Periodontal health status in relation to physicochemical characteristics of saliva among pre-menopausal and post-menopausal women in Baghdad city-Iraq

Alhan A.Qasim, B.D.S., M.Sc. [1]

ABSTRACT

Background: Menopause can bring oral health problems and also associated with significant adverse changes in the orofacial complex. After menopause, women become more susceptible to periodontal disease due to deficiency of estrogen hormone. Current study aimed to evaluate the periodontal health status in relation to salivary constituent including pH, flow rate and some elements (Magnesium, Calcium and inorganic phosphorus) of pre and post-menopause women.

Materials and Methods: Periodontal health status of 52 women aged 48-50 years old (26 pre-menopause and 26 post-menopause) were examined including (gingival index, plaque index, calculus index, probing pocket depth and clinical attachment level). Salivary sample was collected for two women groups, pH and flow rate was recorded, and also biochemical analysis was assessed for some salivary elements include (Magnesium, Calcium and inorganic phosphorus). Student's t-test was used for statistical analysis.

Results: Salivary pH and flow rate of post-menopause women were found significantly lower than those of pre-menopause women, where as the mean of gingival index, probing pocket depth and attachment level indices significantly higher in post-menopause women. The level of salivary magnesium ion was significantly higher in pre-menopause women; also the level of calcium and inorganic phosphorus was lower in post-menopause women with non-significant difference.

Conclusions: This study has shown that the importance of preventive dentistry increases with aging in women.

Key words: Menopause, periodontal disease, salivary elements. (J Bagh Coll Dentistry 2013; 25(3):121-124).

INTRODUCTION

Females through certain stages in their reproductive life cycle, undergo alterations and fluctuating levels arise in the level of sex (steroid hormones) circulating in their blood stream, especially variation in the level of progesterone and estrogen in women may have direct and indirect effects on oral health in form of inflammation, gingivitis, periodontitis and altered microorganism [1,2]. The menopause transition (climacteric, per-menopause) defined as the months and years surrounding the last menstrual period, is precipitated by fewer functioning follicles and ova, a consequent reduction in estrogen level and an inability to respond to pituitary gland. The initial sign of the transition, which may begin in the 40s, is a reduction in menstrual flow. This usually is followed by missed periods [3].

However the menopause is defined as the permanent cessation of menstruation due to loss of ovarian follicular function, and usually takes place between 45 and 55 years of age [4]. Furthermore menopause is a physiological process which typically occurs in the fifth decade of life in women, and involves permanent cessation of menstruation. Many physiological changes, most of which are due to decreased ovarian estrogen production, take place in women approaching the menopause [5], as well as in menopause, the decline in estrogen levels can lead to systemic bone loss.[6] So that after menopause, women become more susceptible to periodontal disease. The problem is due in large part to estrogen deficiency with resulting dental bone loss and inflammatory processes of periodontal tissue [7]. Metabolic changes that occur in postmenopausal women due to hormonal changes can also affect the salivary gland function and calcium and vitamin deficiency and various psychological factors during menopausal years [8, 9]. They may complain of dry mouth because of decreased salivary secretion, as well as burning sensation of the mouth and tongue. Taste sensation may change, causing a frequent complaint of metallic taste [10, 11]. The topic of the effect of menopause on salivary secretion was studied only by a few studies. However the purpose of the present paper was to study the periodontal health status and physicochemical characteristics of saliva in premenopausal and postmenopausal women.

MATERIALS AND METHODS

A case study was carried out in fifty two pre-menopause and post-menopause women aged 48-50 years old include 26 pre-menopause and 26 post- menopause, visiting Periodontics clinic college of Dentistry/ University of Baghdad. Those having parathyroid and metabolic bone

(1) Lecturer. Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad.

disease, cancer, or long term steroid therapy or taking contraceptive drug or other medication, also having early onset of menopause, having history of hysterectomy, having systemic diseases and smokers were excluded. Questionnaires were filled for each patient, eliciting information on medical history, age at menopause, years since menopause. Periodontal probe (William's probe) was used to measure the parameters which was used to assess the periodontal status includes (Plaque index (PlI) [12], Gingival index (GI) [13], Calculus index (CalI) [14], Probing pocket depth(PPD)[15] and Clinical attachment level (CAL)[16]. Stimulated saliva after chewing Arabic gum for one minute was collected in a sterile screw capped bottle [(17)]. Salivary pH was measured using an electronic pH meter (PW 94, Philips, England), and flow rate of saliva was expressed as milliliter per minute (ml / min). Essential elements of saliva were analyzed at the Poisoning Consultation Centre / specialized surgeries hospital. Samples were centrifuged, the clear supernatant was separated by micropipette and was stored at (-20°C) in a deep freeze till being assessed. Saliva level of calcium and magnesium were measured by flame atomic, using absorption spectrophotometer (Buck scientific, 210VGP, USA). The inorganic phosphorus was determined calorimetrically by the Molybdenum – Vanadate method, a ready-made Kit (Bio Maghreb, Tunisia) was used [(18)]. The data was processed with SPSS 9.0 statistical software. Mean and Standard deviation were calculated. Student's t- tests was used to evaluate the significance of difference between different variables. The significance level was accepted at 95% (P<0.05).

RESULTS

The mean value of salivary pH, flow rate of post-menopause and pre-menopause group and statistical analysis using t-test are listed in Table (1).

Table 1. Salivary PH and Flow rate among pre-menopause and post-menopause groups.

Variable		Mean	±SD	t-test	Sig.
pH	Post-Menopause	5.81	0.12	-2.74	.009**
	Pre-Menopause	6.29	0.13		
Flow rate	Post-Menopause	1.76	0.05	-3.21	.002**
	pre Menopause	2.05	0.07		

****Highly significant (p<0.01), df=50**

The data revealed that mean value of pH and flow rate were higher in pre-menopause than that of post-menopause group with highly significant difference. Concerning periodontal parameter as shown in table (2), the mean value of gingival index, periodontal pocket depth and clinical attachment level of post-menopause group were statistically significantly higher than those of pre-menopause group, while there was no significant difference between the test groups in plaque index, although the calculus index was higher in post-menopause than pre-menopause group the difference was non-significant.

Table 2. Periodontal parameters among pre – menopause and post-menopause groups

Variable		Mean	SD	t-test	Sig
Plaque Index	Post-menopause	1.271	0.087	-.316	0.753
	Pre-menopause	1.305	0.060		
Gingival Index	Post-menopause	1.542	0.058	3.645	0.001**
	Pre-menopause	1.275	0.045		
Calculus Index	Post-menopause	.627	0.106	1.118	0.269
	Pre-menopause	.495	0.052		
Pocket depth Index	Post-menopause	3.23	0.150	2.857	0.006**
	Pre-menopause	2.65	0.135		
Clinical attachment level	Post-menopause	2.65	0.200	2.271	0.027*
	Pre-menopause	2.00	0.208		

***Significant at(p<0.05),**Highly significant at(p<0.01),df=50**

The concentration of salivary magnesium, calcium and phosphorus ion in post-menopause and pre-menopause group was presented in Table (3), the salivary magnesium (mg^{+2}) concentration of pre-menopause was higher than post-menopause group with highly significant difference, also the concentration of salivary calcium (ca^{+2}) and inorganic phosphorus was found lower in post-menopause group than other test groups, where as the difference was statistically not significant between both test groups.

Table 3. Salivary elements among pre-menopause and post-menopause groups.

Variable		Mean	±SD	t-test	Sig
Mg	Post-menopause	0.28	0.03	-5.56	0.000 **
	Pre-menopause	0.60	0.05		
Ca	Post-menopause	1.79	0.08	-1.03	0.307
	Pre-menopause	1.97	0.16		
P	Post-menopause	0.25	0.01	-1.27	0.211
	Pre-menopause	0.27	0.01		

Df=50,* significant at p 0.05, highly significant at p 0.01.**

DISCUSSION

Menopause is complete and permanent cessation of menstrual flow (amenorrhea), precipitate by fewer functioning follicles and ova and a consequent reduction in the estrogen level [19], which may cause periodontal disease following menopause as periodontitis and gingivitis, a prevalent oral diseases, have been connected to several systemic health changes [20].

Periodontitis leads to progressive and irreversible loss of bone and periodontal ligament attachment, as inflammation extends from the gingiva into adjacent bone and ligament [21], also menopause associated with significant adverse changes in the oro facial complex, in which women appear to experience an increase in oral symptoms that may result from endocrine disturbances (reduced estrogen) [22].

The present study represented that the level of pH and flow rate of saliva was significantly lower in post-menopause than per-menopause this may lead to complain of post-menopause women from dry mouth because of decreased salivary secretion, as the female hormone estrogen influences many physiological and psychological function of oral discomforts such as burning sensations have long been reported to be strongly associated with the menopause [5, 23, 24].

Previous studies on the topic of the effect of menopause on salivary flow rate have revealed diverse results. A study has reported no change in salivary flow rate after menopause [25], while other studies have shown lower flow rates in postmenopausal women , as it is well known that salivary pH and flow rate play important roles in the oral mucosal defense [24,26].

When the salivary flow rate is reduced, susceptibility to various oral diseases is enhanced, so that the periodontal parameters in the present study including, the gingival index, pocket depth and loss of attachment significantly was higher in post-menopause group as the menopause women has also been associated with destructive periodontal disease in older women [27]. However, hormones have long been recognized as having some role in periodontal disease, so any change in sex hormones have long been considered to affect periodontal tissues and periodontal disease progression [28], as in menopause, estrogen levels decline rapidly, which can lead to systemic bone loss [6,29], this may explain why the difference of plaque index in pre and post-menopause group was non-significant. Also the calculus index was found higher in post-menopause with no significant difference.

The present study represented that the salivary constituents (magnesium, calcium, phosphorus) were lower in post-menopause group, as women appear to experience an increase in oral symptoms that may result from endocrine disturbances (reduced estrogen), calcium and vitamin deficiency and various psychological factors during menopausal years [5,26].

The relative concentrations of the organic and inorganic salivary constituents are known to depend on salivary flow rate [30,31], because the salivary pH, and flow rate post-menopause decline may lead to decrease the level of minerals in saliva of post-menopause women, metabolic changes that occur in postmenopausal women due to hormonal changes can also affect the salivary gland function and salivary composition. In conclusion, the present study revealed that decreased pH, flow rate and oral hygiene might risk periodontal health of aged women. Therefore, importance of preventive dentistry increases with aging in female subjects.

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