

# Periodontal status in pregnant women in comparison with non-pregnant individuals

## Abstract

**Background:** Our understanding of pathogenesis of periodontal disease has changed remarkably over a few decades. Rather than being confined to periodontium, periodontal disease may have a wide ranging systemic effects. It is now recognized that it shares most of the common risk factors for diabetes, coronary heart disease preterm low birth weight, miscarriage or early pregnancy loss and preeclampsia. **Materials and Methods:** The study group comprised of 400 women (200 pregnant women and 200 non-pregnant) with an age range of 18-40 years. Maternal demographic and medical data were collected. Periodontal examinations included: Oral hygiene index (OHI-S), gingival index (GI), pocket probing depth and clinical attachment loss (CAL). **Results:** The results were analyzed using test of proportion when OHI-S was compared in pregnant women with that of non-pregnant individuals, there was no significant difference in good oral hygiene group ( $P = 0.187$ ,  $Z = 1.32$ ). When the GI index was evaluated, a definite statistical difference was noted in mild, moderate and severe gingivitis ( $P - 0.000$ ,  $Z = 0.365$ ;  $P - 0.00$ ,  $Z = 4.17$ ;  $P - 0.000$ ,  $Z = 0.75$ ). CAL index revealed a statistical difference was observed healthy periodontium, mild, moderate and severe periodontitis in both pregnant and non-pregnant women ( $P = -0.000$ ,  $Z = 3.65$ ;  $P - 0.000$ ,  $Z = 5.83$ ;  $P - 0.001$ ,  $Z - 3.24$ ;  $P - 0.000$ ,  $Z - 6.47$ ). **Conclusion:** The present study conducted supports the hypothesis that there is a definite correlation between the pregnant women and poor oral hygiene (gingivitis and periodontitis) as compared with the non-pregnant controls.

### Key words:

Attachment, clinical, disease, loss, periodontal, pregnancy

## Introduction

Periodontal disease is initiated by overgrowth of certain *Bacterial* species, with a majority of Gram-negative, anaerobic *Bacteria* growing in sub gingival sites. The host response to periodontal pathogens causes persistent inflammation and the destruction of periodontal tissues that support teeth.<sup>[1]</sup>

Periodontitis being a remote infection, periodontopathic organisms and their products may have a wide ranging effects, mostly mediated through stimulation of host derived cytokines in target tissues.<sup>[2]</sup>

During normal pregnancy, maternal hormones and locally acting cytokines play a key role in regulating the

onset of labor, cervical ripening, uterine contraction and delivery. Maternal infections during pregnancy have been demonstrated to perturb this normal cytokine and hormone-regulated gestation, sometimes resulting in preterm labor, preterm premature rupture of membranes and preterm low birth weight (PLBW), i.e., <2500 g and <37 weeks of gestation.<sup>[3]</sup>

In contrast to the postnatal endocrine control of growth, where the principal hormones directly influencing growth are growth hormone and the insulin-like growth factors, fetal growth throughout gestation is constrained by maternal factors and placental function and is coordinated

R. Surekha, Priyadarshini Sharma<sup>1</sup>, K. Asif<sup>1</sup>, Surangma Debnath<sup>1</sup>,  
Tabitha Rani<sup>2</sup>, D. N. V. S. Ramesh<sup>3</sup>

Departments of Oral Pathology, <sup>1</sup>Periodontics and Oral Implantology and <sup>3</sup>Oral Medicine and Radiology, Navodaya Dental College, Raichur, Karnataka, <sup>2</sup>Pedodontics, Kamineni Institute of Dental Science, Hyderabad, Andhra Pradesh, India

### Address for correspondence:

Dr. K. Asif,  
Department of Periodontics and Oral Implantology,  
Navodaya Dental College, Raichur, Karnataka, India.  
E-mail: asif\_k16@yahoo.co.in

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by growth factors. In general, growth disorders only become apparent postnatally, but they may well be related to fetal life. Thus, fetal growth always needs to be considered in the overall picture of human growth as well as in its metabolic development.

A number of studies have shown that Bacterial vaginosis is related to PLBW/low birth weight (LBW), which continues to be a significant cause of infant morbidity and mortality.<sup>[4]</sup> Furthermore women with severe periodontal disease detected at mid-pregnancy were at increased risk for preterm delivery, even after adjusting for potential other risk factors, with risk greatest for delivery at less than 32 weeks' gestation.<sup>[5]</sup>

The periodontal disease shares many common risk factors with PLBW. Obstetric complications not only are a significant health care expense, but also affect the well-being of the affected infants throughout life.

Most studies addressing the relationship between periodontitis and adverse pregnancy outcomes have shown that women with the poor oral conditions may be at risk of premature birth.<sup>[5]</sup> PLBW, LBW and preeclampsia.<sup>[6]</sup>

Hence, the prevention of periodontal disease in pregnant women is vital and identification of risk factors for periodontitis during pregnancy can help guide and establish early treatment, which can lead to the avoidance of the possible adverse effects of this disease on pregnancy.

Thus, the aim of the present study was:

1. To evaluate the periodontal status in pregnant.
2. To compare the periodontal status between pregnant and non-pregnant women.

## Materials and Methods

This study was conducted in Department of Periodontics, Navodaya Dental College and Hospital, Raichur, Karnataka. The study group consisted of 400 women (200 pregnant women and 200 non-pregnant) with an age range of 18-40 years. The source of pregnant women was from Department of Obstetrics and Gynecology, Navodaya Medical College and Hospital, Raichur. The subjects were verbally informed about the study and an informed consent was obtained for the same. Periodontal examinations included oral hygiene index (OHI-S), gingival index (GI), pocket probing depth and clinical attachment loss (CAL). CAL is measured from the cement-enamel junction to the most apical penetration of the probe and patients with > 4 mm CAL on at least six teeth were included in the study.

## Statistical analysis

The statistical analysis was performed using the test of

proportion. The results were expressed as mean  $\pm$  standard deviation. The level of significance  $P$  value at a confidence level of 95% was calibrated as non-significant =  $P > 0.05$ , significant =  $0.01 < P < 0.05$  and highly significant  $P < 0.001$ .

## Results

When oral hygiene status was compared in pregnant women with that of non-pregnant individuals, there was no significant difference in good oral hygiene group ( $P = 0.187$ ,  $Z = 1.32$ ).

Whereas, A definite statistical difference in regard to fair and poor oral hygiene status was seen in pregnant women when compared with that of non-pregnant individuals ( $P = 0.000$  and  $P = 0.000$ ,  $Z = 14.51$ ) respectively [Table 1].

When GI index was evaluated, a definite statistical difference was noted in mild, moderate and severe gingivitis in both non-pregnant and pregnant women ( $P = 0.000$   $Z = 3.65$ ,  $P = 0.000$ ,  $Z = 4.17$   $P = 0.000$ ,  $Z = 7.75$ ) respectively [Table 2].

When plaque index (PI) was compared, a definite statistical difference was observed in normal, simple gingivitis, beginning of periodontal disease, established periodontal disease and terminal disease in both non-pregnant and pregnant women ( $P = 0.002$   $Z = 3.24$ ,  $P = 0.000$ ,  $Z = 11.67$ ,  $P = 0.000$ ,  $Z = 5.83$ ,  $P = 0.000$ ,  $Z = 4.03$ ,  $P = 0.000$ ,  $Z = 16.18$ ) respectively [Table 3].

When distribution of CAL index was analyzed, a definite statistical difference was observed in healthy periodontium, mild, moderate and severe periodontitis in both pregnant and non-pregnant women ( $P = 0.000$ ,  $Z = 3.65$   $P = 0.000$ ,  $Z = 5.83$ ,  $P = 0.001$ ,  $Z = 3.24$ ,  $P = 0.000$ ,  $Z = 6.47$ ) respectively [Table 4].

## Discussion

Pregnancy is accompanied by remarkable endocrine alterations. During this period, both progesterone and estrogen are elevated due to continuous production of these hormones by the corpus luteum.<sup>[7]</sup> The levels of sex steroid hormones in saliva is also increased during pregnancy.<sup>[8]</sup> There is now evidence linking maternal infection with preterm delivery. Vaginal colonization with bacteroides has been linked with a 60% increase in the risk of preterm delivery.<sup>[9]</sup> Previous researchers reported that inflammatory mediators induce labor. Thus increasing levels of maternally or fetally derived cytokines such as tumor necrosis factor- $\alpha$  may enhance amniochorionic and decidual interleukin-6 expression, resulting in prostanoid production. Alternatively, both neutrophils and many Gram-negative organisms produce the enzyme phospholipase A2, which hydrolyzes esterified arachidonic acid.<sup>[10]</sup>

The results of the present study showed very poor gingival

**Table 1: Distribution of OHI-S index in pregnant and non-pregnant women**

Score	Non-pregnant	Pregnant	Z value	P value	Significance
Good	40	30	1.32	0.187	*NS
Fair	120	10	14.51	0.000	*S
Poor	40	160	15.00	0.000	*S

\*S – Significant; \*NS – Non-significant; OHI-S – Oral hygiene index; (n=200)

**Table 2: Distribution of gingival index in pregnant and non-pregnant women**

Score	Non-pregnant	Pregnant	Z value	P value	Significance
Light gingivitis	60	30	3.65	0.000	*S
Medium gingivitis	100	60	4.17	0.000	*S
Heavy gingivitis	40	110	7.75	0.000	*S

\*S – Significant; (n=200)

**Table 3: Distribution of periodontal index in pregnant and non-pregnant women**

Score	Non-pregnant	Pregnant	Z value	P value	Significance
Normal	10	0	3.24	0.002	*S
Simple gingivitis	100	10	11.67	0.000	*S
Beginning of PDL disease	50	10	5.83	0.000	*S
Established PDL disease	20	50	4.03	0.000	*S
Terminal disease	10	130	16.18	0.000	*S

\*S – Significant; PDL = Periodontal disease; (n=200)

**Table 4: Distribution of clinical attachment loss in pregnant and non-pregnant women**

Score	Non-pregnant	Pregnant	Z value	P value	Significance
Healthy periodontium	60	30	3.65	0.000	*S
Mild periodontitis	50	10	5.83	0.000	*S
Moderate Periodontitis	50	80	3.24	0.001	*S
Severe periodontitis	40	80	4.47	0.000	*S

\*S – Significant; (n=200)

health in pregnant women. Scores of OHI's and GI were significantly higher in pregnant women when compared with the non-pregnant controls. There was severe gingival bleeding and inflammation in pregnant women our findings were in accordance with previous studies where pregnant women presented more bleeding on probing than control groups. Similar findings were also noted by other studies.<sup>[11]</sup> Incidence of 23.3% preterm birth was observed among pregnant women with periodontitis compared to that of 11.7% in pregnant women without periodontitis.

Hormones such as estrogen, progesterone and chorionic gonadotropin during pregnancy affect the microcirculatory system by producing changes such as endothelial swelling, adherence of granulocytes and platelets to vessel walls, increased vascular permeability and vascular proliferation<sup>[7]</sup> All these inflammatory changes lead to gingival bleeding and swelling.

In the present study, scores of PI and CAL were significantly increased in pregnant women when compared with the non-pregnant controls. Our results were in consistent

with the previous studies, where pregnant women showed relatively severe periodontitis.<sup>[12]</sup>

Periodontal disease is caused by Gram-negative bacteria, which are capable of producing a variety of chemical inflammatory mediators such as increased levels of prostaglandin, interleukin's and tumor necrosis factor molecules.<sup>[7]</sup> Circulatory C-reactive proteins is a marker of systemic inflammation and is associated with periodontal disease, which in turn is associated with the adverse pregnancy outcome.<sup>[6]</sup>

In the early 1990's, Offenbacher *et al.* hypothesized that oral infections such as gingivitis and periodontitis could act as a source of bacteria and inflammatory mediation that could disseminate systemically to the fetal-placental unit, through the blood circulation and induce the pregnancy complications.<sup>[13]</sup>

Previous studies show that there is a definite association between periodontal disease and pregnancy complications.<sup>[14]</sup> It is known that women with progressive periodontal disease

during pregnancy indeed are more likely to have preterm delivery compared with women whose disease does not progress.<sup>[15]</sup> Our results showed that most of the pregnant women were in terminal stages of periodontitis.

Periodontal disease may be as detrimental to pregnancy as smoking or alcohol abuse. The complications of pregnancy periodontitis include, PLBW, LBW, preterm birth, preeclampsia, intrauterine growth restriction etc., A study at the University of North Caroline, pregnant women who have moderate to severe periodontal disease may be seven times more likely to deliver a premature child.<sup>[6]</sup>

Scores of OHI-S, GI, PI, CAL in our study were significantly higher in pregnant women when compared with the non-pregnant controls. We found that there was severe gingivitis and established periodontitis in pregnant women. Considering the adverse effects and complications of pregnancy related gingivitis and periodontitis, it is very imperative to motivate and educate the expecting mother's to maintain good oral health and encourage maternal periodontal therapy during pregnancy, which would be safe for both mother and the fetus.

## Conclusion

Pregnancy periodontitis, being reported as one of such risk factors, is amenable to prevention, control and cure. The present study conducted supports the hypothesis that there is a definite correlation between the pregnant women and poor oral hygiene (gingivitis and periodontitis) as compared with the non-pregnant controls. As periodontal infection is associated with various risk factors in pregnant women such as PLBW, LBW and preterm delivery it is very vital to inspire and educate the expecting mother's regarding maintenance of good oral health as well as to undergo periodontal therapy so as to reduce the undue consequences.

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