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Full Length Research Paper

Self report of adverse gingival conditions among pregnant South-Western Nigerian women

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Reports have associated the occurrence of periodontal diseases, of which gingivitis is the earliest and commonest form in pregnancy with an increased risk for poor pregnancy outcome. There is dearth of information on the oral status of pregnant women in Nigeria. This study assessed self reported adverse gingival changes and its relationship with observed gingival health status among pregnant women in a South-Western Nigerian locality. Responses about self observed gingival status were obtained from 405 pregnant women attending two primary health care antenatal clinics from a local government area within a municipality in South-Western Nigeria. In addition to demographic data, pregnancy and social history, oral hygiene practice and history of professional dental care were obtained using an interviewer administered questionnaire. An intra-oral examination was also performed on each woman and data obtained were analysed using the Statistical Package for the Social Sciences (SPSS) Version 17. The mean age was 25.35 (±5.02) years. Married women accounted for 96.8% of the study population. None of the women reported having ever smoked, while 23.5% of them reported taking alcohol in the form of local herbal preparations both before and during the course of their pregnancy. Older women were more likely to report adverse gingival changes in pregnancy. The association between reported adverse gingival changes and observed severity of gingivitis was significant (P < 0.05). Those who had visited a professional dental care giver were more likely to report adverse gingival changes. Women who chewed kolanuts or bitter kola were also more likely to report adverse gingival changes. This study highlights the low awareness of pregnant Nigerian women about their gingival health status and exposes the need to explore the effect of locally available stimulant nuts on gingival health.

Key words: Self-report, gingivitis, oral hygiene, pregnancy, Nigeria.

INTRODUCTION

Pregnancy has far-reaching systemic effects extending beyond the reproductive organs. In the mouth, the greatest effect of pregnancy is seen in the gingiva (Eley and Manson, 2004). Women with previous chronic gingivitis which attracted no attention before pregnancy become aware of their gingival status as the previously inflamed areas become enlarged and oedematous and more noticeably discoloured with an increased tendency to bleeding (Carranza, 1990). It was reported that this occurs as a result of factors introduced in pregnancy that aggravate gingival response to local irritation by bacterial plaque (Laine, 2002). There is partial resolution of this exaggerated response by the second month post-par-turition, with complete resolution to the pre-pregnant state by the first year post-partum (Laine, 2002), except with persistence of local irritants such as plaque (Laine, 2002). The aforementioned findings corroborate the fin-dings in the study of Taani et al. (2003), who also ob-served an increase in severity of gingivitis with increased parity of the women. Also increased in pregnancy are tooth mobility (Diaz-Guzman and Castellanos-Suarez, 2004), as well as pocket depth and amount of gingival crevicular fluid (Carranza, 1990; Machuca et al., 1999).

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The factors implicated in pregnancy gingivitis are bacterial plaque, lowered immunity in pregnancy and pregnancy hormones. Microbiologic studies have documented a change in sub-gingival micro-flora to a more anaerobic flora during pregnancy. Significantly increased organisms include *Bacteroides intermedius* (Carranza, 1990) and *Porphyromonas gingivalis* (Mascarenhas et al., 2003). In addition, pregnancy hormones are thought to stimulate growth of some bacterial species which have been implicated in gingivitis such as *Bacteroides* species and *Prevotella intermedia* (Zachariasen, 1991).

Changes in maternal immune-responsiveness expressed in terms of decrease in T_8, T_4 and B-cells in peripheral blood and gingival tissues as well as decreased neutrophil chemotaxis and depression of cell mediated immunity and phagocytosis in pregnancy have been reported (Tandon and D'Silva, 2003). Also, *in vitro* studies have demonstrated a decrease in response of peripheral blood lymphocytes to bacterial antigens and a decrease in the absolute number of CD_4 positive cells in pregnant women (Barak et al., 2003). The aforementioned make the gingiva more susceptible to irritation which it otherwise would have combated without clinical expression of disease. However, an increase in the number of T-cells in gingival specimens from pregnant women during experimental gingivitis has also been documented (Laine, 2002).

High levels of progesterone and estradiol β-17 in the gingiva of pregnant women have been documented to effect the development of localized inflammation by stimulating the production of prostaglandins especially prostaglandin E_2 (PGE_2), a mediator of inflammation (Zaki et al., 1984). The pregnancy hormones have also been found to destroy gingival mast cells leading to release of histamine and proteolytic enzymes which contribute to tissue destruction (Carranza, 1990).

Plaque can be controlled by maintaining good oral hygiene (Jin et al., 2003). This is achieved by brushing the teeth at least twice daily using a tooth brush or chewing stick with appropriate techniques (Aderinokun et al.,1999; Al-Otaibi et al., 2004) preferably with the addition of inter-dental cleaning aids such as the dental floss. In addition, regular visits to the dentist or other professional dental care giver for routine professional cleaning of the mouth (scaling and polishing) aids good oral hygiene.

The prevalence of gingivitis in pregnancy has been reported to range between 30 to 100% of pregnant women (Christensen et al., 2003; Al Habashneh et al., 2005). A previous study of Danish pregnant women showed that one-third of their subjects reported gingival changes during pregnancy with bleeding gums being the most frequent symptom (Christensen et al., 2003). The women who were regular users of dental services were more likely to report any gingival changes than those who had not visited the dentist. The proportion of pregnant women who make use of dental services in more developed countries is high: about 90% (Christensen et al., 2003; Al Habashneh et al., 2005). However, less than 15% utilization has been reported among Nigerian pregnant women (Bassey et al., 2010) and less than 10% among South-Western Nigerian students with no significant gender predominance (Bamise et al., 2008). Data on individual assessment of gingival health among Nigerian pregnant women are not available in literature.

Research suggests that women do not seek professional help if they perceive that their gingival status is normal (Christensen et al., 2003). Women were more likely to use dental services in pregnancy if married, educated, had dental insurance, previously used dental services when not pregnant, or had knowledge about the possible connection between oral health and pregnancy outcome (Al Habashneh et al., 2005). The previously established link between periodontal diseases and poor pregnancy outcome, such as pre-mature birth and low birth weight, as well as pre-eclampsia (Boggess et al., 2003; Buduneli et al., 2005; Yiorgos et al., 2006), makes the need to assess how pregnant women in our environment view their gingival health relevant. Though a cause-effect relationship is yet to be established between periodontal status and pregnancy outcome, individuals' view of their oral health status is of great value as it is likely to affect their oral health seeking behaviour (Lopez et al., 2002; Marin et al., 2005). This study assessed self report of gingival changes, the relationship it bears with socio-demographic factors and observed gingival health in pregnant women of South-Western Nigeria.

METHODOLOGY

Ethical approval was obtained from the Oyo State Ethical Review Board. This survey was carried out in Ibadan South-East Local Government Area; one of the five off-shoots of the split of the Ibadan Municipal Government Area (IMG) of Oyo state in 1989. The Primary Health Care Department of the local government has six outreach health centres; two of which have established antenatal clinics. This study sample consisted of 405 consecutive and consenting attendees at the two primary health care antenatal clinics from the local government area between June and August of the year 2007. Interviewer-administered questionnaires (Appendix 1) were used to obtain demographic data, pregnancy and social history, oral hygiene practices and history of professional dental care from the pregnant women. Questions about self observed gingival status were also asked. Two research assistants were recruited and trained using a translated version (in Yoruba) of the questionnaire to enable them administer the questionnaires appropriately. Each woman had an intra-oral examination with a mirror and periodontal probe which was conducted by the first author (IJU), under natural light with particular attention to their oral hygiene and gingival health status. The Oral Hygiene Index-Simplified of Green and Vermillion (1960) was used as a measure of oral hygiene, while the Gingival Index of Löe and Silness (1963) was used as a measure of gingival health. Mild gingivitis was defined as slight reddening and swelling of the gingival, but no bleeding on probing. Moderate gingivitis was defined as red, swollen and shinny gums with bleeding on probing. While severe gingivitis was defined as red, swollen and shiny gums which bleed spontaneously.

The data obtained were entered into a computer spread sheet analyzed using the Statistical Package for the Social Sciences (SPSS) version 17. Frequency tables and measures of central and

tendency were generated and statistical relationships for categorical data was obtained using Chi-square (χ^2) test, while the paired sample t-test was used for continuous variables.

RESULTS

Four hundred and five (405) pregnant women attending the two primary health care antenatal clinics of a South-Western locality in Nigeria were studied. The mean age was 25.35 (±5.02) years. The socio-demographic distribution of the women is shown in Table 1.

None of the women reported having ever smoked cigarette, 138 (34.1%) chewed either kolanuts or bitter kola, and 96 (23.5%) of them reported taking alcohol in the form of local herbal preparations *'agbo'*, both before and during the course of their pregnancy. 267 women (66.2%) brushed their teeth once daily, while a 132 (33.8%) brushed twice. The most commonly used brushing implement was the toothbrush and toothpaste reported by 361 (89.1%), 43(10.6%) of the women used chewing stick, while 1 (0.2%) cleaned her mouth with cotton-wool and salt.

Most of the women, 389 (96.0%) had never visited a dentist or any other oral health care provider. Of the 16 (4%) women who had been attended to by dental professionals, 12 (75.0%) were for toothache related issues, 2 (12.5%) were for trauma and 2 (12.5%) for professional dental cleaning.

140 (34.6%) women reported to have noticed any swelling, bleeding or pain from their gums. The swollen, bleeding or painful gums had been present before pregnancy in 101 (72.1%) of them and 12 (11.9%) of these attested to a worsening in their gingival condition since they got pregnant. The remaining 39 (27.9%) women who noticed gingival changes did so after they got pregnant. Almost half of these women 17 (43.6%) noticed the gingival changes in the second trimester, 6 (15.4%) in the first and third trimesters, respectively, while 10 (25.6%) of them were not sure of the time the gingival changes took place in the course of their pregnancies. Of the 279 multigravid women, only 19 (6.8%) reported any gingival changes in previous pregnancies.

All the women had gingivitis (100.0%). The distribution of gingival health and oral hygiene status is presented in Table 2. Paired sample t-test on individual gingival and oral hygiene scores showed statistically significant variation between oral hygiene and gingivitis ($P < 0.001$). Women who reported adverse gingival changes were observed to have more severe gingivitis than those who did not ($P = 0.039$). This association was stronger in women who reported having swollen, painful or bleeding gums in previous pregnancies ($P = 0.032$) as shown in Table 3. The older women were more likely to report adverse gingival changes in pregnancy than the younger ones ($P=0.035$). It was also observed that those who had visited a professional dental care giver were more likely to report any adverse gingival change in pregnancy than those who had never visited a dental care giver ($P = 0.001$). Women who chewed kolanuts or bitter kola were also more likely to report adverse gingival changes than those who did not ($P = 0.003$) as shown in Table 4. There was no significant relation between the report of adverse gingival condition and the marital status ($P = 0.77$), level of education ($P = 0.12$) and occupational status ($P = 0.43$) of the women studied. The oral hygiene status did not vary significantly with the socio-demographic variables age ($P = 0.27$) and marital status ($P = 0.95$), but oral hygiene significantly improved with the level of education

Table 1. Socio-demographic distribution of sample studied.

Variable	Frequency (%)
Age group	
< 20	81 (20.0)
21-30	277 (68.4)
>31	47 (11.6)
Marital status	
Single	13 (3.2)
Married	392 (96.8)
Level of education	
Post secondary education	7 (1.7)
Secondary education	242 (59.8)
Primary education	146 (36.0)
No formal education	10 (2.5)
Occupation	
Unskilled workers	288 (71.1)
Skilled workers	81 (20.0)
Professionals	5 (1.2)
Students	31 (7.7)
Parity	
1st child	126 (31.1)
2-4 children	257 (63.5)
Greater than 4 children	22 (5.4)

Table 2. Distribution of gingival and oral hygiene status.

Variable	Frequency (%)
Gingivitis	
Mild gingivitis	152 (37.5)
Moderate gingivitis	253 (62.5)
Oral hygiene	
Good oral hygiene	159 (39.3)
Fair oral hygiene	246 (60.7)

Table 3. Relationship between reported gingival changes and observed severity of gingivitis among Ibadan South East LGA pregnant women.

Reported adverse gingival change	Severity of gingivitis		Total	P value
	Mild gingivitis	Moderate gingivitis		
In index pregnancy				
Yes	43 (30.7)	97 (69.3)	140 (100.0)	P = 0.039*;
No	109 (41.1)	156 (58.9)	265 (100.0)	χ^2 = 4.24
Total	152 (37.5)	253 (62.5)	405 (100.0)	
In previous pregnancy				
Yes	4 (16.7)	19 (83.3)	24(100.0)	P = 0.032*;
No	99 (38.8)	156 (61.2)	255(100.0)	χ^2 = 4.62
Total	103 (36.9)	176 (63.1)	279(100.0)	

χ^2= Chi square.

Table 4. Relationship between other variables and reported gingival changes.

Variable	Reported gingival change		Total	P value
	Yes	No		
Age (years)				
11-20	20 (24.7)	61 (75.3)	81 (100.0)	χ^2 = 6.687;
21-30	98 (35.4)	179 (64.6)	277 100.0)	P = 0.035*
6>30	22 (46.8)	25 (53.2)	47 (100.0)	
Total	140 (34.6)	265 (65.4)	405 (100.0)	
Use of dental care				
Yes	12 (75.0)	4 (25.0)	16 (100.0)	χ^2 = 12.04;
No	128 (32.9)	261 (67.1)	389 (100.0)	P = 0.001*
Total	140 (34.6)	265 (65.4)	405 (100.0)	
Kolanut/bitter kola consumption				
Yes	61 (44.2)	77 (55.8)	138 (100.0)	χ^2 = 8.591;
No	79 (29.6)	188 (70.4)	267 (100.0)	P = 0.003*
Total	140 (34.6)	265 (65.4)	405 (100.0)	

χ^2 = Chi square value; * Significant.

education (P < 0.01). In addition, the oral hygiene was better in women using the toothbrush and toothpaste than in those using chewing stick or cotton wool (P = 0.01).

The severity of gingivitis did not vary significantly with the age (P = 0.40), level of education (P = 0.06), or marital status of the women, nor did it vary with the types of tooth brushing implements (P = 0.83) or the frequency of tooth brushing (P = 0.15).

DISCUSSION

In spite of the high prevalence of gingivitis in pregnancy observed, just over a third of the women studied reported adverse gingival changes and this finding is comparable with previous findings in a Danish population (Christensen et al., 2003), further showing that majority of the women are not aware of their gingival health status. This may be an underlying reason for the extremely low utilization of dental services among these women when compared to other reports (Christensen et al., 2003; Al Habashneh et al., 2005). Gingivitis among the women worsened as their oral hygiene scores worsened and this is in congruence with known documentation on the aetiology of gingivitis (Eley and Manson, 2004; Carranza, 1990). The fact that most of the women noticed gingival changes in the second trimester of pregnancy is similar to

the findings from a previous research (Kornman and Loesche, 1980). This is probably a cumulative effect of the increasing circulating hormones on the gums which increase the dilation and increases the tortuosity of gingival micro-vasculature, encouraging circulatory stasis and increasing susceptibility to irritation by metabolic by products in the static blood. This also favours leakage of fluid into the peri-vascular tissues (Carranza, 1990). It was also observed that women who had ever visited the dentist were more likely to report adverse gingival changes than those who had not. This is similar to findings from Christensen et al. (2003) and may be attributed to the ample education the women had received at their previous dental visits, making it easier for them to recognise any deviation from normal appearance of their gingivae. The women who reported this gingival change had more severe gingivitis than those who did not and this is probably as a result of worsening of pre-existing gingivitis. This has been documented in previous literature (Carranza, 1990). This relationship was stronger among those who reported gingival changes in previous pregnancies and may be due to the poorer oral hygiene observed among the multiparous women. Older women were more likely to report adverse gingival changes and this may be due to the fact that their perceived gingival status has been of longer duration than that of the younger women. The limitations of recall bias on the aforementioned should however be borne in mind. In addition, the fact that a significant number of these women had never visited a dentist may mean that the observed gingival conditions were not primarily a result of pregnancy. However, since most of them reportedly observed the adverse gingival condition after they got pregnant, it is safe to say that the pregnancy had aggravated the pre-existing gingivitis.

The significant relationship between kolanut and/or bitter kola consumption and self report of adverse gingival changes may be derived from some effect of these commodities on oral hygiene status, though no significant relationship was found between the latter two in this study. Further studies are necessary to define the possible effect(s) of these two commonly chewed stimulant nuts on oral tissues and oral health in this environment as none were found. On the other hand, these items tend to be sources of extrinsic stains which attract the women to their discoloured teeth, hence inadvertently discovering their gingival status.

A number of reports have associated the occurrence of periodontal diseases in pregnant women with an increased risk for poor pregnancy outcome (Lopez et al., 2002; Marin et al., 2005); hence, the findings from this study serve as a call for the incorporation of routine dental check up and care into the antenatal programme in developing countries.

Contrary to known reports (Al Habashneh et al., 2005), this sample of women showed no significant variation in gingival health status with respect to marital status, level of education and occupational status. This may be due to the fact that majority of the women studied are of similar educational and professional status, thus masking the possible statistical relationship between the groups.

Conclusion

Periodontal disease and low utilization of dental care facilities are common occurrences in developing nations of the world. In view of the aforementioned, it is advocated that every pregnant woman be referred for a dental check-up and necessary treatment at first contact with the antenatal care facility. There is also need for policy formulation with regards to incorporating routine oral health care into antenatal care in this environment. Proper health education is also advocated to improve the use of the available oral health care facilities.

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APPENDIX 1 (QUESTIONNAIRE)

The prevalence of gingivitis in pregnant women attending primary health care ante-natal clinic in Ibadan South-East Local Government Area

Section A: Demographic data

1. Serial no _____
2. Initials _____
3. Age _____
4. Marital status 1. Single 2. Married 3. Divorced
   4. Widowed 5. Others
5. Religion 1. Christian 2. Islam 3. Traditional
   4. Others (specify)
6. Occupation _____
7. Level of education 1. Primary school. 2. Secondary school. 3. Teacher training
   4. University 5. Others (specify) 6. None

Section B: Pregnancy history

8. Is this your first pregnancy? 1. Yes 2. No
8b. If no, how many times have you been pregnant? Specify number _____

9. How many months old is this pregnancy? (1) 1-3 months. (2) 4-6 months.
(3) 7-9 months

10. Do you have swollen, painful or bleeding gums? 1. Yes 2. No

11. If yes, did it you notice it before or after you got pregnant? 1. Before 2. After

12. If before, has it become worse since you got pregnant? 1. Yes 2. No

13. If after, how many months was this pregnancy when it started? (1) 1-3 months. (2) 4-6 months
(3) 7-9 months (4) Not sure.

14. If you have had previous pregnancies, were your gums swollen, painful or bleeding then?
(1) Yes (2) No (3) Can't remember

15. If yes to above, during which pregnancies? (1) At least one of previous
(2) All previous pregnancies. (3) Can't remember

Section C: Social history

16. Do you smoke cigarettes presently? (1) Yes (2) No

16b. If No, have you ever smoked cigarettes? (1) Yes (2) No

16c. If yes, how long ago did you stop? ……

17. Do you take beer or any local brew containing alcohol either before or during this pregnancy? (1) Yes(2) No

18. Do you chew Kola nuts or bitter cola? (1) Yes (2) No

19. How often do you brush your teeth? (1) Twice daily 2. Once daily
(3) Alternate days (4) Once a week 5. Others (specify)

20. What do you use to brush your teeth? (1) Toothbrush and paste (2) Chewing stick (3) Cotton wool/foam and salt (4) Cotton wool/foam and ash (5) Others (specify)

21. Have you ever visited a dentist? 1. Yes 2. No

22. If yes what for? 1. To remove or take care of a painful tooth
2. To clean my teeth
3. I had an accident/ fall
4. Others (specify)

Section D: Intra oral examination

Hard tissue:

Present teeth ----------

Missing teeth ----------

Caries ----------

Debris index
Mean debris score ----------

Calculus index
Mean calculus score----------

Oral hygiene score----------

Gingival index
Mean gingival score ----------