MAVEN

REVIEW ARTICLE

PERIODONTAL MEDICINE

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ABSTRACT:

Periodontal Medicine deals with a two way relationship in which periodontal disease in an individual may be an influence on an individual's systemic health and /or the role of systemic disease on influencing an individual's Per- iodontal health. Systemic disorders like endocrine disorders and hormonal changes, hematologic disorders and immune deficiencies, Vitamin Deficiency, Protein Deficiency, Hypophosphatasia, Congenital Heart Disease, Metal Intox- ication etc influence periodontal health. Here is an attempt is being made to enumerate the interrelationship. (2017, Vol. 01; Issue 01: Page 70 - 76)

Keywords: Periodontal medicine, Systemic health, interrelationship.

CAN PERIODONTAL DISEASE INFLUENCE THE SYSTEMIC HEALTH OF THE PATIENT?

Focal Infection is an idea that a lo- cal infection affecting the small area of the body can lead to subsequent infection or symptoms in other parts of the body due either to the spread of infectious agent itself or toxins produced by it. William Hunter, a British physician first de- veloped the idea that oral microor- ganisms were responsible for a wide range of systemic conditions that were not easily recognized as being infectious in nature. He identified caries teeth, gingivitis and perio- dontitis as foci of infection and ad- vocated extraction of these teeth to eliminate the source of sepsis. Then the concept of biological sys- tems came. It is the study of inter- action between the components of biological systems and how these interactions influence the function and the behavior of that system. The living systems are maintained by the continuous flow of matter and energy and thus any biological system will inevitably be a subsys- tem of a large one. The key feature of such a system is the interaction among the components. Periodontal disease is an immuno-inflammatory disease initiated by micro-organisms and characterized by the destruction of the supporting tissues of the tooth. As it deranges the biological system it has influ- ence on systemic conditions (1).

INFLUENCE OF PERIODONTAL DISEASE ON SYSTEMIC CONDITIONS:

The following systems are influ- enced by periodontal health and disease (1,2):

• Cardiovascular/Cerebrovascular System: Atherosclerosis, Coronary heart disease (CHD), Angina, Myo- cardial Infarction, Cerebrovascular accident (stroke)

• Endocrine System: Diabetes Melli- tus

• Reproductive System: Preterm birth and low-birth-weight (LBW) infants, Preeclampsia

• Respiratory System: Chronic ob- structive pulmonary disease (COPD), Acute Bacterial pneumo- nia

ASSOCIATION BETWEEN PERIODONTAL DISEASE AND CARDIOVASCULAR DISEASE (2,3)

Association is defined as the con- currence of two variables more of- ten than would be expected by chance. As the name suggests two or more causes/diseases can be as- sociated to each other. And Causal- ity is defined as the relationship be- tween an event (cause) and a sec- ond event (effect) where the second event is understood as a conse- quence of the first. As the name suggests one cause/disease has to be present to produce the other dis- ease.

Cardiovascular diseases are the class of diseases that involve the heart or blood vessels. It refers to those related to atherosclerosis (ar- terial diseases) like following:

• Endothelial Dysfunction: Hyper- tension, Atherosclerosis

• Coronary heart disease (CHD): Angina, Myocardial Infarction, Cer- ebrovascular Accident, Peripheral Vascular Disease

• Commonalities between periodon- tal disease and cardiovascular dis- ease:

- Both are inflammatory diseases
- Age related
- Associated with genetic factors
- Common risk factors
    - Smoking
    - Diabetes
    - Obesity
    - Hyperlipidem

POSSIBLE MECHANISM OF INTER RELATIONSHIP BETWEEN PERIODONTAL DISEASE AND CARDIOVASCULAR DISEASE (Figure 1): (4,5)

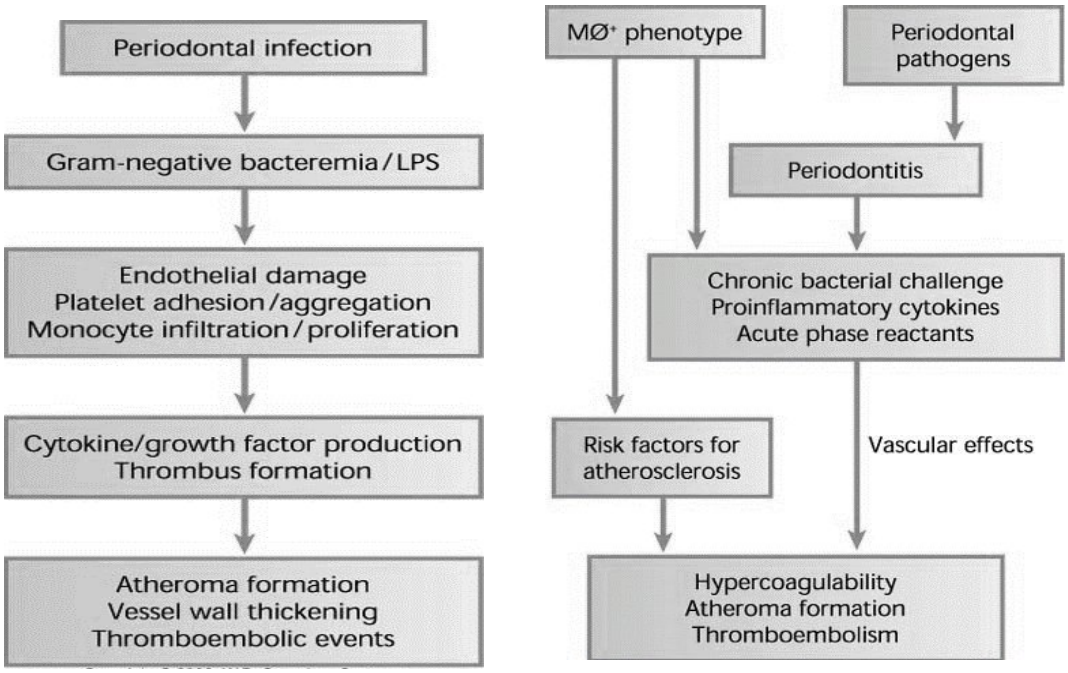


Fig 1: Relationship between periodontal disease and cardiovascular disease

PERIODONTAL DISEASE AND ADVERSE PREGNANCY OUTCOME (6):

Pregnancy is defined as a state of carrying a developing embryo or fe- tus in the female body. The scien- tific term for this is Gravid and the pregnant female is referred to as *Gravida*.

Influence of pregnancy on perio- dontal health:

The influence of pregnancy on peri- odontium is well documented. The gingival changes in pregnancy were described even before the knowledge about hormonal changes in pregnancy was availa- ble. Pregnancy itself does not cause gingivitis but it will modify the tis- sue response to the plaque and ex- aggerate the resultant clinical pic- ture. Gingivitis becomes more se- vere by the eighth month and de- creases during the ninth month of pregnancy. Partial reduction in se- verity of gingivitis occurs by two months postpartum and reverts back to pre-pregnant stage after one year. Gingiva does not return to normal as long as local factors are present. In some cases the in- flamed gingiva form discrerte tumor like growth referred to as pregnancy tumor. Microscopically this en- largement appears as a non-spe- cific, vascularizing proliferating in- flammation. Gingival Changes are usually painless unless compli- cated.

Probable reasons for exaggerated

gingival response during pregnancy:

- Hormonal Changes
- Maternal Immune Response
- Changes In Plaque composition Effect of periodontal disease on pregnancy OUTCOME
- Still Birth
- Fetal Death
- Low Birth Weight
- Pre – term birth
- Pre – term Labor
- Pre – term Premature rupture of membranes
- Preeclampsia

Pre-Term refers to gestation less than 37 weeks and low birth refers to infants less than 2500 grams. Pre-Term low birth weight causes tremendous impact on the health care system and the survivor's own family due to its disastrous consequences like, Death during neo-natal period, Neurodevelopmental problems, Respiratory Problems, Congenital Anomalies, Complication due to neonatal intensive care, Behavioral Problems as pre-schoolers, Attention Deficit Hyperactivity Disorder.

Women with diseases associated with chronic low grade inflammation such as diabetes mellitus, hypertension, obesity and arterial diseases are at an increased risk of giving birth to preterm low birth weight infants (PLBW). The Periodontal disease is also associated with low grade inflammation. Hence it is hypothesized that patients with periodontal disease have an increased risk for PLBW.

PERIODONTAL DISEASE AND PRE-ECLAMPSIA:

Pre-Eclampsia is a maternal multi-organ disease that clinically manifests in the second half of pregnancy by the appearance of hypertension and proteinurea.

Pre-Eclampsia is a disorder unique to pregnancy with the prevalence of 2-3%. It is one of the leading causes of maternal morbidity and mortality in the western world. In recent years a number of studies have explored the relationships between pre-eclampsia and periodontal disease. Pathogenesis of pre-eclampsia is not completely understood but it is generally accepted that endothelial dysfunction of maternal vascular system plays a key role in the clinical manifestation of disease. It is believed that pre-eclampsia is most likely the result of generalized inflammatory response including activation of inflammatory and endothelial cells. Women with diseases associated with chronic low grade inflammation such as diabetes mellitus, hypertension, obesity and arterial diseases are at an increased risk of developing pre-eclampsia. The Periodontal disease is also associated with low grade inflammation. It is hypothesized that patients with periodontal disease have an increased risk of developing pre-eclampsia (7).

EFFECT OF PERIODONTITIS ON DIABETES MELLITUS (8):

Diabetes mellitus is a heterogeneous group of disorders characterized by hyperglycaemia, absolute or relative insulin deficiency or resistance to action of insulin. There is a two way relationship between diabetes and periodontitis.

Effect of periodontal treatment on glycemic control:

The presence of Periodontal Disease increases the risk of worsening glycemic control.

• Taylor (1996), in a cohort study of patients with diabetes with severe periodontal disease for two years, found a relative risk six times more the probability of worsening glyce- mic control in comparison to perio- dontally healthy diabetics. This study found an association in the increase of HbA1c values to the se- verity of periodontal disease in pre- gestational type 2 diabetic women.

• Periodontal disease may induce or perpetuate an elevated inflamma- tory state not only locally, but has also been associated to severe peri- odontitis with the risk of mortality due to cardio-renal disease.

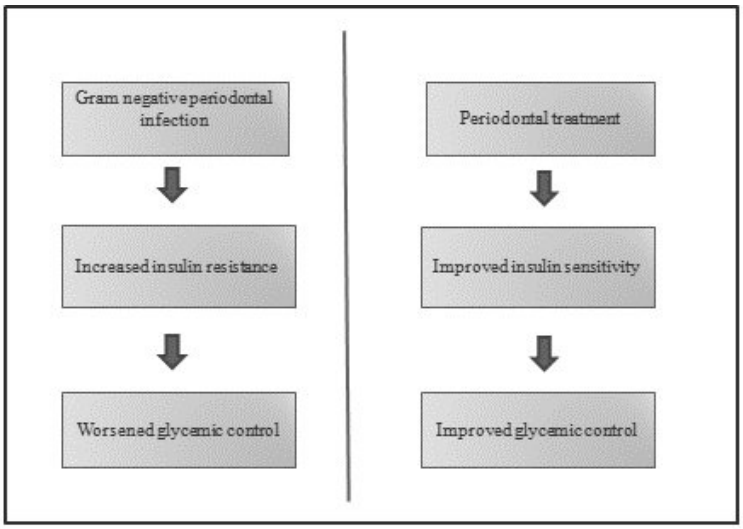
• Studies suggest that patients with periodontitis, particularly those colonized with Gram negative bacteria such as P. gingivalis, Tannerella forsynthesis, and Prevotella inter- media, have greater inflammatory serum markers such as C-reactive protein (CRP), IL-6, and fibrinogen than patients without periodontitis.

• Similarly, there is an increase in resistance to insulin decreasing glycemic control

• Periodontal treatment decreases local inflammation and as a conse- quence, decreases chemical media- tors involved in inflammation, among them IL-6 and CRP, posi- tively contributing to proper glyce- mic control.

• It is evident that Periodontal dis- ease exceeds the local environment affecting the systemic one.

Tissue insulin demand in type I di- abetic patients' decreases after per- iodontal treatment including curet- tage, local gingivectomies and se- lective extractions, scaling and root planning in addition to the use of antibiotics such as penicillin and streptomycin (Figure 2).



Potential effects of periodontal infection and periodontal therapy on glycemia in patients with diabetes.

PERIODONTAL DISEASE AND PNEUMONIA AND COPD:

Pneumonia is defined as an inflam- mation of the lungs caused by bac- terial, fungal, viral or parasitic in- fection. The initiation of bacterial pneumonia depends on the coloni- zation of the oral cavity and the pharyngeal mucosa by potential respiratory pathogens, aspiration of the colonized pathogens into the lower airway and failure of defense mechanisms to eliminate the bacte- ria from the airway mucosa. COPD encompasses emphysema and chronic bronchitis. In individuals with periodontitis, bacteria present in the gingival sulcus or the subse- quently formed periodontal pock- ets, may have easy access to the blood vessels. The microorganisms may also enter the lungs by inhala- tion, but the most common route of infection is aspiration of oropharyn- geal secretions. Therefore, it is pos- sible that oral microorganisms might infect the respiratory tract, causing COPD (9).

PERIODONTAL DISEASE AND RHEUMATOID ARTHRITIS:

Rheumatoid arthritis is a chronic destructive inflammatory disease characterized by the accumulation and persistence of an inflammatory infiltrate in the synovial membrane that leads to synovitis and the de- struction of the joint architecture resulting in impaired function. Rheumatoid arthritis (RA) is a disa- bling condition and can lead to long-term joint damage resulting in persistent pain and loss of function in affected areas. The relationship between RA and the progression of inflammatory conditions elsewhere in the body, such as periodontitis, is controversial. While a number of studies have presented conflicting results regarding a relationship be- tween periodontitis and RA, there have been recent reports suggesting a significant association between these two common chronic inflam- matory conditions. Periodontitis has very similar cytokine profiles to RA, consisting of persistent high levels of pro-inflammatory cyto- kines, including IL-1 β and tumor necrosis factor-alpha (TNF-α) and low levels of cytokines which sup- press the immuno-inflammatory re- sponse such as IL-10 and trans- forming growth factor-b (TGF-β). These cytokines, together with low levels of tissue inhibitors of metal- loproteinases (TIMPs) and high lev- els of MMPs and prostaglandin E2 (PGE2), are associated with the ac- tive stages of periodontitis. A pilot study done by Mercado F, Marshall RI, Klestov AC, Bartold PM disease investigated the prevalence of mod- erate to severe periodontitis was significantly elevated in individuals with RA (unadjusted relative risk of 4.7). In addition, the converse was also true in that periodontitis pa- tients had a higher prevalence of RA compared to the general population (unadjusted relative risk of 1.5). Emerging evidence suggests a strong relationship between the ex- tent and severity of periodontal dis- ease and RA. While this relation- ship is unlikely to be causal, it is clear that individuals with ad- vanced RA are more likely to expe- rience more significant periodontal problems compared to their non-RA counterparts, and vice versa. Hence, the possibility exists that both conditions result from a com- mon underlying dysregulation of

the host inflammatory response (10).

CONCLUSION:

Periodontal medicine is an emerg- ing branch of Periodontology and is still in a state of infancy. Observa- tional studies, particularly cross sectional and case controlled have reported association between perio- dontal disease and cardiovascular disease, adverse pregnancy out- comes, Diabetes Melitus, respira- tory diseases and arthritis. There are conflicting reports based on co- hort studies about relationship be- tween periodontitis and pregnancy outcome. Interventional studies have shown that periodontal treat- ment results in reduction of inflam- matory mediators and biological markers in patients of CVD and Pregnancy. Randomized control tri- als have indicated that periodontal treatment is not effective in preven- tion and treatment of cardiovascu- lar disease and adverse pregnancy outcome. However it is recom- mended that periodontal treatment should be carried after educating the patient in order to reduce the inflammatory burden. In future re- search should be conducted to ex- plore the effectiveness of periodon- tal treatment in the prevention of the above said diseases.

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