending the polyclinics belonging to both genders and all age groups were included and there were no exclusion criteria. The calculated minimum sample size was 418, considering an *a priori* prevalence of 5% and a 95% level of confidence using the OpenEpi® sample size calculator (Open Source Epidemiologic Statistics for Public Health, USA).

### Data collection

The examination sheet was designed and then revised by an assistant professor in oral medicine, including the information related to individual's characteristics, smoking habits, khat chewing habits, and medical and dental history. Tongue lesions were examined as defined in the literature.<sup>20</sup> All the patients were screened using a separate examination sheet, on the dental chair

and under the light of the dental unit, the examinations were performed by a single examiner who is an oral medicine specialist.

#### Ethical issues

The study protocol was approved by the Ethical Committee of the Faculty of Dentistry at University of Science and Technology (Approval No.2015/62). The study was explained to the patients and informed consent was obtained.

#### Statistical analysis

The data collected were analyzed using SPSS® 21 (IBM, USA). To describe the quantitative data, the median and standard deviation were used and to describe the qualitative data, the prevalence distribution tables were used. To analyze the collected data, the Chi-Square analysis test was applied. Regression, bivariate and multivariate analysis were used as needed. A *p*-value less than 0.05 was considered as significant.

**Table 1.** Demographic and clinical characteristics of the study sample.

Variable	Groups	Frequency	%
Sex	Male	368	51.6%
	Female	345	48.4%
Age	35 or less	529	74.2%
	36 or more	184	25.8%
Khat chewing	Yes	349	56.4
	No	270	43.6
Duration of Khat chewing	none	260	42.0
	less than four hours	199	32.1
	four to six hours	98	15.8
	more than six hours	62	10.0
Smoking	Yes	129	20.8
	No	490	79.2
Number of cigarettes /day	none	484	78.2
	<5 cigarettes	38	6.1
	5–10 cigarettes	27	4.4
	11–20 cigarettes	62	10.0
	>20 cigarettes	8	1.3

**Table 2.** Demographic and clinical characteristics of the study sample.

Tongue lesions	Female (n =345)	n (%)	Male (n = 368)	n (%)	Total (n =713)	n (%)
Fissured tongue	166	(48.1)	214	(58.2)	380	(53.3)
Hairy tongue	76	(22.0)	140	(38.0)	216	(30.3)
Coated tongue	38	(11.0)	55	(14.9)	93	(13.0)
Geographic tongue	26	(7.5)	24	(6.5)	50	(7.0)
Atrophic tongue	9	(2.6)	11	(3.0)	20	(2.8)
Ankyloglossia	6	(1.7)	7	(1.9)	13	(1.8)
Crenate tongue	7	(2.0)	4	(1.1)	11	(1.5)
Traumatic ulcer	0	(0.0)	2	(0.5)	2	(0.3)
Median rhomboid glossitis	1	(0.3)	0	(0.0)	1	(0.1)
Fibroma	0	(0.0)	1	(0.3)	1	(0.1)
Aphthous ulcer	1	(0.3)	0	(0.0)	1	(0.1)
<b>Total</b>	<b>239</b>	<b>(69. 2)</b>	<b>307</b>	<b>(83.4)</b>	<b>546</b>	<b>(76.5)</b>

Some patients had more than one tongue lesion.

**Table 3.** Bivariable and multivariable analysis of variables associated with fissured tongue.

		OR(adjusted)	95%CI	p	OR(unadjusted)	95%CI	p
Age groups	4-35 years	.480	.333-.692	.000	.411	.288-.587	<.001
	36-85 years						
Gender	Male	1.264	.918- 1.739	.151	1.498	1.11-2.01	.007
	Female						
Khat chewing	Yes	1.664	1.20-2.30	.002	2.045	1.51-2.75	<.001
	No						
Smoking	Yes	1.524	.99-2.33	.053	2.003	1.34-2.98	.001
	No						

**Table 4.** Bivariable and multivariable analysis of variables associated with hairy tongue.

		OR(adjusted)	95%CI	p	OR(unadjusted)	95%CI	p
Age groups	4-35 years	1.744	1.16-2.61	.007	1.101	.76-1.59	.610
	36-85 years						
Gender	Male	1.995	1.38- .966	.076	2.173	1.56-3.02	<.001
	Female						
Khat chewing	Yes	2.970	2.05-4.30	.000	4.255	2.99-6.04	<.001
	No						
Smoking	Yes	1.660	1.08-2.54	.020	2.750	1.86-4.063	<.001
	No						

**Table 5.** Bivariable and multivariable analysis of variables associated with coated tongue.

		OR(adjusted)	95%CI	p	OR(unadjusted)	95%CI	p
Age groups	4-35 years	.439	.27-.70	.001	.38	.24-.59	<.001
	36-85 years						
Gender	Male	1.161	.72-1.867	.538	1.42	.91-2.21	.119
	Female						
Khat chewing	Yes	1.630	.97-2.723	.062	2.155	1.36-3.40	.001
	No						
Smoking	Yes	1.630	.97-2.72	.062	1.803	1.08 -2.98	.021
	No						

## RESULTS.

The study sample consisted of 713 dental outpatients, 368 males (51.6%), and 345 females (48.4%). Their age ranged from 4 to 85 years (median=24.0 years; SD= 16.0). Among age groups, there were 95 (13.3%) subjects aged ≤14 years, 378 (53.0%) aged 15 - 30 years and 139 (19.5%) aged 31-45 years, 60 (8.4%) aged 46–60 years, and 41 (5.8%) aged 60 years and older.

Demographic and clinical characteristics of the study sample are shown in Table 1. The prevalence of khat chewing and smoking was higher in males than in females: 64.9% versus 32.8%,  $p < 0.001$  for khat chewing, and 26.1% versus 9.9%,  $p < 0.001$  for smoking.

Distribution of various tongue lesions in relation to gender is shown in Table 2. Gender differences were significant ( $p < 0.001$ ) regarding hairy tongue, there were no gender differences for other tongue lesions. The prevalence rates of coated tongue ( $p < 0.001$ ), and atrophic tongue increased with age ( $p < 0.001$ ). The highest prevalence of these lesions was in the 60 years and older group. The prevalence of hairy tongue decreased with age ( $p < 0.001$ ).

Bivariable and multivariable analysis of the variables associated with fissured tongue are shown in Table 3, with hairy tongue shown in Table 4, and with coated tongue shown in Table 5.

## DISCUSSION.

The present study is the first study investigating the prevalence of tongue lesions and associated risk factors among Yemeni population including various age groups from different governorates throughout the country. As such, these findings can be compared with the existing literature regarding other populations.

The prevalence of tongue lesions shows a wide variability, which seems to be related to age, sex, number of individuals examined, methodology, criteria of diagnosis and the number of tongue lesions included in each study.<sup>21</sup> The prevalence of eleven different tongue lesions in Yemeni dental outpatients shows a great difference from previous studies. The results are similar to an Indian study that reported a 78.4% prevalence.<sup>22</sup> However, a study among Saudi population estimated a very low prevalence of 3.96%.<sup>23</sup>

The prevalence of these lesions was greater in males compared to females, this can be explained by gender-related habits such as smoking and khat chewing, which are more common in males than in females. Contrary to this finding, tongue lesions in the Hungarian population<sup>24</sup> were more prominent in females than in males; likewise fissured tongue was more prevalent in Libyan females than males.<sup>25</sup>

A relatively similar existence of FT has been reported by Byahatti *et al.*<sup>20</sup>. A lesser prevalence of FT has been reported in studies conducted by various other researchers.<sup>5,18,26-30</sup> Surprisingly, there was a large dif-

ference in the prevalence of FT between the present study population and the neighboring Saudi population (1.4%), which may be related to Khat chewing as a commonly practiced habit in Yemen. In agreement with a Turkish study,<sup>27</sup> the prevalence of FT in the present study was greater in males than females.

HT was the second most prevalent lesion, and it was more common in males than females. There is a marked difference between the present and other studies regarding HT prevalence rates, e.g.: Libyan (4.4%), Turkish (11.3%), and Jordanian (14.2%) populations. This difference might be associated with sample selection (sex, age groups, ethnicities and habits) and the criteria used for the definition of HT. Khat-chewing males are usually smokers and this may explain the higher prevalence rate of HT among the male smokers in the present study. Older age, male gender, smoking, and khat chewing are significantly associated with HT.

As the validity of the data self-reported by the patients about the presence or absence of systemic conditions is questionable, the authors did not consider this variable in the data analysis.

## CONCLUSION.

The prevalence of tongue lesions among this sample of the Yemeni population was 76.5%, with fissured tongue and hairy tongue being the most prevalent lesions. Khat chewing, smoking, and older age were the associated risk factors for many of studied lesions and anomalies.

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