Salivary flow rate and pH in relation to tongue surface variations

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ABSTRACT
Background: Different tongue surface variations were seen among individuals. This study was aimed to see any relation between salivary flow rates, pH with these variations.

Material and method: A total of 43 females were examined for their variations on tongue surfaces. A flow rate and pH were measured for whole salivary gland sample for each student.

Results: Twenty four of cases (55.8%) showed normal tongue texture, 16 of them (37.2%) were with fissured tongue, while only 2 students with hairy tongue and one with geographic tongue.

Conclusion: A non significant difference was found between normal and fissured tongue regarding the flow rate and pH. While a significant differences was found between normal and fissured tongue regarding the mean age, that fissured tongue increased with age.

Key words: Flow rat, pH, fissure tongue.

INTRODUCTION
Changes in general health of human beings may be reflected by oral mucosa. In addition to the background factors, there are local factors in mouth causing reaction in tongue mucosa.

The effect of tobacco, heavy drinks, spices and person habits in taking one’s meals are seen in reactions of mucosa [1].

Variations of the tongue surface are named according to the clinical appearance. Fissured tongue is also called scrotal tongue or lingua plicota, it is a familial but not always a congenital condition. The fissures are of variable depth and usually extended laterally from a median groove. It is an asymptomatic condition unless food particles and debris lodging in the depths of the fissures cause mild glossitis. Fissured tongue has been reported to be as high as 21%[2].

In geographic tongue (Benign migratory glossitis), the classic manifestation is an area of erythema, with atrophy of filiform papillae of the tongue, surrounded by a serpiginous, white, hyperkeratotic border. The patients are asymptomatic; however sensitivity to hot and spicy foods has been reported. The etiology and pathogenesis are poorly understood, it is noted in adult than children [3,4].

Hairy tongue characterized by a hypertrophy and elongation of filiform papillae, with lack of normal desquamation, colored from yellowish white to dark brown. Normal filiform papillae are approximately (1 mm) in length, whereas in case of hairy tongue the papillae have been measured at more than (15 mm) in length. The precipitating factors include poor oral hygiene, use of medication (broad-spectrum antibiotic), and therapeutic radiation of head and neck.

The incidence and prevalence of hairy tongue increased with increasing age. The prevalence varies widely from 8.3% in children and young adults to 57% in persons who are addicted to drugs and incarcerated [5].

Saliva in the mouth has many functions, one of the main functions is the protection of oral mucosa, while in persons with dry mouth, the cause of many subjective troubles and objective changes is slowing down of salivation. Mucosal signs of decreased salivary flow include inflammation, dryness and inability to express saliva from gland orifice [7].

Salivary flow rate can be measured for whole salivary secretion under resting or stimulated conditions, however the range of flow rates for each these is vary wide among healthy individuals [7]. Therefore, a clear distinction between normal and abnormal flow rate may not be possible [8].

Navazesh et al found that rates of 0.12-0.16 ml/min. seem to define the range below which there is a higher rate of oral and hard tissue abnormalities using that as a baseline [9].

Buffering capacity of saliva refers to its ability to resist a change in pH when an acid is added to it. This property is largely due to bicarbonate content of the saliva which is in turn dependent on salivary flow rate. Bicarbonate concentration also regulates salivary pH, therefore there is a relation between salivary pH, buffering capacity and flow rate, with pH and buffer capacity increasing as flow rate increased [10].

The source of the bicarbonate is partly from the plasma which transfer to saliva and partly from endogenous bicarbonate produced by gland metabolism [11].

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MATERIALS AND METHODS
This study included 43 females’ students from the secondary school and college of dentistry in Baghdad. The mean age of them was 16.4 years and the age range was 13–24 years. A medical history was taken and the oral examination was done for each female.

Variations of the tongue surfaces were classified according to the clinical appearance as: Fissured tongue; geographic tongue and hairy tongue. The whole resting (unstimulated) salivary samples were collected into a graduated plastic tube for 10 minutes at morning between 9-10:30 a.m. The flow rates were calculated as mL/min. and the pH was measured for each sample by PW-9421 pH meter at room temperature directly after collection of the samples.

RESULTS
The sample distribution is seen in Table 1.

<table>
<thead>
<tr>
<th>Sample</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal tongue</td>
<td>24</td>
<td>55.8</td>
</tr>
<tr>
<td>Fissured tongue</td>
<td>16</td>
<td>37.2</td>
</tr>
<tr>
<td>Geographic tongue</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Hairy tongue</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>100</td>
</tr>
</tbody>
</table>

Twenty-four of them (55.8%) were with normal tongue, sixteen (37.2%) were with fissured tongue, while only two (4.7%) with hairy tongue and one (2.3%) with geographic tongue. The mean age of females with fissured tongue was 17.75± 4.669 years, is significantly higher than that of normal tongue which was 15.83±4.061 years (P<0.002) (Table 2,figure 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normal tongue</th>
<th>Fissured tongue</th>
<th>t-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age/years</td>
<td>15.83±4.061</td>
<td>17.75±4.669</td>
<td>3.843</td>
<td>0.002</td>
</tr>
<tr>
<td>Flow rate</td>
<td>1.962±1.123</td>
<td>1.668±1.163</td>
<td>0.638</td>
<td>0.533</td>
</tr>
<tr>
<td>pH</td>
<td>6.787±0.349</td>
<td>6.989±0.338</td>
<td>2.138</td>
<td>0.052</td>
</tr>
</tbody>
</table>

The mean flow rate of whole salivary secretion of samples with fissured tongue (1.668±1.163) showed a non significant difference from that of normal tongue (1.962±1.123), (P>0.05) (Figure 2, table 2). The mean pH of the samples with fissured tongue (6.989±0.338) showed a non significant difference from that with normal tongue (6.787±0.349), (P>0.05), as shown in Table 2, and Figure 3.

Normal tongue occur in 60.71% of the examined sample in the age group of (13-16) years while fissured tongue occur in 28.57% in the same age group (Table 3).

Fissured tongue seen in 53.3% of the examined sample of an age group 21-24 years while normal tongue seen in 46.7% in the same age group (Table 3).

For the hairy and geographic tongue we can’t depend on the results because of their small number.
### DISCUSSION

All the salivary samples were taken at morning between 9-10:30 a.m. reduce variation.

In this study, fissured tongue was seen in females with a mean age higher than that of normal tongue. This agrees with the finding of Kullaa-Mikkonen et al. who said that fissured tongue can be diagnosed initially in childhood, but it is diagnosed more frequently in adulthood and the prominence of the condition appears to increase with increasing age.

In this study, fissured tongue was seen in 37.2% of the examined sample. The prevalence of fissured tongue worldwide varies by geographic location and has been reported to be as high as 21%.

Flow rate and pH of fissured tongue samples showed no significant differences from that of normal tongue samples. This may be explained on the base that saliva flow rate and pH have no effect on the tongue changes and this is enforced by the finding that fissured tongue has no specific etiology but a polygenic or autosomal dominant mode of inheritance is suspected because this condition increased frequency in families with an affected proband.

### REFERENCES