



(RESEARCH ARTICLE)



Maternal periodontitis: A risk factor for preterm labour and low birth weight

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International Journal of Science and Research Archive, 2023, 09(01), 277–280

Publication history: Received on 09 April 2023; revised on 26 May 2023; accepted on 28 May 2023

Article DOI: <https://doi.org/10.30574/ijrsra.2023.9.1.0393>

Abstract

Purpose: Preterm delivery and low birth weight is becoming the foremost crunch in India and is the most prevailing public health issue in developed and developing countries. To prove the confederacy between preterm labour (PTL) or low birth weight (LBW) and maternal periodontitis, a case control study was conducted among 30 puerpera women in rural population.

Methods: The study sample was grouped into cases and controls based on the pregnancy outcomes, cases include 15 mothers with preterm birth and low birth weight babies and controls includes 15 mothers with normal term (greater than or equal to 37 weeks) gestation and normal birth weight babies (more than or equal to 2500 grams), in accordance with postnatal records regarding the gestation weeks and baby weight. Within 48 hours of parturition, periodontal status of the puerperal was examined by Community Periodontal Index.

Statistical analysis used: Epi Info 7 Software.

Results: Pregnant women with periodontal disease are 56 times risk of preterm labour and low birth weight babies and Chi-square value = 16.425 ($p=0.000$).

Conclusions: This study shows that there is a strong statistical association between the preterm labour and birth type of babies with maternal periodontitis. Maternal periodontitis are 56 times risk of preterm labour and low birth weight. Hence, pregnant mothers should be educated about the risk of periodontal disease and motivated to maintain the oral hygiene by proper oral hygiene instruction measures with periodic dental visits.

Keywords: Preterm labour; Low birth weight; Maternal periodontitis; Case-control study

1. Introduction

The preterm delivery and low birth weight are becoming the foremost crunch in India and is the most prevailing public health issue in developed and developing countries. New born baby's birth weight is the most important antecedent for the growth, survival and psychosocial development.

Miller proved once by suggesting the "Focal infection theory" in 1891, that "microorganisms or their waste products obtain entrance from the parts of the body adjacent to or remote from the mouth".^[1] Once the pathogen gains entry systemically, they trigger the release of inflammatory cytokines leading to shortening of gestational age.

Recent studies seem to suggest a slight or moderate association of periodontal disease and preterm low birth weight babies.^[2] An association has been established between severe periodontitis and a variety of systemic condition like

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cardiovascular disease, including endocarditis and coronary heart disease, insulin dependent diabetes mellitus and respiratory disease.^[3]

As many researchers are furnishing evidences regarding the relationship between maternal periodontal status and preterm low birth weight, the objective of this article is to prove the confederacy between preterm labour (PTL) or low birth weight (LBW) and maternal periodontitis.

2. Subjects and Methods

A case control study was conducted among 30 puerpera women after obtaining ethical clearance from the institutional human ethical committee, Sathyabama University, Chennai.

The study population consisted of pregnant women who received uniform pre-natal care from the government health centers in Chennai, Tamilnadu. A pilot study was conducted among 10 normal women to calibrate the examiners, to record the CPI index by one-on-one tutorials and there was 92% agreement between the examiners.

All infants born within 48 hours and women aged between 21 to 35 years who had normal conception were included.^[4] Exclusion criteria includes: Mothers with complications in pregnancies, fetal abnormalities, mothers who consumed antibiotics during pregnancy, multiple gravid, alcoholic and smoking women were excluded from the study. Informed consent was obtained from the study population before the start of the study.

Pregnancy outcomes that were measured are preterm birth and low birth weight babies. The study sample was selected based on World health organization criteria for which defines preterm birth as delivery less than 37 completed weeks gestation and low birth weight as delivery of an infant with a birth weight below 2500g.^[5] The gestational age of the study sample was estimated based on post-natal records. The birth weight of the new born was analyzed using baby weighing scale (Pan type) by the gynecologist. The study sample was grouped into cases and controls based on the pregnancy outcomes, cases include 15 mothers with preterm birth and low birth weight babies and controls includes 15 mothers with normal term (greater than or equal to 37 weeks) gestation and normal birth weight babies (more than or equal to 2500 grams). The study was conducted within 48 hours of parturition.

Periodontal examination was carried out using sterilized mouth mirror and Community periodontal index of treatment needs (CPITN) probe. Periodontal status was examined using Community periodontal index (CPI).^[6] The data were entered in the Microsoft Excel and analyzed with Epi Info 7 Software.

The dependent variable was PTL / LBW. The main independent variable was the indicator of periodontal disease. Chi-square test was used to analyse the association between CPI score and birth type of babies, with the level of significance 0.05 and to estimate the risk of preterm LBW babies in mothers with periodontal disease.

3. Results

Table 1 and 2, shows that pregnant women with periodontal disease are 56 times risk of preterm labour and low birth weight babies and Chi-square value = 16.425 (p = 0.000). Hence, it is evident that there is a strong statistical association between the CPI score and birth type of babies.

Table 1 Distribution of puerperal women based on periodontal disease

Maternal periodontal disease	Birth type	
	Low birth weight n (%)	Normal birth weight n (%)
CPI Score = 0	3 (12.5%)	14 (87.5%)
CPI Score => 1	12 (92.90%)	1 (7.10%)

Chi-square value = 16.425 (p=0.000)

Table 2 Risk estimation for maternal periodontal disease in low birth weight babies Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Maternal Periodontal disease (NO (CPI Score = 0) / Yes (CPI Score => 1))	56.000	4.149	1757.125
Relative risk	10.706	2.110	213.142

4. Discussion

The present study was conducted to prove the interdependence of preterm birth and low birth weight babies with maternal periodontitis. Periodontal disease has gained importance in the last two decades, with numerous researches relating its association with diabetes,^[7,8] cardiovascular disease,^[9] rheumatoid arthritis^[10] and respiratory illness.^[11] Recently researches have shown a marked association between periodontal disease and pregnancy outcomes.^[12]

The increased risk of PTL/LBW in mothers with periodontal disease might be due to presence of gram negative infection in periodontal disease which consists of microbial component, lipopolysaccharide which activates the macrophages and other cell molecules like IL 1 β , TNF- α , IL-6 and PGE 2 and matrix to release metalloproteinase which intern travel to the blood stream and crosses the placental barrier where in the physiological levels of PGE₂ and TNF α increases in the amniotic fluid resulting in low birth weight and preterm birth babies.^[13]

In India, studies have shown that periodontal disease is a possible risk factor for adverse pregnancy outcomes.^[14] However, researches in Tamil Nadu, is limited so this study was undertaken. The study was conducted in rural population as the utilization of health care services is less in rural areas when compared to urban areas.^[15,16] The periodontal status of the mother was examined within 48 hours of parturition as the periodontal status, which deteriorates during gestation improves after parturition.^[17]

Clinical assessment of the periodontal disease was estimated by Community Periodontal Index, because it is recommended by the WHO for screening periodontal disease. It acts as a non-invasive tool for monitoring the disease condition.^[18] Post-natal records were the prime consideration of the study as it materializes the gestation weeks of the mother and the birth weight of the babies. During the time period of our study, only 60 cases were reported out of which few contended to the inclusion and exclusion criteria. On considering the psychological status and patient comfort, the study sample was restricted to 30.

Literature studies, showed the probability which reflects the increase in incidence of PTL/LBW as a result of pregnancy induced periodontitis and decreased awareness among females regarding the association between periodontal disease and preterm labour low birth weight.^[19,20] Hence, an endeavor to educate the general female population by the government and health organizations would contribute in reduction of preterm labour and low birth weight.

5. Conclusion

It is concluded from the present study that periodontal disease in pregnant women is an important obstetric risk factor for PTL / LBW. Hence, pregnant mothers should be educated about the risk of periodontal disease and motivated to maintain the oral hygiene by proper oral hygiene instruction measures with periodic dental visits.

Compliance with ethical standards

Disclosure of conflict of interest

No conflicts of interest.

Statement of ethical approval

Ethical approval had been obtained from Institutional Human ethics committee held at Sathyabama University.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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