ORIGINAL ARTICLE

Epidemiology of Maternal Periodontal Disease and Preterm Birth among Patient Attending in some Selected Hospital in Dhaka City

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ABSTRACT

Objective: Periodontal disease can be a source of subclinical and persistent infection that may induce systemic inflammatory responses that increase the risk of preterm birth. The goal of this study was to establish whether periodontal disease is a risk factor for preterm birth and to evaluate the association of this risk with gestational age.

Study Design: This descriptive cross-sectional study included postpartum women with periodontal disease admitted to the maternity care unit of five different medical college hospitals in Dhaka City.

Methods: The sample size was 111 postpartum; all of them had mild, moderate, or severe periodontitis. A periodontal examination was performed within 48 hours of delivery to determine the severity of periodontal disease. The outcome variable is preterm birth (define as birth occurring before 37 weeks of gestational age.). The statistical analysis of the data was carried out by using software program SPSS version 17.

Results: The prevalence of severe periodontitis was 11.7% (13/111), moderate periodontitis was 36% (40/111), and mild periodontitis was 52.3% (58/111). From the variables that described the socio-demographic characteristics, only age had a significant association with preterm birth, and the mother having a lower age than normal and the mother having higher age than normal had an increased prevalence of preterm birth. From the variables that described the oral health related characteristics, regular visits to a dentist and pain in the tooth had a significant association with preterm birth (P<0.05). From the variables which that described the pregnancy related characteristics, BMI, previous history of miscarriage or abortion, previous history of preterm birth, antenatal check-up, and genital infection had a significant association with preterm birth (P<0.05). From the variables that described the socio-demographic characteristics, only education level had significant associations with periodontitis (P<0.05).

Practical implication: The study suggests that periodontal disease may increase the risk of preterm birth in pregnant women. Therefore, improving the periodontal health of pregnant women may improve pregnancy outcomes. Regular visits to the dentist and early treatment of tooth pain may help in identifying and managing periodontal disease in pregnant women. Additionally, healthcare providers should consider periodontal health as a potential risk factor for adverse pregnancy outcomes and incorporate it into prenatal care. However, more research is needed to determine the causal relationship between periodontal disease and preterm birth, and to identify key confounders.

Conclusions: Our results suggest that a specific drive to improve the periodontal health of pregnant women could be a means of improving pregnancy outcomes. Nevertheless, it is not clear whether only periodontal diseases play a causal role in adverse pregnancy outcomes. Additional longitudinal, epidemiologic, and interventional studies with clear and consistent definitions of periodontal disease and adverse pregnancy outcomes, sufficiently large sample sizes, and controls for key confounders are needed to validate this association and to determine whether it is causal.

Keywords: maternal periodontal disease; preterm birth; risk factors; gestational age; epidemiology; dental visits

INTRODUCTION

Even in historical times, people thought that diseases, which affect the mouth and teeth, such as periodontal infection, could have an adverse effect on the body as a whole. In ancient documents from Egypt, Israel, Assyria, Greece and the Roman Empire, oral health was mentioned as an important factor in overall health [1]. During recent decades, a new area of periodontal research has emerged, and new evidence has been collected relating to the connection between periodontal infection and systemic disease. Recently, the concept of "focal infection" has re-emerged, based on new data, that suggest that periodontal infections contribute to the morbidity and mortality of certain systemic conditions [2]. Hence, research demonstrates that oral diseases are not only markers of underlying health problems but also important determinants of adverse chronic health conditions in infants. Periodontitis as a chronic oral disease may serve as a risk factor for atherosclerosis, coronary heart disease, diabetes mellitus, respiratory infections, and low birth weight (PLBW) in preterm infants [3].Concerning the proposed association between periodontal infection and preterm birth weight, which is still a significant public health problem.

Our mouth is full of bacteria. These bacteria, along with mucus and other particles, constantly form a sticky, colorless "plaque" on teeth. Brushing and flossing help get rid of plaque.

Plaque that is not removed can harden and form "tartar" that brushing doesn't clean. Only a professional cleaning by a dentist or dental hygienist can remove tartar. The longer plaque and tartar are on teeth, the more harmful they become. The bacteria cause inflammation of the gums, which is called "gingivitis" [4]. In gingivitis, the gums become red, swollen and can bleed easily. Gingivitis is a mild form of gum disease that can usually be reversed with daily brushing and flossing and regular cleaning by a dentist or dental hygienist. This form of gum disease does not include any loss of bone or tissue that holds teeth in place.

When gingivitis is not treated, it can advance to "periodontitis" (which means "inflammation around the tooth.") In periodontitis, gums pull away from the teeth and form spaces (called "pockets") that become infected [5]. The body's immune system fights the bacteria as the plaque spreads and grows below the gum line. Bacterial toxins and the body's natural response to infection start to break down the bone and connective tissue that hold teeth in place. If not treated, the bones, gums, and tissue that support the teeth are destroyed. The teeth may eventually become loose and have to be removed [6].

During pregnancy, there are changes in the gingival tissues, that result in the gingiva having less resistance to the bacteria and bacterial products, first gingival inflammation appear in the second

month of pregnancy [7]. In presence of plaque, the first sign of inflammation are more severe, but in the absence of plaque and pre-existing inflammation, the gingiva may also bleed easily in women without the sign of gingival inflammation. Hormonal changes during pregnancy have a special effect on the periodontium, as gingival capillaries dilate, and vascular permeability increases in the gingival tissues as a result of increased levels of circulating progesterone [8].

As a consequence, bacteria and/or their products can diffuse into tissue more readily than normal. The elevated levels of estrogen and progesterone during pregnancy decrease the keratinization of the gingival; therefore, the permeability of the mucosa increases, and as a result, the effectiveness of the epithelial barrier decreases. The pro-inflammatory cytokines IL-1, IL-6 and TNF-a stimulate PGE2 synthesis by the human placenta and chorioamnion [9]. Prostaglandins have a role in regulating the normal physiology of pregnancy [9].The cytokines and lipid mediators are produced either at the infected site (i.e. periodontium) or at the placenta in response to infection. Several mediators produced during gram-negative infection have been proposed to elicit a deleterious effect on the developing fetus, including tumor necrosis alpha and prostaglandin E2 [10]. Collins reported in 1994 that, after inoculation with P. gingivalis (a common gram negative periodontal pathogen), the production of PGE2 and TNF-a increased, as shown in animal experiments and caused adverse pregnancy outcomes in hamsters [10].

The known risk factors for pre-eclampsia include primiparity, nulligravidity, obesity, renal disease, uterine malformation, fetal hydrops, elevated serum lipid ratio, chronic smoking, no prenatal care, and diabetes [11]. Pre-eclampsia and atherosclerosis share some common epidemiologic risk factors; also placental pathologic changes similar to atherosclerotic vascular changes have been described. Maternal periodontal disease with systemic inflammation as measured by C-reactive protein is associated with an increased risk for preeclampsia [11].

Currently, it is thought that, there are several risk factors for preterm birth weight (PLBW) e.g. maternal age of <17 years or > 35 years, low socio-economic status, alcohol and or drug abuse, smoking, multiple pregnancies, malnutrition , hypertension, a variety of metabolic and genetic disorders or inadequate prenatal care. Smoking also restricts or retards fetal growth. As such, these factors can be called "traditional risk factors", but in about 25% of PB cases, these are absent, and PLBW cases remain unexplained [12].

Infection is now considered one of the major causes of PLBW, responsible for more than 30% of all cases [13]. An association between infection of the pregnant woman and preterm delivery has been demonstrated by a number of studies. In one of the first examinations, Patrick in 1967 demonstrated an increased risk for fetal death and neurological abnormalities in untreated severely bacteriuric females [14]. Maternal genitourinary tract infection has also been linked to an increased prevalence of preterm birth Bacterial infection of the chorioamnion, or extra placental membrane may lead to chorioamnionitis, which is strongly associated with preterm delivery. This seems to be a contradiction, and it led researchers to study how inflammation may be present in the fetal placental unit without any evidence of bacterial infection. The findings for further study led to the conclusion that an infection may be distant from the fetal-placental unit or the genitourinary tract, yet still present a risk for PB as a result of the indirect action of translocated bacterial products, like LPS (Lipopolysaccharides) or the action of maternally-produced inflammatory mediators [15].

These findings directed the attention of researchers towards chronic periodontal infection, which can play a significant role as a possible risk factor for preterm birth. Chronic periodontitis, could be a reservoir for inflammatory mediators, and may thus pose a potential threat to the placenta and fetus, increasing the likelihood of preterm birth, low birth weight [7].

Preterm birth is a considerable problem even in economically developed countries as an estimated 11% of pregnancies ended in preterm birth [16]. In Bangladesh, for example, the LBW prevalence 200 death per thousand live births to approximately varies between 23% and 60%[17].

In Hungary, the number of lives births per year is around 9500, of which about 85,000 (8.9%) are preterm birth deliveries according to data from 2000-2004, with the frequency of low birth weight infants being about 8.7%. These numbers have not decreased in the last 20-30 years[18]. Preterm birth and infant mortality result in many problems for the family involved, as well as for society in general. The societal burden of PLBW can be measured in terms of both morbidity and economic outcomes [19].The health problems of PB newborns can result in early death. Infants born before 24 weeks survive rarely, only 15% of those born before 23 weeks are viable, and at 22 weeks, almost non survive, newborn have a better chance for survival if they are born after 26 weeks or more gestational weeks [8]. Depending on newborn's maturity, they may have different degrees of neuromotor abnormality, cerebral palsy, behavioral problems, or learning difficulties, e.g., reading, spelling and mathematics [20]. The rate of cerebral palsy increases with decreasing birth weight. Blindness and deafness also occur more often in low birth weight children than in the normal population [21]. Due to immaturity, these newborns frequently suffer different illnesses such as asthma, an upper respiratory tract infection, or congenital anomalies. PB children become ill more readily than others and their treatment can be more difficult. They also need special care, both from their families and from society in general. Whilst every effort is made to decrease the number of PB newborns by diminishing the effects of all the traditional risk factors and by eliminating new ones, until now about 25% of PB cases cannot be explained by known risk factors [12].

Due to the reluctance of some dental professionals to provide dental care during pregnancy, the state of New York established guidelines to address this problem. This comprehensive report recommends that oral health care should be coordinated among prenatal and oral health care providers. Communication between the dental community and the medical community is a necessity, and a consultation form was developed to help facilitate this process. The New York guidelines suggest and recommend that dental treatment be provided during pregnancy, including the first trimester. However, early in the second trimester (14-20 weeks gestation) is the most favorable time to perform dental procedures [22]. During this gestational age, there is no threat of teratogenicity; nausea and vomiting have usually subsided; and the uterus is below the umbilicus, providing more comfort to the mother. Unrestored carious lesions should be restored as soon as possible, as some pregnant women require general anaesthesia with incubation at delivery. Some physicians are hesitant to intubate due to the increased risk of airway obstruction due to the decreased integrity of decayed teeth that could break off. If treatment is provided in the last trimester, care should be taken to prevent suppression of the inferior vena cava by keeping the woman in an upright position. Ultimately, all health care providers should advise women that maintaining good oral health during pregnancy is not only safe but necessary to reduce the risk of infection to the mother and possibly the fetus.

While it remains inconclusive whether maternal periodontal treatment improves pregnancy outcome, it is clear that treatment of varying degrees of clinical periodontal disease during pregnancy is safe and improves maternal oral health [22,23]. In several studies of periodontal treatment during pregnancy, oral health parameters improved following therapy [22]. All dental services should be available to pregnant women; however, studies have shown that some treatments are best provided only during certain gestational ages. Despite the benefit of treatment, periodontal infection in women of childbearing age remains highly prevalent, particularly among low-income women and members of racial and ethnic minority groups. Regrettably, some subgroups of women who lack

access to dental care will likely miss out on dental care during pregnancy. Oral health care professionals must help bridge this gap.

Periodontal disease in pregnant women is a potential risk factor for preterm birth, so it is very important to give a special attention to the periodontal health of this group [23]. Chronic gingivitis is the most prevalent oral manifestation associated with pregnancy. Gingival changes usually occur in association with poor oral hygiene and the presence of local irritants. Especially the bacterial flora of plaque. Additionally, hormone and vascular changes that accompany pregnancy often exaggerate the inflammatory response to these local irritants [11]. Thus, oral disease can be influenced by demographic and socioeconomic circumstances. The periodontal status is better in mothers with higher education, who work as intellectuals, and living in cities. Thus, it is important that the oral hygiene levels of pregnant women in Bangladesh should be assessed, to identify those who might also need special attention in this respect during pregnancy. Dentists and dental hygienists must actively participate in providing treatment to pregnant women to help maintain maternal health. Knowledge of research studies and published guidelines can help eliminate the timidity that prevails in the dental community regarding providing dental care to pregnant women. In fact, the dental community must embrace this shift in practice guidelines. By embracing the changes, better overall health care can be provided to all women, especially those of childbearing age.

METHODS
Conceptual Framework
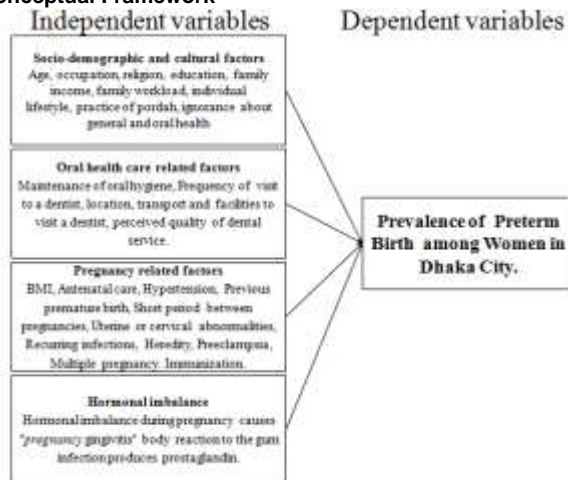
General Objective: To assess the epidemiology of maternal periodontitis and preterm birth, subjects admitted to 5 different medical college hospitals in Dhaka city.

Specific Objectives
1. To examine the effects of socio demographic factors on the periodontal status of a sample of postpartum women in Dhaka city.
2. To find out the association between socio-demographic factors and preterm birth.
3. To assess the relationship between pregnancies related factors and preterm birth.
4. To identify the association between dental service-related factors and preterm birth,

Study Design: This paper addressed the design of a descriptive cross sectional study.

Target Population: Subjects were recruited postpartum having periodontal disease and admitted to the maternity care unit of five different medical college hospitals in Dhaka city.

Study Area: The study area was conducted in Dhaka city. Dhaka city is the largest and most densely populated city in Bangladesh, as well as the country's capital.

Study Site: Many private and government hospitals and medical colleges are situated in Dhaka city. For this reason, the study site was selected from five different medical college hospitals in Dhaka city.

Study Period: The total period of study was from December 2010 to May 2011.

Inclusion Criteria
1. Postpartum with periodontal disease.
2. Low risk (absence of severe systemic pathological conditions that could characterize high risk pregnancy: diabetes, severe hypertension, other chronic diseases that already are risk factors for the preterm birth).

Exclusion Criteria
1. With a risk of preterm delivery and/or low birth-weight (cervical incompetence, prior cervical surgery).
2. With two or more caesarean sections.
3. Users of alcohol, tobacco, and drugs will be excluded from the study.

Sampling Techniques: Five medical college hospitals were selected for sample collection. Hospitals were selected purposively, and patients from the hospital were selected by the purposive sampling technique.

The purpose of the study was explained to the respondent prior to data collection and consent was taken accordingly.

Periodontal Examination: Periodontal examinations were performed within 48 hours of delivery to determine the presence of periodontal disease or periodontal disease progression. The data was recorded on a clinical record form with a complete clinical and periodontal description of all the teeth, including the third molars. Oral hygiene status was assessed as the percentage of surfaces with plaque, by the dichotomous plaque index (presence or absence of plaque). Probing pocket depth (PPD: measurement from the gingival margin to the total probing depth), gingival recession (CSR: measurement from the cemento-enamel junction to the gingival margin), and clinical attachment level (CAL: measurement from the cemento-enamel junction to the total probing depth) were evaluated at four tooth surfaces (mesial, buccal, distal and lingual) using a Williams periodontal probe. The greatest clinical measurement of each surface was recorded. Bleeding on probing (BOP) was assessed and recorded after PPD was measured by the dichotomous index (presence or absence of bleeding), and was expressed as the percentage of surfaces showing bleeding. The examination was carried out by the trained periodontist with experience in the field, and an assistant who provided technical support and filled out the data collection forms.

Criteria for Periodontal Diagnosis: The presence of 4 or more teeth showing at least one site with 4 mm of PPD and clinical attachment loss at the same site, with BOP was diagnosed as periodontal disease (PD). These criteria were operationally selected for the clinical definition of pregnant women who positively and unequivocally exhibited PD specifically for this study. In order to conduct a more accurate evaluation of the characteristics of PD in this population, the extension of the disease was also classified as follows: PI: at least four teeth with PPD and CAL of 4-6 mm; P2: at least four teeth with PPD and CAL of 7-9 mm; and P3: at least four teeth with PPD and CAL of 10 mm. Among the women classified as without PD for this study, those that had BOP in more than 25% of sites would classify as having only gingivitis in some sites, and when it was < 25%, they would be classified as having healthy periodontal status.

Outcome Variable: The outcome variable was the prevalence of preterm birth (PTB, defined as birth occurring before 37 weeks of gestational age) among women admitted in different medical hospitals in Dhaka city.

Data Collection Tool: After determining what information was needed for this study, data collection was accomplished by using a set of questionnaires containing structured and semi structured questions according to the objectives and variables of the study. Pre-testing was done. After pre-testing, it was modified (if

necessary) or finalized based on responses from the study subjects and interviewers.

Statistical Analysis: All interview questions were checked for completeness, correctness, and internal consistency to exclude missing or inconsistent data. The statistical analysis of the data was carried out using software program SPSS version 17.0 and STATA. For analyzing data, some descriptive statistics like mean, median, mode and percentages were used. In order to find association between dependent variables and independent variables, logistic regression and the Chi^2 test was done at a 5% significance level. This was presented in tables, graphs, and charts.

Quality control and quality assurance: In order to ensure the highest quality, interviews were done by the duty doctors and registrars who worked in the outdoor and indoor setting at the selected medical college hospitals. Prior to the distribution of the questionnaires, duty doctors or researcher gave clear instructions to the patients on how to fill out the questionnaires correctly. The patient who could not read or write was helped by an outside person to fill out the questionnaires. After each survey, the questionnaires were checked for any gross mistakes. Other necessary counseling with the research committee for study purposes and analysis was conducted by the researcher to ensure utmost quality.

Ethical Consideration
1. The WHO and BMRC guidelines were followed properly.
2. No one was included in the study without her consent.
3. Without the permission of the respondent, no data was exposed.

Limitations of the Study
1. The selected sample did not represent all the hospitals in Dhaka city; hence findings of the study could not be generalized.
2. Some of the respondents were non cooperative.

Expected Outcome
1. It is expected to understand the association between maternal periodontitis and preterm birth. 2.
2. It is expected to learn level of knowledge of Dhaka women city on oral health care during pregnancy.
3. It can be evaluate the effects of socio-demographic and cultural factors on the periodontal status of pregnant women in Bangladesh.
4. It can be understand that whether the initial periodontitis is the independent risk factor for preterm birth.
5. It is expected that women understand the necessity of treating of maternal periodontal disease or other dental lesions during pregnancy for a complication free pregnancy.

RESULTS

This sectional study was carried out in order to ascertain the relationship between maternal periodontitis and preterm births attending some different medical college hospitals in Dhaka city. A pre-tested questionnaire was used to collect the information. Section A contained questions about socio-demographic information; Section B contained questions about oral health care information; and Section C contained questions about pregnancy-related factors. This chapter deals with statistical analysis done by using the statistical software SPSS version 17.

Socio-demographic and cultural characteristics of the respondents: The following variables described the socio-demographic characteristics of the respondents. They are as follows:

The mean age of the respondents was 25.14 years. The lowest age of the respondent was 16 with a frequency of 1 (0.9%) and the highest age of the respondent was 41 with a frequency of 1 (0.9%). The maximum frequency of the age was 23 years, with a frequency of 13 (11.7%). The lowest frequency of the age was 16, 36 and 41 years with a frequency of 1 (.9%). Most of the respondents were aged between 19-29 years. Most of the respondents (N=111) were house-wives, showing a frequency 59 (53.2%) second most frequent respondents were private service

holders with a frequency of 42 (37.8%). The next group of respondents were in business, with a frequency 6 (5.4%) and the lowest frequency of occupation was government service with a frequency of 4 (3.6%).

Among 111 respondents, maximum frequency of the respondents was belonged to Islam (92) that was 82.9% followed by Hindu (13) which was 11.7% and 4 respondents were (3.6%) from Buddhist religion. Rest 2 of the respondents there was 1 Christian (0.9%) and 1 from another religion. Most (65) of the respondents had a primary level of education (58.6%). 27 had a secondary level of education (24.3%) and 13 were illiterate (11.7%).From the remaining 6 respondents, 3 respondents (2.7%) had a graduate level of education 3 respondents (2.7%) had a higher secondary level of education.

Table 1: Age distribution of the respondent (N=111)

Age	Frequency	Percentage
16	1	0.9%
18	3	2.7%
19	7	6.3%
20	10	9.0%
21	7	6.3%
22	9	8.1%
23	13	11.7%
24	6	5.4%
25	9	8.1%
26	5	4.5%
27	6	5.4%
28	6	5.4%
29	11	9.9%
31	6	5.4%
32	4	3.6%
33	3	2.7%
35	3	2.7%
36	1	0.9%
41	1	0.9%

Table 2: Distribution of the monthly income of the respondents (N=111).

Monthly income	Frequency	Percentage
5000	4	3.6%
6000	5	4.5%
7000	9	8.1%
8000	4	3.6%
10000	23	20.7%
11000	2	1.8%
12000	5	4.5%
15000	12	10.8%
20000	6	5.4%
25000	14	12.6%
30000	12	10.8%
35000	13	11.7%
40000	2	1.8%

Table 3: Distribution of Socio demographic characteristics of respondents

Characteristics	Frequency	Percentage
Occupation		
House wife	59	53.2%
Business	6	5.4%
Private service	42	37.8%
Govt. service	4	5.4%
Religion		
Muslim	92	82.9%
Hindu	13	11.7%
Christian	1	0.9%
Buddhist	4	3.6%
Others	1	0.9%
Education		
Illiterate	13	11.7%
Primary	65	58.6%
Secondary	27	24.3%
Higher Secondary	3	2.7%
Degree	2	2.7%

The mean of the monthly income of the respondents was 18036.04 taka. Most (23) of the respondents (20.7%) had a monthly family income 10000 taka. Following this, the second (with a frequency of 14) 12.6% and third (with a frequency of 13) 11.7% most frequent of the respondent had a monthly family income successively 25000 and 35000. Fourth most frequent (12) of the respondent (10.8%) had a monthly income 15000 and 30000.The highest family income of the respondent(1.8%) with frequency 2

was 40000 taka per month and the lowest family income of the respondent (3.6%) with a frequency 4 was 5000 taka per month.

Oral health related characteristics of the respondents: The following variables describe the Oral health related knowledge and level of maintenance oral hygiene of the respondents:

Out of 111 respondents, 69 had never visited a dentist, and 42 of them had visited to a dentist before. That is, 62.2% never visited dentist and 37.8% had previously visited dentist. Most of the respondents (60.4%) with a frequency of 67 had no idea about the causes behind the oral and dental diseases. 23 respondents (20.7%) thought that life style is responsible behind oral and dental diseases. 20 respondents (18%) thought that food habit is being responsible for dental and oral disease and 1 respondent (0.9%) thought that other cause is responsible than these four cause behind the oral and dental disease. Most of the respondents, that is 88 of total 111 respondents(79.3%) had no restriction from their husband or family to visit a male doctor or dentist, only 23 of them that is 20.7% had a restriction on visit the male doctor or dentist.

Table 4: Distribution of characteristics of oral Health related knowledge (N=111)

Characteristics	Frequency	Percentage
Reason behind oral disease		
Food habit	20	18%
Life style	23	20.7%
Don't know	67	60.4%
Others	1	0.9%
Difference between dentist & quack		
Know	56	50.5%
Don't know	55	49.5%
Restriction to visit male doctor (or Dentist)		
Yes	23	20.7%
No	88	79.3%

Table 5: Distribution of Oral health care related characteristics of the respondents (N=111)

Characteristics	Frequency	Percentage
Visit to a dentist		
Yes	42	37.8%
No	69	62.2%
Use of toothbrush		
Yes	82	73.9%
No	29	26.1%
Material use for tooth cleaning		
Tooth paste	59	53.2%
Tooth powder	44	39.6%
Ash	8	7.2%

Table 6: Distribution of oral disease related characteristics (N=111).

Characteristics	Frequency	Percentage
Pain on tooth		
Yes	64	57.7%
No	47	42.3%
Bleeding from gum		
Yes	102	91%
No	5	4.5%
Don't know	4	3.6%
Gum bleeding associated to pregnancy		
Yes	37	33.3%
No	43	38.7%
Don't Know	31	27.9%
Periodontitis		
Mild	73	65.8%
Moderate	26	26.1%
Severe	9	8.1%

Pregnancy related characteristics of the respondents: The following variables describe the pregnancy-related characteristics of the respondents: Out of 111 respondents, 82 respondents did not have any medical condition or illness (73.9%). The remaining 29 respondents (26.1%) had medical condition or illness. The frequency of respondents who were underweight was 53(47.7%). Frequency of respondents who were in normal weight was 54 (48.6%). The frequency of respondents who were overweight were 2 (1.8%) and frequency of respondent who was obese, was 1 (0.9%) and morbidly obese was also 1 (0.9%). Out of 111 respondents 46, (41.4%) had their 1 St pregnancy, followed by those 38 (34.2%) had their 2" pregnancy.19 (17.1%) respondents had their 3rd pregnancy and 5(4.5%) had their 4th pregnancy. Only 3 (2.7%) had more than 4th pregnancy.

Out of 111 respondents 30 respondents (27%) had a previous history of preterm birth and 81 respondents (73%) had not experience any history of preterm birth. Most of the respondents (91) had never had a miscarriage or abortion before (82%). Rest of the respondents (20) had miscarriage or abortion (18%) before. Among all 111 respondents, 53 respondents that are 47.7% had antenatal checkup during pregnancy but 58 respondents that is 52.3% did not go for antenatal checkup during pregnancy.

Out of 111 respondents, 50 respondents having morning sickness during pregnancy (45%) and 61 respondents did not having morning sickness (55%).Most respondents (85) did not have gestational diabetes (76.6%) rest of the respondent (26) had gestational diabetes (23.4%). More than half of the respondents that is 68 respondents (61.3%) had anemia and rest 43 respondent (38.7% did not have anemia.

Among 111 respondents, none of them or their husbands was HIV/AIDS positive,68 respondents or their husbands did not have HIV/AIDS (61.3%) and 43 respondents (38.7%) or their husband did not know whether they are HIV/AIDS positive or not. most of the respondents (94.6%) did not have epilepsy the frequency is 105. Rest 6 respondents (5.4%) had epilepsy. Less than half of the respondents, that is 44 respondents (39.6%) had hypertension and 67 respondents (60.4%) had normal blood pressure. 92 of the total 111 respondents (82.9%) or their husband did not have or never had tuberculosis and 5 respondents or their husband (4.5%) had tuberculosis and rest 14 respondents (12.6%) did not know whether they or their husband had or ever had tuberculosis. Out of 111 respondents 105 respondents (94.6%) or their husband did not have any genital Infection? Only 6 Respondents (5.4%) or their husband had genital infection. Most (83) of the respondents (74.8%) had vaccination during pregnancy. Rest (28) of the respondents (25.2%) did not have vaccination during pregnancy. Among 111 respondents about half of the respondents, that is 54 respondents(48.6%) had normal duration of the pregnancy and other half of the respondents, that is 50 respondents(45%) had preterm birth and only 7 respondents(6.3%) had very preterm birth.

Table 7: Distribution of pregnancy related characteristics (N=111)

Characteristics	Frequency	Percentage
BMI		
Under weight	53	47.7%
Acceptable weight	54	48.6%
Over weight	2	1.8%
Obese	1	0.9%
Morbidly Obese	1	0.9%
Number of Pregnancy		
1st Pregnancy	46	41.4%
2nd Pregnancy	38	34.2%
3rd pregnancy	19	17.1%
4th Pregnancy	5	4.5%
Over 4 pregnancy	3	2.7%
Previous history of preterm birth		
Yes	30	27%
No	81	73%
Miscarriage or Abortion		
Yes	91	82%
No	20	18%
Antenatal Checkup		
Yes	53	47.7%
No	58	52.3%
Morning Sickness		
Yes	50	45%
No	61	65%
Vaccination		
Yes	83	74.8%
No	28	25.2%

Among 111 respondents we can see the mother aged between lowest ages to 24 had normal gestational age 24, preterm birth 27, very preterm birth 6. Respondents' agebetween 25 to 35 yrs had normal duration of pregnancy 27 respondents, preterm birth 20 and very preterm birth 5 respondents. Respondents aged 36 and above none had

normal duration of pregnancy, 1 had preterm birth and 1 had very preterm birth and the association is significant (as P<0.05)

Table 8: Distribution of medical condition related characteristics (N=111).

Characteristics	Frequency	Percentage
Medical Condition or illness		
Yes	29	26%
No	82	73.9%
Hypertension		
Yes	44	39.6%
No	67	60.4%
Anemia		
Yes	68	61.3%
No	43	38.7%
Gestational Diabetes		
Yes	85	76.6%
No	26	23.4%
Epilepsy		
Yes	6	5.4%
No	105	94.6%
Gestational Age		
Normal duration	54	48.6%
Preterm birth	50	45%
Very preterm birth	7	6.3%

Table 9: Distribution of medical condition related characteristics (N=111)

Characteristics	Frequency	Percentage
HIV/AIDS		
Yes	5	4.5%
No	92	82.9%
Don't Know	14	12.6%
Tuberculosis		
Yes		
No	6	5.4%
Don't Know	105	94.6%
Genital Disease		
Yes	54	48.6%
No	50	45%

Table 10: Association between preterm birth and age of the respondents (N=111)

Gestational age						P-value
		Normal duration	Preterm birth	Very preterm birth	total	
Age of the respondent	Lowest to 24	24 (42.1%)	27 (47.4%)	6 (10.5%)	57 (100%)	0.001
	25 to 35	27 (51.9%)	20 (38.5%)	5 (9.6%)	52 (100%)	
	36 to higher	0 (0%)	1 (50%)	1 (50%)	2 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

Table 11: Association between preterm birth and education levels of the respondents (N=111).

Gestational age					
		Normal duration	Preterm birth	Very preterm birth	total
Education level	Illiterate	4 (30.85%)	4 (30.8%)	5 (38.5%)	13 (100%)
	Primary	30 (46.2%)	29 (44.6%)	6 (9.2%)	65 (100%)
	Secondary	13 (46.1%)	13 (48.1%)	1 (3.7%)	27 (100%)
	Higher Sec:	2 (66.7%)	1 (33.3%)	0 (0%)	3 (100%)
	Graduate	2 (66.7%)	1 (33.3%)	0 (0%)	3 (100%)
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)

The respondents who were illiterate had 4 normal duration of pregnancy, 4 preterm births and 5 very preterm birth_ Respondents who had primary level of education had 30 normal duration, 29 preterm births and 6 very preterm birth. Those who had secondary level of education had 13 normal duration, 13 preterm birth and 1 very preterm birth, those who had higher secondary level of education had 2 normal duration, 1 preterm birth and no very preterm birth and those who had graduate level of education had 2 normal duration, I preterm birth, and none had very preterm birth of pregnancy

In association between occupation gestational age those who were house wives, 26 among 111 had normal duration, 28 had preterm birth and 5 had very preterm birth. Those who had business, 4 had normal duration, 2 preterm births and none had very preterm birth of pregnancy. Those who had private service, 19

had normal duration 16 had preterm birth and 7 had very preterm birth and those who had government service, 2 had normal duration,2 had preterm birth and none had very preterm birth of pregnancy.

Table 12: Association between preterm birth and occupation of the respondents (N=111)

Gestational age					
		Normal duration	Preterm birth	Very preterm birth	Total
Occupational level	Housewife	26 (44.1%)	28 (47.5%)	5 (8.5%)	59 (100%)
	Business	4 (66.7%)	2 (33.3%)	0 (0%)	6 (100%)
	Private Service	19 (45.2%)	16 (38.1%)	7 (16.7%)	42 (100%)
	Govt: Service	2 (50%)	2 (50%)	0 (0%)	4 (100%)
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)

Table 13: Association between history of visit to a dentist and preterm birth of the respondents (N=111).

Gestational age						P-value
		Normal duration	Preterm birth	Very preterm birth	Total	
Have you ever been to a dentist	Yes	25 (59.5%)	16 (38.1%)	1 (2.4%)	42 (100%)	0.023
	No	26 (37.7%)	32 (46.4%)	11 (15.9%)	69 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

Among 111 respondents who visited to dentist before, 25 had normal duration of pregnancy, preterm birth 16 and 1 very preterm birth and those who never visited to a dentist before had normal duration of pregnancy 26 ,preterm birth 32, and very birth 11 And the association of these variables are significance(as p<0.05)

Table 14: Association between periodontal condition and preterm birth of the respondents (N=111).

Gestational age						P-value
		Normal duration	Preterm birth	Very preterm birth	Total	
Periodontal condition	Mild	35 (60.3%)	21 (36.2%)	2 (3.4%)	58 (100%)	0.000
	Moderate	1.5 (37.5%)	24 (60%)	1 (2.5%)	40 (100%)	
	Severe	1 (7.7%)	3 (23.2%)	9 (69.2%)	13 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

Among 111 respondents who had mild periodontitis, 35 of them had normal duration of pregnancy, 21 had preterm birth and 2 had very preterm birth, those who had moderate periodontitis, 15 of them had normal duration, 24 had preterm birth and 1 had very preterm birth and those who had severe periodontitis of them had normal duration, 3 had preterm birth and 9 had very preterm birth and the association is significant (as p<0.05).

Table 15: Association between history of miscarriage or abortion before and preterm birth of the respondents (N=111)

Gestational age						P-value
		Normal duration	Preterm birth	Very preterm birth	Total	
Did you have any miscarriage or abortion before?	Yes	14 (70%)	3 (15%)	3 (15%)	20 (100%)	0.019
	No	37 (40.5%)	45 (49.5%)	9 (9.9%)	91 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

Among 111 respondents 20 had history of miscarriage or abortion before, of them 14 had normal duration of pregnancy, 3 had preterm birth and 3 had very preterm birth. 91 had no history of miscarriage or abortion before, of them 37 had normal duration of pregnancy, 45 had preterm birth and 9 had very preterm birth and the association is significant (As p<0.05).

Table 16: Association between BMI and Preterm birth of the respondent (N=111)

Gestational age		Normal duration	Preterm birth	Very preterm birth	Total	P-value
BMI of the respondent	Underweight	1 (1.9%)	46 (86.8%)	6 (11.3%)	53 (100%)	0.000
	Acceptable	48 (88.9%)	2 (3.7%)	4 (7.4%)	54 (100%)	
	Overweight	1 (50%)	0 (0%)	1 (50%)	2 (100%)	
	Obese	0 (0%)	0 (0%)	1 (100%)	1 (100%)	
	Morbidity Obese	1 (100%)	0 (0%)	0 (0%)	1 (100%)	
Total		51 (45.95%)	48 (43.25%)	12 (10.8%)	111 (100%)	

The respondents who were underweight had normal duration of pregnancy 1, preterm birth 46 and very preterm birth 6 among 53 of total respondents, those who had acceptable weight had normal duration 48, preterm birth 2 and very preterm birth 4 among 54 of total respondents, those who were overweight 1 had normal duration, None had preterm birth,1 had very preterm birth among 2 of total respondents. One respondent was obese had very preterm birth and one respondents was morbidly obese had normal duration of pregnancy and association is significant (as p< 0.05).

Table 17: Association between history of regular antenatal checkup and preterm birth of the respondents (N=111)

Gestational age		Normal duration	Preterm birth	Very preterm birth	Total	P-value
Did you have regular antenatal checkup?	Yes	34 (64.2%)	19 (35.8%)	0 (0%)	53 (100%)	0.000
	No	17 (29.3%)	29 (50%)	12 (20.7%)	58 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

Respondents who had regular antenatal checkup among them 34 had normal duration of pregnancy, 19 had preterm birth and none had very preterm birth, and respondents who did not have regular antenatal checkup, among them 17 had normal duration of pregnancy, 29 had preterm birth and 12 had very preterm birth, and the association is significant (as P< 0.05) Table: 18 Association between genital infection and gestational age of the respondents.(N=111)

Gestational age Total P - value normal duration preterm birth very preterm birth Do you or your husband yes 0 4 2 6 .035 have any genital (.0%) (66.7%) (33.3%) (100.0%) disease? no 51 44 10 105 (48.6%) (41.9%) (9.5%) (100.0%) Total 51 48 12 111 (45.9%) (43.2%) (10.8%) (100.0%)

Table 18: Association between genital infection and gestational age of the respondents (N=111)

Gestational age		Normal duration	Preterm birth	Very preterm birth	Total	P-value
Do you or your husband have any genital	Yes	0 (0%)	4 (66.7%)	2 (33.3%)	6 (100%)	0.035
	No	51 (48.6%)	44 (41.9%)	10 (9.5%)	105 (100%)	
Total		51 (45.9%)	48 (43.2%)	12 (10.8%)	111 (100%)	

The respondents or their husbands, who had genital infection, were 6, of them none had normal duration of pregnancy, 4 had preterm birth and 2 had very preterm birth. And the respondent or their husbands who did not have genial infection, of them 51 had normal duration of pregnancy 44 had preterm birth and 10 had very preterm birth. The association is significant (as P<0.05)

Table 19: Association between periodontitis and education level of the respondents (N=111)

		Education level						P-value
		Illiterate	Primary	Secondary	Higher Sec	Graduate	Total	
Periodontal mild condition	Mild	2 (3.4%)	39 (67.2%)	12 (20.7%)	2 (3.4%)	3 (5.2%)	58 (100%)	0.003
	moderate	5 (12.5%)	22 (55%)	12 (30%0	1 (2.5%)	0 (0%)	40 (100%)	
	Sever	6 (46.2%)	4 (0.8%)	3 (23.1%)	0 (0%)	0 (0%)	13 (100%)	
Total		13 (11.7%)	65 (58.6%)	27 (24.3%)	3 (2.7%)	3 (2.7%)	111 (100%)	

The respondents who had mild periodontitis were 58, among them 2 were illiterate, 39 had primary education, 12 had secondary education, 2 had higher secondary education and 3 of them were graduate. The respondents who had moderate periodontitis were 40, 5 of them were illiterate, 22 had primary education, 12 had secondary education, 1 had higher secondary education and none of them were graduate. The respondents who had severe periodontitis were 13, 6 of them were illiterate, 4 of them had primary education, 3 of them had secondary education, none of them had higher secondary education or graduation. The association is significant (as P<0.05))

Form the study we can come to a conclusion that there was a significant association between periodontitis and preterm birth (P<0.05). From the variables which described the socio demographic characteristics only age had significant association with preterm birth and the mother having lower age and the mother having higher age had increased prevalence of preterm birth. From the variables which described the oral health related characteristics, regular visit to a dentist and pain on tooth had significant association with preterm birth (P<0.05). From the variables, which described the pregnancy related characteristics BMI, previous history of miscarriage or abortion, previous history of preterm birth, antenatal check-up and genital infection had significant association with preterm birth(P<0.05). From the variables which described the socio demographic characteristics only education level had significant associations with periodontitis (P<0.05).

DISCUSSION

This study was carried out in an urban setting at the maternity block of the five different medical college hospitals in Dhaka city, based on the availability of a number of accessible postpartum women with periodontitis.

The majority of the study participants belonged to a low socio-economic group (mean of the monthly income was 18036.04 taka) that had very little awareness of oral health care. It is well known that approximately 50% of preterm deliveries have no established risk factor [24]. In the analysis, the risk factors that showed a significant association with preterm delivery were age, BMI, previous history of preterm delivery, number of visits to an antenatal care provider and periodontitis. Parity of the mother which has been shown to be a significant risk factor for preterm delivery in many studies [25] was not significant in this study (P>0.05). Other medical problems such as gestational diabetes, anaemia, genitourinary infection were not statistically significant (P >0.05).

Although all the subjects had periodontal disease, only 37.8% had visited to dentist. These data clearly demonstrate the lack of importance given to oral health care. Nevertheless, it appears that the likelihood of an adverse pregnancy outcome increases with the severity of periodontitis, (n=111, 58 respondents had mild periodontitis among whom 21 had preterm birth and 2 had very preterm birth, 40 respondents had moderate periodontitis, among them 24 had preterm birth and I had very preterm birth and 13 respondents had severe periodontitis, among them 3 had preterm birth and 9 had very preterm birth)[25].

According to the operational criteria for periodontal disease diagnosis, the participant had mild (65.8%), moderate (29.1%), and severe (8.1%) periodontitis. A study from our neighboring country, India, state of Karnataka reported similar data on the prevalence of periodontitis, and it also found that is periodontitis in more common in women than man[26].

In order to control potential cofounders, women receiving treatment for chronic diseases (such as diabetes mellitus and hypertension) were excluded from the study because antihypertensive medications are strongly related to periodontal status [26,27]. Women using antibiotics were also excluded because of the effects of antibiotics on periodontal tissue. The present study support earlier findings regarding the risk of preterm delivery in mothers with periodontal disease [28], also significant were BMI of the respondents, previous abortion/death of infants and, previous history of preterm delivery. A previous history of preterm delivery was found to be an important risk factor for preterm delivery which is in accordance with the results of some earlier studies [9].

There is a large body of evidence pointing to infection as a key factor in adverse pregnancy outcomes [29], the mechanism by which periodontal disease may cause preterm delivery is beyond the scope of this study. However, there is evidence of a biologically feasible basis for this association. Chronic periodontal infection can produce local and systemic host responses, leading to transient bacteremia. Endotoxins are produced as a result of gram-negative bacterial infection, such as periodontal disease. These endotoxins stimulate the production of cytokinase and prostaglandins and certain cytokinase in appropriate quantities stimulate labor. The systemic inflammation that is initiated by periodontal disease might contribute to preterm delivery [30,31].

Two prospective cohort studies [15] found that moderate-severe periodontitis identified early in pregnancy is associated with an increased risk for spontaneous preterm birth, independent of other traditional risk factors. In the first study, investigators from the University of Alabama conducted a prospective evaluation of over 1300 pregnant women. Complete medical, behavioral, and periodontal data were collected between 21 and 24 weeks of gestation. Generalized periodontal infection was defined as 90 or more tooth sites with periodontal ligament attachment loss of 3 mm or more. The risk for preterm birth was increased among women with generalized periodontal infection; this risk was inversely related to gestational age.

Santos-Pereira et al, studied 124 women between the ages of 15-40 to determine if chronic periodontitis increased the risk of experiencing preterm labor (PTL). In this cross-sectional trial, women who were admitted for preterm labor, with intravenous tocolysis, were enrolled into the PTL group. The control group consisted of term pregnancies that occurred within 36-48 hours after delivery and before discharge. Chronic periodontitis was described as one site with clinical attachment loss (CAL) > 1 mm with gingival bleeding. The severity of periodontitis was classified as early (CAL <3mm), moderate (CAL > 3 mm and < 5 mm), and severe (CAL >5mm). The extent of periodontitis was either localized, CAL < 30%, or generalized CAL > 30%. They concluded that chronic periodontitis increased the risk of having preterm laborin this study the severity of the periodontitis was also described in this manner [32].

Pitiphat et al, conducted a prospective study to determine if self-reported periodontitis was a risk factor for poor pregnancy outcomes. Women were enrolled prior to 22 weeks of gestation and completed a self-report questionnaire during their second trimester. Demographic, medical, and reproductive history, smoking, pre-pregnancy weight, and physical activity were assessed at the first prenatal visit. The self-reported questionnaire was validated by bite-wing radiographs taken prior to delivery. The majority of the participants were white and middle class. Of the 354 participants who had bitewing radiographs available, the prevalence of self-reported periodontitis was 3.7%. It was noted that women who reported periodontitis had significantly higher mean radiographic bone loss than those who did not ($p<0.005$) [33].

In this study, the gestational age was estimated based on the last menstrual period, as recorded in the medical records of the subject. This could be considered as a limitation of the study because ultrasound estimates of the gestational age were not available. While the promotion of good oral health remains an important part of perinatal health care, our results suggest that a specific drive to improve the periodontal health of pregnant women could be a means of improving pregnancy outcomes. Nevertheless, it is not clear whether periodontal diseases play a causal role in adverse pregnancy outcomes. Additional longitudinal, epidemiologic, and interventional studies with clear and consistent definitions of periodontal disease and adverse pregnancy outcomes, sufficiently large sample sizes, and controls for key confounders are needed to validate this association and to determine whether it is causal.

CONCLUSION

This cross sectional study was conducted among postpartum with periodontitis attending in five different medical college hospitals in Dhaka city. The results of our study showed that periodontal disease is an independent risk factor for preterm delivery. The current knowledge of the biological plausibility of this association between periodontitis and preterm delivery supports these findings, but the temporal relationship and causality would be difficult to prove. Caution must be taken in interpreting the applicability of the current data until these findings can be confirmed by a larger, prospective multicenter investigation.

Additional research is needed to improve our understanding of the pathophysiological mechanisms that underlie the association between periodontitis and preterm birth. The potentially causal link between periodontitis and preterm birth that is initiated early in pregnancy must be explored. The treatment of periodontitis during pregnancy may not reduce preterm birth, although a diagnosis of periodontitis during pregnancy could be an early marker of the risk of preterm birth. Secondly, periodontal treatment can cure inflammation of the gums and improve periodontal status.

Good oral health is an important component of overall health and well-being. When oral health is compromised, as in conditions such as periodontitis, consequences may reach far beyond the oral cavity. Periodontitis is associated with an increased risk of illnesses that affect the entire body [13]. Protecting oral health is therefore critical to maintaining overall health.

Current guidelines and data suggest that dental care during pregnancy is safe [34]. However, scaling and root planning is best accomplished between 14-20 weeks gestational age. Providing dental care for pregnant women will help remove potentially harmful bacteria from dissemination and possibly leading to other complications [28]. As oral health care providers, we can educate our patients regarding the importance of oral health and the importance of providing preventive measures to maintain oral health.

Recommendation: On the basis of the study's findings and discussion, the following recommendations may be made.

A. Recommendations for increasing oral health care awareness and education

1. As education is closely related to health and health is related to behavior, it is important to have a sufficient amount of knowledge about oral health and how to maintain oral health in the community. Information on maintaining oral health can be disseminated through the media, educational institutions. Education should start early, at the school level.
2. Attention to the oral health of pregnant women is indeed very necessary. Maintaining the oral health during, after, or before pregnancy is very important, specially the women who become pregnant at very young age or at a very late stage of their reproductive lives.
3. Regular antenatal checkups are also very important.
4. A coordinated effort from the dental and obstetric communities to establish guidelines could benefit maternal oral health and perinatal outcomes.

B. Recommendation for further study

A large study can be carried out with a more advanced questionnaire and a more budget. This study can also be carried out in other cities and in rural areas.

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