

# Periodontal Status and Some Variables among Pregnant Women in a Nigeria Tertiary Institution

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## Abstract

**Background:** Gingival changes during pregnancy have been well-documented. The prevalence of gingivitis in pregnant women has reportedly ranged from 30% to 100%. Increase in both the rate of estrogen metabolism and synthesis of prostaglandins by the gingiva contributed to the gingival changes observed during pregnancy. In effect increased prevalence of dental caries, gingivitis, periodontitis and tooth mobility may be encountered in pregnancy. **Aim:** The purpose of the study was to determine the association of some variables and the periodontal status in a sample of pregnant women attending the Ante Natal Clinic (ANC) of Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos. **Subjects and Methods:** Women at various stages of pregnancy, attending the ANC of LASUTH, constituted the target population. The questionnaire was administered on each patient followed by dental examinations. Periodontal status was assessed using the community periodontal index (CPI) of treatment needs. Oral hygiene status was evaluated according to Green and Vermilion simplified oral hygiene index (OHI-S). **Results:** The association between the CPI scores; OHI-S scores and variables such as trimester and dental visits were statistically significant. **Conclusion:** This study indicated that the gestational age of pregnancy and dental visits have a definite impact on the periodontal status. Oral health education should be included as an integral part of antenatal care to increase the women awareness. This would improve the mothers' dental care-seeking behavior.

**Keywords:** Oral hygiene, Periodontal status, Pregnant women, Variables

## Introduction

Periodontal Diseases is one of the most common chronic disorders of infectious origin known in humans. It may present as gingivitis or periodontitis. Gingivitis is the inflammatory condition of the soft tissues surrounding the teeth and periodontitis, the destruction of the supporting structures of the teeth, including the periodontal ligament, bone, cementum and soft tissues.<sup>[1]</sup> Periodontal infection is highly prevalent during pregnancy.<sup>[2]</sup> Studies have shown that there is a relationship between pregnancy and periodontal status with a variability in the frequency of periodontitis among pregnant women, ranging from 35% to 100%.<sup>[2-8]</sup>

Periodontal infections during pregnancy do not only affect the mother, but may also bring harm to the fetus if left untreated. There are many studies correlating the effect of periodontal diseases on the adverse pregnancy outcomes, such as prematurity, low-birth weight infants and preeclampsia.<sup>[9-12]</sup> Some intervention studies documented that mechanical periodontal therapies such as scaling and root planning during the second trimester of pregnancy may reduce the risk of these adverse outcomes.<sup>[13,14]</sup>

The development of periodontal diseases during pregnancy can be influenced by factors such as human immunodeficiency virus infection, lack of dental care, poor oral hygiene, smoking, low-educational level, low-employment status, increased age and ethnicity. These contribute to worsened periodontal condition during pregnancy.<sup>[5,6]</sup> The 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.<sup>[5,8]</sup>

There is a paucity of data on the effect of socio-demographic factors on the periodontal health of Nigerian pregnant women;

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therefore, more representative epidemiologic studies are necessary. Most of the association studies were carried out in developed and or developing countries.<sup>[4-8]</sup>

The purpose of the present study was to evaluate the periodontal status in a sample of pregnant Nigerian women assessed with community periodontal index (CPI), and oral hygiene index simplified (OHI-S). It also aimed to investigate the relationship between these variables and a series of demographic and clinical variables to determine how these relationships may be modified to improve oral health in Nigerian pregnant women.

## Subjects and Methods

All the pregnant women who attended the Ante Natal Clinic of Lagos State University Teaching Hospital (LASUTH), Ikeja, between March and September 2009 were included in this study. Informed consent was obtained from all participants, and ethical clearance was obtained from the ethical committee of the LASUTH, Ikeja, Nigeria.

The minimum sample size was computed using the formula  $n = z^2 P (1-p)/d^2$  where:

$n$  = Sample size

$z$  = Standard normal deviate of 1.96 for a confidence level set at 95%

$P$  = The prevalence was set at 50%

$d$  = Was the standard error 0.05.

Thus, the computed minimum sample size was 384 subjects. This was increased by 20% to make a total of 460 subjects, to accommodate for non-respondents. A total of 415 questionnaires were properly completed while 45 questionnaires had several uncompleted sections and were thus discarded.

Information on the socio-demographic characteristics, trimester of pregnancy, number of previous pregnancies and previous dental visit was obtained using a questionnaire designed for the study.

The questionnaire was pre-tested for validity and reliability. The validity was examined by evaluating whether the questions in the questionnaire were a correct and comprehensive reflection of the concept the questionnaire was intended to measure. Reliability was tested by making the pilot sample to complete a questionnaire on two separate occasions 2 weeks apart. The two sets of responses were then compared statistically using Spearman's rank correlation coefficient.

Oral examinations were performed in a well-lit room by two calibrated dentists with participants seated on a chair using a mouth mirror and a community periodontal index of treatment needs (CPITN) probe. The following were assessed: Periodontal status was assessed utilizing CPI as described by

Ainamo *et al.* and the World Health Organization.<sup>[15]</sup> The CPI score were categorized as follows:

0 = Healthy periodontal status

1 = Bleeding observed, directly or by using mouth mirror, after probing

2 = Calculus and bleeding detected during probing, but the entire black band on the probe is visible

3 = Shallow periodontal pocket 4–5 mm, gingival margin within the black band on the probe

4 = Deep periodontal pocket 6 mm or more, black band on the probe not visible.

Prevalence of bleeding, calculus and pocket sextants was assessed as a percentage of subjects affected. Prevalence of healthy sextants was assessed by percentage of subjects having six healthy sextants.<sup>[15]</sup>

Oral hygiene status was assessed using the OHI-S of Green and Vermillion.<sup>[16]</sup> For each individual, the debris scores for all the sextants were added and divided by six; the same method was used to obtain the calculus score. The sum of the debris index score and calculus index score gives the OHI-S. The subjects were placed into oral hygiene status categories based on their OHI-S score, good (0.0–1.2), fair (1.3–3.0), and poor (3.1–6.0).

Intra and inter-examiner reliability in using the dental examination criteria was tested by the two examiners performing a duplicate examination on 10 randomly selected mothers. Inter-examiner reliability was determined using kappa statistics. Ninety-five percent agreements on criteria for bleeding, calculus and pockets depth, was obtained on all scoring criteria.

## Data analysis

Data were entered and analyzed using the Statistical Package for Social Sciences version 17.0.(Chicago Illinois, USA) Frequency distributions of subjects were analyzed. The frequency and mean for OHI-S score and frequency of distribution for CPITN scores were also calculated. The Student's *t*-test and analysis of variance were used for statistical evaluation of the means, and the Chi-square test was applied for statistical comparison of the proportions. The level of statistical significance was established at  $P < 0.05$ .

## Results

A total of 415 pregnant women participated in this study. The ages ranged between 20 and 44 years with a mean of 31.32 (4.32). Majority of the subjects 73.5% (305/415) were in the age group 25 to 34 years. Yoruba ethnic group formed 62.7% (260/415) of the study population. 87.0% (361/415) finished with tertiary education, and 68.0% (282/415) were in their third trimester. More than half of them were multiparous 52.3% (217/415) and 63.6% (264/415) have previous dental visit [Table 1].

Age group 20–24 years had the highest score of healthy gingiva, CPI code 0 with 8.7% (2/23). Highest prevalence of

bleeding, CPI code 1, was found in age group 35–44 years with 56.3% (49/87). The prevalence of calculus, CPI code 2, was highest in age group 20–24 and decreased with age.

The trimester of pregnancy ( $P < 0.01$ ) and previous dental visit ( $P = 0.02$ ) showed statistically significant relationship with the CPI scores. Women, in the third trimester, had the highest calculus score, CPI code 2 [Table 2].

The mean OHI-S scores were similar in the different age groups. The overall mean OHI-S for the study group was 1.26 (0.78). Women in the second trimester had highest mean OHI-S score that is, 1.34. The OHI-S scores were statistically significant with, trimester of pregnancy ( $P = 0.02$ ) and previous dental visits ( $P = 0.02$ ), but not associated with age, education and gravid [Table 3].

The level of education was statistically significant with dental visit ( $P < 0.01$ ).

## Discussion

The key finding in this study was that periodontal health of the pregnant women was not statistically associated with their age, education level and parity. In this study, the effect of

pregnancy on the periodontal tissues was clinically exhibited by bleeding and calculus. Periodontal tissue changes may be the result of an altered immune response, or it may be triggered by the stress and anxiety during pregnancy, which may lead to a neglect of oral hygiene and contribute to the deterioration of the periodontal condition. The high socio-economic status, with most of the study participants having secondary or tertiary education, was believed to have a considerable influence on the result of this study. The high socio-economic status recorded in this study could have occurred because the study site was located within a teaching hospital community in an urban setting. The highly educated ones are more likely to have a better understanding and cooperation for maintaining good oral hygiene thereby reducing the risk of developing periodontal disease.

Previous evidences have demonstrated that the prevalence and severity of periodontitis increase with age.<sup>[7,17]</sup> It was suggested that aging is a natural process which results in changes in host immunity against the disease process and may be an indicator of the loss of periodontal support tissue.<sup>[5,18]</sup> However, others believed that increasing severity may be because of the untreated cumulative effect of the disease process over the period of time<sup>[5]</sup> but the practice of optimal oral hygiene can help maintain the teeth throughout life. In this study, age was not significantly related to any of the variables (CPI and OHI-S), suggesting that age was not associated with periodontitis was consistent with the findings of Piscoya *et al.*<sup>[5]</sup> This may be due to the fact that the sample consisted mostly of young women (mean age of 30 years).

The prevalence of periodontal disease tends to increase with gestational age.<sup>[19,20]</sup> The result in this study was similar to those of previous studies,<sup>[19,20]</sup> but in contrast to some other studies.<sup>[4,8]</sup> The finding in this study may be explained by the fact that progesterone and estrogen increases with gestational age of pregnancy reaching their peak plasma levels of 100 ng/ml and 6 ng/ml, respectively, in the third-trimester. The increase in progesterone results in greater vascular permeability, gingival edema, crevicular fluid levels and prostaglandin production, which may lead to gingival inflammation. In addition, may affects the development of local inflammation, reducing regulation of interleukin-6 production and rendering gingival tissues less resistant to inflammatory challenges caused by bacterial plaque.<sup>[6]</sup> Oral hygiene status of the women in this study improved as the gestational age increased, contradictory to results obtained by previous reports.<sup>[3,21]</sup> The plausible reasons may be attributed to negligence of oral hygiene and intolerance early in pregnancy, which they were able to overcome as the gestational age increased.<sup>[19,22]</sup>

The prevalence of periodontal disease was not associated with being multigravida in this study. This was similar to the study of Yas.<sup>[23]</sup> It could be argued that these women had not experienced dental diseases before their current pregnancies

Table 1: Sample distribution		
Characteristics	Frequency	Percentage
Age group		
20-24	23	5.5
25-34	305	73.5
35-44	87	21.0
Ethnic group		
Hausa	4	1.0
Ibo	90	21.7
Yoruba	260	62.7
Others	61	14.6
Educational status		
Primary	8	1.9
Postprimary	46	11.1
Poly	138	33.3
Tertiary	223	53.7
Trimesters		
First	5	1.2
Second	128	30.8
Third	282	68.0
Gravid		
One	198	47.7
≥Two	217	52.3
Previous dental visit		
Yes	151	36.4
No	264	63.6
Frequency of brushing		
Once	274	66.0
≥Twice	141	34.0
Total	415	100

**Table 2: Periodontal status assessed by CPI in relation to variables**

Variables	Healthy Code 0		Bleeding Code 1		Calculus Code 2		P
	Number	Percentage	Number	Percentage	Number	Percentage	
Age group							
20-24	2	8.7	8	34.8	13	56.5	0.89
25-34	19	6.2	161	52.8	125	41.0	
35-44	4	4.6	49	56.3	34	39.1	
Education							
Primary	1	12.5	4	50.0	3	37.5	0.77
Secondary	2	4.3	24	52.2	20	43.5	
Diploma	8	5.8	66	47.8	64	46.4	
Tertiary	14	6.3	124	55.6	85	38.1	
Trimester							
First	2	40.0	3	60.0	0	0.0	<0.001**
Second	6	4.7	59	46.1	63	49.2	
Third	17	6.0	156	55.3	109	38.7	
Gravid							
One	16	8.1	101	51.0	81	40.9	0.21
≥ Two	9	4.1	117	53.9	91	42.0	
Dental visits							
Yes	11	7.3	91	60.3	49	32.4	<0.01**
No	14	5.3	127	48.1	123	46.6	
Frequency of tooth cleaning							
Once	20	7.3	141	51.5	113	41.2	0.30
≥ Twice	5	3.5	77	54.6	59	41.8	

\*\*Highly significant. CPI: Community Periodontal Index

**Table 3: Mean (SD) OHI-S of subjects in relation to independent variables**

Variable	OHI-S (SD)	P
Age group		
20-24	1.28 (0.73)	0.97
25-34	1.26 (0.80)	
35-44	1.28 (0.74)	
Education		
Primary	1.44 (0.74)	0.59
Secondary	1.37 (0.81)	
Diploma	1.21 (0.77)	
Tertiary	1.27 (0.79)	
Trimester		
First	0.04 (0.34)	<0.01**
Second	1.34 (0.84)	
Third	1.24 (0.76)	
Gravid		
One	1.19 (0.80)	0.07
≥ Two	1.33 (0.76)	
Dental visit		
Yes	1.14 (0.81)	<0.01**
No	1.33 (0.72)	
Frequency of tooth brushing		
Once	1.24 (0.79)	0.33
≥ Twice	1.32 (0.77)	

\*\*Highly significant. SD: Standard deviation, OHI-S: Oral Hygiene index simplified

or had received treatment for these diseases and thus did not carry these dental diseases into their current pregnancy. This

was contrary to the report of Taani *et al.*<sup>[22]</sup> that the prevalence of periodontal disease tends to be associated with being multigravida and could be interpreted as due to accumulated tissue destruction across time rather than an intrinsic parity related abnormality.

The analysis disclosed a significant impact of the educational status on the periodontal health, as prevalence of periodontal disease tends to increase with a decrease in educational level. Lower educational status may directly lead to lower access to and utilization of dental services, low-degree of periodontal health awareness and negligence of oral hygiene.<sup>[3,5,19]</sup>

About 63.6% of the women studied have not previously visited a dentist, similar to study of Ifesanya *et al.*<sup>[3]</sup> The CPI and OHI-S of the study group was directly related to previous maintenance visits. Lack of periodontal maintenance visits could lead to increased plaque accumulation resulting in gingival bleeding and periodontal inflammation. These findings were similar to those reported by Patil *et al.*<sup>[2]</sup> Poor socio-economic conditions as indicated by the low-education level, unemployment and small household income are important factors found to be associated with lesser likelihood of not going for a dental visit during pregnancy.<sup>[24]</sup>

The reverse was the case in this study in that the prevalence of dental visit was lower in mothers with tertiary education. This

was similar to the report of Dinas *et al.*<sup>[25]</sup> The most logical explanation for this was that higher education may lead to more demanding job that could keep the mothers very busy. However, pregnant women with higher education in this study show better condition of periodontal tissues. This indicated that that something in the lifestyle of this group, beyond relative mouth cleanliness tends to hold periodontal disease in check.

In general, the impact of age, education and gravid on the periodontal status of pregnant women in this study was limited compared to the importance of gestational age and previous dental visits. However, all the attributes investigated in term of age, oral hygiene, parity, gestational age and dental visit might be considered risk indicators for periodontal disease in pregnant women.<sup>[4-8]</sup> Despite their association, studies have demonstrated that pregnancy does not cause periodontitis, but rather may exacerbate pre-existing periodontal conditions.<sup>[5,6,8]</sup>

## Conclusion

This study indicated that the gestational age of pregnancy and dental visits have a definite impact on the periodontal status. Lack of dental visits during pregnancy may be attributed to lack of oral health care information and counseling in the antenatal health care centers. Oral health education should be included as an integral part of antenatal care. The main goal was to create awareness among the expectant mothers about the importance of prevention of dental disease. The increased awareness would also improve the mothers' dental care-seeking behavior.

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