

**PERIODONTITIS A RISK FACTOR FOR PRE-ECLAMPSIA
IN PREGNANT WOMEN****MISRATH BANU M.A^{*1} AND JAIGANESH RAMAMURTHY²**¹Undergraduate, Saveetha Dental College, Chennai, India²Reader, Department of periodontics, Saveetha Dental College, Chennai, India**ABSTRACT**

Pre-eclampsia is a life threatening condition which is characterised by hypertension and proteinuria in the pregnant women which occurs after 20 weeks of gestation. When not intervened may lead to eclampsia (seizure). There are many risk factors for pre-eclampsia one of which is periodontal disease. Periodontal disease is a chronic inflammatory disease condition surrounding the tooth. Periodontitis shows multifactorial disease etiology. Micro-organisms are considered risk indicators of periodontitis. Of all the micro-organisms *Porphyromonasgingivalis*, *Aggregatibacteractionomycetmcomitans*, and *Fusobacteriumnucleatum* are the important bacteria in the periodontal disease. In periodontitis there is release of C-reactive protein, an acute inflammatory mediator. Chronic infection may cause release of cytokines like IL- β . TNF- α , and other mediators like PGE₂. These inflammatory mediators are also raised in pre-eclampsia. Acute atherosclerosis is the placental lesion of pre-eclampsia and is characterised by focal endothelial disruption, fibrinoid necrosis of the arterial wall, infiltration of peri-vascular spaces by mononuclear cells and macrophages. The pathology and pathogenesis and clinical setting are similar to atherosclerosis. Oral pathogens are detected in atherosclerotic plaque where they may play a role in the development and progression of atherosclerosis. Hence these pathogens may also be responsible or may be present in acute atherosclerosis of placenta.

KEYWORDS: Pre-eclampsia, Pregnancy, Periodontitis, Risk factor.**MISRATH BANU M.A**

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INTRODUCTION

Pre-eclampsia is a medical condition characterised by high blood pressure (hypertension) and significant amounts of protein in the urine (proteinuria) of a pregnant women which occurs after 20 weeks of gestation. It is a life-threatening condition for both the mother and the foetus that it may lead to epilepsy (seizure) when untreated. The exact etiology of the condition is not identified. The known risk factors for pre eclampsia include primiparity, obesity, renal disease, non smoking, no prenatal care and diabetes¹. Periodontal diseases comprises of both gingivitis and periodontitis. It is caused by gram-negative, anaerobes and microaerophilic bacteria that leads to the increase in pro inflammatory prostaglandins (PGE2) and cytokines². Studies have shown that Periodontitis is associated with systemic diseases like cardiovascular disease, diabetes mellitus, and adverse pregnancy outcomes. Adverse pregnancy outcomes that have been linked to periodontal disease include preterm birth, low birth weight, miscarriage or early pregnancy loss, and pre-eclampsia³.

PERIODONTITIS A RISK FACTOR FOR PRE-ECLAMPSIA: PERIODONTITIS

Periodontitis refers to the inflammation of tissues surrounding the tooth. It is characterised by the destruction of the alveolar bone, connective tissues of the gingiva and periodontal ligament⁴. Periodontitis is classified as chronic and aggressive based on the rate of progression, the age of occurrence and amount of microbial deposits Albandar in an overview concluded that subjects of Asian ethnicity had the third highest prevalence of periodontitis⁵. Periodontal diseases are one of the more prevalent oral diseases affecting more than 50% of Indian community⁶. Periodontitis is an inflammatory disease with multifactorial etiology. Although the gram negative anaerobes play a major role in initiation of disease other factors like smoking, systemic condition and genetic factors modify the progression of the disease⁴.

RISK INDICATOR

Risk indicators are those that are not sufficient to cause a disease. There are various microorganisms that have been implicated as etiologic agents in periodontitis. The presence of periodontal pathogens may cause disease but are not sufficient. Indeed the odds ratio of developing periodontal disease in an individual who harbours one of the putative periodontal pathogens is not considered to be risk factors⁷. It has been shown that periodontal pathogens may be a risk indicator for the periodontal diseases but are not risk factors⁸.

ROLE OF MICROORGANISMS

Periodontitis is an inflammatory disease initiated by bacterial pathogens. The role of sub-gingival microbial species in the etiology of periodontal disease has been extensively documented⁹. Microorganisms such as *Porphyromonasgingivalis*, *Tannerella forsythia*, *Treponemadenticola*, *Fusobacteriumnucleatum* and *Aggregatibacteractionomycetemcomitans* are seen in higher levels in periodontitis. One of the most important bacteria implicated in periodontal disease is *Fusobacteriumnucleatum*. It is a gram-negative anaerobic species dominant in dental biofilm.

ROLE OF INFLAMMATORY MEDIATORS

Periodontal disease leads to a moderate systemic inflammatory response, and in individuals with periodontal disease, serum antibody titres for specific pathogens, such as *Porphyromonasgingivalis*, are elevated and independently associated with elevated C-reactive protein levels⁹. C-reactive proteins (CRP) an acute phase protein and widely regarded as a marker of inflammatory burden are produced from the liver. CRP induces monocyte macrophages to produce tissue factors, which stimulates the coagulation pathway and increase blood coagulability. CRP also stimulates complement cascade, further exacerbating inflammation. A chronic bacterial infection is associated with elevation of

proinflammatory cytokines like IL-1 β , TNF- α and other mediators like prostaglandin .

PRE-ECLAMPSIA RISK FACTORS

A risk factor can be defined as an occurrence or characteristic that has been associated with the increased rate of a subsequently occurring disease. It is important to make distinction that risk factors are associated with a disease but do not necessarily cause the disease. There are various risk factors for pre-eclampsia which include primiparity, obesity, renal disease, non smoking, no prenatal care and diabetes ¹. Periodontitis is a potential risk factor for pre-eclampsia.

PATHOPHYSIOLOGY OF PRE-ECLAMPSIA

Pre-eclampsia is a major cause of maternal and fetal mortality and morbidity ¹¹. It is characterised by gestational blood pressure elevation of more than 140mmHg systolic or more than 90 mmHg diastolic in a woman who was normotensive before 20 weeks of gestation and urinary excretion of protein more than 0.3g. Studies have proposed that pre eclampsia to be a syndrome caused by systemic inflammatory response to pregnancy ¹². The mechanisms of pre-eclampsia are vascular contraction, hyper responsiveness and endothelial cell dysfunction ¹¹. Cytokines like TNF-alpha and the interleukins may be associated with oxidative stress. The oxygen-free radicals may lead to the formation of self-propagating lipid peroxidase that propagates highly toxic radicals which may injure endothelial cells. This leads to the formation of nitric acid and interferes with the prostaglandin balance. There is also activation of micro vascular coagulation, increased capillary permeability, and the productions of macrophages are the characteristic feature of atherosclerosis. Acute atherosclerosis is the placental lesion of pre-eclampsia is characterised by focal endothelial disruption, fibrinoid necrosis of the arterial wall, infiltration of peri vascular spaces by mononuclear cells, macrophages and lipoprotein deposition ¹³. C-reactive protein level is a non specific marker of inflammation and is higher among pregnant compared to non-pregnant women. A

research has illustrated median CRP levels during pregnancy is around 3mg/L throughout all three trimesters.

RELATIONSHIP BETWEEN PERIODONTITIS AND PRE-ECLAMPSIA

Chronic infection like periodontitis may cause an increase in C-reactive protein in the serum which acts as a risk factor for cardiovascular disease. There are evidences linking periodontitis with atherosclerosis and generalised hyper inflammatory state provides the basis of association between periodontal diseases and pre-eclampsia. Pre-eclampsia and cardiovascular disease may have common risk factors. In pre eclampsia lipid deposition in the walls of the maternal uterine arteries leading to the placenta occurs. These vascular lesions show atherosclerosis and are named "acute atherosclerosis" ¹⁴. Acute atherosclerosis, the placental lesion of pre-eclampsia shows a similar pattern of pathology, pathogenesis and clinical settings to atherosclerosis. Oral pathogens have been detected in atherosclerotic plaques, where they may play a role in the development and progression of atherosclerosis. In a study done between healthy pregnant patients and pregnant women with pre-eclampsia clinical and immunological parameters were higher in the women with pre-eclampsia. It also showed increase in the levels of pro inflammatory mediators like IL-1 β , TNF- α and PGE₂ among the pregnant women with pre-eclampsia ¹¹. Thus periodontal disease and pre-eclampsia have a common risk factors. Hence infection plays a vital role in the pathogenesis of pre-eclampsia. It has been well demonstrated that cytokines are involved in the inflammatory process ³. Cytokines like IL-1 β , IL-6 and TNF- α , together with PGE₂, are produced locally in the periodontium and migrate to GCF. Thus periodontium which is highly vascular acts as a potential source of systemic inflammatory mediators ¹⁵. These inflammatory mediators from the periodontium may have their effect on fetoplacental unit ¹⁶.

CONCLUSION

The host immune response to an exposure of periodontal pathogen may produce endothelial activation and dysfunction, thus representing a risk factor for pre-eclampsia.¹⁷. Pregnant patients who

developed Periodontitis and didn't undergo treatment developed increased levels of GCF IL-1 beta and IL -6. These mediators predispose them to higher blood pressure and proteinuria leading to Pre- Eclampsia. Thus periodontitis shows association with pre-eclampsia

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