Research Paper

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# Periodontal association with preterm low birth weight

Medical Science

**KEYWORDS :** Preterm low birth weight, periodontitis, risk factors

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## ABSTRACT

Background:Recently the scientific community has demonstrated a growing interest in determining periodontal disease association with pregnancy complications due to the fact that despite the advances in prenatal care and increased public awareness, adverse pregnancy outcomes still present a major public health problem worldwide.
Aims:To find association between periodontitis and preterm low birth weight.
Methods and Material: Total 180 subjects with age group of 18 to 35 years, 90 with PTLBW and 90 without PTLBW were examined within 2 days of delivery. Periodontal assessment was done by recordingGingival Periodontal Index and Simplified Oral Hygiene Index.
Results: Mothers with periodontitis were found to be significantly at greater risk for PTLBW (Odds ratio of 4.57) compared to periodontally healthy mothers. Conclusions: Periodontitis is one of the risk factor for PTLBW. Thus, antenatal care should include periodic oral checkup followed by preventive and therapeutic treatment of periodontal diseases.

**INTRODUCTION:**Preterm low birth weight & its relationship with periodontitis is a topic of great concern since last two decades. The established risk factors of preterm low birth weight are quoted in literature[1] but still in significant number of Preterm low birth weight (PTLBW) deliveries etiology is unknown. Different research studies correlated periodontitis & adverse pregnancy outcomes. Even after many studies being conducted, association of periodontitis to PTLBW is yet an enigma.

Aims andObjectives: This study was conducted with aims and objectives to find association between periodontitis andPTLBW. Periodontal status assessment was done among women who delivered PTLBW babies as well as full term normal birth weight(FTNBW) babies.

**MATERIALS AND METHODS:**
Total 180 subjectsof age group, 18 to 35 years were included in the study. 90 womenwith history of Preterm delivery (<37weeks) and Low Birth Weight (<2500 gm)were included in test group and90 women with full term normal birth weightbaby were included in control group.Mothers with more than one baby, with systemic illness likediabetes, hypertension, tuberculosis, ischemic cardiopathology, acute endocrinopathies were excluded. Smokers, alcoholic andsubjects with abdominal trauma,urinary tract infection were excluded. All subjects were from Govt. Medical College & Hospital, Aurangabad. Periodontal examination was conducted within 2 days of delivery with the help of instruments like mouth mirror and probe.

Periodontal assessment was done by recordingGingival Periodontal Index (GPI) and by Oleary, Simplified Oral Hygiene Index(OHI-S) by Greene and Vermillion while the parameters recorded were haemoglobin, age and height of mother, weightof the baby. Educational level, family income were evaluated by Modified Kuppuswamy scale.[2]

Statistical analysis:Data was analysed using 2 independent sample t-test, Fisher's exact test andChi-square test.

**RESULTS:**
Demographic and periodontal data was analysed of 180 women. The mean age was found to be 22.82 ±3.07 in test compared to 21.7 ± 3.08 in control group. Mean weight of babies in mothers with PTLBW was 1.91±0.51 whereas in FTNBW was 2.84±0.26, thus the difference being statistically significant. In this study haemoglobin and height of mother did not show any statistically significant difference between control and test group

**Table 1: Mean ± Standard deviation (SD) of different study variables in cases and controls**

| Variable | Test ( n= 90) | Controls (n=90) | P-value |
|---|---|---|---|
| | Mean ± SD | Mean ± SD | |
| Age (years) of mother | 22.82±3.07 | 21.70±3.08 | 0.015* |
| Delivery week | 33.86±3.08 | 39.04±0.59 | < 0.001* |
| baby weight | 1.91±0.51 | 2.84±0.26 | < 0.001* |
| Hb | 9.99±1.77 | 10.05±0.86 | 0.79 |
| Height ( ft) | 4.97±0.20 | 4.97±0.29 | 0.90 |
| OHI-S | 1.64±1.20 | 0.47±0.52 | < 0.001* |
| GPI | 2.84±1.56 | 1.15±1.57 | < 0.001* |

* Significant (P-value < 0.05) 2 independent sample t-test used.

With respect to educational data in table no.2, there was statistically significant difference with respect to educational status between control and test group except for the last category i.e. graduate groupwhere test & control both group include 3.33% of total subjects. Oral health and periodontal status was described by OHI-S and GPI. OHI-S in test was 1.64±1.20 and with control group was 0.47±0.50, the difference was statistically significant

**Table 2: Proportion of characteristics in cases and controls**

| Variables | | Test (n=90) | | Controls (n=90) | | P-value |
|---|---|---|---|---|---|---|
| | | N | Percentage (%) | N | Percentage (%) | |
| Kuppuswamy classification | I | 0 | 0.00 | 1 | 1.11 | 0.142 |
| | II | 0 | 0.00 | 2 | 2.22 | |
| | III | 14 | 15.56 | 16 | 17.78 | |
| | IV | 65 | 72.22 | 67 | 74.44 | |
| | V | 11 | 12.22 | 4 | 4.44 | |
| Education | Illiterate | 19 | 21.11 | 7 | 7.78 | < 0.001* |
| | Primary | 8 | 8.89 | 2 | 2.22 | |
| | Secondary | 15 | 16.67 | 6 | 6.67 | |
| | SSC | 35 | 38.89 | 50 | 55.66 | |
| | HSC | 10 | 11.11 | 22 | 24.44 | |
| | Graduate and Above | 3 | 3.33 | 3 | 3.33 | |

* Significant (P-value < 0.05) Fisher's exact test used.

**Table 3: Proportion of characteristics in cases and controls**

| | | Test (n=90) | | Controls (n=90) | | P-value |
|---|---|---|---|---|---|---|
| | | no of cases | Percentage (%) | no of cases | Percentage (%) | |
| GPI score | Healthy | 9 | 10 | 42 | 46.66 | < 0.001* |
| | G | 38 | 42.22 | 33 | 36.67 | |
| | P | 43 | 47.78 | 15 | 16.67 | |
| OHIS score | Good | 40 | 44.44 | 80 | 88.89 | < 0.001* |
| | Fair | 41 | 45.56 | 10 | 11.11 | |
| | Poor | 9 | 10.00 | 0 | 0.00 | |

* Significant (P-value < 0.05) Chi-square test used.

**Figure 1 : Oral hygiene index in cases and controls**

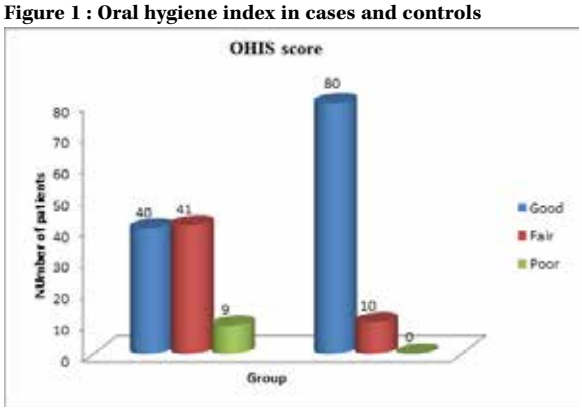
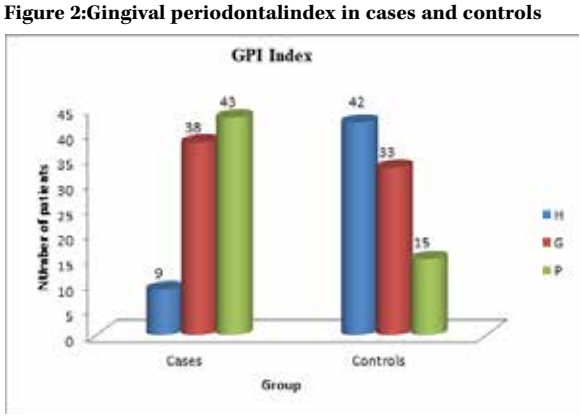



**Figure 2:Gingival periodontalindex in cases and controls**




GPI index score was 2.84± 1.56 for test and 1.15±1.57 in control which was statistically significant. Out of total 51 periodontally healthy women, 42 belong to control group and 9 belong to test, whereas out of total 71 gingivitis patients, 38 belong to cases and 33 belong to control while out of 58 periodontitis cases, 43 (47.78%) belong to cases and 15 (16.67%) belong to control group thus the difference being statistically significant. Out of 33 mild periodontitis cases, 23 belong to test group and 10 to control group. Out of 25 moderate to severe periodontitis 20 belong to test group and 5 belong to control group, thus showing statistically significant difference. Mothers with periodontitis were found to be significantly at greater risk for PTLBW (Odds ratio of 4.57) compared to periodontally healthy mothers.

**DISCUSSION:**

It is recognized that experimental study is the most appropriate type of study design for making inferences regarding the cause–effect relationship between two conditions,[3] for example between therapy for periodontal disease and prematurity/low birth weight.[4] The classic intervention design requires that one group receives treatment, while another group (also with the disease) is merely monitored without receiving this therapy. Even though the benefit from periodontal therapy for preventing undesirable gestational outcomes is unclear.[4,5] some ethics committees for research on human beings (institutional review boards) have taken the view that there is a clear breach of ethical guidelines when research subjects are allocated randomly to groups with or without treatment. Thus, not treating periodontitis patients even after knowing the risk of PTLBW lead to ethical issues. So observational studywas planned to find periodontal association with PTLBW with intent to conduct a case-controlstudy with cases being mothers who experienced PTLBW and controls being mothers with FTNBW.A case-control design normally assumes that exposures are determined historically through interview records and that the exposures

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occurred prior to the outcome. A periodontal examinationconducted at a point in time is a measure of the periodontal experience of the individual; a single examinationusually cannot determine whether the diseased sites are active at that time. A periodontal examination conducted on mothers within 2 days of their child's birth is a measurement of prior disease experience and provides the same information as any single exam conducted during the pregnancy. The advantage in this study is that all periodontal exams, were done in a standardized mannerwith trained examiners. Although the periodontal disease measured occurred prior to the birth, howeverwe cannot determine whether the disease actuallywas in an active cycle during the pregnancy. This type ofclassification error would tend to bias the results towardthe null. Thus, the data from this study have the characteristics of a case-control design: the subjects were drawnfrom the same pool; their inclusion in the study was based on the outcome of interest; and the exposures occurredprior to the outcome.

The World Health Organization defines preterm birth as any live birth at less than 37 weeks of gestation & birth weights are considered to be low if <2500 g.[6]Offenbacher[7] found that the risk for preterm labor requiring medical intervention or premature rupture of membranes (<37 weeks), or low birth weight infants (<2500 grams), was greater if the mother had periodontitis: preterm birth) - OR 7.9 and low birth weight OR 7.5 (after controlling for smoking, race, alcohol use, age, nutrition, and genitourinary infection.). This finding is similar to the present study conducted with odds ratio of 4.75 for preterm low birth weight. The results of our study corroborates with that of Jeffcoat showing 4.4 fold greater risk of PB, Lopez andJarjoura.

In the present study,educational level had statistically significant relation with preterm low birth weight which is contradictory to the results of Kothiwale [8] and Radnai.

According to Kristenson J. etal, less than 20 years of maternal age was risk factor for preterm delivery, but in present study in test group mean age of mothers is 22 years. No association was found between haemoglobin and PTLBW and preterm birth was significantly associated with low birth weight which is similar to Kothiwale et al [8] study

For statistical analysis of correlation of poor periodontal health of pregnant women with PTLBW of infant "independent sample t" test is used, p-value < 0.05 was obtained. Statistically significant relation was found between PTLBW and periodontitis in this study & these results corroborates with the results ofOffenbacher[7], Jeffcoat, Lopez , Radnai and Vergenes[9].Results by Mitchell-lewis, Davenport, Holbrook, Lunardelli [10], Skuldbol, Farell[11]showed contradictory results to the present study.In our study GPI index measuring CAL was usedas a clinical parameter. GPI index showedsignificant association with PTLBW. These results corrborates with Lopez andJarjoura. Lopez used probing depth and Jarjoura used attachment lossas a clinical parameter.

Patient with an average set of 28 teeth with moderate to severe periodontitis had surface area of infection and inflammation equivalent to surface of two hands[12]. It has been shown that periodontal pathogens (or their antigens) such as C. rectus, P. intermedia, F. nucleatum, P. micra, P. gingivalis, T. forsythia, T. denticola and P. nigrescens cross the placenta and reach the developing fetus in high enough levels to stimulate the fetus to produce IgM antibody against these bacteria.[13,14] Elevated subgingival levels of P.gingivalis, T. forsythia, P. intermedia and P. nigrescens have been detected in the oral microbiota during pregnancy, as this may increase the chances of their hematogenous translocation to the amnion.[15]Case control study by Davenport found no association between maternal periodontal disease and increased risk for PTLBW infants. (OR 0.78) which is contradictory to present study.

Smoking, alcohol, genito-urinary tract infections, hypertension, diabetes mellitus, poor prenatal care and poor maternal nutrition due to low socioeconomic status are the risk factors for PTLBW.Periodontitis serve as a reservoir for hematogenous spread of oral bacteria and inflammatory mediators to the fetal-maternal unit causing PTLBW. Meta-analysis by Khader [16] indicate that periodontal disease in pregnant mother significantly PTLBW with adjusted odds ratio of 5.28 for PTLBW. It has been suggested thatperiodontal infection increases the risk of preterm birth through a systemic increase in pro-inflammatorycytokines. These cytokines may affect placental viability leading to low birth weight and initiate contractions of the uterus prematurely leading to prematurebirth.[17,18,19]

**CONCLUSION:**

According to present cross sectional study, we can conclude that there is correlation between periodontitis and PTLBW. Periodontitis can be consider as one of the risk factor for PTLBW.There are many short-term and long term health consequences of PTLBW[1] which can lead to socioeconomic burden to the society. Hence, antenatal care at Primary health centers, Rural hospitals should also include periodic oral checkup followed by preventive and therapeutic treatment of periodontal diseases. Further multicentered studies with larger sample size need to be conducted to confirm association between periodontitis and PTLBW.

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