Evaluation of Resting (unstimulated) flow Rates of whole Saliva in Relation to Age and Gender[+]

Muayad K. Rabee[*] Alia Mahmood Alwan [**]

Abstract

Dry mouth is a common feature in the elderly, but is not clear what proportion of Incidences are related to functional disturbances and whether age persue 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 rats. It was determined in Twenty four unmediated, healthy individuals. the subjects were divided into two age groups < 70 years (group A), >70 years (group B). 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.

المستخلص:

أن ظاهرة جفاف الفم هي من ظواهر الشيخوخة ولكن ليس هناك نسبة واضحة بين المسنين وهل أن هناك خلل وظيفي وهل لها علاقة بالعمر والجنس.

أن هدف هذه الدراسة هو لتحديد تأثير العمر على معدل سيلان اللعاب بدون تحفيز الغدد اللعابية تم أخذ ٢٤ عينة صحيحة بدنياً وبدون استعمال مواد طبية وتم تقسيمهم الى فئتين عمريتين.(A) أكبر من ٧٠سنة و(B) أصغر من ٧٠ سنة. تم تشخيص هبوط واضح في معدل إفراز اللعاب للأشخاص وبدون محفزات مع تقدم العمر ($p<0.001$). وقد اتضح أن معدل سيلان اللعاب عند الإناث أقل من الذكور في الحالة الطبيعية (أي عدم استعمال محفزات لإفراز العاب).

Introduction

Saliva is a fluid Secreted by three pairs of major salivary gland and many minor salivary glands is normally always 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

---

[+] **Date received 22 / 6 / 2006 Date accepted 29 / 12 / 2009**

[*] **Assistant Prof. Institute of medical Technology "Baghdad"**

[**] **Assistant Lecturer Institute of Medical Technology "Baghdad"**

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. These are common features in elderly people compared with younger age group[2]. 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[3, 4, 5]. 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 over 80years in others. It appears that some studies may have included subjects on systemic medications[6,7]. A part from these conflicting observation of age- related changes in flow rates[8]

The aim of this study is to determine whether there are age-dependent changes in salivary flow rates of resting whole saliva in healthy completely Edentulous patients.

Patients and Methods

Twenty four (14 males, 10 females), healthy adult, unmediated subjects were selected to take part in this study and were divided among the following two groups according to their age: group A (< 70 Lesser than), 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, Alcoholic) Environmental exposures were similar for all the subjects. (patients has questioned according to health questionnaire (Boucher's,(1985) (see Appendix).

Collection of saliva samples

All samples were taken between the hours 9 and 11 a.m. unstimulated whole saliva was collected from all subjects by direct expectoration into a sterile container over period of 10 min so that the flow rate could be calculated [9]. The flow rates of resting whole and stimulated saliva were measured by volume and expressed as 1 ml/ min.

Results

* Saliva flow rate according to gender

The mean and S.D in sample (14 male) was (0.9357± 0.12157 ml/ min) while for (10 female) was (0.92± 0.12649 ml/ min) as shown in table (1) fig. (1).

Table (1): Distribution of secretions rate of resting whole saliva (male and females)

type	Gender	N	Mean	SD	F. value	Sig.
SFR	Male	14	0.9357	0.12157	52.915	0.000 H.S
	Female	10	0.92	0.12649		

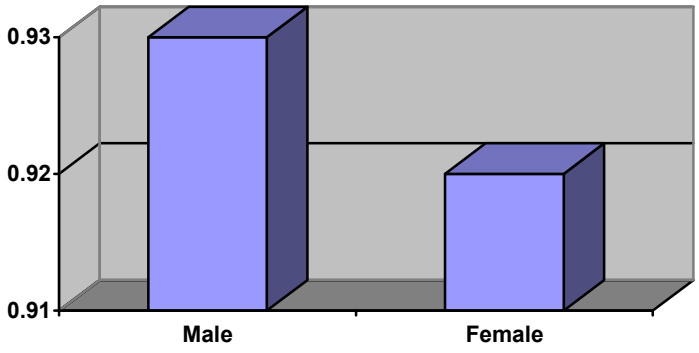

Figure (1): Mean of saliva flow rate

*** Saliva flow rate according to age.**

The mean age and S.D in year of < 70 years (16) was (0.9400±0.14161 ml/min) while for ≥ 70 (8) was (0.9075±0.06671 ml/ min) as shown in table (2), fig. (2).

Table (2): Distribution of age (years) for male and females of the Saliva

type	Age groups	N	Mean	SD	F. value	Sig.
SFR	<70	16	0.9400	0.14161	52.315	0.000 H.S
	≥70	8	0.9075	0.06671		

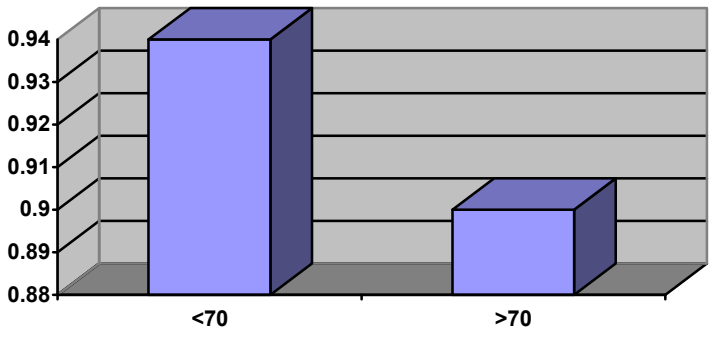

Figure (2): Age group of the Saliva flow rate.

Table (3) : Saliva flow-rate in a number of studies

Author	Year of the study	Age of the participants	Salivary flowrate ml/min	Number of subjects
Zaus and Fosdick	1939		0.5	15
Becks and Wainwright	1943	5-95 y.o (female and male)	0.32 s.d. 0.23	661
Windeler and Shannon	1967	18-23 U.S.A	0.19-0.66 (Range)	-
Shannon and forme	1973		0.32	50
Benedek-spat	1973	19-23	0.57±0.075	
Gutman and Ben Aryh	1974	6-76 (female and male)	0.37	
Shannon and feller	1979	11-16	0.04 ± 0.03	
Legerlof and Ekstrand	1982	19-49	0.13-2.0 (Range)	
Heintze et al	1983	15-74 (female and male)	0.36 male 0.26 females	629
Kalla-Mikkonen et al	1985	20-32 y.o. finland	0.34 ± 0.17	
Rudney et al	1991	18-23 y.o. U.S.A	0.33 ± 0.16	
Ferquson	1996	20-55 y.o. (female and male)	0.24 s.d. 0.17	22
Thylastrup and fejerskov	1996		0.25-0.35	
Pocock and Richards	1999		0.5	
Axelsson	2000		Normal 0.25-0.35 low 0.1-0.25	
Sulaiman	2000	20-32 Iraq	2.06-2.46 (Range)	
Humphery and Williamson	2001		Above 0.1-0.3	
Morton and Boros	2004	59-75 (female 75)	0.36 ± 0.33	35
Al-Shimmary	2003	50-60	0.19 ± 0.36	57

Discussion

The differences between the sexes have been explained on the basis of female salivary glands being smaller than those of males [10]Another factor contributing to this reduction of flow rate might be hormonal status. Women of post-menopausal age have been reported to have decreased salivary flow rates[11] but this loss of estrogens would not be sufficient to account for reduced flow in females, suggest that age is a more important factor[12] with respect to the parotid saliva flow rate. No age- related reduction in the stimulated secretion rate was detected this agrees with other investigators[13]Who have reported that the stimulated parotid saliva flow did not diminish with increased age in healthy individuals.

It has been found in old people, not only a quantitative reduction in maximum saliva flow but also qualitative changes in the saliva had been reported [4,14,12] Yurdukoru [2001] showed the mean unstimulated and stimulated whole salivary flow rates of healthy complete denture wearer patients were not significantly different from the rates of younger healthy individuals.

The salivary flow rate appears to be independent of age in healthy unmedicated subject. Many times, reduced saliva flow rate in older patients is linked to side effects of prescription medication [16]

This study revealed that saliva flow rate that in male was significantly higher than in female and the change in flow rate of whole saliva were related to age .

References

1. Mandel, I.D. and Wotman , S. "The salivary secretions in health and disease*". Oral science revue* ,8,25. 1976

2. Thorselins I, Emil son C G, O Sternberg T " salivary conditions and drug con motion in older age group of elderly Swedish Individuals".

3. Heintze U, Birkhed D, Bjorn H "Secretion rate and buffer effect resting and stimulated whole saliva as a function of age and sex". *Swed Dent* J 7:227-238. 1983

4. Gutman, D and Ben, H."The influence of the age on salivary content and rate of flow". *Int*. *J of oral surge*,3,314-317. 1974

5. Yaegaki, Ogura R kames yama T, Sujaku C "Biochemical diagnosis of reduced salivary I land function*". Iut J oral surge* 14:47-49. 1985

6. Fure S, Zickert "Prevalence of root surface caries in 55, 65, and 75 year old Swedish Individuals". *Community dent oral*. 1990

7. Narhi to, Heurman JH, Ainamo A, Nevalinen JM, Schmidt kaunisahok G, Siukosaai P, etal "Association between Salivary flow rate and the use

8. Helfmw,Baum *BJ* "Unstimulated and stimulated parotid salivary flow rate in individuals of different ages". J *Dent R*es 63: 1182-1185. 1984

9. Challacombe SJ " Serum and salivary anti bodies to strep to coccus mutants in Relation to the development and treatment of human dental caries*". Arch oral Boils* 25: 495-502. 1980

10. Scott J "Age, Sex and contra lateral differences in the volumes of human submandibul are Salivary glands". *Arch oral Boi*l 20:885-887. 1975

11.Parvinen T, Larmas M "Age decency of Stimulated Salivary flow rate, ph and lacto b-acillus and yeast concentrations" *J Dent Res* 61:10 52-1055. 1982

12. Ship JA, Nolan NE, Puckett SA. "Longitudinal analysis of parotid and submandibular salivary flow rates in healthy, different aged adults*" J. Gerontol Abiol Sci med Sci* 1995;50:M 285-9. 1995

13. Baum, B.J. "Evaluation of unstimulated parotid salivary flow rate in different age groups". *J. Dent Res;* 60, 1292. 1981

14. Makila, E. "Oral health among the in mates of old people's homes. The salivary secretion, *proceedings of the finish dental society*" 37, 64. 1977

15. Yuradukoru B, Terioglu H. and Yilmaz, T, "Assessment of whol, saliva flow rate in denture wearing patients". *J. oral Rehabilitation* 2001, 28; 109-112. 2001

16. Ship JA, Nolan NE, Puckett SA. "Longitudinal analysis of parotid and submandibular salivary flow rates in healthy, different aged adults*" J. Gerontol Abiol Sci med Sci* 1995;50:M 285-9. 1995

Appendix

<table>
<tr><th colspan="2">[TABLE (5)] Xerostomia: Associated Symptoms</th></tr>
<tr><td>ORAL</td><td>SYSTEMIC</td></tr>
<tr><td>SALIVA: Decrease in amount, foamy, viscous, ropy</td><td>THROAT and LARYNX: Dryness, hoarseness, persistent dry cough</td></tr>
<tr><td>LIPS: Dry, cracked, fissured (cheilosis)</td><td>NOSE: Dryness; frequent crust formation, decrease in olfactory acuity</td></tr>
<tr><td>TONGUE: Burning (glossopyrosis), pain (glossodynia)</td><td>EYES: Dryness, burning, itching, gritty sensation, feeling that the lids stick together, blurred vision, sensitivity to light</td></tr>
<tr><td>CHEEKS: Dry</td><td>SKIN: Dryness, butterfly rash, vasculitis</td></tr>
<tr><td>SALIVARY GLANDS: Swelling, pain</td><td>JOINTS: Arthritis; pain, swelling, stiffness</td></tr>
<tr><td>THIRST: Frequent ingestion of fluids, especially while eating; keep water at bedside</td><td>GI TRACT: Constipation; Gastroesophageal Reflux (GERD)</td></tr>
<tr><td>MASTICATION: Difficulty with eating dry foods; difficulty with the use of a denture</td><td>VAGINA/VULVA: Dryness, burning, itching, history of recurrent fungal infections, dyspareunia</td></tr>
<tr><td>SWALLOWING: Difficulty with (dysphagia)</td><td rowspan="3">GENERAL SYMPTOMS: Fatigue, weakness, generalized aching, weight loss, depression</td></tr>
<tr><td>SPEECH: Difficulty with (dysphonia)</td></tr>
<tr><td>TASTE: Difficulty with (dysgeusia)</td></tr>
<tr><td colspan="2">Adapted from Sreebny LM: in “Saliva and Oral Health”, Second Edition, Edgar WM and O’Mullane DM, Eds., Published by British Dental Association, London, 1996.</td></tr>
</table>

Sample of the Health

Questionnaire

Name	Phone
Age	Social condition
Sex	Hospitalization
Address	Medication
Occupation	Family history
	Habits

When did you last sec your physic & why?

Do you take any medication (how much & why)?

Section 1= Medical

Has doctor ever told you that you have a heart condition (Heart murmur، heart attack or angina pectoris, for example)?

Have you ever had rheumatic fever, or rheumatic heart disease?

Have you ever been told that your blood pressure is too high? Too low?

Have you ever told that you have diabetes?

Do you bleed abnormally following a cut, tooth extraction, or other operation?

Do you have any allergies (hay fever, asthma)?

Are you allergic to any drug or medicine (aspirin, sulfa, penicillin، Novocain)?

Have you ever had a lug, liver or kidney disease?

Have you ever had syphilis?

Section II:

I -Cardiovascular

Do you breath get out easily?

Do you have difficulty breathing when you are dallying down?

Are your ankles often badly swollen?

Have you ever had a stroke?

Nervous system：

Have you ever been treated for an emotional disturbance?

Have you ever been treated for epilepsy?

Have you fainted more than twice in your life?

Have you ever been treated for any other disease of the nerves?

Respiratory system：

Have you ever had a sinusitis?

Have you ever coughed up blood?

Have you ever lived with anyone who had tuberculosis?

Gusto intestinal tract：

Do you have frequent spells of diarrhea?

Have you ever vomited blood?

Have you suffered from any other stomach trouble?

Have you ever got jaundice?

Endocrine system：

Does a any of your relatives have diabetic ?

Have you ever taken thyroid tablets?

Are you taking, or have you ever taken, ACTH or cortisone?

Blood：

Have you ever had anemia?

Are you a hemophiliac?

Have you ever had` any other blood disease?