

Periodontal Infection A Risk Factor for Pre Term Low Birth Weight Infants: An Epidemiological Study

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ABSTRACT

Background: The international definition of low birth weight adopted by the “29th World Health Assembly” in 1976 is – a birth weight of less than 2500 gms (upto and including 2499 gms). Preterm or premature birth is usually defined as a gestation age of less than 37 weeks. In the last decade great interest has been generated to support the hypothesis that subclinical infection is an important cause of preterm birth. The hypothesis linking subclinical infection and premature birth is that the microbial toxins produced such as endotoxin (LPS) enter the uterine cavity during pregnancy by ascending from lower genital tract or blood borne route from a non genital focus (pyelonephritis, periodontitis, etc.) Hence this study has been designed to determine the periodontal status of mothers with low birth weight and normal birth weight delivery at Institute of Maternal and Child Health (IMCH) Medical college, Kozhikode and to assess the effect of periodontal status of mothers on birth weight of infants. A matched case control study with a selection ratio 1:1 was performed using 100 cases and 100 controls delivered at IMCH, Medical College Kozhikode. Periodontal examination of the selected patients were done with a Williams graduated probe and data regarding the clinical attachment level, probing pocket depth at four sites per tooth and gingival index given by H. Loe and Silness was recorded. Gingival status of the pre term low birth weights was compared to that of normal birth weight mothers and was found to be statistically insignificant. In the present study mean CAL for cases was 2.64 ± 0.67 mm/site (table 2, graph 2). The difference noticed is tested statistically (t value 6.8) and is found to be highly significant.

Keywords: Periomedicine, Pregnancy outcomes, Periodontitis, Low birth weight infants.

INTRODUCTION

Periodontal research has emerged and evidences are published referring to the connection between periodontal infection and systemic diseases.^[1]

Preterm Low Birth Weight infants born represents a major social and economic public health problem in developed countries and poses a threat of greater magnitude in developing countries

like India. The international definition of low birth weight adopted by the “29th World Health Assembly” in 1976 is – a birth weight of less than 2500 gms (upto and including 2499 gms). Preterm or premature birth is usually defined as a gestation age of less than 37 weeks. Various factors have been found to associate with preterm and/ or low birth weight infants. Maternal risk factors include age, height, weight, socio-economic status, ethnicity, smoking, alcohol, nutritional status, and stress.^[2] In addition, parity, birth interval, previous

Received: Jan. 21, 2016; Accepted: Mar. 18, 2016

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complications, pre- and ante-natal care, maternal hypertension, infections, and cervical incompetence may also be important.^[3] However, no studies have been able to confirm the etiology as yet and the search still continues.

In the last decade great interest has been generated to support the hypothesis that subclinical infection is an important cause of preterm birth. The hypothesis linking subclinical infection and premature birth is that the microbial toxins produced such as endotoxin (LPS) enter the uterine cavity during pregnancy by ascending from lower genital tract or blood borne route from a non genital focus (pyelonephritis, periodontitis, etc.)

The 1996 study by Offenbacher and colleagues suggested that maternal periodontal disease could lead to a seven-fold increased risk of delivery of a PLBW infant. Moreover, it has been observed in animal models that infection with Gram-negative periodontitis-associated micro-organisms may adversely affect pregnancy outcomes. As pointed out by Offenbacher et al,^[4] these findings have been shown potential significance to risk assessment of PLBW, to oral health care during pregnancy. Since then numerous studies have been published establishing the link and some studies failed ^[5] to establish association between maternal periodontitis and preterm low birth weight.

Hence this study has been designed to determine the periodontal status of mothers with low birth weight and normal birth weight delivery at Institute of Maternal and Child Health (IMCH) Medical college, Kozhikode and to assess the effect of periodontal status of mothers on birth weight of infants.

AIMS AND OBJECTIVES

To determine and compare the periodontal status of mothers with normal birth weight infants to periodontal status of mothers with low birth weight infants delivering at IMCH, Kozhikode and find the odds ratio for risk assessment.

MATERIALS AND METHOD

A matched case control study with a selection ratio 1:1 was performed using 100 cases and 100 controls delivered at IMCH, Medical College

Kozhikode. After obtaining institutional approval and consent of all the subjects, hospital records pertaining to each delivery during the study period in the hospital was screened and cases and controls identified.

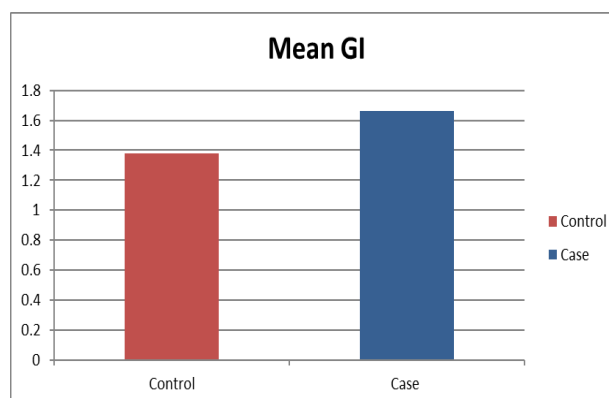
Any mother delivering a live infant whose weight was less than 2500 gms was considered as a case and those who delivered live infants more than 2500 gms were considered controls. Mothers with any systemic disease, twin pregnancy and known obstetric risk factors and Rh factor isoimmunity were not taken for the study. Data regarding gender, birth weight of child, gestation age, onset of prenatal care, medical history, infection history, treatment during current pregnancy and other complications of pregnancy were obtained from hospital records. Periodontal examination of the selected patients were done with a Williams graduated probe and data regarding the clinical attachment level, probing pocket depth at four sites per tooth and gingival index given by H. Loe and Silness was recorded. The collected data was then subjected to independent student's 't' test to compare between the cases and controls. The risk of exposure in cases was found using a 2x2 contingency table.

RESULTS

Table I: Mean and SD of Gingival Index

Gingival index	Mean	S.D.
Control	1.3816	0.6266
Case	1.6638	0.5976

p-value = 0.5017



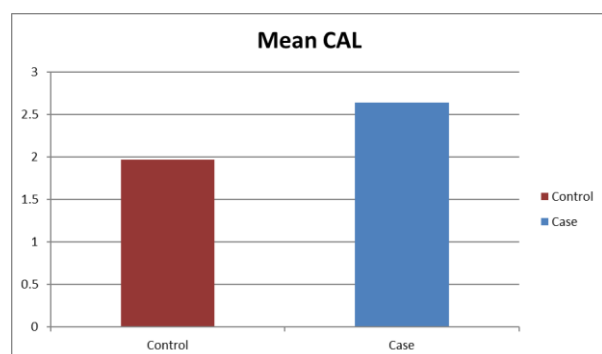
Graph I : Mean GI

Table II: Mean SD of Clinical Attachment Level

Clinical attachment level	Mean	S.D.
Case	2.6424	0.7192
Control	1.9712	0.6799

p-value = 1.47E-10

t-value = 6.8



Graph II: Mean CAL

Table III: Contingency table to find out Odds Ratio

	Positive Exposure	Negative Exposure
Case	81	16
Control	46	55

$$\text{Odds Ratio: } \frac{81 \times 55}{16 \times 46} = 6.05$$

DISCUSSION

Gingival changes associated with pregnancy are reversed post partum. Periodontal examination in this study was conducted on mothers within three days of their child's birth at

which stage there was not much change possible in the periodontal condition.

Gingival status of the pre term low birth weights was compared to that of normal birth weight mothers and was found to be statistically insignificant(table 1, graph 1). In this study the mean gingival index of case group was 1.66 ± 0.59 ; compared to control group of 1.38 ± 0.62 at p value = 0.501 which is statistically insignificant. This result does not go in accordance with the study of A.P Dasanayake⁶. His study found mothers with LBW infants had less healthy area of gingiva with more areas of bleeding compared to normal birth weight mothers. This difference could be due to increased prevalence of gingivitis in pregnant women, maternal T-lymphocyte depression and also an inadequate sample size of the current study. The control group infants were 700 gms heavier than the case group. The mean weight of babies vary considerably across different populations. For example mean birth weight of infants born in India is about 2.9 kgs while that of Sweden is 3.5 kgs. The etiology of racial disparity in infant mortality and LBW is multifactorial in nature and not completely explained by difference in demographics, use of tobacco and drugs or medical illness ^{7,8} demonstrated that chronic exposure to oral pathogens did not afford protection but actually enhanced fetoplacental toxicity of exposure during pregnancy. Intra amniotic levels of PG-E2 and TNF α rise steadily throughout pregnancy until a critical threshold level is reached to induce labour, cervical dilatation and delivery. Since these molecules appear to be normal mediators of parturition, periodontal infections which result in excessive secretion of these mediators by decidua and trophoblast cell layer result in pre term and LBW babies. ^{6,7,8}

In the present study mean CAL for cases was 2.64 ± 0.67 mm/site(table 2, graph 2). The difference noticed is tested statistically (t value 6.8) and is found to be highly significant. This is in accordance to the study of Offenbacher ⁹ which found the mean CAL for PLBW cases was 3.1 ± 0.74 versus 2.8 ± 0.61 for NBW controls at p value 0.04.

In order to understand the risk of exposure to periodontal disease, Odd's ratio has been calculated and found mothers in the case group are

six time more likely to be exposed to periodontal disease as compared to the control group (table 3). This is keeping CAL of more than 2mm as periodontitis patients.

Thus based on data from this study and most of the peer reviewed studies regarding periodontal infection and risk of adverse pregnancy outcome it can be suggested that the relationship between periodontal infection and PLBW is real. The association is biologically plausible in that several mechanisms have been demonstrated and others have been suggested. Further studies are required to ascertain the association.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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