Original Article

PERIODONTITIS AS A RISK FACTOR FOR PRETEREM BIRTH

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ABSTRACT

Objectives: *The aim of this study was to evaluate whether, or not, periodontitis is a risk factor for preterm birth.*

Materials and methods: *A total of 170 women (85 cases and 85 controls) were examined at the Gynecology Ward of Khyber Teaching Hospital, Peshawar. The data was recorded on a specifically designed proforma. A detailed history was taken and periodontal examination was carried out with mouth mirrors and William's periodontal probe. The collected data was analyzed using SPSS version 17. The Pearson chi square test was used to assess the significance, if any, among the two groups.*

Results: *The most common age group was in the range of 21-25 years. Based on Plaque Index and Periodontal Disease Index, majority of the patients (cases: n = 64, 75.3%, controls: n = 68, 80%) had mild gingivitis. The Pearson chi square test showed a p-value of 0.06.*

Conclusion: *Within the limits of this study it is concluded that periodontitis does not appear to be a risk factor for preterm birth in this population.*

Keywords: *Periodontitis, Preterm birth, Pregnancy.*

INTRODUCTION

Periodontitis is an infectious disease of the supporting tissues of the teeth caused by specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession or both[1]. Various factors are associated with the increased incidence of periodontitis namely plaque, poor oral hygiene, smoking and certain systemic conditions. Three pathogenic species have been identified as causative factors for periodontitis, namely Aggregibacter actinomycetemcomitans Aa, Porphyromonas gingivalis and Tannerella forsythia[2].

Previous studies have found an association between periodontal disease during pregnancy and preterm birth. Preterm birth is defined as delivery at fewer than 37 completed weeks gestation, and resulting Low Birth Weight (LBW) of an infant of below 2500g[3]. These infants are forty times more likely to die in the neonatal period than Normal Birth Weight (NBW) infants[4]. The primary cause for LBW is preterm labor or premature rupture of membranes (PROM)[5]. Known factors which could induce Preterm Low Birth Weight (PLBW) include smoking, genetics, alcohol, inadequate prenatal care, nutritional deficiencies and urinary tract infections. However, 25% of PLBW cases still occur with unknown etiology[6].

A periodontal infection may influence the outcome of pregnancy by providing a source of gram-negative anaerobic organisms and bacterial components such as lipopolysaccharides. These can trigger the release of immune modulators such as PGE_2 and TNF-α, which are normally involved in parturition, and in turn, may influence the course of pregnancy[7,8,9]. Periodontal pathogens are thought to gain access to the fetoplacental tissues via blood-borne pathways and are thought to elicit inflammatory and prostaglandin cascades that precipitate preterm labor[10,11].

The aim of this study is to evaluate the periodontal health as a risk factor for preterm birth in pregnant women.

MATERIALS AND METHODS

This case-control study was conducted among women who gave birth at the Gynecology ward at Khyber Teaching Hospital, Peshawar. The study pro-

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tocol was approved by the Institutional Ethical Committee of Khyber College of Dentistry, Peshawar. A case was defined as a woman who gave birth to an infant prior to gestational age 37 weeks and a birth weight below 2500 grams. A control subject was defined as a woman who gave birth to a full term infant (gestational age 38 weeks and above) with birth weight above 2500 grams. Patients with risk factors such as smoking, alcohol use, drug use during pregnancy, genetics, inadequate prenatal care, nutritional deficiencies, urinary tract infections, systemic diseases such as hypertension, diabetes mellitus were not included in the study.

The information was collected on a specifically designed proforma. The examiners were assessed for calibration by the Head of Periodontology Department. After informed consent was taken, a detailed history was taken, which specifically inquired about maternal age, socioeconomic status (annual income, educational level), number of gestations, previous pregnancy history, maternal complications and infectious diseases. In order to diagnose the periodontal status, the same examiner performed periodontal examination. Clinical periodontal examination was performed by using Plaque Index by Sillness and Loe[12] (Table 1) and Periodontal Disease Index (PDI) by Ramfjord[13] (Table 2) which includes Gingival assessment and pocket record. Ramfjord teeth (which include maxillary right first molar, left central incisor and first premolar and mandibular left first molar, right central incisor and first premolar) were examined at four sites on each tooth i.e. mesial, distal, facial or buccal and lingual or palatal surfaces. The probing pocket depth was measured from the gingival margin to the bottom of the gingival pocket. The clinical attachment loss was measured from the cement-enamel-junction to the base of the pocket. Periodontal examinations were performed at the bedside of each mother in the postpartum wards by using mouth mirrors, William's periodontal probes(millimeter graded) and a light source.

The collected data was processed and analyzed-using Statistical Package for Social Sciences (SPSS) version 17. The details of the patient's variables were described using frequency distribution. The Pearson Chi-square test was used to assess the level of significance between periodontitis and preterm birth. A p-value of less than 0.05 was considered statistically significant.

Table 1: Plaque Index

Scores	Criteria
0	No plaque.
1	A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on the tooth surface.
2	Moderate accumulation of soft deposits within the gingival pocket, or the tooth and gingival margin which can be seen with the naked eye.
3	Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

Table 2: Periodontal Disease Index (Gingival Assessment)

Score	Criteria
G0	Absence of inflammation
G1	Mild to moderate inflammatory gingival changes not extending all around the tooth.
G2	Mild to moderate severe gingivitis extending all around the tooth.
G3	Severe gingivitis characterized by marked redness, tendency to bleed and ulceration.

RESULTS

One hundred and seventy women were included in this study. Half of the sample population was divided into cases and the other half was divided into controls. Among the case group, the age distribution was such that majority of the patients (n=35, 41.2%) were in the age group 21-25 years followed by age group 16-20 years (n=18, 21.2%). Among the control group majority of the patients were in the age group 21-25 years (n=32, 37.7%). The age distribution is given in Table-3.

Table 3: Age Distribution

Age Group (years)	Case group		Control group	
	n	%	n	%
16-20	18	21.1	16	18.8
21-25	35	41.2	32	37.7
26-30	16	18.8	22	25.9
31-35	14	16.5	11	12.9
36-40	2	2.4	4	4.7
Total	**85**	**100**	**85**	**100**

Majority of the patients in both groups were housewives (case group = 94.1%, control group = 89.4%). In the case group, 3 patients (3.5%) were students while 2 patients (2.4%) in the case group and 9 patients (10.6%) in the control group were working women.

Most of the patients stated that they brush their teeth regularly (case group = 75.3%, control group = 77.6%) while the rest of the patients did not have proper brushing habits (case group = 24.7%, control group = 22.4%).

More than half of the patients in both groups were polygravida (case group = 69.4%, control group = 65.9%) while 26 patients (30.6%) in the case group and 29 patients (34.1%) had just given birth to their first child. Reproductive details of the patients are given in Figure 1.

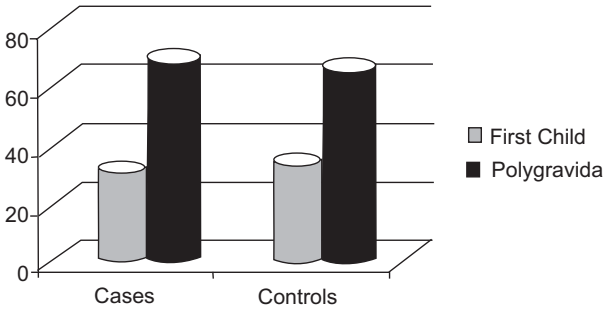

Fig. 1: Reproductive Details

The periodontal status of these patients showed that majority of patients in the case group (47.1%) came under category 2 according to Plaque Index while in the control group most of the patients (71.8%) were categorized as category 1. The plaque index distribution is given in Table 4.

Table 4: Plaque Index

Value	Case group		Control group	
	n	%	n	%
0	2	2.3	2	2.3
1	35	41.2	61	71.8
2	40	47.1	22	25.9
3	8	9.4	0	0
Total	**85**	**100**	**85**	**100**

On the basis of PDI, the gingival health of most patients was scored as 1 (case group = 75.3%, control group = 80%) and majority of the patients in both groups had an average pocket depth of 2mm (case group = 70.6%, control group = 81.2%). The details of PDI are given in Table 5.

Table 5: Periodontal Disease Index

Gingival Assessment	Case Group		Control Group	
	n	%	n	%
0	4	4.7	3	3.5
1	64	75.3	68	80
2	14	16.5	14	16.5
3	3	3.5	0	0
Total	**85**	**100**	**85**	**100**
Pocket Record (mm)				
1	7	8.2	1	1.2
2	60	70.6	69	81.2
3	18	21.2	15	17.6
Total	**85**	**100**	**85**	**100**

Among the case group 82 patients (96.5%) had normal periodontal status while 3 patients (3.5%) showed signs of mild periodontitis (clinical attachment loss = 1-2 mm). In the control group normal periodontium was seen in 83 patients (97.7%) while 2 patients (2.3%) showed signs of severe periodontitis (clinical attachment loss = 5mm or more). A p-value of greater than 0.05 was obtained in both the case group and control group, signifying that periodontitis is not a significant causal factor for preterm birth.

DISCUSSION

Preterm birth is an important health problem in both developing and industrialized countries[14]. Majority of the patients (41.2%) in this case-control study were in the age group 21-25 years. This is in accordance with study conducted by Grandi[15] in Argentina. However, in a study conducted by Khader[16] amongst the Jordanian population, the predominant age group was above the age of 30 years. This can be attributed to the tradition of early marriages in this part of the region.

The women in both groups had no difference regarding their occupation. Among the case group, 94.1% and among the control group, 89.4% of the

patients were housewives. Most of these patients had no primary or secondary education.

Oral cleanliness is important for the preservation of oral health as it removes microbial plaque, thus preventing it from accumulating on teeth and gingivae[17]. Maintenance of effective plaque control is the cornerstone of any attempt to prevent and control periodontal disease. The evidence from large cohort studies has demonstrated that high standards of oral hygiene will ensure the stability of periodontal tissue support[18]. Majority of the patients included in this study stated that they brush their teeth regularly (case group = 75.3%, control group = 77.6%). However, due to their conditions, these patients had not brushed their teeth for the past one or two days and 47.1% patients in the case group had a score of 2 on Plaque Index and 71.8% of the controls had a score of 1.

Periodontal disease represents a pathology, affecting more than 23% of women between the ages of 30 and 54 years[19]. There are two subcategories of periodontal disease i.e. gingivitis and periodontitis. Gingivitis is an inflammatory process and affects the gingivae only. However periodontitis refers to an inflammation of the supporting structures of the teeth[20]. Based on PDI, majority of the patients in this study showed signs of only mild gingivitis (category 1 on gingival assessment: case group = 75.3%, control group = 80%) and an average pocket depth of 2mm (case group = 70.6%, control group = 81.2%) which is considered as normal pocket depth. The clinical attachment loss, which signifies periodontitis, was seen only in 3 patients (3.5%) in the case group and 2 patients (2.3%) in the control group. This was found to be statistically insignificant.

Maternal infection such as periodontal disease can play a role in preterm birth, though this is still a controversial topic[21]. Risk factors for preterm birth may include multiple births, maternal age and systemic maternal infection. More than two third of the patients in the case group gave a history of multiple pregnancies, which is a recognized risk factor for preterm birth[22].

In this study, no appreciable association was found between periodontitis and preterm birth (case group p-value=0.06, control group p-value=0.62). Two relatively significant studies in the United Kingdom also failed to find an association between maternal periodontal disease and preterm birth[3]. Similarly Davenport[22] and Buduneli[23] reported that there was no association between periodontitis and preterm birth. However, studies conducted at other centers documented that there was a significant association between periodontitis and preterm birth. Galloway first suggested in 1931 that periodontal disease has more than just an association, but actually contributes to a low birth weight[24]. Later in 1996, Offenbacher et al[5] suggested that a periodontal infection could serve as a chronic reservoir of lipopolysaccharide (LPS), which could target the placental membranes via the bloodstream, a process often associated with preterm parturition. Jeffcoat et al[25] reported that there was evidence suggesting that pre-existing periodontal disease in the second trimester of pregnancy increases the risk of a preterm birth.

CONCLUSION

Based on this study we conclude that

- The most common age group was in the range of 21-25 years.
- Majority of the patients were polygravida house wives with proper brushing habits.
- Based on PDI, most of the patients had mild gingivitis
- There does not appear to be an association between periodontitis and preterm birth in this population.

RECOMMENDATIONS

This issue is still controversial and large-scale longitudinal, epidemiological and interventional studies are required to determine whether or not periodontitis is a risk factor for preterm birth.

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