

The Prevalence And Severity of Periodontal Disease in Different Stages of Pregnancy and in Women Taking Oral (Contraceptive Pills) in Sulaimani City, Kurdistan Region, Iraq

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Abstract

Background: Pregnant women show an increased susceptibility to periodontal diseases due to an exaggerated inflammatory response of gingival tissue to local irritant factors such as dental plaque and calculus.

Aim: The aim of this study is to determine the prevalence and the severity of periodontal disease at different stages of pregnancy.

Subject and method: The sample consists of (125) women from Private Clinic, Primary Health Care Centre and Maternity Hospital in Sulaimani city, Kurdistan Region, Iraq. They were divided into three main groups. Group one, which included (75) pregnant women and this group was subdivided equally into three subgroups according to their trimester (1st trimester, 2nd trimester and 3rd trimester). Group two, which included (25) women receiving oral contraceptives pills, and match in age with group 1. Group three (control group), which included 25 women, and match in age with group 1 and group 2, and the following parameters were measured: Plaque index (PLI); Gingival index (GI); periodontal pocket depth (PPD); Bleeding on probing (BOP); Gingival Crevicular fluid (GCF).

Results: The results showed high prevalence of gingivitis. The highest mean score of (GI) was found in the pregnancy group; less in oral contraceptive group, and finally the control group. Comparison between the (3) main groups showed significant difference ($p < 0.05$). GCF showed the same pattern as PLI and GI, and the total mean score was highest in the pregnancy group; less in oral contraceptive group and finally the control group. Comparison between the 3 main groups declared significant difference ($p < 0.05$) similar to the PLI and GI.

The highest percentage of PPD was mostly found in the pregnancy group and less in contraceptive group. Comparison between the (3) main groups showed high significant difference, while between pregnancy and oral contraceptive declared significant difference ($P < 0.05$). The high percentage of bleeding on probing (score 1) was found in the pregnancy group, followed by oral contraceptive and finally the control group. There was no prevalence of pregnancy tumor (pregnancy epulis) in the three subgroups of pregnant women.

Conclusion: Major changes in clinical parameters (PLI, GI, BOP, PPD, and GCF) occurred during the 2nd and 3rd trimesters and to a lesser extent during contraception.

Keywords: Pregnancy, Gingivitis, Periodontal disease.

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Introduction

Periodontitis refers to the bacterial plaque-related chronic inflammatory disease, and if left untreated will lead to progressive destruction of dental supporting tissue causing tooth loss [1,2]. Periodontitis is a relatively common clinical condition, which occurs in more than 30% of people in some populations [3,4,5,6,7]. During pregnancy, the most common dental problem for the mother is the periodontal disease, which has a prevalence of between 5% and 20% in pregnant women [8]. Pregnancy is associated with an exaggerated inflammatory response of gingiva to local irritant which is mediated by increasing levels of endogenous hormones (Estrogen and progesterone) [9]. The hormonal imbalance during pregnancy causes a problem to the gingiva of pregnant women, which appears red, swollen and increased tendency to bleeding [10]. The anterior region of the mouth is more commonly affected and interproximal sites tend to be most involved [11]. The severity of a pre-existing inflammation is increased during pregnancy, beginning in the 2nd month of pregnancy and increases significantly reaching a peak in the eighth month and decreases during the ninth month [12], and most pregnancy-related gingivitis improves with good home oral care and removal of local irritants [13,14,15]. A large number of studies were carried out to investigate the periodontal disease as a

risk factor for adverse pregnancy outcomes [16,17], many of these studies have reported positive association between periodontal diseases and adverse pregnancy outcomes [18, 19, 20,21, 22, 23,24]. In addition, periodontal pathogenic bacteria have been associated with adverse pregnancy outcomes [25,26, 27, 28,29, 30,31]. However, some studies reporting no significant relationship between periodontal diseases and adverse pregnancy outcomes [32,33]. In some cases, the inflamed gingiva forms discrete tumor-like masses referred to as pyogenic granuloma (pregnancy tumor; pregnancy epulis) which is a localized area of pyogenic granulation tissue arising from the 4th to the 9th month of pregnancy and shows regression after delivery [34]. Pregnancy tumor is a benign non-neoplastic mucocutaneous condition [35].

It occurs as a reactionary response to constant minor trauma and might be related to hormonal changes [36, 37, 38,39,40,41,42]. In the oral cavity, pregnancy epulis appears clinically as a sessile or pedunculated, resilient, erythematous, exophytic and painful papule or nodule with a smooth or lobulated surface that bleeds easily [37, 38, 43, 44]. Contraceptives are the most widely used method for birth control [45]. The way by which oral contraceptives influence periodontal tissues is that they aggravate the gingival response to local irritants; i.e. dental plaque [46, 47]. After long-term use of contraceptives, the important clinical

symptom seems to be gingival inflammation which ranges from an increase in gingival exudate only, to the appearance of pregnancy-like tumor [47]. Because of conflicting data in regard to severity and prevalence of periodontal diseases during pregnancy and the scarcity of data at different times of pregnancy and the women taking of contraceptives, this study is performed to clarify these issues.

The Aims of study

The present study is designed to :

- 1- Determine the prevalence and the severity of periodontal disease at different stages of pregnancy in Sulaimania .
- 2- Determine the severity and the prevalence of periodontal diseases in women who are on contraceptive pills .
- 3- Carry out a comparison between the various groups .

Materials and Methods

Sample:

The sample consists of (125) women from Private Clinic , Primary Health Care Centre and Maternity Hospital in Sulaimani city, Kurdistan Region, Iraq . The age of women range from (20-35) years. The sample was divided into 3 major groups:

Group 1: Which includes (75) pregnant healthy women and were divided equally into three subgroups according to the trimester: (25) pregnant women in the 1st trimester; (25) pregnant women in the second trimester; and (25) pregnant women in the third trimester

Group 2: Which includes (25) women were receiving oral contraceptives pills for a minimum period of 6 months and who was matched in age with group I.

Group 3 : which includes (25) women (control), not pregnant and who matched according to age with group I and II as shown in table(1) .

Materials and instruments:

Gloves , eye glasses and masks , dental mirror numbers 4, cotton rolls, periodontal probes type Williams (Marking at 1,2,3,5,7,8,9,10 mm) , Artificial light, Kidney- shaped dishes , Gauze ,Straight sharp explorer ,paper point size (30), Ninhydrin solution 2% , and Vernier.

Methods

Oral examination : The intra oral examinations were performed for all subjects on ordinary chair in most proper position , and used artificial lights. Third molars, teeth with huge amount of calculus ,and women who had less than twenty teeth were excluded. The clinical parameters used in the periodontal assessments :

Plaque Index (PLI)

The methods of detection of bacterial plaque , according to the plaque index [48] by using a straight sharp explorer and measure the amount of plaque on all teeth for four surfaces , buccal (labial) , lingual (palatal) , mesial and distal surfaces .

Gingival index (GI)

The method of measurement of severity of gingivitis , according to the gingival index[49] , inspection by naked eyes and by gentle probing via using Williams graduated periodontal probes all teeth for four surface buccal (labial) , lingual (palatal) mesial and distal .

Bleeding on probing (BOP)

By using Williams periodontal probe and pass it to the base of the probable pocket (Gingival Sulcus Bleeding Index)

for four surfaces of all teeth [50], in BOP score " I " is given in case of bleeding emerges within 15 second after probing (presence of bleeding and score " 0" for absence of bleeding .

Probing pocket depth (PPD)

By using Williams periodontal probe , which was inserted into gingival sulcus as close as possible to the long axis of the tooth at four surfaces of each tooth was recorded , and the site for measurement were mid- buccal (labial) , mid – palatal (lingual), mesiobuccal and distobuccal surface. No pressure was used to insert Williams probe and the probe was allowed to fall by its own weight (from the gingival margin to the base of sulcus (pocket). In PPD, score (0) demonstrates depth of a gingival sulcus from [0- 2 mm], while score (1) demonstrates the depth of gingival sulcus more than [2-3 mm] , and score (2) demonstrates the depth of pocket more than [3-5 mm] .

GCF flow measurement

The method of measurement of gingival fluid by using paper size (30) was inserted within gingival sulcus of mesial and distal surface of maxillary anterior teeth (upper 6 anterior teeth) by the using the method of [51], then by staining paper point in ninhydrin (2%) solution. the paper point was stained and then measured by vernier.

Statistical analysis

1- **Descriptive statistics:** Statistical tables, arithmetic mean, Standard deviation, Coefficient of Variance CV%.

2- **Inferential analysis :** t-test, F-test by ANOVA [2 way analysis of variance] , Chi – square test , p- value at 0.05.

Note : If P-value < 0.05 mean significant
If P-value more (P>0.05) mean non-significant

If P-value < 0.001 mean high significant

Results

Plaque Index (PLI):

High significant difference was found between the pregnancy and the control group, and between the pregnancy group and contraceptive group (p<0.0001). In comparison between the 3 major groups (control , pregnancy and oral contraceptive) , by using F- test ANOVA which revealed significant differences (p< 0.05) between the pregnancy and both contraceptive and control groups as shown in table(2).

In comparison between the control and the oral contraceptive pill there was highly significant difference (p<0.0001) as shown in the table (3) .

Gingival index [GI] :

Highly significant difference was found between pregnancy and control group ,and significant difference was found between pregnancy and contraceptive group (p<0.05). In comparison between the 3 major groups was done by F-test using [ANOVA] which revealed that there were significant differences (0<0.05) between pregnancy and both contraceptive and control groups , as shown in table (2), There was highly significant difference between the control and the contraceptive group, as shown in table (3).

Gingival crevicular fluid (GCF) Measurement

In comparison between 3 major groups (control , pregnancy and oral contraceptive) by using F-test [ANOVA] which revealed significant difference (p< 0.05),while highly significant difference between the

pregnancy and control groups ,and non significant difference between the pregnancy and contraceptive pill group , as shown in table (2) . And in comparison between the control and contraceptive pill revealed high significant difference , as shown in table (3) .

Probing pocket depth [PPD]

In comparison between 3 major groups (control , pregnancy and oral contraceptive groups) by using chi-square test which revealed highly significant difference among them (p<0.0001),and there was highly significant difference between the control and pregnancy group (p<0.0001),

while there was a significant difference between the contraceptive and pregnancy group (p<0.05) , and there was highly significant difference between the control and oral contraceptive group (p<0.0001) as shown in table (4).

Bleeding on probing

Highly significant difference (p<0.0001) was found between the following : pregnancy and control group; pregnancy and contraceptive group. In comparison between the between 3 major groups (control , pregnancy and oral contraceptive groups) by using chi-square test, there was highly significant difference(p<0.0001 among them as shown in table(5) .

Table (1): Distribution of the sample according to type of the group.

Group 1 (75 pregnant women)			Group 2 (women taken contraceptive pills)	Group3 (Control group)	Total number of the sample
First trimester	second trimester	Third trimester			
25	25	25	25	25	125

Table (2): Comparison between the control , pregnancy , and oral contraceptive groups in relation to the PLI, GI and GCF.

Indices	Comparison between pregnancy and control group		Comparison between pregnancy and oral contraceptive group		Comparison between control, pregnancy & Oral contraceptive groups	F- test
	F-test	p-value	F-test	p- value		
Plaque Index	9.867	P<0.0001 HS	5.860	P<0.0001 HS	F=4.35 P<0.05 S	F=4.221 P<0.05
Gingival Index	8.990	P<0.0001 HS	3.24	0.021 S	F=4.888 P<0.05 S	S
Gingival Fluid Measurement	8.370	P<0.0001 HS	0.840	0.400 NS	F=3.989 P<0.05 S	

Table (3): Comparison between the control group and oral contraceptive groups in relation to the PLI, G.I and G.C.F.

Comparison between control and contraceptive oral groups		t-test	F-test	Significant
	Plaque index	4.670	0.000	HS
	Gingival index	6.325	0.000	HS
	Gingival Fluid	5.689	0.000	HS

Table (4): comparison between control, pregnancy and oral contraceptive groups in relation to probing pocket depth using Chi-square.

	Stages of pregnancy								
	Total Pregnancy group		First trimester subgroup		Second trimester subgroup		Third trimester subgroup		Chi-square (Total)
	Chi-square	P-Value	Chi-square	P-Value	Chi-square	P-Value	Chi-square	P-Value	
Control group	96.981	p< 0.0001 HS	49.778	p< 0.0001 HS	99.259	p< 0.0001 HS	171.36	p< 0.0001 HS	22.189 p< 0.0001 HS
Oral contraceptive group	13.068	p< 0.05 S	5.121	p< 0.05 S	11.538	p< 0.05	68.056 S	p< 0.0001 HS	
Chi-square between control and oral contraceptive=68.121 p< 0.0001HS									

Table(5): Comparison between the control, pregnancy, and oral contraceptive groups in relation to bleeding on probing using chi-square.

	Stages of pregnancy								
	Total Pregnancy group		First trimester subgroup		Second trimester subgroup		Third trimester subgroup		Chi-square (Total)
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value	
Control group	56.630	P<0.001 HS	22.987	P<0.001 HS	31.436	P<0.001 HS	41.588	P<0.001 HS	41.540 P<0.0001 HS
Oral contraceptive group	38.436	P<0.001 HS	3.461	p>0.05 NS	23.429	P<0.001 HS	66.727	P<0.001 HS	HS

Discussion

The result of this study showed difference in clinical parameters (PLI, GL, BOP, PPD, and GCF) between the three main groups (pregnancy ,contraceptive in taking women and control group).In addition there was a variance in clinical parameters among pregnancy subgroups (1st trimester , 2nd trimester and 3rd trimester).

1-Plaque Index

This difference in plaque accumulation between the main groups could be attributed to that the sample is drawn from different places for example, most of pregnant women were selected from maternal hospital, most of them of low socioeconomic state , none of them received any motivation for plaque control or under health care program.

These finding are consistent with [Suliaman,1995] [52] ,who showed an increase in plaque level during pregnancy, also [Yalcin etal,2002] [53] in their study to evaluate the periodontal condition of 61 pregnant women at their 1st, 2nd and 3rd trimesters Plaque index measurement were repeated at the 1st, 2nd and 3rd trimesters and they found that plaque index scores increased gradually in the 1st, 2nd and 3rd trimester. In contrary ,it was observed that the plaque index did not fluctuate through pregnant women nor non-pregnant women. [Loe and Silnes,1964][48], Kornman and Loesch,1980][54], [Yiorgos,2006][19]. It was reported that there was a non-significance difference between women on contraceptive pill and control in plaque index [Pankhurst etal. ,1981] [55]; this results are in consistence with our results.

2-Gingival index [GI]

The present study has shown varying degree of gingival inflammation in the entire 3 main groups, which shown more

inflammation during pregnancy and less in contraceptive group and less in the control group. In comparison between three main groups, showed significance differences between pregnancy and both oral contraceptive and control group, also high significance differences are present between the control and pregnancy group, and in comparison between sub groups showed more inflammation during the 2nd and 3rd trimesters and to a lesser extent in the oral contraceptive group and even less in the 1st trimester sub group.

Several previous studies done on pregnant women are in agreement with our study [Loe H. and Sillness ,1963][49], [Hugoson ,1970][56],[Cohen,1970][57],[Tilakaratne,etal .,2002][58].The increased levels of inflammation during pregnancy, may be due to that estrogen and progesterone , which can modulate vascular response and connective tissue turned over in the periodontium , associated with interaction with inflammatory mediators. This interaction of estrogen and progesterone with inflammatory mediators may help to explain the increased levels inflammation seen during periods of hormonal fluctuation [Soory,2000] [59]. In contrary to our study, no significance difference was demonstrated in gingival health of pregnant and post-partum women [Jonson etal. 1988] [60]. The oral contraceptive group has shown high significance difference in gingival inflammation when compared to the control group. This is consistent with the previous studies[Lindhe,1974][61],[Kalkwarf,1978][62]. While in contrary to our result [Knight and Wade,1974][63] found no significant difference in gingival index between women taking oral contraceptive and control women.

3-Gingival crevicular fluid (GCF)

This study, has shown that more GCF flow was found in the pregnancy group followed by oral contraceptive and finally

followed by the control group. Also, our study revealed that the differences between subgroups were clearly noticed, and in taking pregnancy subgroup GCF flow was more during the 2nd and 3rd trimester and less in the 1st trimester subgroup. A possible explanation of this result is that the difference in gingival inflammation is related to the time of pregnancy. According to many studies revealed that the severity of gingival inflammation starts to increase from the 2nd month rising to a peak in the 8th month, this corresponding to the division into the trimester [Cohen et al,1969][64], [Nuamah And Annan ,1998][65] ,[Clothier et al,2007][20]. Moreover, another explanation for difference in gingival inflammation is that , the elevated levels of estrogen and progesteron in pregnancy alter the connective tissue ground substance by increase fluidity and affect degree of keratinization of gingival epithelium, the decrease in the keratinization of gingiva, together with an increase in epithelial glycogen, result in decreased effectiveness of the epithelial barrier in pregnant women and make gingival more sensitive to injury. The effect of oral contraceptive on GCF is closer to the 2nd and 3rd trimester subgroups , and revealed non-significance differences with the pregnancy subgroups. Our result in agreement with the previous study [Jensen et al.,1981][66].

4-Periodontal pocket depth [PPD]

Our study revealed that the prevalence of pocket was low in the entire three main groups. The presence of pocket was more during the pregnancy and to a lesser extent in contraceptive pill group, while the prevalence of no pocket being in control group (which mean that the prevalence of pocket is more associated with pregnancy and contraceptive group). The gingival inflammation and associated gingival swelling causes increase in the depth of

gingival sulcus, this explain why pockets were more during pregnancy and contraceptive group. In pregnancy subgroup, the pockets were more during the 2nd and 3rd trimester because of the extended period of the inflammation .This result is in agreement with the result of [Loe and Sillness, 1963][49]. In our study chi-square test was used which revealed a gradual increase in the number of sites with PPD that exceed 3mm throughout pregnancy and most of the increases of PD were found in the 2nd and 3rd trimester, in the labial, buccal, inter proximal sites of the anterior teeth and posterior teeth. In this study no pocket depth exceed 5mm and the conclusion that there was a relatively good periodontal health among the present study (young patient) and confirm that the major change in clinical parameter of (PPD) occurred during the 2nd and 3rd trimester, and this result is in agreement with the result of [Latva-Aho et al,2004] [67] . It was reported that probing depth increased gradually during pregnancy until one month postpartum [Muramatsue and Takaesue ,1994][68]. In addition, it was found that PPD scores increased gradually during pregnancy in the 1st ,2nd and 3rd trimesters [Yalcin et al., 2002][53].

5 - Bleeding on probing[BOP]

Our study demonstrated a high prevalence of BOP during pregnancy and less in contraceptive group and even less in the control group, and comparison between 3 main groups show high significant differences between the following: control and pregnancy group, control and oral contraceptive group, this result is in agreement with the previous studies on pregnant and control women Hugoson ,1970][56];[Cohen,1970][57]. In addition, this result is in agreement with the previous studies on women taking oral contraceptive and compare them with control women [Lindhe,1974] [61],[alkwarf,1978][62]. This

indicates, that the state, of pregnancy and contraception is associated with a high prevalence of BOP.

Within the pregnancy subgroups showed as expected more BOP during the 2nd and 3rd trimesters (because of extended period of inflammation) and to a lesser extent in the 1st trimester subgroup and this result is in agreement with the result of [Kornman and Loesch,1980][54], , who found that gingivitis and gingival bleeding increased during the 2nd trimester, and also our result confirm with the study of[Pindborg,1996] [69] ,who found that gingival changes and increase tendency to bleeding occur at the end of 1st trimester and persist until delivery. Also our result is consistent with [Muramastu and ,Takaesue,1994]] [68] who found that the number of gingival sites with bleeding and redness increase throughout pregnancy until 1 month post partum. Also [Latva-Aho etal.,2004] [67] found significant increasing in BOP between the 1st and 2nd trimesters .

Pregnancy Tumor:

In this clinical study, no any case of pregnancy tumor(pregnancy epulis) was recorded, this could be due to the small size of the sample, while[Mair A.M. and Orban,1949] [70] found that the incidence of pregnancy tumor was 0.5%. In addition, [Carranza . and Newman,2001] [46] found that the pregnancy epulis occurred in 0.2% . - 9.6%.

Conclusions

1- All women in this study had varying degree of plaque accumulation, being more in the pregnancy and less in contraceptive group and even less in the control group with presence of significant difference between the 3 main groups.

2-Gingival inflammation were present in all sample, and the inflammation was more during the 2nd and 3rd trimester subgroup and to a less degree in contraceptive pill

group and even less in the control group, with the presence of a significant difference between the 3 main groups.

3. Gingival crevicular fluid flow was more during the 2nd and 3rd trimester subgroup and less in contraceptive pill group; the difference between the three main groups was significant and correlated with severity of gingival inflammation.

4. The prevalence of pocket was low in whole sample, and pocket of depth more than 4mm was more in the 2nd and 3rd trimester's subgroup and less in contraceptive, with high significant difference between the main groups.

5. Bleeding on probing were present in all sample and was more during the 2nd and 3rd trimester and less in the contraception and even less in the control group, bleeding on probing present with high significant difference between the main group.

6. No any case of pregnancy tumor (pregnancy epulis)was recorded in all examined pregnant women .

7. This study confirms that the major changes in clinical parameters occur during the 2nd and 3rd trimester.

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