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Prevalence of gingival inflammation among pregnant women attending the Anugrah Narayan Magadh Medical College and Hospital, Gaya Bihar India

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Abstract
Objective: To determine the prevalence of gingival inflammation (gingivitis) among pregnant women attending the Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar.
Materials and Methods: A single-point assessment was conducted using a self-reported questionnaire completed by participants. Information such as patients' age, gestational age, educational status, occupation, was obtained. Furthermore, the participants were examined by trained dentists to determine the presence and severity of gingival inflammation. The data obtained were processed, and descriptive and comparative analyses were done using Epi info version 3.5.1. Statistical significance was established at P values <0.05.
Results: Five hundred pregnant women aged between 21 years and 45 years [mean age: 32.6 (±6.04) years] participated in the study. Gestational age was between 4 weeks and 41 weeks with a mean of 22.80 (±10.15) weeks. The prevalence of gingivitis was 92%.
Conclusion: The higher prevalence of gingivitis during pregnancy is well-established and that observation is corroborated by this study. A change in gingival colour may be an early indication of gingival inflammation, early detection and prompt treatment could prevent further periodontal deterioration. Hence, there is the need to incorporate and intensify oral health education during antenatal care so that pregnant women are able to identify gingival inflammation, especially when it is associated with periodontal inflammatory diseases.

Keywords: gingival inflammation, gingivitis, pregnant women

1. Introduction
Periodontal diseases are inflammatory conditions affecting the tooth-supporting tissues. Gingivitis and periodontitis are the two most common manifestations. Periodontitis contributes extensively to the global burden of oral diseases [1]. It is a risk factor for poor pregnancy outcomes, including Preterm birth (delivery before 37 weeks of gestation) and low birth weight (birth weight lower than 2500 gram) which are both still considered to be the greatest problems in obstetrical medicine [2]. During pregnancy there are two hormones (estrogen and progesterone increasing in their level which leads to hyper vascularization of the periodontium and changes in collagen production, increasing the vascular permeability and making the gingival tissue more susceptible to local irritants, gingivitis, granuloma, and periodontitis [2]. Pregnancy gingivitis is the swelling and inflammation of the gums of pregnant women due to bacterial plague, especially early in their pregnancy. In this state, plaque irritates the gum tissue more, making it tender, bright red, swollen, sensitive, and easily bleeds [3-5]. usually, the peak occurrence is between the second month and eight month of gestation and tapers off after delivery [6]. The earliest clinical signs could be changes in gingival colour from the usual coral pink of healthy gingiva to red and progressing to bleeding on tooth brushing and then to spontaneous bleeding from the swollen gum. The most common site is the front of the mouth [4]. Tooth brushing twice daily, dental flossing once daily and the use of antimicrobial mouth rinses has been known to reduce the risk of pregnancy gingivitis [6].
The bacteria known as Fusobacterium nucleatum, has been linked with adverse pregnancy outcomes. Since F. nucleatum is associated with periodontal infections rather than genital or uterine infections. It is supposed that the infection enters the mother's bloodstream making its way down from the oral cavity rather than genital tract [7]. C-reactive protein (CRP) is an acute-phase reactant synthesized by the liver in response to the inflammatory cytokines interleukin (IL)-6, IL-1, and tumor necrosis factor alpha. Circulating CRP levels are a marker of systemic inflammation and are associated with periodontal disease, a chronic bacterial infection as- associated with elevation of proinflammatory cytokines and prostaglandin. Elevated immunoglobulin G induced by bacterial species associated with destructive periodontal diseases is associated with increase in CRP which has been associated with adverse pregnancy outcomes [7].

2. Materials and Methods
This is a cross-sectional study conducted at the Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar. Participants were drawn from women who attended the Dental department. All consecutive patients who signed a written informed consent were recruited. A self-reported

questionnaire was used to obtain information such as the participant's age, gestational age, ethnicity, educational status, and occupation, perception of self-gingival colour. Furthermore, the participant's medical and dental histories were taken and extra oral and intraoral examinations were performed on each participant to determine the existence of gingivitis. The questionnaire was pretested among pregnant women attending an another government hospital to determine its validity and reliability and necessary adjustments made Each patient's mouth was examined using disposable latex gloves, disposable facemasks, and sterile dental mouth mirrors. Adequate infection control was ensured before the examinations as examiners had to scrub their hands with soap after which antiseptic lotion was applied and the hands were dried with a sterile towel. The protocol was observed in between every consecutive subject. To ensure reliability and consistency, the standard criteria for diagnosis were defined and the examiners were calibrated using the statistical test of reliability of Cohen's kappa. The criteria for diagnosis include the presence of changes in gingival colour, gingival swelling, and gingival bleeding on probing estimated using the gingival index (GI) of Loe and Silness, 1963. The index scores the marginal and interproximal tissues separately on a scale of 0-3 as follows: 0 = normal gingiva; 1 = mild inflammation — slight change in colour and slight edema but no bleeding on probing; 2 = moderate inflammation — redness, edema, and glazing, bleeding on probing; 3 = severe inflammation — marked redness and edema, ulceration with tendency for spontaneous bleeding. Bleeding was assessed by probing gently along the wall of soft tissue of the gingival sulcus. The scores of the four areas [mesial, distal, buccal (facial) and lingual (palatal)] of the tooth was summed and divided by 4 to give the GI for each tooth. The GI of the individual was obtained by adding the values for each tooth and dividing by the number of teeth examined. The GI was scored for all surfaces of all teeth as follows: 0.1-1.0 = mild inflammation 1.1-2.0 = moderate inflammation 2.1-3.0 = severe inflammation Data analysis was performed using Epi Info version 3.5.1 (www.cdc.gov/epiinfo) statistical software. Descriptive analyses were done and statistical comparison was accomplished with the chi-square test, taking P values <0.05 to be statistically significant.

3. Results

Interrater reliability analysis using the Cohen's kappa statistics was performed to determine the coherence among raters. K value of 0.8 for was obtained (note that K > 0.7 is generally considered satisfactory). Table 1 shows the socio demographic characteristics of the participants. There were five hundred pregnant women with an age range of 21-45 years and mean age of 32.6 [Standard Deviation (SD) ±6.04] years who participated in the study. Gestational age was between 4 weeks and 41weeks with a mean value of 22.8 (SD ±10.15) weeks. Overall, 243 (48.6%) had at least a tertiary level of education while 6(1.2%) had no formal education. Some participants were professionals including medical doctors, lawyers, engineers, and self-employed elites; 194 participants (38.8.6%) were full-time homemakers. The prevalence of pregnancy gingivitis is depicted in Table 2. of the 500 participants, 92.0% (460/500) had pregnancy gingivitis. Among these, 65.2% (300/460) had mild gingivitis, 33.1% (152/460) had moderate gingivitis, and 1.7% (8/460) had severe gingivitis.

Table 1: Demographic Data of Participants

Variables	Frequency	Percentage (%)
Age (Years)		
21-25	50	10
26-30	140	28
31-35	150	30
36-40	110	22
>40	50	10
Total	500	100%

Table 2: Gestational Age (weeks)

0-13	100	20
14-26	196	39.2
27-40	204	40.8
Total	500	100%

Table 3: Educational Status

None	70	14
Primary	75	15
Secondary	110	22
Diploma	60	12
Graduate	120	24
Post Graduate	65	13
Total	500	100%

Table 4: Occupational

Self –Employed	165	33
Full House wife	175	35
Professional	160	32
Total	500	100%

Table 5: Frequency and severity of gingivitis among Participants

Gingivitis	Frequency	Percentage (%)
Present	460	92%
Absent	40	8%
Total	500	100%
Severity		
Mild	300	65.2
Moderate	152	33.1
Severe	8	1.7
Total	460	100

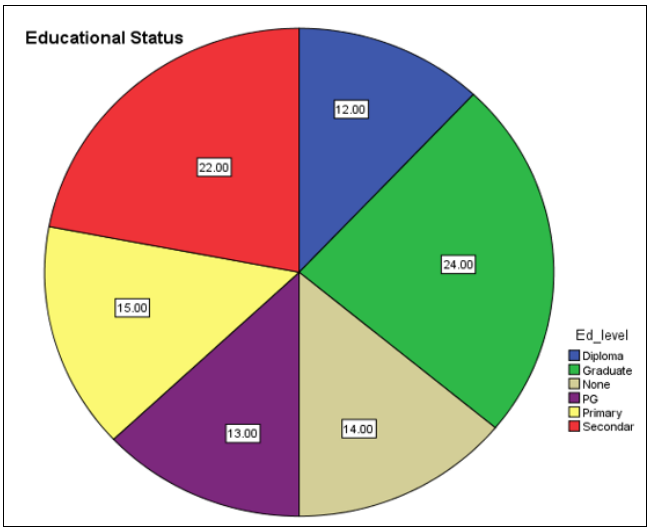

Fig 1: Educational Status of Participants

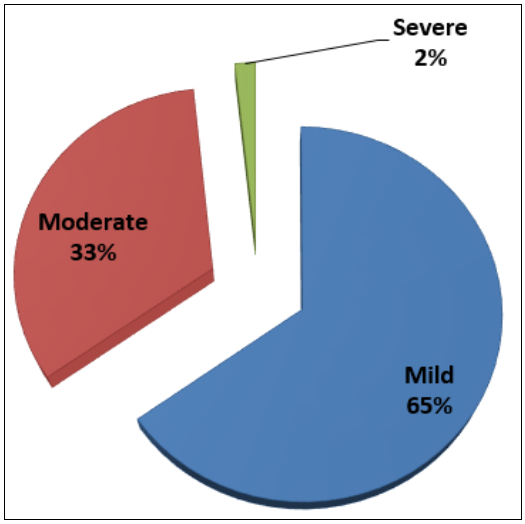

Fig 2: Severity of gingivitis among Participants

4. Discussion

Pregnancy has been associated with a high prevalence of gingivitis. This observation is corroborated by this study in which we found a prevalence of 92.0% a value comparable 86.2% reported in Thailand [4]. Some other authors such as Chanduaykit *et al*. [8]. and ababneh *et al*. [9]. made similar observations, reporting a prevalence of 86.2% and 97% respectively. This high prevalence of pregnancy gingivitis has been ascribed to the altered immune response to stress and anxiety as well as hormonal imbalances known to be associated with pregnancy. The altered host physiology tends to accentuate normal inflammatory reaction to plague accumulation, leading to rapid deterioration of the oral condition [3, 4]. however, the degree of severity of pregnancy-related gingivitis appears to be largely determined by the individual's oral hygiene rather than the mere existence of pregnancy [10]. This fact may account for the observation of mild gingivitis in a large majority- about three-fourth of the participants in this study. Compared to a similar study conducted at the antenatal clinic of King Hussein Medical Center in Saudi Arabia where about 70% of the pregnant women had moderately severe gingivitis, our study population presented better oral hygiene. This may not be unconnected to the differential level of literacy and elitism between the two populations of participants in these studies. In our study, some of the participants were professionals and individuals of middle to high socioeconomic standings and few are not educated. The former study involved a population of largely illiterate women whose oral health consciousness was predictably lower. About 35% of the participants in our study expressed moderate to severe gingivitis. Moreover, it must be emphasized that periodontal treatment during pregnancy is safe as several studies [11-14]. have demonstrated the safety and beneficial effects of periodontal therapy in pregnancy.

5. Conclusion

This study has corroborated the observation of higher prevalence of gingivitis during pregnancy. A change in gingival colour may be an early indication of gingival inflammation, early detection and prompt treatment could prevent further periodontal deterioration. Hence, the need to incorporate and intensify oral health education during antenatal care cannot be overemphasized. This will enable pregnant women to identify gingival changes that may be associated with inflammatory and no inflammatory periodontal diseases.

6. References

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