

Original Article

Evaluation of Unstimulated Salivary Flow Rate and Oral Symptoms in Menopausal Women

K. Borhan Mojabi¹✉, M. Esfahani^{2,3}, H. Jahani Hashemi⁴

¹Assistant Professor, Department of Oral Medicine, School of Dentistry, Qazvin University of Medical Sciences, Qazvin, Iran

²Post Graduate Student, Department of Oral Medicine, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

³Post Graduate Student, Dental Research Center, Tehran University of Medical Sciences, Tehran, Iran

⁴Assistant Professor, Department of Biostatistics, School of Dentistry, Qazvin University of Medical Sciences, Qazvin, Iran

Abstract:

Objective: The aim of the present study was to evaluate unstimulated salivary flow rate and oral symptoms in menopausal women.

Materials and Methods: A total of 200 individuals including 100 women in their menopause (case group) and 100 men in the same age range (control group) participated in this analytic descriptive investigation. None of the patients were being treated for any systemic disease or taking any medication. Unstimulated salivary flow rate was measured using the spitting method and the prevalence of oral symptoms was evaluated by filling out a questionnaire. The results were analyzed with ANOVA, chi-square and Student's t-test ($P<0.05$).

Results: The average of unstimulated salivary flow rate was 0.127 ml/min (SD=0.057) in women and 0.214 ml/min (SD=0.105) in men. The prevalence of dry mouth was 50% versus 32%, difficulty in eating dry foods 31% versus 8%, burning sensation in oral mucosa 3% versus 0%, taste reduction, 4% versus 2% and bitter or metallic taste 16% versus 8% in female and male subjects, respectively.

Conclusion: A significant difference in salivary flow rate and prevalence of oral symptoms was found between the two groups ($P<0.05$). Reduced salivary flow rate and a high prevalence of oral symptoms in menopausal women may be related to the hormonal alterations that occur during this period.

Key Words: Menopause; Salivary flow rate; Elderly; Oral Symptom

✉ Corresponding author:
K. Borhan Mojabi, Department
of Oral Medicine, School of
Dentistry, Qazvin University of
Medical Sciences, Qazvin, Iran.
kamojabi@yahoo.com

Received: 27 September 2006

Accepted: 3 January 2007

Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2007; Vol: 4, No.3)

INTRODUCTION

Oral discomfort including dry mouth, altered taste and burning sensation are common chief complaints encountered in dental clinics. Most oral sensory complaints are caused by systemic diseases or are side effects of different medications, however this does not hold true for a considerable number of patients seeking oral care. Previous studies have shown that many of these patients are menopausal women. The probable etiology of oral discomfort in menopausal women has been related to

alterations in the quantity and/or quality of saliva [1].

Menopause is defined as the permanent cessation of menstruation that occurs after loss of ovarian function and oocyte depletion. It has been suggested that the years immediately prior to and the decades following the initiation of menopause are of greater clinical significance. This process occurs at a median age of 51 years in western countries. Genetics appears to play a major role in the determination of menopausal age, but the effect of race and

nutritional status seems to be limited [2]. Average life expectancy in females is estimated to be approximately 78.3 years; therefore it can be assumed that women generally live about one-third of their life beyond menopause [3].

Women at menopausal may repeatedly develop a number of oral mucosal disorders. Burning mouth syndrome is considered as a common oral problem in these patients. A mean age of 50-60 years and a marked female predominance (3:1) has been reported for the onset of burning mouth syndrome. Gender difference demonstrates an increase with age suggesting that menopause may have an important part in the incidence of burning mouth syndrome [4]. Xerostomia is also a frequent finding among postmenopausal women. Other less common menopause-associated symptoms include bad or altered taste, viscous saliva and mucosal disorders such as lichen planus, benign mucosal pemphigoid and Sjogren's syndrome [4].

Saliva plays an essential role in maintaining oral health. Alterations in salivary function may lead to impairment of oral tissues and have a large impact on the patient's quality of life [5]. A higher incidence of dental caries, oral mucositis, dysphagia, oral infections and altered taste has been reported in individuals with reduced salivary flow [6]. There is controversy regarding the effect of menopause on the quantity of saliva. A number of studies demonstrated reduction [7-10], while others have not found any changes in the saliva of menopausal women [1,3,11].

Our hypothesis suggests that menopause is associated with lower salivary flow rate and higher prevalence of oral symptoms. Accordingly, the aim of the present study was to investigate unstimulated salivary flow rate and oral symptoms among menopausal women.

MATERIALS AND METHODS

The study sample of this analytic-descriptive

investigation consisted of 200 individuals including 100 menopausal women and 100 men. All subjects were in the same age range and one year had passed from the last menstruation of the female participants. The patients were selected from those referred to the Department of Oral Medicine, Faculty of Dentistry, Qazvin University of Medical Sciences, from August to December 2004.

A questionnaire covering information on age, sex, systemic disease, daily medication and various oral symptoms was filled out for each individual by a trained interviewer.

Whole unstimulated salivary flow rate was determined by the spitting method. The individuals were told to refrain from eating and drinking at least one hour prior to the examination time (between 4:00 and 5:00 PM for all patients) and were asked to rinse their mouth with water. Each sample was obtained by having the patient expectorate into a disposable cup every 1 minute, for 5 minutes. The volume of saliva was measured by a 5cc syringe and the flow rate was calculated in milliliters per minute.

Data were analyzed with the SPSS statistical analysis software and chi-square along with Student's t-test were used for analysis of the differences between the groups. Two-way ANOVA was applied to determine the effect of age and gender on salivary flow rate. A probability value of $P < 0.05$ was accepted as statistically significant for all tests.

RESULTS

The mean age of the female and male participants was 60.72 and 62.33, respectively; without a significant difference between the two groups ($P = 0.1$). A total of 81 (40.5%) individuals, 42 women and 39 men, were using oral prosthesis, but the difference was not statistically significant ($P = 0.66$).

The mean unstimulated salivary flow rate was 0.171 ml/min; with 0.127 ml/min ($SD = 0.057$) recorded in females and 0.214 ml/min

Table 1. Unstimulated salivary flow rate (ml/min) between genders in the different age-subgroups.

Salivary flow rate Age-subgroup	Unstimulated salivary flow rate Mean (SD)	
	Woman	Man
50 – 53	0.142 (0.068)	0.262 (0.141)
54 – 57	0.135 (0.055)	0.212 (0.071)
58 – 61	0.143 (0.073)	0.203 (0.088)
62 – 65	0.112 (0.046)	0.204 (0.084)
66 – 69	0.127 (0.039)	0.180 (0.088)
70 – 73	0.092 (0.037)	0.227 (0.136)

(SD=0.105) in males. Minimum and maximum salivary flow rates were respectively 0.04 and 0.28 ml/min in women and 0.04 and 0.6 ml/min in men. We determined the effect of age and gender on salivary flow rate and found no interaction between age and gender ($P=0.362$). According to Table 1, the impact of age on salivary flow rate was not significant ($P=0.168$), while it was significant for sex ($P<0.001$).

The prevalence of oral symptoms in women was 50% for dry mouth, 31% for difficulty in eating dry foods, 3% for burning sensation, 4% for taste reduction and 16% for bitter or metallic taste. In men a prevalence of 32%, 8%, 0%, 2% and 8% were found for dry mouth, difficulty in eating dry foods, burning sensation, taste reduction and bitter or metallic taste, respectively. A significant difference in three of the symptoms including dry mouth, burning sensation and difficulty in eating dry foods was found between males and females ($P<0.05$) but the difference was not significant for taste reduction ($P=0.40$) and bitter or metallic taste ($P=0.082$).

DISCUSSION

The present study was designed to evaluate unstimulated salivary flow rate and the occurrence of oral symptoms in menopausal women. A significant difference in unstimulated salivary flow rate was found between males and females ($P<0.05$), indicating decreased flow rate in women. The prevalence of

the studied oral symptoms in women and men was 50% vs. 32% for dry mouth, 31% vs. 8% for difficulty in eating dry foods, 3% vs. 0% for burning sensation, 4% vs. 2% for taste reduction and 16% vs. 8% for bitter or metallic taste. Only the first three symptoms showed a significant difference between male and female subjects.

In the current investigation, the number of patients was similar in both male and female groups, which could be considered as an advantage compared to other studies like that conducted by Aghahosseini et al [1] who used 158 menopausal women and 83 men in order to evaluate stimulated whole salivary flow rate and composition in menopausal women. The age range of females and males (case and control groups) was similar in our sample which was in accordance with the work of Aghahosseini et al [1] but in contrast to others who studied pre-menopausal women [3,11,12].

We determined unstimulated salivary flow rate, while similar studies assessed stimulated or both stimulated and unstimulated flow rates [1,3,8,9,11-13]. It has been suggested that unstimulated whole saliva collection is the most valuable method for evaluation of salivary gland function. Ideally, dentists should determine baseline values for unstimulated whole salivary output at an initial examination [14]. According to Navazesh et al [15] resting methods are preferable for the differentiation of individual salivary flow rates.

In the present study the mean unstimulated salivary flow rate was significantly lower in menopausal women as compared to male controls ($P<0.05$), which suggests a strong relation between unstimulated salivary flow rate and menopause. Similar findings were also reported by Dodds et al [8], and Laine and Leimola-Virtanen [9] who respectively showed an age-related decrease in salivary output and a higher salivary flow rate in pre-menopausal compared to post menopausal women. On the contrary Aghahosseini et al [1] and Ship et al

[3] did not find a significant difference in major salivary gland flow rates between pre- and post-menopausal females.

In the current investigation subjective complaints of oral symptoms were compared between the two groups. A significantly higher prevalence of dry mouth, burning sensation and difficulty in eating dry foods was found among the female subjects, but the other studied oral symptoms were similar in both men and women. Likewise, Aghahosseini et al [1] and Equia et al [16] also indicated a high prevalence of oral symptoms among menopausal women. The later study showed that 82.9% of the patients with burning mouth syndrome were post-menopausal females.

CONCLUSION

This study demonstrates that unstimulated salivary flow rate and subsequently oral symptoms may be influenced by menopause.

ACKNOWLEDGMENT

This research has been supported by Qazvin University of Medical Sciences. The authors would like to thank the department of ophthalmology for their assistance.

REFERENCES

- 1-Aghahosseini F, Akhavan Karbasi MH. Evaluation of stimulated salivary flow rate in menopausal and post-menopausal women. *Journal of Dental Medicine Tehran University of Medical Sciences* 2003;16(2):39-45
- 2-Berek Js, Adashi E, Hillard PA. *Novaks Gynecology*. 12th Ed. Canada: Williams and Wilkins; 1996. p. 981-1011.
- 3-Ship JA, Patton LL, Tylenda CA. An assessment of salivary function in healthy premenopausal and postmenopausal females. *J Gerontol* 1991 Jan;46 (1):M11-5.
- 4-Frutos R, Rodríguez S, Miralles L, Machuca G. Oral manifestation and dental treatment in menopause. *Medicina Oral* 2002;7:26-30.
- 5-Silverman S, Eversole LR, Truelove EL. Essen-

tials of Oral Medecine. Canada: BC Decker Inc; 2002. p. 256, 260.

6-Fischer D, Ship JA. Effect of age on variability of parotid salivary gland flow rates over time. *Age Ageing* 1999 Oct;28(6):557-61.

7-Bergdahl M, Bergdahl J. Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress. *J Dent Res* 2000 Sep;79(9):1652-8.

8-Dodds MW, Johnson DA, Yeh CK. Health benefits of saliva: a review. *J Dent* 2005 Mar;33(3): 223-33.

9-Laine M, Leimola-Virtanen R. Effect of hormone replacement therapy on salivary flow rate, buffer effect and pH on perimenopausal and post-menopausal women. *Arch Oral Biol* 1996 Jan; 41(1):91-6.

10-Närhi TO. Prevalence of subjective feelings of dry mouth in the elderly. *J Dent Res* 1994 Jan; 73(1):20-5.

11-Ghezzi EM, Wagner-Lange LA, Schork MA, Metter EJ, Baum BJ, Streckfus CF et al. Longitudinal influence of age, menopause, hormone replacement therapy, and other medications on parotid flow rates in healthy women. *J Gerontol A Biol Sci Med Sci* 2000 Jan;55(1):M34-42.

12-Streckfus CF, Baur U, Brown LJ, Bacal C, Metter J, Nick T. Effects of estrogen status and aging on salivary flow rates in healthy Caucasian women. *Gerontology* 1998;44(1):32-9.

13-Sreebny LM, Valdini A. Xerostomia. Part I: Relationship to other oral symptoms and salivary gland hypofunction. *Oral Surg Oral Med Oral Pathol* 1988 Oct;66(4):451-8.

14-Greenberg MS, Glick M. *Burkets Oral Medicine*. 10th Ed. Spain: BC Decker Inc; 2003. p. 238.

15-Navazesh M, Christensen CM. A comparison of whole mouth resting and stimulated salivary measurement procedures. *J Dent Res* 1982 Oct;61(10): 1158-62.

16-Eguia Del Valle A, Aguirre-Urizar JM, Martinez-Conde R, Echebarria-Goikouria MA, Sagasta-Pujana O. Burning mouth syndrome in the Basque Country: a preliminary study of 30 cases. *Med Oral* 2003 Mar-Apr;8(2):84-90.