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Periodontal Status of Pregnant Women and Low Birth Weight of Infants-A Risk Assessment (An Epidemiologic Study)

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Abstract: *Periodontal infections which serve as reservoirs of gram negative anaerobic organisms, lipopolysaccharides and inflammatory mediators including $PGE_2$and TNF-α, may have consequences that extend beyond the periodontal tissues themselves. Low birth weight children experience combination of various neurosensory, developmental and health problem causing tremendous impact on the health care system and survivors own family. All of these warrants the continuous research for risk factors for LBW that are amenable to prevention. Aims: .In the present study it was sought to determine the periodontal status of the mother with low and normal birth weight infants and to assess the affect of periodontal status of the mothers on birth weight of infants Methods and Material: Hence full mouth periodontal examination was carried out on 100 mothers with LBWand NBW infants after controlling for all other known risk factors.DMF index,OHI score, Gingival index, Probing Pocket Depth, and Clinical Attachment Level measurement were made. Results: It was found that mothers with LBWinfants had poorer oral hygiene, increased gingival index, probing pocket depth and clinical attachment loss measurement.DMF Index was not associated with the risk of LBW.This data suggest that periodontal infections is a risk factor for LBW Infants Conclusions: Periodontal disease can be considered as a potential risk factor for low birth weight.*

Keywords: *Periodontits,.Low birth weight infants,inflammatory mediators, risk factor.*

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I. Introduction

Periodontal infections which serve as reservoirs of gram negative anaerobic organisms,lipopolysacharides and inflammatory mediators including PGE_2 and TNF α may have consequences that extend beyond the periodontal tissues themselves[1,2,3,4,5].Several animal[6] and clinical studies[7,8,9] have clearly demonstrated an association between periodontal infection and adverse pregnancy outcome. The purpose of this study is to determine the periodontal status of mothers with low birth weight and normal birth weight infants delivering at the hospital, and to assess the effect of periodontal status of mothers on birth weight of infants.

II. Subjects And Methods:

A matched case –control study with a selection ratio of one was performed using 50 cases and 50 controls delivered at the hospital. After obtaining institutional approval and consent of the subjects, hospital records pertaining to each delivery occurring during the study period in the hospital was screened and cases and controls identified.

2.1 Patient selection:

Any mother who delivered a live infant whose birth weight was less than 2500 gm was considered as a potential case. Potential controls were mothers who delivered live infant who weighed more than 2500 gm.or more [10]. Systematic random sampling was used to select controls. Mothers with any systemic diseases, twin pregnancy and known obstetric risk factors and Rh –factor isoimmunity were excluded.mothers age,occupation,level of education habits if any, dental history and dental treatment during current pregnancy were obtained through personal interview. data regarding gender and birth weight of the child ,gestational age, onset of prenatal care, medical history pertaining to exclusion criteria, blood haemoglobin of the mother ,infection history and treatment during current pregnancy and pregnancy complications like IUGR,PROM and details of previous pregnancies were obtained from hospital records.

2.2Clinical examination

The selected patients were subjected to careful oral examination under proper illumination with patient made to sit erect on her bed using mouth mirror and Williams graduated probe. Full mouth data were recorded as clinical attachment level (CAL)and probing pocket depth at four sites per tooth.CAL was measured in millimetre using cementoenamel junction as reference point. Third molar teeth were excluded from the study.DMF Index, Debris and calculus using Oral Hygiene Index and Gingival Index were measured.

2.3Data Analysis

The data collected is entered into a master sheet and statistical tables were constructed. In order to compare the two group's statistical constants like mean, standard deviation, and percentage were computed. Hypothesis formulated were tested statistically using *z test* in the case of percentages and *student t test* to test equalities of means. The association between two groups in the case of quantitative data was tested by using *chi square* test for association.

III. Results

Statistically no significant was noted between two groups with regard to age, relegion, level of education, occupation, gravidity. Both groups had almost equal infection rates, but UTI 14% and Vaginitis 10% were recorded only in the study group, which was significant statistically. The weight of fetal outcome was only two third of the control group (mean=3.023kg) in the study group (mean=1.992). The difference was significant at very high level. The women in the study group had a tendency to terminate the pregnancy earlier compared to the control group. The mean age was 34.46 wks in place of 38.82wks in the control group.IUGR was the main complication noted in the study group (14%) where as IUGR was not reported in the control group PROM was 10 fold higher in the study group (38%) compared to the control group(4%).both inference were highly statistically significant. Complaints such as bleeding gums, tooth mobility, pus discharge and abscess formation were present in the study group, where as no complaint except bleeding gum was observed in the control group. This is highly statistically significant. No appreciable difference was noted between two groups in DMF Index. The OHI score in the study group was 1.744 (mean)compared to control group 0.7294(mean).the Oral Hygiene was poor in study group and difference noted was significant. The mean Gingival Index also showed similar turn. The risk of increased gingival index was observed in the study group. The mean value of PPD was only 1.93 in control group in place of mean 2.7 in study group. The mean CAL was higher in the study group (mean =2.741) compared to control group (1.957) the student 't' test happened to be highly statistically significant in case of probing pocket depth and clinical attachment loss.

IV. Table

		Study group	Control group	tvalue	p value
Gestational Age In Weeks	MEAN	34.46	38.82	14.53	P<0.0001
	SD	3.52	1.02		
Weight Of Fetal Outcome	MEAN	1.992	3.023	41.32	P<0.0001
	SD	0.12	0.13		
DMF Index	MEAN	0.0724	0.0922	0.91	P>0.05(NS)
	SD	0.08	0.12		
Oral Hygiene Index	MEAN	1.744	0.7294	5.97	P<0.001
	SD	1.0	0.664		
Gingival Index	MEAN	1.480	0.7698	4.73	P<0.01
	SD	0.54	0.59		
Probing Pocket Depth	MEAN	2.6976	1.9346	8.87	P<0.001
	SD	0.44	0.43		
Clinical Attachment Level	MEAN	2.741	1.957	8.71	P<0.001
	SD	0.470	0.436		
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V. Discussion

Periodontitis, one of the most common diseases of humans, is an infectious condition that results in the inflammatory destruction of periodontal ligament and alveolar bone. The inflammatory response may result in gingival ulceration around the tooth which can allow bacterial cells or their products including LPS, peptidoglycan fragments and hydrolytic enzymes into systemic circulation. Host response to periodontal infection result in the local production of cytokines and biologic mediators including interleukins and prostaglandins as well as systemic responses such as induction of serum antibodies .Because of the extensive microbial plaques associated with periodontal infection, the chronic nature of these diseases, the exuberant local and systemic host response to the microbial insult, these infections may influence overall health and course of systemic disease. Oral health has been associated with pregnancy for generations based on empirical observation and anecdotal reports. The famous saying "a (loss of) tooth for every child" is still heard in many parts of the world.

In the present 1:1 case control study conducted at SAT Hospital ,Medical college Thiruvananthapuram,it was sought to determine whether periodontal infection could be associated with low birth weight infants, controlling for all known risk factors.

Cases and controls in the study were selected from eligible mothers using systematic random sampling. The exposure to the established risk factors for LBW was established by examining hospital records and by personal interview. The study population was drawn from the same pool; and similar in age, religion, income status, level of education, occupation and gravidity. Since there is no evidence that the relationship between oral health of the mother and LBW of infant was different for those who participated in the study compared to those who were theoretically eligible but did not participated, selection bias would be minimal. Misclassification of the case status (LBW) in relation to exposure of interest (oral health) would be minimum, since case status was based on hospital records. Any measurement error in birth weight would be random between groups with good and poor oral health.

Gingival changes associated with pregnancy are thought to be reversed postpartum.[11] Periodontal examination in this study was conducted on mothers within I to 3 days of their child's birth, at which stage, there was liable to little resolution of the condition. It is a measurement of prior disease experience and provides the same information as any single examination done during pregnancy. Although periodontal disease measured in this study occurred prior to the birth however it cannot be determined whether the disease actually was in active cycle during pregnancy this type of classification error could tend to bias the result to null. Thus the data from this study have the characteristics of case control design, the subjects were drawn from the same pool: their inclusion was based on the outcome of interest and exposure occurred prior to the outcome.

Periodontal status of the mothers in this study was evaluated by Oral Hygiene Index, Gingival Index, Probing Pocket Depth and Clinical Attachment Level Measurement.

Dental caries experience did not differ significantly between 2 groups.

Mean OHI score for case groups was 1.744 compared to 0.7294 for controls which was highly significant at $P<0.001$. Mean gingival index for the case group was 1.480 compared to 0.7698 for the control. This was also statistically significant. This result was similar to the study reported by Dasanayke AP [12], they found mothers with low birth weight infants had less healthy areas of gingiva, more areas with bleeding and calculus.

In the study of 124 subjects, conducted at university of north Carolina[7] ,the mean CAL for PLBW cases was 3.1+-0.74 (93) versus 2.8+_0.62 (31) for NBW controls at $p=0.038$:for all cases and controls ;and 2.98 +_ 0.084 (46) versus 2.56+_0.54(20) at $p=0.041$ for the primiparous subject.

In a large prospective study [13] of more than 1300 pregnant women, subjectswith periodontitis had five fold increased risk of preterm birth before 35 weeks of gestation and 7fold increased risk of delivery before 32 weeks compared with women without periodontitis.

In the present study mean CAL for case mothers was 2.741mm/site and control mothers 1.957mm/site. The difference is highly significant at $p<0.001$ level. The difference in the mean CAL between earlier study [7] and present study may be due to different population and age of subject under the study. Thus in the present study ,mothers with LBW infants had poor oral hygiene and increased clinical attachment loss (or more severe periodontal disease) compared to mothers with NBW infants other case control studies showed similar results[10,14,15].

Theoretically, compromised oral health of the mother can affect the fetus in many different ways.

1. Decreased nutritional intake as a result of poor oral health;. For this to be true , nature of oral illness should be severe enough to interfere with food intake and should last for considerable time period the extend of periodontal disease observed in the present study was not severe enough for this to be a possibility
2. Bacteremia; Sconyers et al [14] demonstrated that intra oral manipulation such as by oral hygiene procedure have the potential to cause bacteremia.

3. Periodontal infection; can serve as chronic reservoir of LPS which could target the placental membrane via blood stream. LPS can elicit IL-Iβ and PGE2 production by the chorioamniotic and trophoblastic cells, a process often associated with parturition [8, 15].
4. It is also possible that there is an unknown genetic or environmental confounder that is an under lying condition, that places the patient at risk for periodontal disease and PLBW. Certain subcategories of patient have upregulated monocyte response to LPS that result in 3 to 5 fold elevation of inflammatory mediators [18]. Thus an underlying hyper responsive trait may place an individual at risk for both severe periodontitis and PLBW [16].

Fetal weight outcome of the case group in the present study was 1.992 kg. this was only two third of the control group (3.02kg) gestational age of the children in the case group (34.46wks) was compared with controls (38.82wks).both of these were found to be highly significant .IUGR and PROM were also reported more in the case group. In this study urinary tract infections and vaginitis were found to associate with adverse pregnancy outcome. The possibility that periodontal infection may also render the patient more susceptible to sub clinical bacterial vaginosis cannot be ruled out. Darveau et al[17] indicated that exposure to oral LPS down-regulate E-section expression on endothelial cells and thereby prevent the normal leukocyctic margination and diapedesis which would occur in response to secondary enteric LPS challenge ,thus oral LPS inhibit normal neutrophil clearance of enteric organisms that may permit a selective overgrowth or invasion of gram-negative organisms within the genitor-urinary tract and predispose or exacerbate any existent enteric challenge at distal site.

A small number of studies have failed to detect any significant association between periodontal disease and adverse pregnancy outcomes[18,19,20].This may be due to difference in race, genetic ,socioeconomical,environmental factors and difference in study design.

Thus based on the data from this study, periodontal disease can be considered a potential risk factor for low birth weight .This needs to be confirmed by larger prospective multi canter investigation. It is also important to determine to what extent maintenance of periodontal health [21, 22] would decrease the incidence of this condition .Future studies which uses all available methods or identification of underlying genetic trait would help in either proving or disproving the above possibility.

VI. Conclusion

The present case control study was performed on 100 mothers with normal birth weight and low birth weight infants at the hospital.The periodontal status of the mothers and the association between periodontal health and birth weight of the infants were assessed. It was found that

1. Mothers with LBW infants had poorer oral hygiene, more gingival bleeding, increased probing depth and increased clinical attachment loss compared to mothers with NBW infants.
2. Periodontal disease of mothers is associated with LBW infants

Periodontal infections which serve as reservoir of gram negative organisms, LPS and inflammatory mediators including PGE2, TNF α may pose a potential threat to the fetalplacental unit.periodontal diseases are both preventable and readily treated and thus provide new opportunity for intervention strategies to reduce the incidence of LBW.

References

[1]. American Academy of Periodontology,Position paper.Periodontal disease as a potential risk factor for systemic diseases. *J Periodontol* 1998;69:841-50.
[2]. De stefano F, Anda RF, Khan HS. Dental disease and risk of coronary heart disease and mortality. *British Medical Journal* 1993;306:688-91.
[3]. Lowe GD. Etiopathogenesis of cardiovascular disease,hemostsis,thrombosis and vascular medicine. *Annals of Periodontology* 1998;3(1):421-6.
[4]. Mattila KJ ,Nieminen MS, Vatlonen V. Association between dental health and acute myocardial infections. *British Medical Journal* 1989;298:779-81.
[5]. Nishimura F,Takahashik, Kurihara M. Periodontal disease as complication of diabetes. *Annals of Periodontology* 1998;3:20-9.
[6]. Collins JG, Windley HW, Arnold RR, Offenbacher S. Effect of porphyromonas gingivalis infection on inflammatory mediators response and pregnancy outcome in hamsters. *Infection and Immunity*-1994;62:4356-61.
[7]. Offenbacher S,Katz V,Fertik G. Periodontal infection as possible risk factor for preterm low birth weight. *Journal of Periodontology* 1996;67(suppl);1103-13.
[8]. Offenbacher S, Odle BM, Van Dyke TE. The use of creviclar fluid PGE_2 levels as predictor of periodontal attachment loss. *Journal of Periodontal Research* 1986;21:1-13.
[9]. Dasanayake AP. Poor periodontal health of the pregnant woman as a risk factor for low birth weight. *Annals of Periodontology* 1998;3:206-12.
[10]. World Health Organization.Expert committee on maternal and child health;Public aspects of low birth weight,Geneva,Switzerland 1950,WHO Technical report series,no27.
[11]. Loe H,SilnessPeriodontal changes in pregnancy . *Journal of Periodontology* 1965;36:209-1
[12]. Dasnayake AP. Periodontal disease is related to local and systemic mediators of inflammation. *Journal of Evidence Based Dental Practise* 2010;10:246-7.

[13]. Jeffcoat MK, Guers NC, Reddy MS.Periodontal infection and preterm birth;results of a prospective study . *Journal of American DentalAssociation* 2001;132:875
[14]. conyers JR, Crawford JJ, Moriarty JD. Relationshoip of bacteremia to toothbrushing in patients with periodontitis. *JournalAmerican DentalAssociation* 1973;87:616-22.
[15]. Moss M ,Beck J, Genco R ,Salvi G ,Offenbacher S. Progressing periodontitis is associated with increased serum TNF-α. *Journal of Dental Research* 1995;74(special issue):153.
[16]. Zachariasen RD, Dennison DK. Periodontal disease and preterm low birthweight deliveries. *Journal Gt Houst Dental Society* 1998;70(4):16-9.
[17]. Darveau RP, Cunningham MD, Bailey T. Ability of bacteria associated with chronic inflamatory disease to stimulate E-selectin expression and promote neutrophill adhesion. *Infection and Immunity* 1995;63:1311-17.
[18]. Davenport ES, Williams CECS, Sterne JAC, Murad S, Sivapathasundaram V, Curtis MA. Maternal periodontal disease and preterm low birthweight;case control study. *Journal of Dental Research* 2002;81:313-8.
[19]. Vettore MV, Leal MD, Leao AT, Monteiro Da Silva AM, Lamar GA, Sheiham A. The relationship between periodontitis and preterm low birthweight. *Journal of Dental Research* 2008;1:73-8.
[20]. Rajapakse PS, Nagarathne M, Chandrasekra KB, Dasanayke AP.Periodontal disease and prematurity among non-smoking Srilankan women. *Journal of Dental Research 2005*;84:274-7.
[21]. Lopez NJ, Smith PC, Gutierrez J. Periodontal thetrapy may reduce the risk of preterm low birthweight in women with periodontal disease:a randomized controlled trial. *Journal of Periodontolology* 2002;73:911
[22]. Lopez NJ, Smith PC, Gutierrez J.Higher risk of preterm birth and low birthweight in women with periodontal disease. *Journal of Dental Research* 2002;58:81.

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