

# Frequency of 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 antenatal care clinic at Princess Haya Hospital in Aqaba from January 2010 to August 2010. Data were collected from 580 women. Two groups were created. The first group (n=260) included women at their first trimester and the second group (n=320) 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:** Gingivitis was detected in 26.8% in women examined during their first trimester of pregnancy as compared to 32.1% in women examined during their third trimester. There was no statistical significant difference in the incidence of gingivitis between trimesters. However, there was significant difference between the first and third trimester of pregnancy regarding associated calculus ( $p<0.0001$ ) and the presence of malodor ( $p=0.006$ ) with both being more common in later pregnancy. Oral hygiene habits and regular dental care were much better during first months of pregnancy compared to the last three months ( $p<0.0001$ ).

**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.

**Key words:** Gingivitis, Pregnancy, Trimester

JRMS March 2013; 20(1): 19-24

## 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. This 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.<sup>(1)</sup> Many published reports have indicated between dental diseases and adverse pregnancy outcome especially pre-term delivery, pre-eclampsia, and intra-uterine growth retardation.<sup>(2-4)</sup> The signs and symptoms of gingivitis during pregnancy are similar to those in the non-pregnant population. Yet the signs of

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Manuscript received July 28, 2011. Accepted January 5, 2012

inflammation have a tendency to be more severe in pregnancy for a similar degree of plaque.<sup>(5,6)</sup> Many studies had reported that the prevalence of pregnancy gingivitis to be present in about 30% of pregnant ladies and can reach up to 100% of them depending on the study, however the majority of studies reported it to increase significantly during pregnancy.<sup>(6-8)</sup> 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 oestrogen and progesterone and by the end of last trimester they can reach up to 30 times higher than seen during non pregnant status.<sup>(9)</sup> These 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.<sup>(9)</sup> 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.<sup>(10,11)</sup> 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.<sup>(6)</sup>

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

## Methods

A comparative descriptive study was conducted on pregnant women attending Princes Haya outpatient antenatal clinic from the period from June 2010 to August 2010. Selection was performed by convenience sampling and women were asked to participate in our study. After confirmation of the women's pregnancy status

clinically and by sonography, they were divided into two groups. The first group (n=260) was for pregnant women on their first trimester (up to 14 weeks gestation) and the second group (n=320) was for pregnant women in their third trimester of pregnancy (from 28 weeks gestation). The data collected included age, parity, education status, occupation, past medical and dental history, and obstetrical history. All patients were examined intra-orally by a dentist, for the presence of gingivitis, number of teeth, associated calculus, malodor, and teeth apposition.

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.

## Results

Table I reveals that slightly less than half of our patients were below 25 years of age at the time of the study (46.5% for the first group and 47.8%) for the second group. Also it showed that 80% of the first group and 79.1% of the second group were below 35 years of age. The data were similar between the two groups regarding parity, with more than half of the patients within the two groups having one or two babies (P1-2) as compared to about one quarter of those pregnant with their first baby (P0) at the time of the study. Table I shows also that 29% of examined women at first trimester were employed compared to 21% at third trimester, also 64% of them live in the city compared to 63% of those in the third trimester group.

Table II shows that 132 women in the first group had a regular dental check up (50.7%) compared to only 35 women in the second group (10.9%). Also it shows that 90% of women in the second group had last follow up visit to their dentist more than 6 months ago, as compared to 44% of women in the second group. Fifty-five women (21%) in the first group gave a history of gum bleeding as compared to 174 women (54%) in the second group. First trimester group showed that 54% of women brush their teeth less than once every day, 20% were current smokers and 46% had previous pregnancy with gingivitis; compared to 70%, 19%, and 49% respectively

**Table I:** Frequency distribution of participants in first and third trimester of pregnancy according to category of independent variables

		First trimester		Third trimester		P-value
		No (260)	%	No (320)	%	
Age (years)	< 25	121	46.5	153	47.8	0.9212 NS
	26-35	87	33.5	106	33.1	0.9695 NS
	>36	52	20.0	61	19.1	0.9756 NS
Parity	P 0	61	23.5	77	24.0	0.9505 NS
	P 1-2	141	54.2	174	54.4	0.9831 NS
	P >3	58	22.3	69	21.6	0.9899 NS
Education level	Basic	28	10.8	35	10.9	0.9876 NS
	Secondary	156	60.0	221	69.0	0.1355 NS
	Higher	78	29.2	46	20	0.3701 NS
Employment	Yes	77	29.6	69	21.5	0.4345 NS
	No	183	70.4	251	78.5	0.1051 NS
Occupation	City	167	64.2	203	63.4	0.9567 NS
	Outside city	93	35.8	117	36.6	0.9792 NS

**Table II:** Oral health behavior for pregnant women in first and third trimester

			First trimester		Third trimester		P-value
			No (260)	%	No (320)	%	
Regular dental check up (less than 6 months)	Yes		132	50.7	35	10.9	*<0.0001
	No		128	49.3	285	89.1	*<0.0001
Last dental visit	<6 months		145	55.8	31	9.7	*<0.0001
	>6 months		115	44.2	289	91.3	*<0.0001
History of gum bleeding	Yes		55	21.1	174	54.4	*<0.0001
	No		205	78.9	146	45.6	*<0.0001
Brushing habit	Twice/day		41	15.8	27	8.5	0.5342 NS
	Once/day		78	30.0	67	20.9	0.3754 NS
	Less frequent		141	54.2	226	70.6	0.0074 NS
Smoking habit	Yes		54	20.7	61	19.0	0.9144 NS
	No		184	70.8	228	71.3	0.9951 NS
	Former		22	8.5	31	9.7	0.9593 NS
Previous pregnancy with gingivitis	Yes		122	46.6	157	49.0	0.8282 NS
	No		138	53.4	163	51.0	0.8177 NS

**Table III:** Oral condition in first and third trimester of pregnancy

		First trimester		Third trimester		P-value
		No (260)	%	No (320)	%	
Presence gingivitis	Yes	69	26.8	102	32.1	0.6050 NS
	No	191	73.2	218	67.9	0.3425 NS
Associated calculus	Yes	156	60.0	258	80.6	*0.0001
	No	104	40.0	62	19.4	*0.0028
Presence Malodor	Yes	40	15.4	149	45.6	*0.0006
	No	220	84.6	171	54.4	*0.0001
Malposition teeth	Yes	51	19.6	79	24.7	0.6500 NS
	No	209	80.4	241	75.3	0.2870 NS
Number teeth	Mean	27.3		22.1		-
	Minimum	23		22		-
	Maximum	32		32		-

\* Significant values marked with an asterix

within the second group. Gingivitis was detected in 69 cases (26.8%) in women during their first

trimester of pregnancy as compared to 102 cases (32.1%) in women during their third trimester of

pregnancy ( $p= 0.6050$ ). Pregnant women at their third trimester had more calculus and malodor on dental examination as compared to those with first trimester, 258 cases (80.6%) compared to 156 cases (60%) for calculus and 149 cases (45.6%) compared to 40 cases (15.4%) for the presence of malodor respectively (Table III). 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.<sup>(12,13)</sup>

One recent study has shown that the highest presence of gingivitis was noticed during the last two trimesters of pregnancy.<sup>(6)</sup> 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.<sup>(14)</sup> A more recent study undertaken on pregnant women attending a government maternity hospital on Chennai described the presence of gingivitis during various stages of pregnancy gingivitis was reported to occur in 22.6% of women during the first trimester, 22.6% in second trimester, and 54.8% in third trimester of pregnancy.<sup>(15)</sup> Women in the third trimester of their pregnancy were significantly less likely to have had a dental review in the preceding 6 months than those attending in the first trimester which could be due to factors including a simple pressure on their time.

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.<sup>(5)</sup> 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.<sup>(12,13,16,17)</sup> Our study also showed that about 20% of both groups currently smoke and it did not seem to influence the gingival health of the present study population, although smoking in another study performed on urban adult population in Sweden was considered to be a major risk factor for developing gingivitis during pregnancy.<sup>(18)</sup>

Gingival bleeding tendency in the current study has been found to increase significantly from first to third trimester (21% to 54%), this finding was consistent with other studies.<sup>(5,12)</sup> Christensen *et al.* in his study reported that most pregnant women might not recognize gingival bleeding as a sign of inflammation.<sup>(19)</sup> Another study reported the prevalence of gingival bleeding during pregnancy was 89%,<sup>(20)</sup> in contrast with other study that showed it to be 29%.<sup>(15)</sup> This wide variation in the presence of gingival bleeding may be related to the presence of plaque, hormonal changes, and the presence of other local irritants.

Zachariassen *et al.* in his study concluded that gingival problems during pregnancy could be reduced significantly if sub gingival plaque is minimized.<sup>(21)</sup> In the present study, associated

calculus with gingivitis was significantly higher in pregnant women at their third trimester as compared to first trimester. In other study, the peak in plaque appearance was during the first trimester of pregnancy and declined as pregnancy proceeded toward term,<sup>(6)</sup> one explanation is related to poor oral hygiene during the first months of pregnancy which is related to nausea and vomiting that makes tooth brushing very difficult and sometimes impossible.<sup>(12)</sup>

One study performed also on Jordanian pregnant women showed no statistically significant differences between patients at different stages of pregnancy and the grade of gingival index, plaque index or pocket depth scores.<sup>(22)</sup>

The presence of gingivitis as well as increased depth of periodontal pocket has been reported during pregnancy.<sup>(12)</sup> Nonetheless, no clear evidence showed that pregnancy could affect periodontal attachments. Tilakaratne *et al.* reported no difference in attachment loss during pregnancy and outside pregnancy,<sup>(5)</sup> this finding can be attributed to insufficient levels of circulating sex hormones during pregnancy to cause break-down, despite its assumed effects on epithelial tissue barrier.

Very few studies have considered the level of dental awareness among pregnant women. One Jordanian study showed that 56% of studied subjects were not aware of the necessity of increasing the frequency of teeth brushing during pregnancy and only 5% of them believed there might be any association between gum disease and adverse pregnancy outcomes.<sup>(23)</sup> Pirie *et al.* focused on the importance of increased awareness of developing oral conditions during pregnancy and advised health professionals to provide appropriate information, advice and reassurance followed by referral for dental examination, treatment and monitoring as necessary as well as effective communications between the dentist and obstetrician to ensure provision of best care for pregnant women.<sup>(24)</sup> 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.<sup>(25)</sup>

## 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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