PERIODONTAL HEALTH STATUS OF PREGNANT WOMEN ATTENDING THREE ANTE-NATAL CLINICS IN ACCRA, GHANA

Goka RY[1]; Nyako EA[1]; Sackeyfio J[2]; Hewlett S[1]; Ndanu TA[2]; Konadu AB[1,3]; Ankoh SE[1]

[1]Department of Restorative Dentistry, University of Ghana Dental School, College of Health Sciences, University of Ghana; [2]Department of Community and Preventive Dentistry, University of Ghana Dental School, College of Health Sciences, University of Ghana; [3]Dental/Oral and Maxillofacial Surgery Department, Korle-Bu Teaching Hospital, Accra, Ghana.

Abstract

Objective: To assess the periodontal health status of pregnant Ghanaian women at different gestation periods.

Methodology: A cross-sectional study involving two hundred pregnant women attending the ante-natal clinic at the Korle Bu Teaching Hospital (KBTH), Kaneshie, and Ussher polyclinics was done. Data was obtained by use of a questionnaire and on-site periodontal examination. Variables determined included the socio-demographic characteristics and Community Periodontal Index of Treatment Needs (CPITN) of study participants. A summary description of variables was presented, and cross-tabulations was used to compare responses among the three trimesters.

Results: About one third, (38%) of the study participants were in the third decade of life, with a majority (55%) having had formal education to the basic level. While 72% of women had never seen a dentist, nearly three-quarters (76.2%) had a CPITN of 2 or more.

Conclusion: There is a high prevalence of periodontal disease among pregnant women. Healthcare professionals should therefore consider oral healthcare referrals and education for pregnant women.

Key words: *Pregnant women, Periodontal disease, Periodontal status, Treatment needs*

Introduction

Periodontal diseases (PD) are an inflammatory condition of the supporting tissues of the teeth.[1, 2] They can affect only the gingiva (gingivitis), or the underlying connective tissue, including periodontal ligament and alveolar bone (periodontitis).[1] The Center for Disease Control and Prevention (CDC) reported that the incidence of periodontal diseases increased with age with about 47.2% of adults aged 30 years and 70.1% aged 65 years having the condition.[3]

Pregnancy is accompanied by an increase in the levels of both progesterone and estrogen which, by the third trimester reach levels ten to thirty times what is experienced during the typical menstrual cycle.[4] Elevated progesterone hormone levels are known to stimulate the production of prostaglandins which cause inflammation and induce changes in vascular permeability leading to gingival oedema, hyperemia, and increased inflammatory response to dental plaque and bleeding in periodontal tissues thus increasing the risk of bacterial infections.[5] These hormonal changes that occur make the gingiva more sensitive and make it easier for gingivitis to develop. Some studies have shown that pregnancy does not cause periodontal disease but may exacerbate preexisting unfavorable predisposing factors and preexisting periodontal conditions.[6,7] As the pregnancy progresses, there might be an increased incidence of gingivitis and an increase in the depth of periodontal pockets,[7,8] which might not necessarily result in loss of periodontal clinical attachment level.[7] There is, nonetheless, a consensus that pregnant women suffer a decline in periodontal health status.[9] Aside from periodontal diseases, other oral conditions have also been linked to pregnancy, such as caries and pyogenic granuloma.[10]

Some studies have shown an association between periodontal disease and adverse pregnancy outcomes.[11,12] The various adverse pregnancy outcomes include preterm birth, low birth weight, early pregnancy loss, gestational diabetes mellitus, and preeclampsia.[7,12] Nuamah and Annan did a study on the periodontal status and oral hygiene practices of pregnant and non-pregnant women in Ghana, which was published in 1998.[13] Since then there has been little data published on the periodontal and oral health status of pregnant women which has created a gap in the formation of an oral health policy for pregnant women. It is important to understand the periodontal status and treatment needs of pregnant women in Ghana to help in planning oral health care for them.

This study, therefore, sought to assess the periodontal health status of pregnant women at different gestational periods and to evaluate their periodontal treatment needs, using the Community Periodontal Index and Treatment Needs (CPITN). Some studies

Corresponding Author: **Dr. Akua Boakyewaa Konadu**
University Of Ghana Dental School, Korle-Bu, Accra Ghana.
Email Address: a.konadu@kbth.gov.gh
Phone Number: 0243213100
Conflict of Interest: None Declared

have pointed to a relationship between higher gestational age and increased CPITN.[14,15]

Materials and Methods

This was a cross-sectional study involving two hundred (200) pregnant women between the ages of 16 to 43 years who were attending the ante-natal clinics at the Obstetrics Department of Korle Bu Teaching Hospital (KBTH), and the ante-natal clinics at Kaneshie and Ussher polyclinics.

Accra is a Cosmopolitan City. It serves as both the capital of the Greater Accra region and the capital of Ghana. It is one of the most populous cities in the country. The Korle-Bu teaching hospital is the biggest referral center in the country and the two polyclinics (Kaneshie and Ussher) serve a lot of communities in the capital city.

Women attending the antenatal clinic at the three chosen sites and who met the inclusion criteria and gave their consent were recruited for the study. The study was carried out using participant interviews and clinical examinations. A semi-structured questionnaire was administered to all the participants through personal interviews to collect their demographic data and medical history. One dentist and a final year dental student of the University of Ghana Dental School, were calibrated through a series of intensive training before the data collection. The oral examination was done using direct visual screening and adequate artificial light with intra-oral dental mirrors and a periodontal probe (Williams). Only definite teeth cavitations were recorded as dental caries. Retained roots and other oral health conditions were noted. Periodontal examination was done with the Community Periodontal Index and Treatment Needs (CPITN).

CPITN is primarily a screening procedure involving clinical assessment to check for the presence or absence of periodontal pockets, calculus and gingival bleeding. The use of a special CPITN periodontal probe (or its equivalent) is recommended. For epidemiological purposes in adult populations, ten (10) specified index teeth are examined; for persons under 20 years of age, only six index teeth are specified. All teeth are examined and the highest score for each sextant is noted. Only 6 scores are recorded. Individuals are assigned to one of four treatment need categories determined from their CPITN scores.[16]

The PDT Sensor Probes Type U5 (Williams) with graduated markings of 2,3,4,5,7 and 9mm were used to evaluate the depth of the gingival sulcus/periodontal pocket. The presence of gingival bleeding on gentle probing, calculus, or other plaque retaining factors and periodontal pockets, were noted.

The mouth was divided into six sextants and 10 index teeth were recorded. The worst score (highest probing depth) for each of the six sextants was recorded for 10 index teeth, which consisted of all the first two molars and the upper right and the lower left central incisors (teeth numbers:17,16, 11, 26,27,37 36, 31, 46, and 47). For each of the index teeth, four sites involving the mesial and distal aspect of the index tooth and the lingual and buccal surfaces were probed. and the worst score recorded for each of the sextants. For expecting mothers younger than 19 years, only six teeth, the first molars in each quadrant and the central incisors in the first and third quadrants (teeth numbers: 16, 11, 26, 36, 31, and 46,) were examined. This modification was made to avoid classifying the deepened crevices associated with the eruption of molar teeth as periodontal pockets

Treatment needs were considered based on the maximum code for the entire mouth. The treatment recommendation was told to each participant. Oral hygiene education was also given to all participants. Appropriate referrals were given to all participants in need of dental care.

All variables were entered in Microsoft access 2007 and cleaned using Microsoft Excel 2007, analysis was done using SPSS 22.0. A summary description of continuous variables was presented as means and standard deviations and categorical variables as frequencies and percentages. A Chi-square test was used to compare the responses among the three trimesters.

Permission was sought from the institutions where the study was carried out. Consent was obtained from study participants before the study related was carried out. **Table 1** shows the codes and the treatment needs

Table 1: Community Periodontal Index of Treatment Needs (CPITN) codes and treatment needs.

Findings	Code	Treatment needs/Recommendations
No signs of periodontal disease	0	no need for additional treatment
Gingival bleeding after gentle probing	1	Oral hygiene instruction improvement in personal oral hygiene
Supragingival or subgingival calculus	2	Scaling Oral hygiene instruction improvement in personal oral hygiene
Pathologic pockets 4-5 mm deep	3	Periodontal treatment to remove infected tissue Oral hygiene instruction improvement in personal oral hygiene
Pathologic pockets ≥ 6 mm deep	4	Complex Periodontal treatment to remove infected tissue Oral hygiene instruction

Results

The study included 200 women receiving antenatal care in various stages of their pregnancy. 111(55.5%) were in their third trimester, 76(38%) were in their second trimester and 13(6.5%) were in their first trimester the age of the participants ranged from 16-43 years with most of the participants in the 26-30 age group 76(38%) only 2(1%) were in the 46-50 age group.

189(94.5%) had no known underlying medical conditions. The demographics and the underlying medical conditions are shown in **Table 2**.

Table 2: Socio demographic characteristics and medical history of the study participants

Variable	Number(n)	Percentage(%)
Ages of respondents (years)		
16-20	12	6.0
21-25	40	20.0
26-30	76	38.0
31-35	50	25.0
36-40	20	10.0
41-50	2	1.0
Total	200	100.0
Tribe		
Ga	36	18.0
Ewe	31	15.5
Akan	98	49.0
Northern	33	16.5
Other	2	1.0
Total	200	100.0
Educational Level		
None	32	16.0
Basic (Primary and JSS)	100	50.0
Secondary	41	20.5
Tertiary	27	13.5
Total	200	100.0
Number of children		
0	63	31.5
1-2	101	50.5
3-5	33	16.5
≥6	3	1.5
Total	200	100.0
Underlying Medical Condition		
No known medical condition	189	94.5
Asthma	2	1.0
Diabetes Mellitus	1	0.5
Hypertension	5	2.5
Infection(unspecified)	1	0.5
UTI	2	1.0
Total	100	100.0
Last dental visit		
Never	144	72.0
6 months ago	4	2.0
1-2 years ago	11	5.5
2-5 years ago	15	7.5
More than 5 years ago	26	13.0
Total	200	100.0

Fifty per cent of 100(50%) of the participants had basic education. 63(3.5%) had never had a child before and 102(50.5%) had at least one child. The majority 144(72%) of the participant had never been to the dentist before. Those who had been to the dentist before 26(13.0%) visited the dentist over five years before the study.**Table 3** shows the CPITN findings

Table 3: The Community Periodontal Index of Treatment Needs (CPITN) finding in the various trimesters

Findings	CPITN Code	First Trim-ester	Second Trime-ster	Third Trim-ester	Total
No signs of periodontal disease	0	3 (1.5%	10 (5.0%)	31 (15.5%	44 (22.0%)
Gingival bleeding after gentle probing	1	0	1 (0.5%)	2 (1.0%	3(1.5%)
Supragingival or sub gingival calculus	2	10 (5.0%	57 (28.5%	65(32.5 %)	132 (66.0%
Pathologic pockets 4-5 mm deep	3	0	6 (3.0%)	12 (6.0%	18 (9.0%
Pathologic pockets ≥ 6 mm deep	4	0	2 (1.0%)	1 (0.5%	3(1.5%

156(78%) of the participants had some form of periodontal condition. 20(10%) bled from the gingiva during gentle probing. About a third 132(66%) of respondents had supra and sub gingival calculus deposits. Of these, 10(5%) were in the first trimester of pregnancy, 57(28.5%) in the second trimester, and 65(32.5%) in the last trimester of pregnancy. Those with periodontal pockets were in their second and third trimester. 18(9.0%) of the participant had a probing depth of 4-5mm, and 3(1.5%) had a probing depth of ≥6mm as shown in the table above.

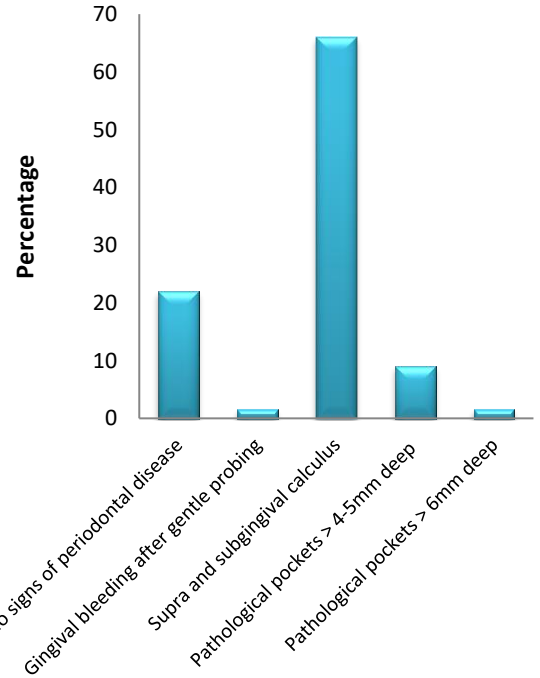

Figure 1: Maximum Score for CPITN

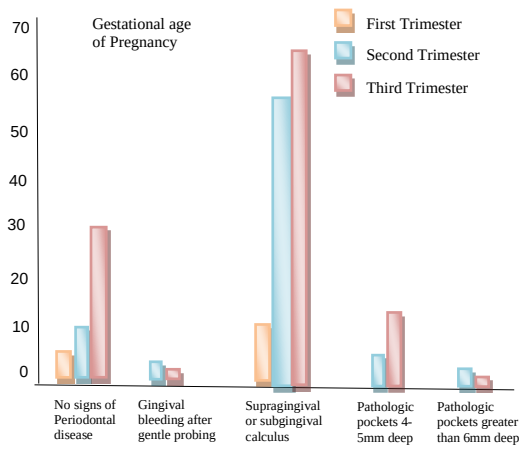

Figure 2: Result of cross tabulation of gestational age against maximum score of CPITN

Figure 2 shows A cross tabulation of the gestational age and the maximum CPITN score

Comparing the incidence of periodontal conditions within the various stages (age of pregnancy) There was a high incidence of calculus deposits and this was mainly during the second and third trimesters. Using the chi-squared test at a $p<0.05$, there was no significant difference ($p=0.696$).

The other dental condition detected are presented in table 4 below.

Table 4: Other dental conditions detected

Dental condition	Number of participants	Percentage
Retained roots only	4	4.7
Retained roots	6	7.0
Dental Caries	28	32.6
Fractured tooth/ teeth only	4	4.7
Gingival recession only	15	17.5
Geographic tongue only	2	2.3
Missing tooth/ teeth only	14	16.3
Retained deciduous tooth only/ teeth	2	2.4
Ectopically erupted tooth/ teeth	1	1.2
Over- erupted tooth/ teeth	2	2.3
Crowding	1	1.2
At least peg-shaped lateral incisor	2	2.3
Attrition	2	2.3
Dento-alveolar abscess	1	1.2
Mouth ulcers	1	1.2
Crossbite	1	1.2
Total	**86**	**100**

Discussion

Improving maternal oral hygiene is important for oral health and may improve pregnancy outcomes. This study assessed the periodontal health status of pregnant women attending three ante-natal clinics in Accra, Ghana (the Korle-Bu Teaching Hospital, the Kaneshie, and the Ussher polyclinics).

The study used CPITN scores to determine the prevalence and severity of periodontal diseases in pregnant women. The prevalence of periodontal disease among the pregnant women attending the antenatal clinic was 156(77.8%). This differs from a study by Nuamah and Annan among pregnant and non-pregnant women attending the outpatient clinic of the Department of Obstetrics and Gynecology of Korle-Bu Teaching Hospital where they reported a prevalence of about 90% among pregnant women.[13] Oral health awareness and the practice of good oral hygiene might have increased in the twenty years between the studies. The difference in methodology might be another reason for the difference in the prevalence.

Regarding the CPITN results, the presence of calculus (supragingival and subgingival calculus) with a CPITN score of 2 was the strongest indication of periodontal disease found in 132(66%) of participants. This is consistent with studies done by Vasiliauskiene I. et al[17] in Lithuania and Wandera M. et al[12] in Eastern Uganda in which 58.6% and 63% of participants respectively had a CPITN score of 2.

The CPITN scores increased as the pregnancy progressed into the second and third trimesters. In addition to the effects of hormonal changes on the periodontium, this might be because about 144(72%) of the participants in this study had never visited the dentist and even those who had visited the dentist, 26(13%), did so over five years ago. In a study done by Maybodi et al[14] that measured the CPITN changes during pregnancy, they found that CPITN increased as the month of pregnancy increased.

In this study 21%, of the participants, had pockets greater or equal to 4mm, all of them were in their second or third trimester. This tallies with results from a study done in Turkey by Yalcin et al,[18] which showed that the plaque index, gingival index, and probing depth scores increased gradually in the first, second, and third trimesters, although oral hygiene instructions were given to the entire study population. In a study done in Brazil by Marianna Vogt et al,[9] more cases of periodontal damage were detected when the examination was performed later in gestation. However, in a similar study done in Uganda gestational age did not influence periodontal status among the pregnant women investigated. In another study done by Lasisi T.J et al.[24] in Southwestern Nigeria and involving only women in the third trimester of pregnancy, 11.7% of the subjects stated that they bled from the gingiva.

In this study, 1.5% of the participants bled from the gingiva during gentle probing. The results of a study by Toygar et al.[20] demonstrated a gingival bleeding prevalence of 24.2% in Turkish pregnant women. The low prevalence of bleeding and deep pockets and high prevalence of calculus is consistent with findings of African populations.[21,22]

There is the need for studies to be carried out on the adverse effects of these periodontal conditions on the pregnancy outcomes in Ghana and awareness created. Of particular concern was the high number of participants (72%) who had never been to see a dentist before. Of the 28% who had seen a dentist before, 7.5% had had their last visit within the past 2 years. Though these results are lower than the 96.1% and 81.1 % of pregnant women who had never had a dental checkup in Mali and Southwestern Nigeria and Mali respectively,[23, 24] there is still much to be done to increase oral health awareness and educate pregnant women about the adverse effects of periodontitis on pregnancy outcomes such as low-weight pre-term babies.

Eighty-six participants had other dental conditions as shown in **Table 3**. Out of this twenty-eight (14%) had only caries or caries in combination with other pathologies and four participants (2%) had pyogenic granuloma in the second and third trimesters, this falls within the reported frequency range of 0-9.6%.[25] This finding is consistent with that obtained by Daley et al[26] who reported that 80% of pyogenic granulomas present clinically in the last two trimesters of pregnancy.

Though the prevalence rate of caries was low, that of periodontal disease was comparable to those of other countries. This coupled with the low dental visit is of concern and calls for an oral healthcare plan for pregnant women. Pregnant women must receive oral health assessment, dental cleaning, and any necessary treatment during pregnancy, as oral health conditions may affect the pregnancy.[27] The second trimester is a good time to schedule a routine visit to a dental professional, however, if a pregnant woman experiences a problem at any time during pregnancy, she is advised to seek professional help immediately.[28]

Oral hygiene education needs to be intensified to empower individuals and to improve community health behaviours regarding oral health. Ghana is yet to see a robust oral health policy that would direct the provision of oral health services to pregnant women. We recommend that Oral health care services should be integrated with antenatal services for all pregnant women. The antenatal care team can be very influential in encouraging women to maintain a high level of oral hygiene, to visit an oral health professional, and to promote completion of all needed treatments during the pregnancy. Routine professional scaling and polishing is required for pregnant women in the country to improve their periodontal health status.

Conclusion

The findings of this study showed that the prevalence of periodontal disease increases with the increasing gestational age of the pregnancy. It is important to take into consideration that the prevention of periodontal inflammation during pregnancy should be a therapeutic objective.

References

1. Armitage, GC. The complete periodontal examination. Periodontology 2000. 2004. 34, 22–33.
2. Pihlstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. Lancet. 2005. 366; 9499:1809-1820.
3. Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ. Prevalence of Periodontitis in Adults in the United States: 2009 and 2010. *J Dent Res*. 2012; 91; 10: 914-920.
4. Ruben Ovadia, Rafael Zirdok, Rosa Maria Diaz-Romero. Relationship between Pregnancy and Periodontal disease. Facta Universitatis Series: Medicine and Biology. 2007.14; 1.10-14.
5. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. *Acta Odontol Scand*. 1963. 21:533-551.
6. Laine MA. Effect of pregnancy on periodontal and dental health. *Acta Odontol Scand*. 2002, 60: 257-264.
7. Moss KL, Beck JD, Offenbacher S. Clinical risk factors associated with incidence and progression of periodontal conditions in pregnant women. *J Clin Periodontol*. 2005, 32: 492-498.
8. Taani DQ, Habashneh R, Hammad MM, Batieha A. The periodontal status of pregnant women and its relationship with socio-demographic and clinical variables. *J Oral Rehabil*. 2003, 30: 440-445.
9. Vogt M, Sallum AW, Cecatti JG, Morais SS. Factors associated with the prevalence of periodontal disease in low-risk pregnant women. Reprod Health. 2012. 9:3.
10. Robinson P, Schmerman M, Glob. Libr. Women's med. *2*015. doi 10.3843/glowm.10105
11. Gomes-Filho IS, da Cruz SS, Rezende EJ, da Silveira BB, Trindade SC, Passos JS: Periodontal status as a predictor of prematurity and low birth weight. *J Public Health Dent*. 2006, 66: 295-298.
12. Vettore MV, Leal M, Leao AT, da Silva AM, Lamarca GA, Sheiham A: The relationship between periodontitis and preterm low birthweight. *J Dent Res*. 2008, 87: 73-78.
13. Nuamah, I, Annan RT. Periodontal status and oral hygiene practices of pregnant and non-pregnant women. *East Afr Med J*. 1998. 75. 712-714.
14. Fahimeh Rashidi Maybodi, Ahmad Haerian-Ardakani, Farzaneh Vaziri, Arezoo Khabbazian, Salem Mohammadi-Asl CPITN changes during pregnancy and maternal demographic factors impact on periodontal health. *Iran J Reprod Med*. 2015; 13:107–112.
15. Tezel A. periodontal condition of pregnant women assessed by CPITN and the role of nurses according to the needs of treatment. *Health Med*. 2011; 1:1951–1955.
16. Cutress TW, Ainamo J, Sardo-Infirri J. The community periodontal index of treatment needs

(CPITN) procedure for population groups and individuals. *Int Dent J*. 1987.37:222-233. PMID: 3481626.
17. Vasiliauskiene I. Oral Health Status of Pregnant Women. Stomatologija, *Baltic Dental Maxillofacial J*. 2003. 5:57-61.
18. Yalcin F, Eskinazi E, Soydinc M, Basegmez C, Issever H, Isik G. The effect of sociocultural status on periodontal conditions in pregnancy. *J Periodontol*. 2002; 73:178–182.
19. Lasisi TJ, Abdus-Salam RA. Pattern of Oral Health among a Population of Pregnant Women in Southwestern Nigeria. *Arch Basic Appl Med*. 2018. 6:99–103.
20. Toygar HU, Seydaoglu G, Kurklu S, Guzeldemir E, and Arpak N. Periodontal health and adverse pregnancy outcome in 3,576 Turkish women. *J Periodontol*. 2007. 78; 11, 2081–2094.
21. Baelum V, Scheutz F: Periodontal disease in Africa. *Periodontol* 2002. 29:79–103.
22. Baelum V, Chen X, Manii F, Luan W-M, Fejerskov O. Profiles of destructive periodontal disease in different populations. *J Periodontal Res*.1996. 341:17–26.
23. Opeodu OI, Dosumu EB, Arowojolu MO. Periodontal Condition and Treatment Needs of Some Pregnant Women in Ibadan. Nigeria Annals of Medical and Health Sciences Research. 2015.5.
24. Hess RF, Gililland CS, Dembélé J. Prevalence and Predictors of Periodontal Disease among Pregnant Women in Mali, West Africa. *Ann Med Health Sci Res*. 2017. 7; 263-270.
25. Steinberg BJ. Women's Oral Health Issues. *J Dent Educ*. 1999; 63:271-275
26. Daley TD, Nartey NO, Wysocki GP: Pregnancy Tumour: An Analysis. *Oral Surg Oral Med Oral Pathol*.1991 72:196-199.
27. Hashim, R. and Akbar, M. Gynecologists' Knowledge and Attitudes Regarding Oral Health and Periodontal Disease Leading to Adverse Pregnancy Outcomes. Journal of International Society of Preventive and Community Dentistry. 2014. https://doi.org/10.4103/2231-0762.149028
28. Brar, Pamneet. The Effectiveness of Education Based Programs Delivered by Non-dental Professionals for Preventing Early Childhood Caries. PhD. Thesis, Faculty of Graduate Studies, University of Calgary. 2015.