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PRE- TERM LOW BIRTH WEIGHT AND PERIODONTAL DISEASE

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ABSTRACT

Preterm birth is an important issue in public health and is a major cause for infant mortality and morbidity throughout the world. There is a growing consensus that systemic diseases elsewhere in the body may influence preterm low birth. Many risk factors have been identified including ethnicity, age, tobacco, systemic and oral infection. However, almost 50% of preterm birth causes still remain unknown. Periodontal diseases are a group of oral inflammatory diseases caused by bacterial plaque and their by products namely the enzymes and toxins that are influenced by host response factors. Recent studies have hypothesized that maternal periodontitis could be a high-risk factor for pre term low birth. There is increasing evidence today which suggests that periodontal infection caused primarily due to gram negative micro-organisms can have an adverse impact on the systemic health of the individual, acting as a risk factor for cardiovascular diseases and adverse pregnancy outcomes.

KEYWORDS: Pregnancy, pre term low birth, periodontal disease, risk factor.

INTRODUCTION

Each week of pregnancy betters a foetus chance of survival outside the womb.

Pre term birth is a major medical, social and economic problem accounting for a large proportion of maternal and especially neonatal mortality, acute morbidity and long term sequel.[19] Normal gestation period for humans is 40 weeks. Pre term or premature birth is usually **defined** as a gestational age of less than 37 weeks. Majority of the pre term births are also low birth weight **(LBW)**; where in which, the infant weighs less than 2500 grams. Pre term labour **(PTL)** is **defined** as contractions and cervical changes necessitating medical intervention. Pregnant women with moderate to severe periodontitis are at increased risk of pre term low birth weight (PTLBW) deliveries. This emerging subdiscipline of Periodontology wherein the effect of periodontal infections on systemic health is researched and possible solutions evaluated was termed as "Periodontal Medicine" by Offenbacher et al at the World Workshop in Periodontics of 1996.[13]

The hypothesis that oral infection as a cause for systemic maladies (focal infection theory) is more than a century old. In 1890, W.D. Miller published a paper titled "The micro-organisms of the human mouth: The local and general diseases which are caused by them" wherein oral infections were considered as the prime cause of systemic diseases.[11,12] The focal infection theory proposed by William Hunter was widely accepted between 1900 to 1940.[3] During this era, radical dental treatments (like extraction for caries, gingivitis and periodontitis) were advised as a solution for systemic diseases.[5,6] After 1940, the focal infection theory fell into disrepute largely due to a lack of scientific evidence, discovery of antibiotics and unacceptable treatment options.[15] PTLBW deliveries remain a significant public health issue and a leading cause of neonatal death.[17] Higher incidences of neuroectodermal problems, blindness, respiratory problems and developmental problems are seen in PTLBW survivors.

RISK FACTORS FOR PTLBW INCLUDE

1. Periodontitis.
2. High or low maternal age.
3. Inadequate pre natal care.
4. Smoking, tobacco, alcohol, or drug abuse during pregnancy.
5. Genetic background.
6. Low socio-economic status.
7. Maternal stress.

8. Genito-urinary tract infections.

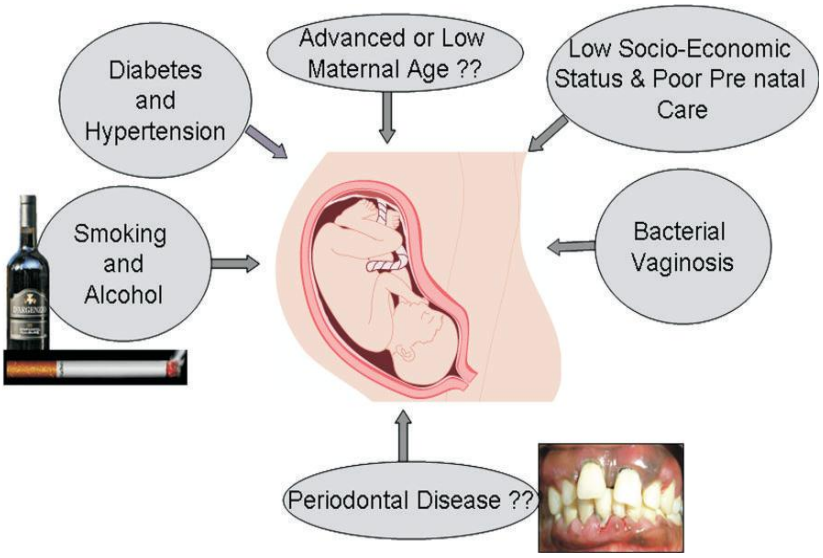

Fig 1: Diagrammatic representation showing possible risk factors affecting pre term low birth weight delivery.

Biologic possibility between periodontitis and PTLBW deliveries: The main cause of low birth weight deliveries is premature rupture of membrane(PROM) and preterm delivery.[17] Periodontal infection and inflammation result in increased levels of toxic products (lipopolysaccharides) from bacteria and also inflammatory mediators released from the host, especially prostaglandins, tumour necrosis factor alpha (TNF-á), interleukins-1 (IL-1) and IL-6. This induces placental and systemic inflammatory response resulting in PROM and preterm delivery[7]

Three pathways have been proposed to explain the possible mechanisms by which infection can spread from the oral cavity to produce secondary systemic effects: (i) metastatic spread of infection from the oral cavity as a result of transient bacteraemia. Although if the disseminated microorganisms find favourable conditions, they may settle at a given site and after a certain time lag, start to multiply[10], (ii) metastatic injury from the effects of circulating oral microbial toxins, eg lipopolysaccharide, which is continuously shed from periodontal gram-negative rods during growth and when introduced into the host, gives rise to a large number of pathological manifestations[4] and (iii) metastatic inflammation caused by immunological injury induced by oral microorganisms.[4] It is also plausible that micro-organisms may gain direct access to the amniotic fluid and fetus in several ways: ascending via the vagina through the cervix into the chorio decidual sac during pregnancy, via the

endometrium which is chronically infected prior to pregnancy, or alternatively through a hematogenous route.[2] Periodontal disease has the ability to influence PLBW through an indirect mechanism involving inflammatory mediators or a direct assault on the amnion.

Periodontal microorganisms associated with PTLBW deliveries

The effects of microbial infections on pregnancy outcomes have been observed in all mammalian species, including humans, and have been extensively studied in several animal models.[4] During the second trimester of pregnancy, the proportion of Gram-negative anaerobic bacteria in dental plaque increases in respect to aerobic bacteria.[18] Periodontal organisms *Porphyromonas gingivalis (P.gingivalis), Fusobacterium nucleatum*, Capnocytophaga species and *Campylobacter rectus* have been isolated from the amniotic fluid of women with PTLBW deliveries. In a cross-sectional study, women with low birth weight infants had higher levels of *Actinobacillus actinomycetemcomitans, Bacteroides forsythus, P gingivalis* and *Treponema denticola* when compared with normal birth weight infants.[16] The high prevalence of elevated fetal IgM to *Campylobacter rectus* among premature infants raises the possibility that this specific maternal oral pathogen may serve as a primary fetal infectious agent, eliciting prematurity and also restricting fetal growth.[20] An animal study concluded that *P.gingivalis* infection during pregnancy increased maternal tumor necrosis factor alpha, restricted fetal growth and also activated maternal immune and inflammatory responses[8] Increased levels of *Actinomyces naeslundii* genospecies and *Lactobacillus casei* levels were seen in low birth weight infants, which can be used as predictors of adverse pregnancy outcomes.[1]

Patient education and importance of the possible association between periodontal disease and Pre term low birth weight deliveries

The identification of modifiable risk factors of Pre term low birth weight deliveries is of utmost importance. Among the various confirmed risk factors, only two are modifiable: smoking and alcohol.[9] Periodontal disease, if, confirmed as a risk factor will be very valuable, since periodontal disease can be controlled, treated or prevented. Efforts are required to create awareness and conclusively prove the link between periodontal disease and Pre term low birth weight deliveries and also educate pregnant women about the biologically plausible role of periodontal infections leading to adverse pregnancy outcomes.

CONCLUSION

The potential relationship between maternal periodontitis and birth outcomes, if proven to be causative, could be significant for public health improvement, given that periodontitis affects a considerable proportion of the general population and is preventable and treatable. Multicenter, randomized, controlled clinical trials are required to confirm this link between maternal periodontitis and Pre term birth. As an oral health care provider, the periodontist is in a unique position to take the initiative toward motivating expectant mothers as well as gynaecologists[14] regarding the importance of maintaining optimal oral health during pregnancy to avoid any possible adverse pregnancy outcomes.

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