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Periodontitis and systemic diseases: A literature review

Dr Hiroj Bagde

Associate Professor, Department of Periodontology, Rama Dental College, Kanpur, UP

Email: hirojbagde8@gmail.com

Dr. Rachita Mustilwar

Lecturer, Department of Periodontology, Rural Dental College, PIMS (DU), Loni, Maharashtra

Email: dr.rachu@gmail.com

Dr Supriya Mishra

Resident, Department of Periodontology, Government Dental College and Hospital, Raipur

Email: dr.supriya4@gmail.com

Dr Palak Upadhyay

Reader, Department of Oral Pathology, Maitri Dental College, Durg

Email: drpalak22@gmail.com

Dr. Machireddy Bhavishyavani

General Dental Surgeon, Private Practitioner, Kukatpally, Telangana.

Email: bhavireddy4@gmail.com

Dr Lalit Darade

Lecturer, Department of conservative dentistry and Endodontics, D Y Patil School of Dentistry Nerul Mumbai

Email: drlalitdarade@yahoo.com

Abstract---The present study focus on the association of the periodontitis and the systematic diseases. Periodontics and the systemic diseases has increased over the years. The present study focus on different types of the systemic diseases and its association with the periodontics diseases. The literature review contains an introductory part in which discussion on the diseases given along with a conceptual framework. The present study contains periodontitis and cardiovascular diseases, pregnancy outcomes, respiratory diseases. In addition to that association with the diseases with cardiovascular diseases, diabetes shown. Literature gap, theoretical

approach and conclusion provided that provide a clear understanding of the topic.

Keywords---systemic disease, periodontitis, literature review.

Introduction

Periodontitis acts as a potential source of infection for systematic diseases with which it gets associated with such diseases. Periodontitis and systematic diseases often get associated as in recent years the number of periodontitis cases has increased. The present study focuses on the factors in which periodontal bacteria and its bi-products have a bi-directional relationship that links periodontitis and systematic diseases. Some common pathways found that stress with linked to oral infection along with secondary systematic effects. It includes metastatic injury from the influences of circulating oral microbial bacteria and the effects of circulating oral microbial toxins. The present study stresses the impact of oral as well as physical care on the wellbeing of the individual and the need to take precautions or treatment in case of periodontitis and co-morbidities.

Periodontitis and systematic disease

Systematic diseases refer to diseases that affect the human body parts as well as the whole body. Periodontal disease occurs due to infectious and inflammations in the gums and the bone surrounding the teeth. In recent years, the number of periodontitis and systematic diseases has increased risks in the health of the human body. Periodontal diseases and systematic diseases result mostly in adults due to a lack of dental care (1). During the year 1900, traces of the “focal infection” found that linked due to the occurrence of oral sepsis and diseases that affected other organs of the human body. In recent years, systematic diseases such as diabetes, cardiovascular disease, adverse pregnancy, respiratory disease, and cognitive impairment linked with the occurrence of periodontitis (2). In addition to that rheumatoid arthritis, metabolic syndrome, chronic kidney diseases, and cancer found in some patients that have associations with periodontitis.

The case of periodontitis shows that the pathogens become responsible for triggering the leukocytes of the human body mainly the innate immune system that realise the pro-inflammatory mediators. The mediators or the cytokines play an integral role in the development of chronic periodontitis (3). As they have the long term detrimental effects a relationship develop that gets associated with the systemic inflammation along with various biological phenomenon at both the functional and the molecular level. The origin of the disease traced back in terms of immune system response, oral microbiota, and genetics consisting of the host. The periodontitis and the systematic disses have complex responses in which inflammatory responses act as physiological reactions (4). Inflammation plays a dual role in that it protects the organism from bacterial infections so that they cannot reach the deeper tissue. In case the inflammation becomes persistent and deregulated it causes irreversible destruction of the tissues causing periodontitis.

The destruction of the periodontal tissues causes symptomatic consequences leading to periodontal pockets, tooth mobility or tooth migration. Studies show that periodontitis increases with age and teeth might get loose or in the worst case falls out. In the early stage periodontitis known as gingivitis where gums become swollen or red and can even bleed (5). Periodontitis occurs because of ill practice in oral hygiene and studies show that in men periodontitis cases have increased more than in women. The main cause that gets associated with the disease is bacteria infecting the mouth tissue that mainly surrounds the teeth which results in inflammation. The inflammation indicates that the person has developed a periodontitis (6). A person developing periodontitis feels pain while chewing as the gums become tender, red, bleed or swollen.

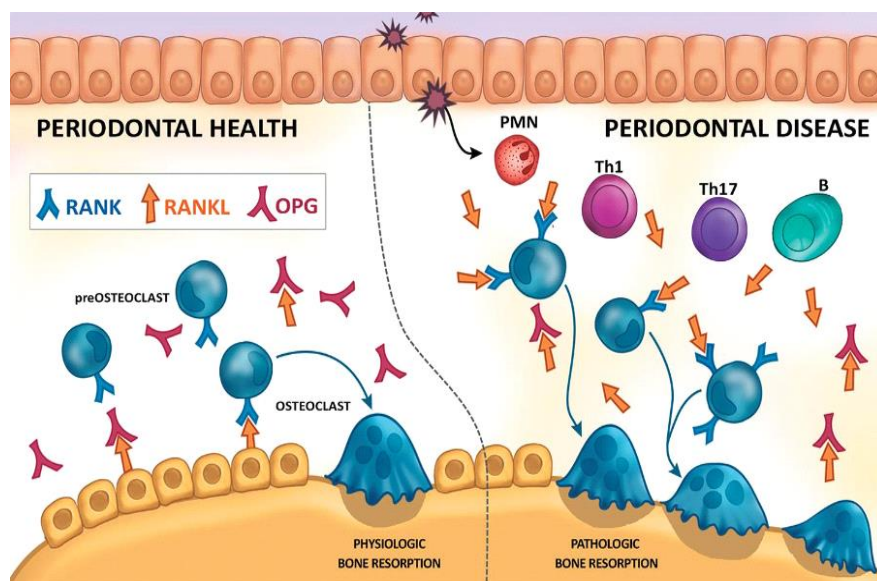


Figure 1: Periodontal disease osteo immunology (28)

The person who has developed a periodontitis feels a change in their teeth or the fit of partial dentures and develops bad taste or breath within their mouth. Besides poor oral hygiene, the factors that are a risk to periodontitis include smoking habits, crooked teeth, underlying immunodeficiency, fillings, and changes in the female hormones. Gingivitis treated with proper oral hygiene, however, when periodontitis develops the treatment becomes an expensive factor (7). The term “confounding” denotes the links between people who developed periodontitis and systematic diseases. Periodontitis and systematic diseases act as risk factors as they get associated with several factors such as obesity, age, smoking habits, or even social-economic status. Periodontitis and systematic disease are linked due to the shared similar disease pathways that link one to the other (8). Treatment by a periodontitis helps in reducing the symptoms or signs of a certain particular disease as they support a causative link.

The pathogenic mechanism associated with Periodontitis

Periodontitis and systematic disease can occur due to two main pathogenic mechanisms such as the direct mechanism and the indirect mechanism. In the

case of chronic periodontitis, the circulating bacteria directly affects the organs or certain organs of the human body (9). When chronic periodontitis develops the lining in the epithelium region or the periodontal pockets gets the sensation of inflammation as that part becomes ulcerated. This, in turn, provides a direct point of entry for the periodontal bacteria into the circulatory system. In the thrombi of patient's detection of periodontal bacteria found that acute myocardial infarction an outcome of direct entry. Pathological changes occur in such patients that occur due to the atheromatous plaques.

Indirect mechanisms result in chronic illnesses such as type 2 diabetes, cardiovascular diseases, and rheumatoid arthritis. In the case of an indirect mechanism, inflammatory responses occur as a response to the bacteria and their by-products that create systemic effects indirectly. Chronic periodontitis acts as a source of inflammation as they act as a contributing factor for the pathogens of other diseases that occur due to inflammation (10). C-reactive protein or the CRP in the blood shows the development of periodontitis in the human body that occurs due to the indirect mechanism (13).

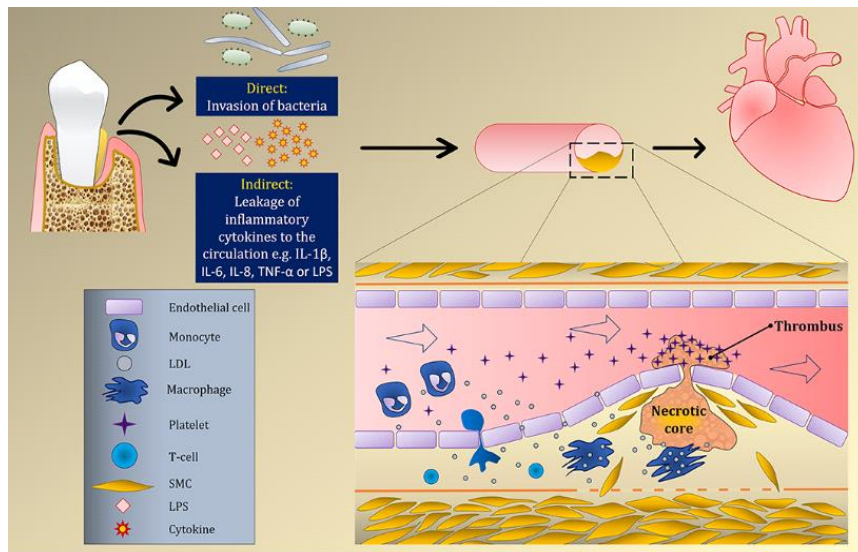


Figure 2: Molecular biology periodontitis (27)

Links between Periodontitis and different systematic diseases Periodontitis and cardiovascular diseases

Periodontitis and cardiovascular disease have an association that acts as confounding facts of risks for an individual. A condition known as atherosclerosis developed that becomes atherosclerotic cardiovascular disease where the walls of the artery thicken that happens due to the accumulation of calcium, as well as fatty materials, which develop plaques, and as a result, the arteries of the human heart stiffed and become hard. In such cases, stroke or aneurysm, myocardial infarction, and angina occur (11). Periodontitis occurs in such excess bacteria mechanistically linked directly or indirectly which also develops the atherosclerotic disease. A patient who has already developed periodontitis needs

to focus on the conditions of their health or vice versa. A person who has developed an illness due to that health or has suffered a stroke or similar issues needs to consider their oral hygiene (12). Any person needs to focus on certain risk factors such as hypertension, smoking, and obesity and take necessary precautions from their doctor.

Periodontitis and Adverse pregnancy outcome

Links between pregnancy and periodontitis found as maternal periodontal acts as a potential source of microorganisms. Towards the end gestation period, inflammation occurs in the case of pregnant women as microorganisms enter the body through direct or indirect mechanisms (14). When the microorganism enters the body it influences the health of the mother as well as the fetus causing premature birth, low birth weight as well as pre-eclampsia. Pregnant mothers need to focus on improving their oral health during pregnancy in order to gain benefits during that period. Pregnant mothers also develop signs of gingivitis that gets mainly associated with hormonal changes that need continuous or frequent monitoring (15). The absence of periodontitis in pregnant mothers shows improvement in oral health. In case of periodontitis develops during the pregnancy mothers need to focus on consulting the healthcare professional in order to get effective treatment so that they do not lose their teeth.

Periodontitis and diabetes

Diabetes occurs in the human body because of an increase in blood sugar or glucose levels. In the case of hyperglycaemic, the immune system of a person becomes weak as insulin-producing cells get destroyed (16). In the case of type 1 diabetes, the immune system gets affected and in the case of type 2 diabetes, the human body does not produce the required insulin. In type 2 diabetes, the cells most important become insulin resistant. Due to this, a relationship between diabetes and periodontitis develops that becomes bi-directional. In many cases, periodontitis due to the lack of control of glycaemia (17) have affected both diabetic and non-diabetic patients. A sense of chronic inflammation arises that connects both the periodontitis and the chronic inflammation.

Patients with diabetes need to a constant focus on their dental health as they remain at continuous risk of developing periodontitis. As the patients, face issues with their glycaemic control, their chances of suffering from the periodontitis increase (18). A person who has already developed periodontitis needs to focus on checking their blood sugar levels at a constant interval as it might link to further complications in the body. In case a person faces issues such as dry mouth due to taking medicines related to diabetes needs to receive a thorough dental examination (19). The person needs to focus on checking their heart or kidney as it might result in such other systematic diseases as well. In case they suffer a burning sensation in the mouth or candida infections also need to take the guidance of the healthcare professionals.

Periodontitis and neurological diseases

Periodontics often gets associated with neuroinflammation or neurological diseases. Cases of developing periodontal pockets have increased in the persons who have developed Parkinson's disease or other neurologically affected individuals (20). In the regions of the brain, motor disability, as well as cognitive impairment, occurs that diminishes the efficacy of oral hygiene. A person with a brain injury fails to take care of their oral health results in poor oral health parameters. Pro-inflammatory cytokines when released into the bloodstream systematically through the ulcerated periodontal pockets weaken the barriers in the blood of the brain that hampers neurons resulting in secondary micro logical cell activation.

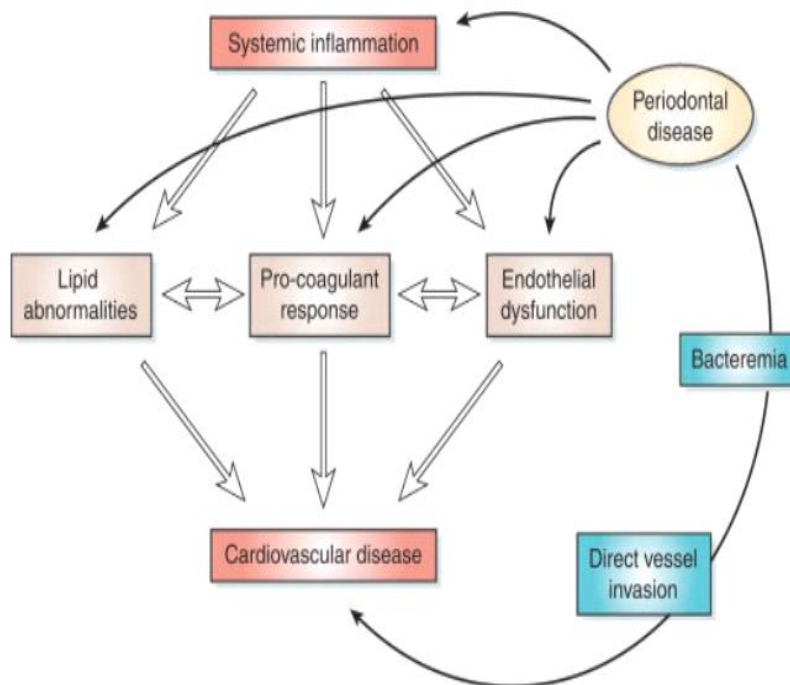


Figure 3: Impact of the periodontal disease on the pathogenesis of cardiovascular disease (29)

Periodontitis and other systematic diseases

Periodontitis gets associated with diseases such as choric kidney disease and other co-morbid conditions. A decrease in the functioning of the kidney arises when the kidney is unable to filter water from the human body (21). A person developing symptoms of chronic kidney disses needs to focus on their oral hygiene as complex pathogens enter the human body that has a direct link to periodontitis. Another systematic disease that has a link with periodontitis known as cognitive impairment. The systematic disease occurs due to dementia or Alzheimer's. Cognitive impairment and periodontitis occur due to the lack of knowledge of the patient to patient their oral health and it further develops as

signs of Alzheimer's progress. Accumulation of excessive fat in the human body or obesity adds as risk increases for the human body. A person who has acquired abnormal fat in their body has shown signs of periodontitis due to their unhealthy lifestyle. As obesity as the marker of an unhealthy lifestyle, the person shows signs of periodontitis that confounds the link.

A person who has developed cancer takes a certain amount of medicines that link to periodontitis. In the case of the development of cancer, a person feels an inflammatory sensation in their mouth (22). Cancer has confounding effects that include smoking as well as the socioeconomic status of an individual. Oro-digestive cancer or pancreatic cancer often gets associated with periodontitis as identified as a risk factor. Metabolic syndrome acts as multiple factors of risk that include hypertension, hyperglycaemia, and abdominal obesity, which become associated with periodontitis. Respiratory diseases such as pneumonia and COPD (chronic obstructive pulmonary disease) result in periodontitis. COPD occurs due to excessive smoking that obstructs the airflow progressively and inflames the airways. Pneumonia also relates due to lung infection, in recent years cases linked to periodontitis and pneumonia have increased. Pathogenic bacteria found in the oral cavity increase the risks of periodontitis, which requires improvement in oral health.

Treatment Linked to Periodontitis

The association between the systematic inflammation and the oral inflammation in the case of periodontitis has long-term detrimental effects that influence the systematic behaviours of different types of organs. In the case of gingivitis, taking good oral care and seeking the advice of a professional can help in treating the disease effectively. In case periodontitis develops, the person needs to consult a doctor for effective treatment (23). The process requires cleaning the root of the affected area and can even result in surgery. The three types of periodontal disease include chronic gingivitis, aggressive periodontitis, and generalized chronic periodontitis. The healthcare professional tests the disease according to the progression of the disease keeping in mind the co morbidity of the person (24). A person who developed periodontics teeth needs to focus on their lifestyles and get regular dental cleanings so that other co-morbidities or systematic diseases do not affect them.

The doctors often advise them to stop smoking or chewing tobacco as it might affect their hearts. In order to reduce the plaque, a person needs to focus on cleaning their teeth daily and seek the treatment of a doctor in case of the worst scenario (25). Non-surgical methods include scaling, antibiotics, and root planning when the periodontitis gets not progress into the advanced stage. When the period reaches the advanced stage methods including flap surgery, bone grafting, guided tissue regeneration, soft grafting of tissues, and professionals use tissue-stimulating proteins keeping in mind the other systematic disease that person has already developed.

Theoretical approach

According to the theory of the formation of a periodontal pocket becomes a crucial factor as it emphasizes “host-microbial interactions in periodontal diseases”. According to the theory of Wilkinson, pocket formation results due to the deficiency of vitamin A, which can act as a risk to systemic diseases (26). The theory proposed by Fish suggests that apical migration results in the destruction of gingival fibres of the epithelial attachment. Development of the periodontal pockets suggests that an individual has also developed signs of co morbidities.

Literature gap

The present study needs to focus on further areas related to the medical aspects of the cases of periodontal inflammation. The study needs to focus on the presence of oral pathogens and in which approach they relate to non-oral diseases for which therapeutic intervention along with drugs becomes a crucial factor. In addition to that, periodontitis linked to systematic bone loss not discussed. Besides systematic disease, the present study could not emphasize the COVID 19 and inflammation related to periodontitis.

Conclusion

An individual needs to focus on oral health as it has both direct and indirect impacts on human health. From the above discussion, it concludes that periodontitis and systematic health often linked as it influences human beings. With the increase in health problems of the unhealthy lifestyles, smoking, and socio-economic acts risk factor for both the systemic health and the development of periodontitis. The present study concludes that periodontitis associated with various systemic diseases such as diabetes, cardiovascular disease, pregnancy, obesity, and neurological diseases. The present study also focuses on the causative role and the patient's need to focus on good oral health. Periodontal diseases act as biomarkers for several diseases that require an effective diagnosis. Treating periodontal disease becomes a crucial factor as it shares risks and can influence positively on the systemic disease. Diet and a healthy way of living become crucial in the effective treatment of the chronic periodontitis as its co-morbidities.

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