Influence of age and gender on salivary flow rate in completely edentulous patients

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Abstract

The denture retention and stability are dependent on saliva flow rate and quality, patients with dry mouth may have problems with the stability or comfort of maxillary complete dentures.

Dry mouth is a common feature in the elderly, but it is not clear what proportion of incidences is related to functional disturbances and whether age persists and gender play a role. The aim of this study is to determine the effect of age on unstimulated (Resting) whole and stimulated saliva flow rates. It was determined in 100 unmedicated, healthy individuals wearing complete dentures. The subjects were divided into two age groups: group A (< 70 years), group B (> 70 years). A significant decrease in the secretion rates of unstimulated whole saliva in relation to age was observed in the study population (p < 0.001).

Females had significantly lower mean flow rates than males for unstimulated (resting) whole saliva.

Key word: Complete denture, edentulous, salivary flow.

Introduction

Saliva is a fluid secreted by three pairs of major salivary glands and many minor salivary glands which is normally found in oral cavity. It is a fluid which shows, like the other body fluids, some changes correlated with some diseases. Saliva is regarded as one of the important factors in regulating oral health, with respect to both the volume produced and the constituents it contains.\(^1\)
Functional disturbances of the salivary glands can cause a reduction in salivary flow and subjective dryness which affect complete denture retention. As we know, the presence of thin salivary film layer is essential for the comfort of the mucosa beneath a denture base and for denture retention. Although numerous studies on the properties and secretion of saliva have been published, the effect of aging on saliva flow remains unclear, a decrease in whole saliva flow with age and reduction in whole and parotid salivary secretion rate with age was reported\(^3,4\). Some of the variation in results might be due to the fact that "elderly" may be described as over 60 years of age in some studies and over 80 years in others. It appears that some studies may have included subjects on systemic medications\(^5,6\). A part from this conflicting observation of age-related changes in flow rates\(^7\).

The aim of this study is to determine whether there are age and gender–dependent changes in salivary flow rates of resting whole saliva in healthy completely edentulous patients receiving new pairs of complete dentures (immediately after the first wearing of the complete denture).

**Materials and Methods**

Hundred healthy newly wearing complete dentures elderly subjects were selected from prosthetic clinic, each participant was given detailed and reassuring information as well as instruction on the purpose of the experiment, to dissipate apprehension and mental stress that may cause temporary mouth dryness by decreased salivary secretion to take part in this study. They were divided among the following two groups according to their age: group A (< 70 lesser than) and group B (> 70 greater than). Each patient has been asked about name, age, address, social condition, hospitalization, medication, duration of disease, family history, habits like (smoking, alcohol). Environmental exposures were similar for all the subjects. (Patients has questioned according to health questionnaire of Boucher's, 1985).

**Collection of Saliva Samples**

All samples were taken between 9:00 and 11:00 am. Unstimulated whole saliva was collected from all subjects by direct expectoration into a sterile container over a period of 10 min, so that the flow rate could be calculated\(^8\). The flow rates of resting whole saliva were measured by volume and expressed as ml/min. The participants were kept as quite as possible to allow saliva flow into the mouth as normal as possible. All patients are seated in an armed dental chair with a standard head rest position with slight forward position of the head to prevent saliva swallowing and help in collection behind lightly closed lips. The patient was instructed to do initial swallowing to remove the excess of the deionized water (pre–sampling period was 1 min). Patients were asked to refrain from smoking, eating and drinking for 2 hours prior to the test session, to avoid swallowing and to make as few movements as possible during the procedure. Spitting method for collection of saliva samples was used. The participants were allowed to spit in large graduated test tubes. Then the tubes were covered well and held in crushed ice container for flow rate calculation\(^9\).

**Results**

* Saliva flow rate according to gender:

The mean and S.D for Saliva flow rate in sample (50 male) was (0.4300 ± 0.3700 ml/min) while for (50 Female)
was (0.03420 ± 0.02580 ml/min) as shown in table (2) and Fig (1).

* Saliva flow rate according to age:

The mean age and S.D in year of <70 years (50) was (0.5300 ± 0.21500 ml/min) while for >70 years (50) was (0.4200 ± 0.14400 ml/min) as shown in table (3) and Fig.(2).

Discussion

Results of this study showed that Salivary flow in males was significantly higher than in females and this could be explained on the basis of that female Salivary glands being smaller than that of male according to Scott (1975)\(^{(11)}\). Another factor contributing to this reduction of flow rate might be hormonal status in female and this agrees with Ship et al (1995)\(^{(12)}\) as they stated that women in post menapausal age had been reported to have a decreased Salivary flow rates, but this loss of estrogens would not be sufficient to account for reduced flow in female as Parvinen and Larmas (1982)\(^{(13)}\) suggested that, age is more important factor with respect to the parotid saliva flow rate.

Also results indicated that the change in flow rate of whole Saliva was related to age factor and this was in agreement with Al-Shimmary (2003)\(^{(14)}\) and Marton and Boros (2004)\(^{(15)}\) who measured the salivary secretion in 57 people aged between (50-60) years and found that the mean values were (0.19 ± 0.36 ml/min) and in 35 people aged between (59-75) years, the mean values were (0.36 ± 0.33 ml/min), he found a correlation between the rate of secretion and age in the group of (50-75) years elderly people.

In conclusion, this study revealed that salivary flow in males was significantly higher than in females and the change in flow rate of whole Saliva was related to age factor.

References

14- Al-Shammary (2003): Some Saliva properties in dentate, edentulous and
denture wearers, Thesis for master degree.


Table (1): Unstimulated saliva flow rate determination Dodds and Suddik (1995)\(^{(10)}\)

| 1. | The patient must not have had any type of Salivary stimulus during the preceding two hours ie: food, drink, gum, mint, dental treatment etc. |
| 2. | The patient should sit quietly without any conversation or oral activity for six minutes, allowing any saliva to passively collect in the mouth. |
| 3. | Every two minutes or so during this time the patient should spit into a small funnel leading into a small milliliter graduated cylinder. |
| 4. | After six minutes measure the fluid, not the foam on top and record the volume. |
| 5. | Divide the volume by six to determine the flow rate in milliliters / minute. |

Table (2): Distribution of secretions rate of resting whole saliva (male and females)

<table>
<thead>
<tr>
<th>Type</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFR</td>
<td>Male</td>
<td>50</td>
<td>0.4300</td>
<td>0.3700</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50</td>
<td>0.0342</td>
<td>0.0258</td>
<td>H.S</td>
</tr>
</tbody>
</table>

Figure (1): Mean of saliva rate

Table (3): Distribution of age (years) for male and females of the Saliva flow rate

<table>
<thead>
<tr>
<th>Type</th>
<th>Age groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>F. value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFR</td>
<td>Male</td>
<td>50</td>
<td>0.5300</td>
<td>0.21300</td>
<td>52.315</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50</td>
<td>0.4200</td>
<td>0.14400</td>
<td></td>
<td>H.S</td>
</tr>
</tbody>
</table>
Appendix

Sample of the Health Questionnaire
Boucher's 1985

<table>
<thead>
<tr>
<th>Name :</th>
<th>Age :</th>
<th>Sex :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address :</td>
<td>Phone :</td>
<td></td>
</tr>
<tr>
<td>Occupation :</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When was your last visit to your physician and why?
Do you take Any medication (how much & why)?

1.  تشرب ماء قبل الفطور صباحاً
2.  تسخين الطعام ببطء
3.  هل الفم صغير؟
4.  هل تشرب الماء مع الطعام
5.  هل تشرب الماء بعد الطعام
6.  نزيف قلب الأسنان
7.  مرتاح بلبوب طقم الأسنان