Original Article

Oral Health Status of Pregnant Women: A Cross-Sectional Study in A Tertiary Level Hospital

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Abstract

Background: Pregnancy induces physiological changes that can increase the risk of oral diseases such as gingivitis, periodontitis, and dental caries. Despite the importance of oral health in maternal and fetal outcomes, oral health often receives low priority during prenatal care in many developing countries, including Bangladesh.

Objectives: This study aimed to assess the oral health status of pregnant women attending Khulna City Medical College Hospital and identify factors associated with poor oral health outcomes.

Methods: A cross-sectional study was conducted from January 2023 to January 2025, enrolling 200 pregnant women using systematic random sampling. A structured questionnaire and clinical oral examination (based on WHO oral health assessment form) were used. Data were analyzed using SPSS v26; associations were assessed using chi-square and logistic regression analyses.

Results: Of the 200 participants, 68% had gingivitis, 42% had dental caries, and 28% had periodontal pockets ≥4 mm. Poor oral hygiene (Simplified Oral Hygiene Index, OHI-S >3) was found in 61%. Low education level, low income, and irregular dental visits were significantly associated with poor oral health outcomes ($p < 0.05$). Incidence of gingivitis was higher in the 2nd and 3rd trimesters. Dental caries was more common in the 3rd trimester, possibly due to hormonal changes and dietary habits. The incidence of periodontal disease (pockets ≥4mm) was significantly higher in the 3rd trimester.

Conclusion: This study provides valuable insight into the oral health status of pregnant women at Khulna City Medical College Hospital. The high prevalence of gingivitis, dental caries, periodontal disease, and poor oral hygiene underscores the need for preventive care and oral health education. Pregnant women should be routinely screened for oral health conditions, and dental care should be integrated into prenatal care routines.

Keywords: Pregnancy, Pregnant Women, Oral Health, Gingivitis, Periodontitis, Dental Caries, Khulna, Bangladesh.

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Introduction

Pregnancy is a period of profound physiological, hormonal, emotional, and behavioral changes that can significantly impact a woman's overall and oral health. Elevated levels of estrogen and progesterone during pregnancy enhance vascular permeability and increase the inflammatory response, particularly in the gingival tissues, making pregnant women more susceptible to gingivitis—a condition commonly referred to as "pregnancy gingivitis." These changes may begin as early as the first trimester and often worsen as pregnancy advances if appropriate oral hygiene is not maintained.

Additionally, pregnant women may experience a higher

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incidence of dental caries, periodontal disease, tooth mobility, and oral erosions, often due to altered dietary patterns (such as increased carbohydrate intake or frequent snacking), nausea and vomiting associated with morning sickness, and reduced focus on maintaining oral hygiene. These oral health issues not only lead to discomfort, pain, and difficulty in eating but may also negatively affect maternal nutrition and overall quality of life during pregnancy.

Importantly, several studies have highlighted a strong association between periodontal disease and adverse pregnancy outcomes, such as preterm birth, low birth weight, and preeclampsia (Offenbacher et al., 1996; Xiong et al., 2006). The proposed biological mechanism involves the translocation of periodontal pathogens and pro-inflammatory cytokines into the systemic circulation, which may contribute to systemic inflammation and affect placental and fetal development.

Globally, the prevalence of oral diseases among pregnant women remains high. Studies from both high- and middle-income countries like the United States, Brazil, China, and India have reported gingivitis rates ranging from 60% to 75%, dental caries from 40% to 60%, and periodontal disease affecting 20% to 40% of pregnant women (George et al., 2011; Hashim et al., 2012).

However, oral health care during pregnancy continues to be undervalued in many countries, especially in low- and middle-income settings, where lack of awareness, insufficient training among antenatal care providers, cultural beliefs, and limited accessibility to dental services serve as major barriers to preventive and curative dental care.

In low- and middle-income countries, access to oral health care remains limited, and awareness among both pregnant women and health care providers is often low (Amin & ElSalhy et al., 2014).

In Bangladesh, oral health is not routinely integrated into antenatal care protocols, and national data on the oral health status of pregnant women is limited. Consequently, oral health problems during pregnancy are often unrecognized and untreated. Moreover, both pregnant women and healthcare providers often harbor misconceptions regarding the safety and necessity of dental treatment during pregnancy, leading to further neglect.

To address this gap, the present study was conducted to evaluate the oral health status of pregnant women attending Khulna City Medical College Hospital, a tertiary care facility in southern Bangladesh. The study aimed to evaluate the prevalence of oral conditions like gingivitis, dental caries, and periodontal disease, and to correlate these conditions with demographic factors such as age, trimester, and socioeconomic status.

The findings are expected to contribute to the existing body of knowledge and to advocate for the integration of oral health into routine maternal healthcare services.

Materials and Methods:

Study Design and Setting:
A hospital-based, cross-sectional study was conducted at Khulna City Medical College Hospital, Bangladesh, between January 2023 and January 2025.

Ethical Approval:
Approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Sample Size:
A sample size of 200 pregnant women was calculated to ensure sufficient power.

Sampling Technique:
Systematic random sampling was used.

Inclusion Criteria:

- Pregnant women aged 18–40 years
- Willing to participate and provide consent
- Participants in their 1st, 2nd or 3rd trimester of pregnancy

Exclusion Criteria:

- Women with systemic diseases (e.g., diabetes)
- Women on medications affecting periodontal health (e.g., phenytoin)
- History of periodontal treatment in past 6 months
- Non-pregnant women

Data Collection Tools:

- Structured, interviewer-administered questionnaire (demographics, oral hygiene habits, dental visit history, diet)
- Clinical oral examination following WHO Oral Health Survey 2013 guidelines
- Gingival Index (GI): Was used to Assess gingival inflammation)

- Decayed, Missing, Filled Teeth (DMFT) Index: Was used to assess the presence of dental caries.
- Periodontal pocket depth assessment
- Simplified Oral Hygiene Index (OHI-S): Was used to assess oral hygiene level

Data Analysis:

Data were analyzed using SPSS v26. Descriptive statistics summarized prevalence rates. Chi-square tests assessed associations between categorical variables; logistic regression identified independent predictors. A p-value <0.05 was considered statistically significant.

Result and observation:

Demographic Characteristics of Participants:

The study included 200 pregnant women with a mean age of 27.6 ± 4.8 years. Most of the participants were in the 2nd trimester (45%), followed by the 3rd trimester (35%) and 1st trimester (20%). In terms of education level, the majority had secondary education (35%), followed by primary education (30%), and higher education (20%). The socioeconomic background showed that 40% of the participants had a monthly household income of <10,000 BDT.

Table 1. Participant Characteristics (n=200)

Variable	Category	Frequency	Percentage
Age (mean ± SD)	-	27.6 ± 4.8 years	(%)
Trimester	1st trimester	40	20%
	2nd trimester	90	45%
	3rd trimester	70	35%
Education Level	No formal education	30	15%
	Primary	60	30%
	Secondary	70	35%
	Higher	40	20%
Monthly Household	<10,000 BDT	80	40%
income	10,000 – 20,000 BDT	70	35%
	20,000 BDT	50	25%

Oral Health Findings:

Gingivitis was the most prevalent condition, affecting 68% of the participants. It was most common in the 2nd trimester. Dental caries (DMFT ≥1) was present in 42% of the participants, with the highest prevalence seen in the 3rd trimester. Periodontal pockets ≥4mm were found in 28% of the women, with more severe cases observed in those in the 3rd trimester. Poor oral hygiene (OHI-S >3) was reported in 61% of the pregnant women, indicating suboptimal oral hygiene practices.

Table 2. Oral Health Status among Pregnant Women (n = 200)

Oral Health Condition	Frequency	Percentage
Gingivitis 136	68%	(%)
Dental Caries (DMFT ≥ 1)	84	42%
Periodontal Pocket ≥ 4mm	56	28%
Poor Oral Hygiene (OHI-S > 3)	122	61%
Awareness of oral health	56	28%

Figure1. Prevalence of Oral Conditions among Pregnant Women

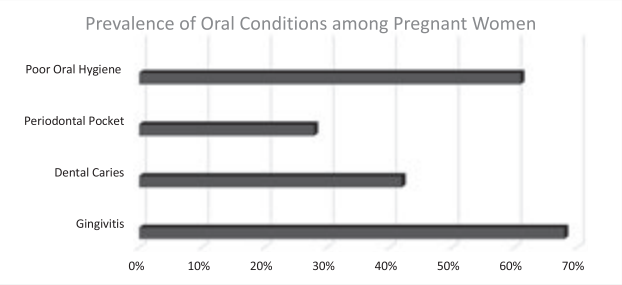


Figure 2: Awareness about pregnancy and oral health

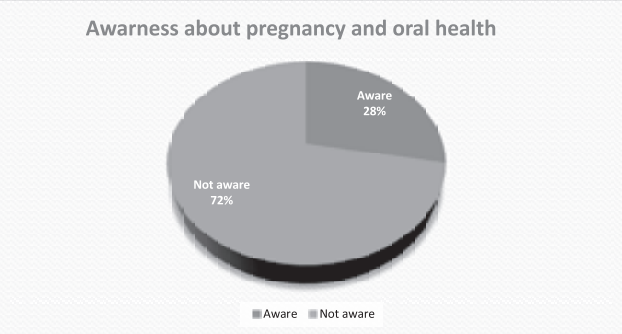


Table 3. Association of Socio-demographic Factors with Gingivitis

Factor	Gingivitis (%)	No Gingivitis (%)	P-value
Education: Low	80%	20%	0.01**
Education: High	50%	50%	
Income: Low	75%	25%	0.01**
Income: High	55%	45%	
Dental Visit: None	70%	30%	0.01**
Dental Visit: Regular	45%	55%	

Table 3 showed the relationship between various socio-demographic factors—such as education level, monthly income, and dental visits during pregnancy—and the presence of gingivitis among pregnant women in the study. The data show that lower education levels and lower household income are significantly associated with a higher prevalence of gingivitis ($p < 0.01$). Additionally, women who did not visit a dentist during pregnancy had a notably higher rate of gingivitis compared to those who did. These findings highlight the influence of socio-economic status and oral healthcare access on periodontal health during pregnancy.

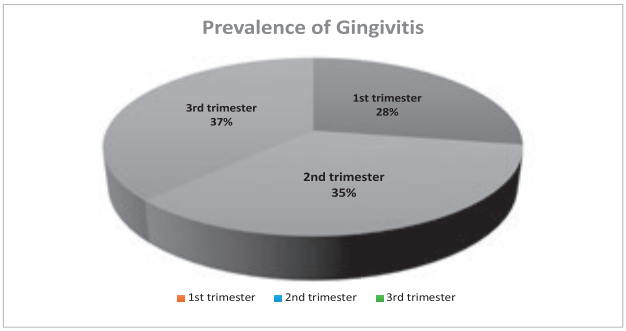
Trimester-wise Distribution of Oral Health Conditions:

Table 4. Oral Health Status in trimester

Oral Health Condition	1st trimester	2nd trimester	3rd trimester
Gingivitis	28%	35%	37%
Dental Caries	20%	33%	47%
Periodontal Pocket ≥ 4mm	28%	40%	42%

Table 4. showed the incidence of gingivitis was higher in the 2nd and 3rd trimesters. Dental caries was more common in the 3rd trimester, possibly due to hormonal changes and dietary habits. The incidence of periodontal disease (pockets ≥4mm) was significantly higher in the 3rd trimester.

Figure 2. Trimester-wise Gingivitis Prevalence



Discussion:

Oral health during pregnancy is a critical issue. Hormonal changes, increased blood flow, and alterations in the immune response can predispose pregnant women to conditions like gingivitis and periodontitis.

This study revealed a notably high prevalence of gingivitis (68%) among pregnant women attending Khulna City Medical College Hospital. This finding aligns with global studies reporting increased gingival inflammation during pregnancy due to hormonal surges. Elevated levels of estrogen and progesterone increase vascular permeability and modify the host immune response, predisposing gingival tissues to inflammation even in response to minimal plaque accumulation (Silk et al., 2008; George et al., 2011).

The trimester-wise analysis in our study showed an increase in gingivitis prevalence with advancing pregnancy, highest in the third trimester, corroborating the findings of Yenen et al. (2011), who noted progressive worsening of gingival conditions as pregnancy advances.

The prevalence of dental caries (42%) is also consistent with findings from other low-resource settings. Frequent snacking, increased intake of fermentable carbohydrates, morning sickness-induced vomiting, and reduced attention to oral hygiene are contributing factors (Hashim et al., 2012; Ahmed et al., 2020). Physiological changes in saliva, such as decreased flow and altered pH, further promote caries development during pregnancy.

Periodontal pockets ≥4mm were found in 28% of participants, indicating progression from gingivitis to periodontitis in a significant proportion. These findings are comparable to studies from the U.S. and China, where periodontitis prevalence among pregnant women ranged from 20–40% (Offenbacher et al., 1996; Xiong et al., 2006). The implications of maternal periodontitis are profound, as several studies have linked it to adverse pregnancy outcomes, including preterm birth and low birth weight (Bobetsis et al., 2006; Sanz et al., 2013).

Socio-demographic factors such as low education level, lower income, and poor oral hygiene habits were significantly associated with increased risk of gingivitis and caries in our study. Women with no formal education were 2.5 times more likely to develop gingivitis, emphasizing the role of health literacy in oral health maintenance. This is in line with findings from studies conducted in India and Jordan (Amin & ElSalhy, 2014; Al Habashneh et al., 2005), which also highlight the protective role of education and regular dental visits.

Alarmingly, only 15% of participants had visited a dentist during their pregnancy. This underutilization of dental services reflects a lack of awareness, socio-cultural misconceptions (e.g., the belief that dental treatment during pregnancy is harmful), and possibly limited availability of affordable care. Studies by Gaffield et al. (2001) and the CDC (Centers for Disease Control and Prevention) support these barriers, stressing the need for targeted oral health education during antenatal care.

Despite these risks, only 15% of participants had visited a dentist during pregnancy. This underscores the urgent need to integrate dental screening into routine antenatal care, as recommended by WHO.

This study showed that lower education levels and lower household income are significantly associated with a higher prevalence of gingivitis ($p < 0.01$). Additionally, women who did not visit a dentist during pregnancy had a notably higher rate of gingivitis compared to those who did. These findings highlight the influence of socio-economic status and oral healthcare access on periodontal health during pregnancy.

The findings from this study suggest a need for targeted oral health education for pregnant women, particularly in the second and third trimesters. It is essential to emphasize the importance of regular dental visits, proper brushing techniques, and the role of nutrition in maintaining good oral health during pregnancy.

Conclusion:

Oral health among pregnant women in Khulna is significantly compromised. Awareness programs and integration of oral health services into routine antenatal care are essential. Healthcare providers, including obstetricians and dentists, must collaborate to ensure comprehensive maternal care. The oral health status of pregnant women attending Khulna City Medical College Hospital was poor, with high rates of gingivitis, caries and periodontal disease. Addressing oral health in pregnancy is crucial for improving both maternal and fetal outcomes.

Recommendations:

- Implement community-based oral health education programs for pregnant women
- Provide affordable preventive dental services for pregnant women
- Encourage routine dental check-ups during prenatal visits
- Train healthcare professionals on the importance of maternal oral health
- Policy advocacy for inclusion of dental care in national maternal health programs

Limitations:

- Hospital-based sample may not represent the general pregnant population
- Self-reported data may have recall bias
- Cross-sectional design limits causal inferences

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