



## **Frequency of Periodontitis and Gingivitis in Pregnancy: A Comparative Study between First and Third Trimesters of Pregnancy.**

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### **Abstract**

**Objective:** The aims of this study were to determine the incidence of gestational gingivitis and assess oral health status in two groups of women at different stages of pregnancy.

**Methods:** A comparative descriptive study was conducted on pregnant women attending the outpatient department of gynaecology department at Pacific Medical College and Hospital in Udaipur, Rajasthan from January 2010 to August 2010. Data were collected from 100 women. Two groups were created. The first group (n=50) included women in their first trimester and the second group (n=50) included women in their third trimester of pregnancy at the time of their dental examination. Data were collected

from the women by face-to-face interview and intra-oral examination. The two groups were compared.

**Results:** Pregnant women in their third trimester had more calculus and malodour on dental examination as compared to those with first trimester. However, there were no statistically significant differences between the two groups regarding the presence of teeth apposition as well as the number of teeth at the time of dental examination.

**Conclusion:** Our study confirms that the frequency of gingivitis during the third trimester of pregnancy is higher than during the first trimester. Further studies are needed to determine the relation of gingivitis to oral hygiene and dental care habits.

**Keywords:** Gingivitis, Pregnancy, Trimester, periodontitis, oral hygiene.

## **Introduction**

Dental and oral health diseases occurring in pregnancy may include caries, tooth erosion, gingivitis, epulis, pyogenic granuloma of pregnancy and many others. Depending on clinical assessments several studies have reported the presence of gingivitis in women during pregnancy. It is called pregnancy gingivitis and defined as the gingival inflammation caused by the presence of plaque and exacerbated by changes of female sex hormone levels during normal pregnancy. Pregnancy is accompanied by an increase in the production of estrogen and progesterone.

Initially, the ratio of estrogen and progesterone is 100:1 but during the final months this changes to 1:1. Following birth the hormones reach their normal levels within 2 to 3 days (Mariotti 1994, Laine 2002).

Many published reports have indicated relation between dental diseases and adverse pregnancy outcome especially pre-term delivery, pre-eclampsia and intra-uterine growth retardation. The signs and symptoms of gingivitis during pregnancy are similar to those in the non-pregnant population. Two theories have been proposed for the action of the hormones on the cells of the periodontal tissues: 1) a change in the effectiveness of the epithelial barrier to bacterial insult and 2) an effect on collagen turnover (Markou et al. 2009). There are several receptors for estrogen and progesterone within the gingival tissue. The estrogen receptors (ERs) exist as two subtypes: ER alpha and ER beta. ER beta is widely expressed at high levels in oral tissues (Välilmaa et al. 2004). ER beta is involved in important physiological processes, such as cell differentiation, extracellular matrix organization and stromal-epithelial communication. Estrogen firstly decreases collagen production and keratinization of gingival epithelium and secondly induces proliferation of fibroblasts and decreases the collagen and no collagen proteins, blocks the turnover of the gingival tissue, thereby

reducing the capacity of gingival tissue to repair. The result is an increase in the permeability of the epithelial barrier and an increased response to plaque bacteria. Yet the signs of inflammation have a tendency to be more severe in pregnancy for a similar degree of plaque.

Pregnancy is accompanied by many changes in the composition of the subgingival microflora. Jensen et al. (1981) and Korman and Loesche (1980, 1982) showed that *Prevotella intermedia* and *Prevotella melaninogenica*, use either estradiol or progesterone as a substitute for naphthoquinone (Jensen et al. 1981) and vitamin K (Korman & Loesche 1982), as essential growth factors which encourage a proliferation of these microorganisms in subgingival plaque during pregnancy.

The exact factors leading to developing gingivitis during pregnancy have not been clearly recognized. A change in the periodontium caused by increased endogenous sex hormones is considered a major aetiologic factor. The main sex hormones affecting the periodontium are estrogen and progesterone and by the end of last trimester they can reach up to 30 times higher than seen during non pregnant status.

The sex hormones have various effects on the microcirculation leading to swelling of endothelial cells, adherence of platelets and granulocytes on vessel walls, formation of microthrombi and potentially increasing the vascular permeability in gingival tissues and thereby increasing susceptibility to inflammation due to bacterial or even physical irritation. Although the accumulation of plaque is recognized as the main cause of gingivitis, few other reported factors like the physiology of pregnancy and the presence of diabetes mellitus may make the gingival tissue more liable to disease or exacerbate the growth of micro biota which is attributed to the depression in the immune system during pregnancy. Pregnancy gingivitis is a reversible self-limiting disease that resolves

after delivery due to the decrease in hormonal levels and it does not develop to periodontitis.

The objectives of this study were firstly to identify the frequency of pregnancy gingivitis and periodontitis in first trimester pregnant women as compared to women at third trimester of pregnancy and secondly to assess oral health status and behaviour of those women during pregnancy.

#### **Methods:**

The study included 100 pregnant women attending the Gynaecology and Obstetrics outpatient department (OPD) at Pacific Medical College and Hospital, Udaipur, Rajasthan. The study participants were divided into two equal groups of 50 each; Group I: Control group, without periodontal disease; Group II: Study group, with chronic periodontitis. An informed consent was taken from all the participants. Screening examination included: 1) medical history; 2) obstetric history; 3) dental history; 4) Periodontal Parameters (Plaque Index, Gingival Index, Probing depth, recession depth and clinical attachment level). The study participants were selected in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000.

Subjects with age group > 18 years, pregnancy with gestational age < 26 weeks having minimum of 20 sound permanent teeth without any systemic disease and having chronic generalized periodontitis with Clinical attachment level (CAL)  $\geq$  4 mm and willing to sign the consent form were included in the study. Subjects with history of antibiotic intake during pregnancy, multiple pregnancies, intention to deliver at hospital other than that of the study and having other obstetric risk factors like smoking, alcohol consumption, drugs use, etc were excluded from the study.

Periodontal disease activity was determined at the baseline for all the participants using mouth mirror and William's calibrated probe. To diagnose cases of chronic

periodontitis following measurements were taken: Plaque Index (Silness and Loe), Gingival Index (Loe and Silness), pocket probing depth, recession depth and Clinical attachment level. Blood samples were taken for estimation of C reactive protein levels from the subjects of both groups. C-reactive protein levels were determined using ultrasensitive turbidimetric immunoassay (ERBA), with a detection limit of 0.0094 mg/dl. Gestational age was calculated from the last menstrual period (LMP).

The data were classified and organized into tables and were compared between the two groups and statistically analyzed. Percentages were examined using chi-square test and a P value less than 0.05 was considered statistically significant.

Table 1

Oral condition in 1st and 3rd trimester of pregnancy						
		1 <sup>st</sup> trimester		3 <sup>rd</sup> trimester		P value
		No.(100)	%	No.(100)	%	
Gingivitis	Yes	25	25	27	27	0.747>0.05
	No	75	75	73	73	
Halitosis	Yes	14	14	26	26	0.033<0.05
	No	86	86	74	74	
Calculus	Yes	76	76	89	89	0.015<0.05
	No	24	24	11	11	
Malposition of teeth	Yes	12	12	8	8	0.345>0.05
	No	88	88	92	92	
	Mean	27.3	27.3	32	32	
	Minimum	23	23	33	33	
	Maximum	32	32	35	35	

Table 2

Oral health behaviour in pregnant women in 1 <sup>st</sup> and 3 <sup>rd</sup> trimester of pregnancy						
		1 <sup>st</sup> trimester		3 <sup>rd</sup> trimester		P value
		No.(100)	%	No.(100)	%	
Last dental visit	<6 months	51	51	18	18	0.0000<0.05
	>6 months	49	49	82	82	
H/O gum bleeding	Yes	53	53	13	13	0.0000<0.05
	No	47	47	87	87	
Brushing habit	Twice a day	6	6	63	63	0.0000<0.05
	Once a day	85	85	30	30	
	Less	9	9	7	7	
Smoking habit	Yes	39	39	18	18	
	No	38	38	72	72	

Table 3: Oral health behaviour in pregnant women in 1st and 3rd trimester of pregnancy

	Observed values			Expected values		P value	
Gingivitis	25	27	52	26	26	0.7471399	TRUE
	75	73	148	74	74		
	100	100	200				
Halitosis	14	26	40	20	20	0.0338949	FALSE
	86	74	160	80	80		
	100	100	200			0.0155522	FALSE
Calculus	76	89	165	82.5	82.5		
	24	11	35	17.5	17.5		
	100	100	200				
Malposition of teeth	12	8	20	10	10	0.3457786	TRUE
	88	92	180	90	90		
	100	100	200				
Last dental visit	51	18	69	34.5	34.5	0.0000009	FALSE
	49	82	131	65.5	65.5		
	100	100	200				
H/O Bleeding gums	53	13	66	33	33		
	47	87	134	67	67	0.0000000	FALSE
	100	100	200				
Brushing habit	6	63	69	34.5	34.5	0.000000000000000	FALSE
	85	30	115	57.5	57.5		
	9	7	16	8	8		
	100	100	200				

Table 4: Frequency distribution of participants in 1<sup>st</sup> and 3<sup>rd</sup> trimester of pregnancy according to category of independent variables

		1 <sup>st</sup> trimester		3 <sup>rd</sup> trimester		P value
		No.(100)	%	No.(100)	%	
Age(yrs.)	<25	62	62	48	48	0.097>0.05
	26-35	28	28	34	34	
	>35	10	10	18	18	
Parity	P0	28	28	23	23	0.485>0.05
	P1-P2	56	56	55	55	

	P>3	16	16	22	22	
Education level	Basic	13	13	10	10	0.2692>0.05
	Secondary	58	58	69	69	
	Higher	29	29	21	21	
Employment	Yes	30	30	21	21	0.144>0.05
	No	70	70	79	79	
Occupation	Rural area	65	65	64	64	0.825>0.05
	Urban area	35	35	36	36	

Table 5: Oral health behaviour in pregnant women in 1<sup>st</sup> and 3<sup>rd</sup> trimester of pregnancy

	Observed values			Expected values		P value	
	Age	62	48	110	55	55	0.0978726
	28	34	62	31	31		
	10	18	28	14	14		
	100	100	200				
Parity	28	23	51	25.5	25.5	0.4851550	TRUE
	56	55	111	55.5	55.5		
	16	22	38	19	19		
	100	100	200				
Education level	13	10	23	11.5	11.5	0.2692728	TRUE
	58	69	127	63.5	63.5		
	29	21	50	25	25		
	100	100	200				
Employment	30	21	51	25.5	25.5	0.1442657	TRUE
	70	79	149	74.5	74.5		
	100	100	200				
Occupation	65	64	129	64.5	64.5	0.8825230	TRUE
	35	36	71	35.5	35.5		
	100	100	200				

P value > 0.05 = True = Insignificant = No difference found in 1<sup>st</sup> and 3<sup>rd</sup> trimester by respective factor

P value < 0.05 = False = significant = Significance difference found in 1<sup>st</sup> and 3<sup>rd</sup> trimester by respective factor

**Results**

A total of 100 women with 1<sup>st</sup> and 3<sup>rd</sup> trimester of pregnancy were included. Out of those 50 patients were in 1<sup>st</sup> trimester and 50 patients in 3<sup>rd</sup> trimester of pregnancy. Pregnant women at their third trimester had more calculus and malodour on dental examination as compared to those with first trimester. However, there were no statistically

significant differences between the two groups regarding the presence of teeth apposition as well as the number of teeth at the time of dental examination.

### **Discussion**

Periodontal health has been studied widely during pregnancy, yet most of the data reported is still controversial. The majority of the information is from cross-sectional studies, making it impossible to study the exact relationship between pregnancy and periodontal diseases. The rate of pregnancy gingivitis varies widely according to the study, ranging from around 30% up to 100% and some studies reported that it was significantly higher during pregnancy as compared to non-pregnant women.

One recent study has shown that the highest presence of gingivitis was noticed during the last two trimesters of pregnancy. Our study showed that the presence of gingivitis was higher in third trimester (32.1%), as compared to first trimester of pregnancy (26.8%). This finding was also consistent with other studies. Fernando & Jiffry reported that there was a gradual increase in gingivitis from the first trimester to the third trimester with a peak level noticed in the seventh month of pregnancy, followed by a significant decline in its severity of during the last month of pregnancy. Tilakarate et al. also studied the severity of gingivitis during pregnancy and reported it to rise significantly during the last two trimesters of pregnancy and gingival inflammation to decline spontaneously after delivery. Most of the above studies show that gingivitis becomes more common as pregnancy progresses.

Most of the pregnant women in this study had poor oral hygiene, as well as inadequate dental check-up attendance. The findings seen during first trimester may be due to nausea and vomiting and may become even worse as pregnancy proceeds towards delivery. The results of this study also showed an association between oral health

status and different socio-demographic factors such as education, occupation, employment, dental hygiene and gingivitis. However, no significant statistical difference was revealed between first and third trimester of pregnancy. Our results also showed a higher prevalence of gingivitis among unemployed pregnant women than employed ones, lower level of education than higher levels, previous dental attendance, and living in the city than living outside the city. These findings are consistent with many other studies.

In the present study, associated calculus with gingivitis was significantly higher in pregnant women at their third trimester as compared to first trimester.

The presence of gingivitis as well as increased depth of periodontal pocket has been reported during pregnancy. Nonetheless, no clear evidence showed that pregnancy could affect periodontal attachments. Very few studies have considered the level of dental awareness among pregnant women. Oral health and quality of life among pregnant women may be improved by the introduction of educational programs on oral self-care and other health promotion interventions during pregnancy.

### **Conclusion**

Our study demonstrates that the frequency of gingivitis during the third trimester of pregnancy is higher than that in the first trimester; however, it is considered statistically insignificant. Further studies are needed to determine the relation of gingivitis to oral hygiene and dental care habits. Obstetricians should be aware of the potential effects of pregnancy on oral and dental health and they should encourage their patients to seek regular dental evaluation for prevention and early management of oral disorders.

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