

Periodontitis as a Risk Factor for Preterm Low Birth Weight

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Purpose: There is growing evidence showing that a number of complex human diseases are caused or are at least influenced by periodontal diseases. Such diseases include cardiovascular diseases, respiratory diseases, diabetes mellitus and osteoporosis. The aim of study was to evaluate periodontal diseases as a risk factor for a preterm low birth weight.

Materials and Methods: A total of 48 mothers, 20 of who had a preterm low birth weight delivery, were examined in the Clinics of Periodontology, Faculty of Dentistry, Cumhuriyet University. The periodontal exams consisted of a full mouth pocket depth, a Loe and Sillness Gingival index score measurements, and a panoramic radiograph analysis. Information on any other factors that may cause a preterm low birth weight was obtained from the family physician. **Results:** The study results indicated that periodontitis (OR: 3.6 95% CI: 1.06 - 12.18) together with bacterial vaginosis (OR: 11.57 95% CI: 1.26 - 105.7) were independent risk factors of a preterm low birth weight. According to the data obtained from this study, the paternal age, tobacco use and the mothers' height were not significant risk factors for a preterm low birth weight.

Conclusion: Within the limits of this study, it is concluded that a poor periodontal health status of the mother may be a potential risk factor for a preterm low birth weight.

Key Words: Preterm low birth weight, maternal periodontal health

INTRODUCTION

Preterm infants who are born with a low birth weight (PLBW) are a major social and economic public health problem in both developed and

developing countries.¹ Birth weight is a single outcome of a complex multifactorial system, and has been chosen in many studies as a key indicator of the underlying health of the population under investigation.²

Disorders related to a shorter gestation period and PLBW are among the leading causes of death in infants.^{3,4} Low birth weight (LBW) infants have a higher mortality rate during the neonatal period normal birth weight infants,^{5,6} and LBW survivors face neuro-developmental problems,^{7,8} respiratory problems,^{9,10} congenital anomalies,^{11,12} and complications due to neonatal intensive care,¹³ causing a tremendous impact on the health care system and the survivors own family.

Some risk factors that have been associated with a PLBW include a high (> 34 years) and low (< 17 years) maternal age, African-American heritage, a low socioeconomic status, inadequate prenatal care, drug abuse, alcohol and tobacco use, hypertension, diabetes, and multiple pregnancies. Despite increasing efforts to diminish the effects of these risk factors through preventive interventions during prenatal care, there has been a only small decrease in the number of PLBW infants.¹⁴⁻¹⁹

There is a reason to believe that other unrecognised risk factors may contribute to the continuing prevalence of PLBW infants. One possible contributing factor to this phenomenon is the effect of an infection on PLBW. It is possible that subclinical genitourinary and periodontal infections can adversely affect the pregnancy outcomes.²⁰⁻²² A periodontal infection may influence the pregnancy outcomes by providing a source of gram-negative anaerobic organisms and bacterial components such as lipopolysaccharides. These can trigger the release of immune modulators

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such as PGE₂ and TNF- α , which are normally involved in normal parturition, and in turn, may influence the course of pregnancy.^{23,24}

The aim of this study was to evaluate the periodontal health of the mothers to determine if it is a risk factor for preterm low birth weight infants.

MATERIALS AND METHODS

Patient selection

This case-control study requested the participation from women who were in-patients in the Department of Family Physician at the Medical School of Cumhuriyet University. A total of 50 volunteer mothers were enrolled in this study. However, two were excluded due to a genitourinary tract infection with concurrent antibiotic therapy. The total study sample size was 48 mothers (20 cases and 28 controls). Detailed data on the outcome of the current pregnancy was gathered from the patient's prenatal record and history from the current pregnancies.

As stated in an early study reported by Offenbacher et al.,²⁴ PLBW cases are defined as mothers delivering an infant weighing < 2,500g and born before 37 weeks' of gestation. The controls were mothers delivering an infant weighing more than 2,500g born after 38 weeks' gestation.

Administered structured questionnaire

Information was collected on the known risk factors^{22,24} and included the following: a previous preterm delivery, the socio-economic status (annual income, educational level), maternal age, number of gestations, previous pregnancy history, maternal complications (smoking, illicit drug use, alcohol use, lack of prenatal care), infectious diseases (chorioamnionitis, bacterial vaginosis, asymptomatic bacteriuria, cervical/vaginal colonization), uterine causes (myomata, uterine septum, bicornuate uterus, cervical incompetence), eclampsia, preeclampsia and Rh factor iso-immunity.

Measurement of periodontal status

A full-mouth periodontal exam was performed

on 48 mothers early after the birth of their children. In order to diagnose the periodontal status, the same examiner (U.K.G.) performed all the measurements. Full-mouth data included measuring the pocket depths (PD) on six sites per tooth using a Florida probe (Version 2.75 Florida Probe Corporation, Gainesville, FL, USA), bleeding on probing and the LoeandSillness Gingival index (GI)²⁵ scores.

Panoramic radiographs were taken for each patient. Patients with 3 or more sites with a 4 mm or more pocket depth and bleeding upon probing together with radiographic alveolar bone loss were diagnosed as periodontitis. The amount of alveolar bone loss was measured on the panoramic radiographs and was defined as having a 3 mm or more distance between the cemento-enamel junction and interdental septum.

Statistical analysis

The odds ratios (OR) and 95% confidence intervals (CI) were obtained to indicate an association between PLBW and the potential risk factors (maternal age, maternal height, families income, smoking, bacterial vaginosis, placenta previa and periodontitis).

RESULTS

The unadjusted odds ratio and the 95% confidence limits for several potential risk factors including periodontitis for PLBW are given in Table 1. The odds ratio is a means of comparing whether or not the probability of a certain event occurring is the same for the two groups. Only bacterial vaginosis together with periodontitis appeared to influence the observed frequency of PLBW in this dataset. Odds Ratio analysis suggested that periodontitis increased the risk for PLBW almost 4 times. In addition, bacterial vaginosis raised the incidence of PLBW 12 times. However, this study failed to detect any effect of the maternal age, height, annual income, smoking and placenta previa on a PLBW.

DISCUSSION

The major two subcategories of periodontal

Table 1. Unadjusted Odds Ratios for the PLBW Risk Factors

Risk factor	OR	95% CI
Mother's age	0.925	0.17 - 6.1
Mother's height	0.667	0.11 - 1.67
Annual income	0.466	0.16 - 1.52
Smoking	0.190	0.02 - 1.73
Bacterial vaginosis	11.570	1.26 - 105.70
Placenta previa	5.570	0.99 - 31.31
Periodontitis	3.606	1.06 - 12.18

OR, odd ratio; CI, confidence intervals.

diseases are gingivitis and periodontitis. Gingivitis is an inflammatory process and affects only the gingival component of the periodontium. However, the term periodontitis refers to an inflammation of the supporting structures of the teeth; the destruction of the gingival and periodontal fibres, resorption of the crestal bone and the apical proliferation of the junctional epithelium.²⁶

The clinical features of importance for making a diagnosis include alterations in the gingival colour, form, density, the gingival crevice depth, the position of the epithelial attachment, the tendency for bleeding, and any crevicular fluid.²⁶ There are number of indices for an epidemiological study of periodontal diseases. The choice of index should relate to the type and objectives of the study. In this study, in order to diagnose periodontitis in both groups, a GI, PD, BOP and radiographic examination were used. The GI by Loe and Sillness²⁵ was used to evaluate the form, colour, density and the tendency to for the gingiva to bleed. PD measurements require a graded periodontal probe, and measures the distance between the gingival margin to the dento-gingival junction, which is generally 1 - 2 mm. When this distance becomes 3 mm or greater, it refers to the loss of a gingival attachment, which might be the beginning of periodontitis. The BOP confirms the occurrence of gingival inflammation by evaluating gingival bleeding after probing the gingival sulcus with a periodontal probe. Radiographic techniques have improved greatly in recent years. However, in order to use this as a diagnostic tool, a clinician must combine the results with the

clinical findings.²⁶ In this study, periodontal disease was diagnosed as periodontitis when the patient has 3 or more dental sites with a 4 mm or more pocket depth and bleeding upon probing together with radiographic alveolar bone loss.

This cross-sectional unmatched case-control study pointed out that the presence of periodontitis and bacterial vaginosis increases the risk for giving birth to a preterm low birth weight infant. The design of this study does not explain the cause of the association between periodontitis and PLBW. However, there are some probabilities, which are supported by biochemical, immunological, and histological evidence.^{2,20,24}

It is believed that in the infection process, the levels of biologically active molecules such as PGE₂ and TNF- α , which are normally involved in normal parturition, are raised to artificially high levels by the infection process. The periodontium can serve as a renewing reservoir for some mediators such as TNF- α , IL-1 β and IFN- γ , as well as PGE₂ because they can reach high concentrations in the tissues in periodontitis.²⁴

Galloway first suggested in 1931 that periodontal disease has more than just an association, but actually contributes to a low birth weight.²⁷ Later in 1996, Offenbacher et al.²⁴ suggested that a periodontal infection could serve as a chronic reservoir of lipopolysaccharide (LPS), which could target the placental membranes via the bloodstream, and LPS has been shown to elicit the production of IL-1 β and PGE₂ by the chorioamniotic and trophoblastic cells, a process often associated with preterm parturition. Jeffcoat et al.²⁸ reported that with their existing case-control studies and prospective and uncontrolled intervention studies, there was evidence suggesting that pre-existing periodontal disease in the second trimester of pregnancy increases the risk of a preterm birth.

Maternal age, maternal height, annual income and placenta previa were the other known risk factors for PLBW. However, our results could not show any statistical differences between the groups. The small number of patients in this study may explain this.

A periodontal examination conducted on mothers after giving birth might raise some questions. However, as mentioned in previous

studies,²⁴ a periodontal examination conducted at a particular point in time is a measure of the periodontal experience of the individual. Therefore, such an examination is a measurement of a previous disease experience, and provides the same information as any single exam conducted during pregnancy.

Together with other reports,^{24,29,30} the results of this study provide additional evidence showing that periodontitis is a potential risk factor for PLBW.

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