

Review Article

Periodontal Diseases and Systemic Conditions: A Comprehensive Review

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ABSTRACT

Periodontal disease is highly prevalent, contributing to the global burden of chronic diseases and constituting a major public health problem. The relationship between periodontitis and other pathological conditions could be established by the immunogenic potential of host and/or bacterial products that reach the bloodstream and target distant organs and systems. Hence; we planned the present review to highlight the association of periodontal diseases and systemic conditions.

Key words: Periodontitis, Systemic conditions.

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INTRODUCTION

The periodontal diseases are a diverse group of clinical entities in which induction of an inflammatory process results in destruction of the attachment apparatus, loss of supporting alveolar bone, and, if untreated, tooth loss. Periodontal disease is one of the most common diseases of the oral cavity and is the major cause of tooth loss in adults. There are two main categories of periodontal disease in which loss of supporting structures around the tooth occurs: chronic periodontitis and aggressive periodontitis. The diseases can be further characterized by the extent of bone loss (localized or generalized) and the severity of the disease (slight, moderate, or advanced). Most patients suffer from chronic periodontitis, an insidious disease in which the destruction is consistent with the presence of bacterial plaque and mineralized plaque or calculus.¹⁻³

Recent evidence suggests that periodontal infection may significantly enhance the risk for certain systemic diseases or alter the natural course of systemic conditions; and conditions in which influences of periodontal infection are documented include coronary heart diseases (CHD) and CHD-related events such as angina and infarction, atherosclerosis, stroke, diabetes mellitus; preterm labor, low-birth-weight delivery; and respiratory conditions such as chronic obstructive pulmonary diseases. This affiliation does not affect all but definitely affects several. Periodontitis initiates systemic

inflammation and can be monitored by inflammatory markers like C-reactive protein or fibrinogen levels.⁴

CARDIOVASCULAR DISEASES

Chronic periodontitis is associated with the incidence of coronary heart disease (CHD) among younger men, independent of established cardiovascular risk factors. Cumulative evidence supports a causal association between periodontal infection and atherosclerotic cardiovascular disease or its sequelae. The possible link may involve direct and indirect effects of the periodontal infection; an alternative pathway may be related to genetic and other host factors that increase the susceptibility to both atherosclerosis/thrombosis and chronic periodontitis. Studies have shown that periodontitis results in higher systemic levels of C-reactive protein, interleukin (IL)-6, and neutrophils. These elevated inflammatory factors may increase inflammatory activity in atherosclerotic lesions, potentially increasing the risk for cardiac or cerebrovascular events.⁵ These systemic markers of inflammation are also said to serve as predictors of present and future cardiovascular events and disease. In addition, oral bacteria have been found in carotid atheromas and it is reported that some oral bacteria may be associated with platelet aggregation, an event important for thrombosis. Evidence that suggests an

association between chronic oral infections and myocardial infarction had also been presented.^{6,7}

DIABETES MELLITUS

Diabetes is a group of metabolic diseases characterized by hyperglycemia and results from either a deficiency in the secretion of insulin and/or reduced insulin action. In type 1 diabetes, there is an absolute deficiency of insulin. In type 2 diabetes, there is the involvement of resistance to insulin and an inability of the pancreas to compensate for this resistance. Severe hyperglycemia can cause numerous symptoms, including polyuria, polyphagia, polydipsia, weight loss and blurred vision. There is peripheral vascular insufficiency, causing scarring disorders and physiological changes that reduce the immunological capacity, thereby increasing the susceptibility to infection. A greater glucose and calcium content in the saliva favors an increase in the amount of calculus and irritating factors to oral tissues, leading to periodontal disease, which is the most common dental manifestation in the oral cavity among diabetic patients (75%).^{8,9} Chronic periodontal disease and diabetes mellitus are common chronic conditions in adults throughout the world. Severe periodontal disease often coexists with diabetes and is considered the sixth most common complication of the disease. A number of studies have demonstrated that poor blood sugar control may contribute to poor periodontal health and that such individuals have a 2.8-fold greater chance of developing destructive periodontal disease as well as a 4.2-fold greater chance of having progressive alveolar bone loss. The increased risk of developing periodontal disease cannot be explained by age, gender or hygiene. The interrelationship between periodontal disease and diabetes provides an example of a systemic disease predisposing individuals to oral infection and, once the infection is installed, it exacerbates the systemic disease.¹⁰

PERIODONTAL DISEASE AND ADVERSE PREGNANCY OUTCOMES

There is a large body of evidence pointing to infection as a key factor in adverse pregnancy outcomes. Oral mechanical manipulation (e.g. tooth brushing, dental procedures, and even routine mastication) can cause bacteremia. Chronic periodontal infections can produce local and systemic host responses leading to transient bacteremia. Lipopolysaccharide (LPS) endotoxins and other bacterial substances can gain access to gingival tissue, initiate and perpetuate local inflammatory reactions, and consequently produce high levels of proinflammatory cytokines. Such activations of maternal inflammatory cell responses and cytokine cascades play important roles in the pathophysiological processes of preterm labour, low birthweight, and pre-eclampsia.¹¹ In addition, LPS, bacteria from subgingival plaque, and proinflammatory cytokines from inflamed periodontal tissue can enter the bloodstream, reach the maternal-fetal interface, trigger or worsen maternal inflammatory response, and increase plasma levels of prostaglandin and

cytokines (e.g. tumour necrosis factor). Thus, it appears that periodontal disease may play a nonspecific role in various adverse pregnancy outcomes.^{12,13}

PERIODONTAL DISEASES AND OSTEOPOROSIS

Osteoporosis is categorized into primary or secondary. Primary osteoporosis is associated with increased age and/or decreased sex hormones. Secondary osteoporosis implies an underlying cause such as usage of glucocorticoids, systemic diseases affecting bone turnover, or low calcium intake. Periodontal disease is a chronic destructive disease that may occur in adults, young people and children. Periodontal pathogens which are found in the dental biofilm result in inflammation of the gingiva which is called gingivitis.¹⁴⁻¹⁶ When periodontal tissue destruction and alveolar bone loss happen, it is called periodontitis. Periodontal disease and periodontal pathogen have been linked to several systemic diseases. There are many factors mentioned as periodontal risk factors such as gender, tobacco use, diabetes and nutrition, body mass index [BMI], socioeconomic status and access to dental care. By the way, it seems that some systemic conditions such as cardiovascular disease, diabetes mellitus, preterm birth, osteoporosis, respiratory disease and systemic infections are related to the periodontal status. Recently, some studies have reported an association between osteoporosis and bone loss in periodontal diseases. Discussions about the association between these two bone-damaging diseases began in 1960. Since both osteoporosis and periodontal diseases are bone destructive diseases, it has been hypothesized that osteoporosis could be a risk factor for the progression of periodontal disease. But some of the literature concluded that osteoporosis in human organs has no effect on the maxilla and mandible density.¹⁷⁻²⁰

CONCLUSION

Inflammatory processes can underlie the etiology of several pathological conditions ranging from metabolic to infectious diseases. Under the light of data published in the literature, it can be suggested that periodontal disease may be associated with systemic diseases.

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