



Salivary sex hormones & its relation to periodontal status among pregnant & non pregnant women

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Abstract

Salivary sex hormones (estradiol/ progesterone) levels may rise dramatically & may affect the periodontal health during pregnancy. The aim of this study was to measure the level of estradiol & progesterone in stimulated saliva of pregnant women & its correlation to periodontal status in comparison to non pregnant women.

A total of 26 women of the age group 20-24yr. attending the maternal & child health care in the medical city hospital were selected at the 3rd trimester of pregnancy & another 26 unmarried women were selected rand only. Saliva had been collected for analysis of estradiol & progesterone & periodontal status had been evaluated using plaque index (PII), gingival index (GI), probing depth (PD) & clinical attachment level (CAL), t-test, X^2 & correlation coefficient were used where indicated.

The results revealed a significant difference in the mean PII & GI among pregnant & control groups. Pregnant women showed deeper pocket & more attachment loss & a high mean of salivary sex hormones than control group with significant differences.

The results also revealed a positive correlations between probing depth, clinical attachment level & salivary sex hormones while there was no significant weak correlation between PII, GI with salivary sex hormones.

All the periodontal parameter & salivary sex hormones in this study were higher value in pregnant women than non pregnant with significant differences. More strong positive correlations were found between PD, CAL with salivary sex hormones & weak correlations with PII & GI.

Keywords: Periodontal disease, pregnancy, salivary sex hormones.

Introduction

Periodontal diseases are group of chronic infectious diseases resulting in inflammation of gingival &/or periodontal tissues with progressive loss of alveolar bone & include two basic forms, gingivitis & periodontitis⁽¹⁾.

The link between pregnancy & periodontal inflammation & the effect of pregnancy on periodontal health has

been studied extensively & only recently evidences indicated an inverse relationship to systemic health that periodontal disease may affect the well being of the fetus by elevating the risk for low birth weight & preterm infants^(2, 3).

It has been found that the ovarian sex hormones (estradiol/ progesterone) levels rise dramatically & may affect the periodontal health during pregnancy^(4, 5). Changes in these

hormones levels occur when the anterior pituitary secretes follicle stimulating hormone (FSH) & luteinizing hormone (LH), resulting in the maturation of the ovary & cyclical production of estrogen & progesterone⁽³⁾. Estradiol & progesterone could stimulate the production of the inflammatory mediator prostaglandin E₂ from arachidonic acid in the gingiva of pregnant women⁽⁶⁾. Progesterone also enhance the accumulation of polymorph nuclear leukocytes in the gingival sulcus⁽⁷⁾.

Also it has been found that progesterone may enhance the chemotaxis of polymorph nuclear leukocyte, while low concentrations of estradiol have been shown to reduce polymorph nuclear leukocyte chemotaxis⁽⁸⁾. Other studies suggest that sex steroid hormones may modulate the production of cytokines & progesterone may down regulate the IL-6 production by human gingival fibro blasts to 50% of that of control values^(9,10).

Kinane et al have suggested that it may be through IL-6 that estrogen & progesterone exert their effect on the gingiva⁽¹¹⁾.

Concentrations of these hormones increase in saliva & fluid with increased concentration in serum⁽¹²⁾. Saliva is an excellent medium to measure sex steroid hormones because it is a natural ultrafiltrate of blood & steroids not bound by carrier protein in the blood freely diffuse into saliva. Measurement of these hormones in saliva become a valuable & reliable alternative due to the non invasiveness & laboratory independence of sampling & cost effective way of monitoring ovarian stimulation infertility management programs^(14,15).

Because of little studies that concerned with measurement of ovarian sex hormones in saliva, it was decided to conduct this study to

measure the changes in the level of sex hormones (estradiol & progesterone) in stimulated saliva of pregnant women during third trimester & their correlation to periodontal status in comparison to non pregnant women.

Materials and method

Twenty six systemically healthy pregnant women in their 3rd trimesters attending the maternal & child health care in the medical city hospital were selected for the study, with an age range 20-24 years. The control group included 26 unmarried women selected randomly. Collection of saliva sample was performed before periodontal evaluation.

Stimulated whole salivary sample was taken from each woman without eating or drinking except water one hour before collection between 10-12 am⁽¹⁶⁾. Each patient was told to chew a piece of Arabic gum (0.5-0.7gm) for one minute & the saliva expectorated, chewing was then continued for three minutes with the same piece of gum & the saliva collected in a sterile screw capped bottle. The salivary samples then were taken to the laboratory analysis. Samples were centrifuged at 4000 rpm for 30min. the clear supernatant was isolated & kept frozen at -20°C until being assessed for salivary estradiol & progesterone in the teaching laboratories of the medical city hospital by using special kits (progesterone EIA kit & VIDAS Estradiol II kit).

After saliva collection, the patients were examined for the following periodontal parameters:

1. Plaque Index (PII) of Sillness & Løe 1964⁽¹⁷⁾. The four surfaces of each tooth were examined except 3rd molar.
2. The gingival inflammation was assessed by gingival index of Løe & Sillness 1963⁽¹⁸⁾ (GI).

3. Probing depth (PD) was measured with a William's probes at four surfaces from the gingival margin to the most apical extent of the probe without pressure, the probe was allowed to fall by its own weight⁽¹⁾. A scale of different probing depth grades was designed as the following:

Grade 0 (1, 2, 3 mm).

Grade 1 (4, 5 mm).

Grade 2 (≥ 6 mm).

4. Clinical attachment level (CAL) was assessed using periodontal probe by measuring the distance in mm from the free gingival margin to the CEJ, then measuring the distance from the free gingival margin to the bottom of the pocket & the attachment level then obtained by subtracting the first measurement from the second one.

Also a scale was designed to assess different attachment level grades & as the following:

Grade 0: no attachment loss

Grade 1: 1-2mm

Grade 2: 3-4mm

Grade 3: ≥ 5 mm

Statistical analysis:

The data was processed & analyzed using the statistical package for social sciences (SPSS). Means, SD & percentages were assessed. t-test, X^2 & correlation coefficient (r) were used where indicated. Level of significance of this study was 0.05.

Results

The total sample is composed of 52 women (26 pregnant ladies at the third trimester & 26 unmarried women at the age group 20-24 yr.).

Table 1 shows the mean values of plaque & gingival indices among study & control groups. Mean plaque index was higher among pregnant women with statistically significant differences. The mean gingival index

was also significantly higher among pregnant women.

Table 2 shows distribution of women according to different probing depth grades. The majority of women (study & control groups) had grade 0 (1, 2, 3mm). Pregnant women had higher percentages of grade 1 & grade 2 probing depths (11.5% & 7.7%) than control group (7.7 & 0) respectively with significant differences.

Table (3) shows that most of the sample had no attachment loss while grade 2&3 was higher among study group with statistically significant differences.

Table (4) shows clearly that the pregnant women had a very high mean value of salivary estradiol (280.8 ± 153.53) than control group (12.404 ± 6.838) with significant differences.

Also a higher salivary progesterone concentration was noticed among pregnant women than the control group (4.885 ± 4.214 , 2.613 ± 2.352) respectively with significant differences.

Table (5) demonstrates the relations between PII, GI of control & study groups with salivary sex hormones. It shows that there is no significant relation between each group with estradiol & progesterone.

In table (6), it demonstrates the correlations between salivary sex hormones & periodontal variables (probing depth & clinical attachment level). It shows that in both groups (control & study), all the correlations were positive. A significant positive correlation was noticed between progesterone & probing depth & the same picture was found between progesterone & clinical attachment level of pregnant women. While the correlation between estradiol & PD, CAL of the same group was non significant.

Discussion

Many studies concerning the periodontal health of pregnant women had shown high prevalence of periodontal disease specially gingivitis (19, 20).

The present study revealed a significant differences in the mean plaque & gingival index between pregnant & control group. The mean plaque index was higher in pregnant women than control & this could be attributed to increase negligence of oral hygiene during the third trimester of pregnancy because the women may become exhausted with restless condition while the young unmarried women are more taking care of their appearance including their oral hygiene. This result is in agreement with other studies (21, 22).

The results revealed an increased gingival inflammation in pregnant women than control with a highly significant difference & this could be an inflammatory response to dental plaque around gingival margin which is the main etiological factor in gingival inflammation (3). Also the increased inflammation of the gingiva could be attributed to fluctuation in sex hormones during pregnancy which reach maximum value in the ninth month (5). This result is in agreement with previous studies (6, 21, 22).

In this investigation, most women had the normal depth of gingival sulcus (1, 2, 3)mm. probing depth of 4-5mm & deep pocket of more than 6mm was noticed among pregnant women more than control group with significant differences. The presence of deep pockets mean that those women had periodontitis that may be previously existing because periodontitis require a chronic inflammatory state of the periodontal tissue lasting longer than those months of pregnancy (23). Also the presence of deep pockets in

pregnant women could be attributed to the quick effect of increasing progesterone & estradiol level which affect the formation of prostaglandins & also affect the presence of high counts of *Prevotella intermedia* (6).

Our finding that probing depth increases during 3rd trimester of pregnancy more than non pregnant women is consistent with other studies (6, 24).

Regarding attachment loss, most of women in this study showed no attachment loss especially non pregnant women. As we know attachment loss often is a predictor of tooth loss, & increase attachment loss may suggest ongoing tissue destruction. In our investigation, two women had attachment loss of 5mm or greater, also our results revealed that during pregnancy both estradiol & progesterone were positively correlated to clinical attachment loss & more strongly correlated to probing depth, but further longitudinal studies are needed & larger sample should be taken.

Finally, pregnant women may be considered as patients with a temporary, but higher than normal risk, of developing periodontal complications. Therefore concentrated preventive programs should be recommended.

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Table (1) Mean values of PL and GI among study and control groups

Groups	PL	t-test	p-value	GI	t-test	P-value
	Mean +SD			Mean +SD		
Control	0.562±0.542	2.02	0.049 S	0.536±0.598	3.04	0.0038 HS
Pregnant 3 rd trimester	0.835±0.437			1.01±0.523		

*P<0.05 Significant

Table (2) Percentage distribution of women according to different probing depth grades

Groups	Periodontal probing depth grades					
	Grade(0)(1,2,3)mm		Grade1(4,5)mm		Grade2(\geq 6)mm	
	No.	%	No.	%	No.	%
Control	24	92.3	2	7.7	0	0
Pregnant 3rd trimester	21	80.7	3	11.5	2	7.7

$X^2=2.40$ df=2 P-value=0.042 significant P<0.05

Table (3) Distribution of women according to different clinical attachment level grades

Groups	clinical attachment level grades							
	Grade(0)		Grade(1)(1-2)mm		Grade(2)(3-4)mm		Grade3(\geq 5)mm	
	No.	%	No.	%	No.	%	No.	%
Control	24	92.3	1	3.8	1	3.8	0	0
Pregnant 3rd trimester	21	80.7	1	3.8	2	7.7	2	7.7

$X^2=2.533$ df=3 P-value=0.041 significant P<0.05

Table (4) Mean values of salivary sex hormones among study and control groups

Groups	Estradiol (pg/ml)	t- test	Progesterone (ng/ml)	t- test
	Mean +SD		Mean +SD	
Control	12.404 \pm 6.838	12.118 S	2.613 \pm 2.352	6.181 S
Pregnant 3rd trimester	280.8 \pm 153.53		4.885 \pm 4.214	

P<0.05

Table (5) Correlation coefficient between PI, GI and salivary sex hormones among study and control groups

Groups		Estradiol		Progesterone	
		r	P	r	P
Control	PL	0.233	0.252	-0.247	0.224
	GI	0.276	0.173	-0.153	0.454
Pregnant	PL	0.039	0.850	0.028	0.891
	GI	-0.017	0.936	-0.103	0.615

Table (6) Correlation coefficient between probing depth, clinical attachment level and salivary sex hormones among study and control groups

Groups		Estradiol		Progesterone	
		r	P	r	P
Control	PD	0.392	0.222	0.428	0.322
	CAL	0.402	0.199	0.422	0.301
Pregnant	PD	0.507	0.072	0.525	0.042
	CAL	0.292	0.392	0.492	0.049