

## Preeclampsia and pre term low birth weight babies: Possible role of periodontal infections: A comprehensive review

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### Abstracts

Periodontitis is an inflammatory disease affecting supportive tissues of the teeth, leading to progressive destruction of connective tissue attachment and the alveolar bone. This destruction is characterized by the formation of a periodontal pocket. Because of its chronic inflammatory infectious nature, periodontitis has been considered a systemic exposure implicated with causative agent in variety of systemic diseases and condition. Recent findings have suggested that periodontal diseases are associated with a higher risk of cardiovascular diseases, atherosclerosis and adverse pregnancy outcomes, such as preterm birth and low birth weight and preeclampsia.

**Keywords:** Periodontitis, Preeclampsia, Preterm low birth weight babies.

### Introduction

Periodontitis is an inflammatory disease affecting supportive tissues of the teeth, leading to progressive destruction of connective tissue attachment and the alveolar bone. This destruction is characterized by the formation of a periodontal pocket.

Because of its chronic inflammatory infectious nature, periodontitis has been considered a systemic exposure implicated with causative agent in variety of systemic diseases and condition. Recent findings have suggested that periodontal diseases are associated with a higher risk of cardiovascular diseases, atherosclerosis and adverse pregnancy outcomes, such as preterm birth and low birth weight.<sup>1</sup> and preeclampsia.<sup>2</sup>

Preeclampsia is a multi factorial disorder affecting approximately 10% of pregnancies and contributes significantly to maternal and perinatal morbidity and mortality.<sup>2</sup> It usually occurs after 20 weeks of gestations. It is characterized by abnormal vascular response to placentation, reduced organ perfusion, vasospasm, activation of coagulation system, inflammatory like response, oxidative stress, and some perturbation in volume and blood pressure control, affecting the placenta, kidney, liver, and brain. Preeclampsia is determined by maternal blood pressure elevation accompanied by proteinuria.<sup>3</sup>

What is Preeclampsia and pre term low birth weight baby?: Preeclampsia can be defined as blood

pressure >140/90 mm of Hg on two separate occasion after 20 week of gestation and at least 1+ proteinuria.<sup>2</sup>

The World Health Organization defines preterm birth as any live birth at less than 37 weeks of gestation. Delivery at less than 32 weeks is termed very preterm, and delivery at less than 28 weeks, as extremely preterm. The majority of preterm births are also low birth weight. The international definition of low birth weight adopted by the Twenty-ninth World Health Assembly in 1976 is a birth weight of “less than 2500 g.”<sup>5</sup>

### Etiology of preeclampsia

Periodontal infections increases the burden of endo toxins, inflammatory cytokines on vessels<sup>4</sup> Effects on Feto - Placental unit blood vessels leading to Atherosclerotic lesions of the spiral arteries<sup>4</sup> causing Ischemia,<sup>3</sup> Oxidative and inflammatory vascular damage,<sup>4</sup> Endothelial damage in the placental vascular bed<sup>4</sup> and Preeclampsia<sup>4</sup>

Risk factors for preterm low birth weight babies<sup>6</sup>

1. Primary present before pregnancy, 2. Secondary develop during pregnancy

Possible role of periodontitis in causing pre term low birth weight babies<sup>7</sup>:

Tissue invading gm – ve bacteria release endotoxins which triggers release of inflammatory mediators like cytokine and PGE 2. Inflammatory Mediators are increased in Amniotic Fluid as well. Causing premature rupture of the membrane.

**Table 1:** Studies associating role of periodontal infection and pre mature birth/ preeclampsia

Author and year	Study design/population	Conclusion
Collins et al 1994 <sup>8</sup>	Hamster model. which utilized a localized, non-systemic (non-disseminating) infection with periodontal pathogenic bacterium <i>Porphyromonas gingivalis</i> .	Increases in PGE2 and TNF $\alpha$ were observed which appeared to be associated with reduced fetal birth weight
Dasanayake 1998 <sup>9</sup>	55 pairs of women	Logistic regression indicated mothers With healthy gingiva were at lower risk for low birth weight infants (odds ratio= 0.3).

Hillier et al 1993 <sup>10</sup>	50 women with preterm labour	Reported that the mean concentration of amniotic fluid IL-6 was higher when delivery occurred before 34 Week's gestational age.
Lui's Ota'vio Miranda Cota et al 2006 <sup>11</sup>	588 women	Maternal periodontitis was determined to be associated with an increased risk of preeclampsia.
Jefcoat et al 2003 <sup>12</sup>	1313 women	Periodontal disease association with preterm low birth weight babies
Bogges KA et al 2005 <sup>13</sup>	-	When fetal exposure to oral microorganisms occur, the risk of preterm delivery increases 2 fold, but when there is an attendant fetal inflammatory response the risk increases 4-7 fold.
Offenbacherr 1996 <sup>14</sup>	124 pregnant or postpartum Mothers.	Mothers with preterm or low birth-weight babies had significantly worse periodontal disease than those giving birth to normal weight babies. They suggested a role of cytokines in the mechanism for preterm low birth weight babies.

**Table 2:** Role of cytokines in preterm low birth weight babies studies:

Romero et al 1993 <sup>15</sup>	Amniotic fluid IL-6 is a reliable marker of intrauterine infection in women with premature rupture of membranes.
Hillier et al 1993 <sup>16</sup>	Reported that the mean concentration of amniotic fluid IL-6 was higher when delivery occurred before 34 weeks gestational age.

**Table 3:** Risk factors for preterm low birth weight babies

Modifiable	Non modifiable
Low socio economic conditions	Genetics
Smoking	Multifetal pregnancies
Diet and nutrition	Previous pre term birth
Systemic diseases	Abnormal placenta
Domestic violence	Young age pregnancy
Stress / depression	Abnormal fetal position
Preeclampsia	Abnormal fetus
Periodontal diseases	Systemic disease/syndromes

**Diagnostic factors of preeclampsia/ pre term low birth weight babies**

Blood pressure >140/90 mm of Hg at 20 weeks of gestation Proteinuria, quantification of protein excretion over 24 hours is the gold standard method.

The international definition of low birth weight adopted by the Twenty-ninth World Health Assembly in 1976 is a birth weight of "less than 2500 g."<sup>5</sup>

**Conclusion**

Because of its chronic inflammatory infectious nature, periodontitis has been considered a systemic exposure implicated with causative agents in a variety of systemic illnesses. Recent findings have suggested that periodontal disease is associated with a higher risk of preeclampsia and pre term low birth weight babies.

Associations between preeclampsia, preterm low birth weight babies and periodontitis should be interpreted with

discretion, because the etiology of both events is likely multifactorial. It is important to emphasize that primary healthcare services must be proficient to diagnose and manage periodontal disease all through pregnancy. Managing periodontal disease may represent a novel strategy to reduce the incidence and/or complications from adverse pregnancy outcomes.

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**Conflict of interest**

None.

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