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IP International Journal of Periodontology and Implantology

Journal homepage: <https://www.ijpi.in/>

Review Article

A literature review on periodontitis and systemic diseases

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ARTICLE INFO

Article history:

Received 20-05-2023

Accepted 07-06-2023

Available online 29-06-2023

Keywords:

Periodontitis

Oral pathogens

Inflammation

Health out comes

Systemic diseases

ABSTRACT

Periodontitis is found to be one of the most common infectious disease that is inflammatory in nature occurring in the oral cavity. A normal human being oral cavity contains variety of bacterias, that have the tendency to spread to different sites of the body that too particularly in the patients those are immunocompromised and ultimately results in the various systemic diseases. Maintenance of health of oral cavity is very much required and is a necessity as it is known as oral cavity is the mirror image of the systemic health of the individual.

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1. Introduction

Periodontitis is the inflammatory disease affecting the supporting tissue of the tooth or the teeth. Periodontitis is caused by specific organisms that ultimately results in the destruction of the periodontal ligament along with the alveolar bone. Periodontitis is found to be the most common inflammatory disease affecting the adult population. In the year 2010 it was revealed that a total of 3.9 billion of individuals in the world wide were affected by periodontal disease. United state center for disease control and prevention stated that periodontal disease is considered as a world wide pandemic that results in impairment of the speech and ultimately reduces the quality of the life. Periodontal infection act as a risk factor for different systemic diseases like, cardiovascular diseases, respiratory diseases, cerebrovascular diseases, Alzheimer disease, diabetes mellitus.¹⁻⁵

Pathogens of the periodontal diseases has the tendency of causing non oral diseases also, about mainly thirty gram negative species of the oral cavity are responsible for the

production of the endotoxins which directly or indirectly contribute in the development of the systemic diseases.

2. Etiopathology of the Periodontitis

Periodontitis affects the ten to fifteen percent of the population world wide, with the prevalence of occurrence of 66.2 % in the age group of fifteen years and 89.2 % of prevalence of occurrence in the age group of thirty five to forty five years. A variety of various gram positive and gram negative bacteria's were released from the dental plaque which colonize themselves around the tooth structure as well as colonizes themselves around the gingival margin and colonize themselves in the interproximal area of the tooth. The products that are released from these bacteria's are various endotoxins cytokines and protein toxins, that have a tendency to induce the host response by penetrating in to the gingival epithelium, and finally results in the inflammation of the gingiva. Evidence of inflammation visible with clinical changes in tissue like color from pink to red, swelling, and bleeding upon probing. These changes attributable by certain pathogens include aggregatibacter actinomycetecomitans, porphyromonas gingivalis, bacteroides forsythus, prevotella

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intermedia, *Campylobacter rectus*, *treponema denticola*, *fusobacterium nucleatum* etc. There are various risk factors that attributed in the development of the periodontal diseases like stress, diabetes mellitus, aging, consumption of alcohol and cigarette smoking.⁶⁻¹¹

3. Systemic Diseases and Periodontitis

It is the inflammation of the tooth supporting structure that is caused by specific microorganisms that ultimately results in the formation of the periodontal pocket which leads to the gingival recession and finally leads to the destruction of the bone. It has been stated that periodontitis is one of the predisposing factor in the development of the cardiovascular diseases, diabetes mellitus, respiratory diseases, cerebrovascular diseases, adverse pregnancy outcome alzheimers disease.¹²

4. Cardiovascular Disease and the Periodontitis

Studies identified *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans* and *Tannerella forsythia* as causative agents in periodontal disease. According to Noack - level of c reactive protein is high in patients with periodontitis, which is found to be an independent risk factor for the development of the cardiovascular disease. cardiovascular disease is characterized by the accumulation of the plaque which is inflammatory in the nature and results in the formation of thrombosis which ultimately leads to myocardial infarction. according to a meta analysis that combined five cohort studies stated that the patients having periodontal diseases having 1.14 time higher tendency of developing cardiovascular disease as compared to the patients who are not having any periodontal disease. periodontitis occur with such bacteria which are mechanically linked either directly or indirectly which are having the tendency of developing atherosclerotic disease.^{11,13-15}

5. Diabetes Mellitus

It is a metabolic disorder which is characterized by the chronic hyperglycemia and which is accompanied by the alteration of the metabolism of the carbohydrates, proteins and the lipids. In case of hyperglycemia patient immune system of the individual becomes weak, due to the destruction of the cells which are responsible for the production of the insulin. In a patient having diabetes mellitus there is destruction of the periodontal supporting structures, But in various studies it has been stated that periodontal disease is one of the etiological factor in the poor glycemic control in diabetes mellitus, this revealed that there is two way or interconnected relationship between diabetes mellitus and the periodontitis. Diabetes mellitus is found to be a metabolic disease and periodontitis is a disease of spreading of infection, which ultimately leads

to the formation of the mediators of the inflammations. A study revealed that there is a positive relationship between periodontitis and diabetes mellitus, by Pathak A K et al, in their study revealed that out of 300 individuals who all are having diabetes mellitus only 6.7 % of the individuals exhibit healthy periodontium, on the other hand 68.7 % of the individuals exhibited clinical condition of gingivitis and 25.3 % of the individuals exhibited periodontitis clinically as well as radio graphically. Occurrence of both the conditions simultaneously in an individual states direct interrelation between the two diseases clearly.¹⁵⁻¹⁹

6. Periodontitis and the Pulmonary Infection

It has been stated that infection from the oral diseases that too especially the periodontitis alters the course and the pathogenesis for various diseases which include pulmonary or the respiratory infection. Thoden Van Velzen et al stated that 100 million bacteria served as a reservoir for potential pathogens from one cubic millimeter of the dental plaque. Bacteria associated with oral and respiratory diseases shares the same mechanism of shedding of the bacteria in to the oral cavity in to the saliva and after than aspirated in to the lower respiratory tract which leads to the infection of the respiratory tract. According to a study conducted by monro et al the load of the oral bacterial increases during the time of the intubation and higher the dental plaque increases the risk for the development of the pneumonia. One of the study also revealed that different indexes like russell's periodontal index, periodontal index for risk of infectiousness, and papilla bleeding index, the values of these indexes are higher in the patients those are suffering from respiratory disease i.e. chronic obstructive pulmonary disease. This directly shows the interrelation between the periodontitis and respiratory infection.¹⁸⁻²¹

7. Cerebrovascular Disease

The various risk factors that are associated with the cerebrovascular disease includes high blood pressure, diabetes mellitus, hyperlipidemia, consumption of alcohol, smoking of cigarette. Studies stated that infectious and inflammatory diseases also plays role as etiological factor in the development of the cerebrovascular disease. The process of inflammation in the periodontitis if proceeded, it act as a high risk factor in the development to the cerebrovascular disease.^{11,13-20}

8. Adverse Pregnancy Out Come

Periodontitis is found to be one of the exceedingly prevalent condition during the time of the pregnancy and is having adverse outcome in terms of pre term deleivery, low birth weight of the baby, preeclampsia. Various researchers stated that, the transport of the different pro inflammatory mediators via hematogenous route from

the periodontal infection and reached the placenta or the amniotic cavity will induce pathology that will lead to adverse outcome.^{19–21}

8.1. Alzheimer disease

Alzheimer Disease is a progressive neurological disorder which is characterized by the irreversible impairment in the memory, impairment in the thinking process of the individual, impaired speech and impaired learning capacity of the individual. A study on oral health stated that individuals those are having neurological disorders always has a higher prevalence of poor oral health parameters along with they are having chronic generalized periodontitis. Alzheimer's disease (AD) is a fatal neurodegenerative disorder associated with inflammation including A β amyloid 1-42 peptide (A β 42), hyperphosphorylated tau protein (P-Tau). In periodontitis, inflammatory mediators and pathogens cause systemic infection due to that Blood Brain Barrier (BBB) of cerebral transport become compromised by microbial activation.^{15–19}

9. Conclusion

Periodontitis always serve as a connecting link between various systemic diseases. Periodontal disease predisposes to inflammatory mediators in systemic circulation hence prevention of periodontal disease progression is advisable to avoid its systemic outcomes.

10. Source of Funding

None.

11. Conflict of Interest

None.

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Cite this article: Kant K, Sahni A, Verma S, Chandela P, Janvi. A literature review on periodontitis and systemic diseases. *IP Int J Periodontol Implantol* 2023;8(2):94-96.