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REVIEW ARTICLE

BEYOND THE ORAL CAVITY: THE SYSTEMIC IMPACT OF PERIODONTITIS. A NARRATIVE REVIEW

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Periodontitis is a chronic inflammatory disease of the supporting structures of the teeth, characterized by microbial dysbiosis and local tissue destruction. Increasing evidence demonstrates that its impact extends far beyond the oral cavity, influencing systemic health through mechanisms such as systemic inflammation, immune modulation, bacterial translocation, and endothelial dysfunction. This narrative review explores the relationship between periodontitis and a spectrum of systemic conditions, including cardiovascular diseases, diabetes mellitus, respiratory diseases, rheumatoid arthritis, chronic kidney disease, Alzheimer's disease, erectile dysfunction, cancer, metabolic syndrome, gut dysbiosis, and adverse pregnancy outcomes. The bidirectional nature of many of these associations highlights the importance of integrated care, early detection, and preventive strategies. Recognizing the oral–systemic health connection is essential for healthcare professionals to improve patient outcomes and for the development of public health strategies aimed at holistic well-being.

Keywords: periodontitis,cardiovascular diseases, diabetes mellitus, respiratory diseases, rheumatoid arthritis, chronic kidney disease, Alzheimer's disease, erectile dysfunction, cancer, metabolic syndrome, gut dysbiosis, pregnancy

INTRODUCTION

Oral health and general health are closely interconnected.[1] The oral cavity serves as the primary entry point to the body, where food intake begins and mastication enables the release and absorption of essential nutrients. Maintaining a healthy oral environment is therefore fundamental to overall systemic health.

Infections within the oral cavity can have consequences beyond the mouth. Routine activities such as biting and chewing may facilitate the entrance of oral bacteria into the bloodstream, allowing them to disseminate throughout the body and potentially affect distant organs.[2]

Despite the existence of thousands of scientific publications addressing this topic, awareness of this relationship remains limited among both the public and many healthcare professionals, including dentists.[3]

Periodontitis has been associated with a range of systemic conditions. This relationship is linked to its infectious nature, characterised by the presence of large numbers of pathogenic microorganisms, such as *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Fusobacterium nucleatum*. These pathogens can exert effects beyond the oral cavity by triggering systemic immune responses.[4]

Locally, this results in the destruction of the periodontal tissues.[5] However, the broader systemic implications are often underestimated: periodontitis may contribute to the development or progression of various systemic diseases.[6]

This article explores the relationship between periodontitis and systemic health.

1. Cardiovascular diseases

Cardiovascular diseases (CVD), including coronary heart disease, hypertension, and stroke, represent a major global health burden.[7] Increasing evidence indicates a significant association between periodontitis and cardiovascular conditions, mediated through mechanisms such as systemic inflammation, endothelial dysfunction, and shared risk factors (*Figure 1*).[8]

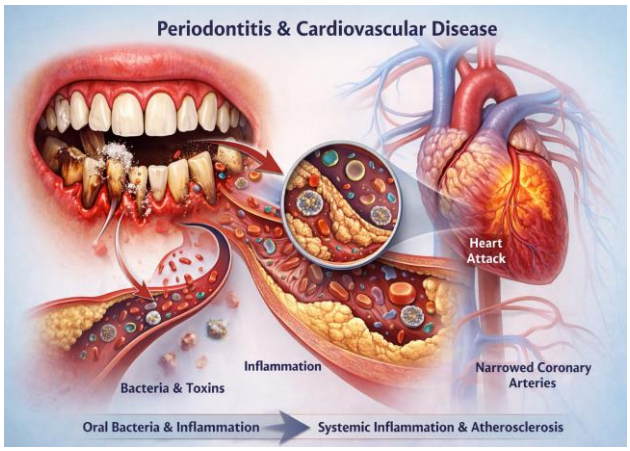

Figure 1. Relationship between periodontitis and cardiovascular disease.

The chronic inflammatory burden associated with periodontitis may contribute to the development of atherosclerosis through the accumulation of arterial plaques, thereby increasing the risk of myocardial infarction and other cardiovascular events. Epidemiological data suggest that periodontitis is associated with approximately a twofold increased risk of myocardial infarction and up to a threefold increased risk of stroke or transient ischaemic attack (TIA).[9,10] Furthermore, existing cardiovascular conditions may be exacerbated in the presence of ongoing oral infections.

Several biological mechanisms have been proposed to explain this relationship:

1. **Systemic inflammation:** Periodontitis is associated with elevated levels of systemic inflammatory markers, such as C-reactive protein (CRP), which play a role in the development and progression of atherosclerosis.[11]
2. **Endothelial dysfunction:** Periodontal pathogens and inflammatory mediators may enter the bloodstream, contributing to endothelial dysfunction, an early and critical step in atherogenesis.[12]
3. **Bacterial translocation:** Oral bacteria associated with periodontitis can disseminate systemically and may directly participate in the formation of atherosclerotic plaques.
4. **Immune response:** The host immune response to periodontal infection can amplify inflammatory processes within the vascular system, further promoting arterial damage.

In addition, periodontitis and cardiovascular diseases share several common risk factors, including smoking, diabetes mellitus, ageing, genetic predisposition, and dietary habits.[13] This overlap highlights the importance of early identification, preventive strategies, and a more integrated approach to patient care, addressing both oral and systemic health.

2. Diabetes

Diabetes mellitus is a chronic metabolic disorder characterised by elevated blood glucose levels, resulting either from insufficient insulin production (type 1-diabetes) or from insulin resistance (type 2-diabetes).[14]

There is a well-established bidirectional relationship between diabetes and periodontitis. Individuals with diabetes are more susceptible to periodontal disease, while the presence of periodontitis can adversely affect glycaemic control, thereby exacerbating diabetes.[15] It has been suggested that a large proportion of periodontal patients are at increased risk of diabetes (*Figure 2*).

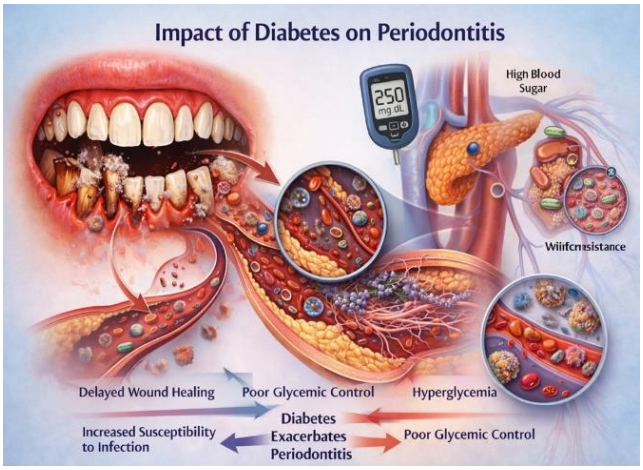

Figure 2. Relationship between periodontitis and diabetes

Diabetes influences periodontal health through several mechanisms:

1. **Impaired immune response:** Hyperglycaemia can compromise immune function, reducing the body's ability to combat periodontal infections.[16]
2. **Increased inflammatory response:** Elevated blood glucose levels enhance inflammatory activity, thereby accelerating periodontal tissue destruction.
3. **Delayed healing:** Diabetes is associated with impaired wound healing, which can hinder the recovery of periodontal tissues.[17]

Impact of periodontitis on diabetes

Conversely, periodontitis can negatively affect glycaemic control through multiple pathways:

1. **Increased insulin resistance:** Chronic inflammation associated with periodontitis can impair insulin sensitivity, making blood glucose levels more difficult to regulate.[16]
2. **Systemic inflammation:** Periodontitis elevates systemic inflammatory markers, which can further disrupt glucose metabolism.
3. **Complications in disease management:** Poor oral health may complicate the overall management of diabetes.[17]

Both conditions are associated with increased production of inflammatory cytokines, such as tumour necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6), which contribute to insulin resistance and tissue destruction. In addition, advanced glycation end-products (AGEs), which are elevated in diabetes, can accumulate in periodontal tissues, promoting inflammation and structural damage.[18] Increased oxidative stress, common to both diabetes and periodontitis, further contributes to tissue breakdown and the development of complications.[19]

These interrelated mechanisms underline the importance of early screening, continuous monitoring, and an integrated approach to care. Preventive and therapeutic strategies should address both conditions simultaneously. Maintaining optimal glycaemic control through diet, physical activity, and appropriate medication can reduce the risk and severity of periodontitis. Likewise, interventions aimed at reducing inflammation may have beneficial effects on both periodontal and systemic health.

3. Respiratory diseases

Respiratory diseases encompass a range of conditions affecting the lungs and airways, including chronic obstructive pulmonary disease (COPD), pneumonia, and asthma. Chronic periodontitis has been associated with an increased risk of developing such respiratory conditions.[20] This relationship is largely attributed to the aspiration of oral bacteria into the lower respiratory tract. A similar association has also been observed in relation to the severity of COVID-19 infections.[21]

The link between periodontitis and respiratory disease can be explained through several mechanisms:

1.Bacterial aspiration: Pathogenic oral bacteria may be aspirated into the lower airways, where they can contribute to respiratory infections. This risk is particularly significant in elderly individuals and in patients with compromised immune function.[22]

1. **Systemic inflammation:** Periodontitis can elevate systemic inflammatory markers, such as interleukin-6 (IL-6) and tumour necrosis factor-alpha (TNF-α), which may exacerbate chronic inflammatory respiratory conditions, including COPD and asthma.[23]
2. **Altered immune response:** The chronic immune activation associated with periodontal infection may impair the body's ability to effectively respond to respiratory pathogens.[20]
3. **Oral hygiene:** Poor oral hygiene increases the microbial load within the oral cavity, thereby elevating the risk of aspiration of pathogenic bacteria into the respiratory tract.[24]

These shared mechanisms highlight the importance of recognising oral health as a contributing factor in respiratory disease risk and progression. The same clinical principles outlined previously apply in this context. Management should focus on reducing periodontal inflammation, which may in turn lower systemic inflammatory burden and improve respiratory outcomes. In cases of significant bacterial infection, targeted antibiotic therapy may be considered as part of a comp

4. Rheumatoid arthritis

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterised by persistent inflammation of the joints, leading to pain, swelling, and progressive joint destruction.[25] Increasing evidence suggests an association between periodontitis and rheumatoid arthritis, with studies indicating that greater severity of periodontal disease may be linked to more severe manifestations of RA. Specific oral pathogens are believed to play a key role in this relationship (*Figure 3*).

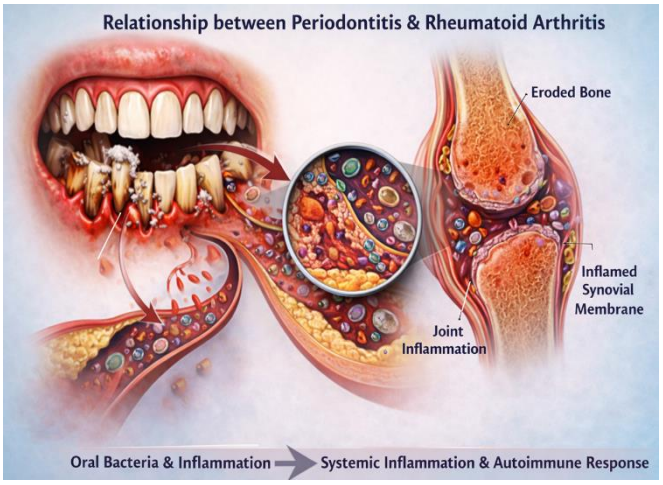

Figure 3. Relationship between periodontitis rheumatoid arthritis.

Several shared biological mechanisms underpin the association between these two conditions:

1. **Chronic inflammation:** Both RA and periodontitis are characterised by sustained inflammatory responses driven by an overactive immune system.[25]
2. **Cytokine production:** Elevated levels of pro-inflammatory cytokines, including tumour necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), and interleukin-6 (IL-6), are present in both diseases and contribute to tissue destruction.[26]
3. **Genetic predisposition:** Certain genetic factors, including shared susceptibility loci, may increase the likelihood of developing both RA and periodontitis.
4. **Autoimmunity:** The presence of autoantibodies, such as rheumatoid factor and anti-citrullinated protein antibodies (ACPAs), is a hallmark of RA and has also been observed in patients with periodontitis.[27]

The influence of periodontitis on rheumatoid arthritis extends beyond general inflammation. Periodontal pathogens, particularly Porphyromonas gingivalis, may enter the bloodstream and contribute to RA pathogenesis through mechanisms such as molecular mimicry and the citrullination of proteins.[28]

Conversely, rheumatoid arthritis may adversely affect periodontal health. The dysregulated immune response associated with RA can impair the host's ability to control periodontal infections. In addition, medications commonly used in the management of RA, including immunosuppressive agents, may increase susceptibility to oral infections or contribute to xerostomia, further compromising oral health.[29]

These interactions highlight the importance of recognising the bidirectional relationship between rheumatoid arthritis and periodontitis. As with other systemic conditions, clinical management should emphasise early detection, integrated care, and targeted preventive and therapeutic strategies.

5. Chronic kidney disease

Chronic kidney disease (CKD) is characterised by a progressive decline in renal function, which may ultimately lead to kidney failure. It is frequently associated with comorbid conditions such as cardiovascular disease and diabetes mellitus.[30] An increasing body of evidence suggests that periodontitis is associated with a higher risk of developing CKD.

This relationship is largely mediated by shared inflammatory pathways and bacterial factors. The coexistence of periodontitis and CKD contributes to an increased overall inflammatory burden, which has been linked to higher mortality rates (*Figure 4*).

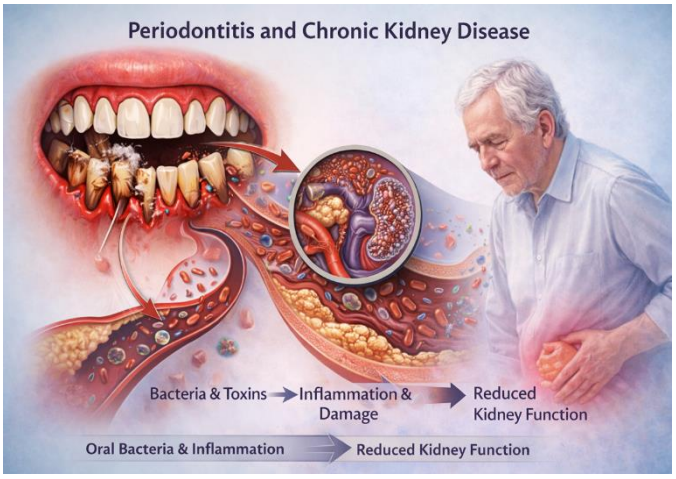

Figure 4. Relationship between periodontitis and chronic kidney disease.

Several common mechanisms underlie the association between these two conditions:

1. **Chronic inflammation:** Both CKD and periodontitis are characterised by persistent inflammatory responses. Periodontal inflammation can contribute to systemic inflammatory load, potentially accelerating the progression of renal dysfunction.[31]
2. **Immune system dysregulation:** CKD can impair immune function, increasing susceptibility to infections, including periodontal disease.[31]
3. **Shared risk factors:** Conditions such as diabetes mellitus and cardiovascular disease are recognised risk factors for both CKD and periodontitis.[31]

Periodontitis may influence CKD progression through several pathways:

1. **Systemic inflammation:** Periodontal infection can elevate systemic inflammatory markers, such as C-reactive protein (CRP), which may adversely affect renal function.
2. **Bacterial translocation:** Oral pathogens and their by-products can enter the bloodstream and may contribute to renal damage and disease progression.[32]
3. **Endothelial dysfunction:** Chronic inflammation associated with periodontitis can induce endothelial dysfunction, which plays a role in the progression of CKD.[33]

Conversely, CKD may negatively impact periodontal health through multiple mechanisms:

1. **Reduced immune function:** Impaired immune responses in CKD increase susceptibility to periodontal infections.[32]
2. **Altered oral environment:** CKD and its associated treatments can modify the oral environment, for example through reduced salivary flow, leading to increased plaque accumulation and a higher risk of periodontal disease.[31]
3. **Medication-related effects:** Pharmacological treatments for CKD, including immunosuppressive agents and antihypertensive medications, may adversely affect oral health and increase the risk of periodontitis.[34]

These bidirectional interactions emphasise the importance of recognising the link between oral and renal health. As with other systemic conditions, clinical management should focus on early detection, preventive strategies, and an integrated, multidisciplinary approach to patient care.

6. Alzheimer's disease

Alzheimer's disease is a progressive neuro-degenerative disorder characterised by cognitive decline, memory impairment, and behavioural changes.[35] Its pathophysiology involves three key processes: the accumulation of amyloid-beta peptides, the aggregation of hyperphosphorylated tau protein, and chronic neuroinflammation within the brain.[36]

Emerging evidence suggests an association between periodontitis and an increased risk of Alzheimer's disease (*Figure 5*).

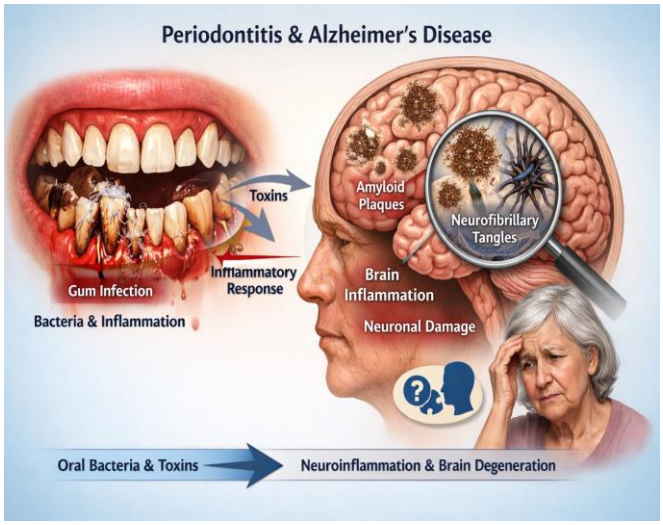

Figure 5. Relationship between periodontitis and Alzheimer's disease.

Periodontal pathogens may contribute to the enhanced production of amyloid-beta peptides, while both conditions are also linked to increased oxidative stress, which can lead to cellular and tissue damage.[37]

The potential impact of periodontitis on Alzheimer's disease can be explained through several mechanisms:

1. **Bacterial translocation:** Periodontal pathogens, particularly *Porphyromonas gingivalis*, may enter the bloodstream and reach the brain, where they may contribute to the formation of amyloid plaques and neurofibrillary tangles.[38]
2. **Inflammatory mediators:** Cytokines and other inflammatory mediators generated during periodontal infection may cross the blood–brain barrier, promoting neuroinflammation.[39]
3. **Immune response:** Chronic periodontal infection can induce a sustained systemic immune response, which may influence central nervous system function and contribute to neurodegenerative processes.

Epidemiological studies have reported a higher prevalence of periodontitis in individuals with Alzheimer's disease compared to cognitively healthy populations. Furthermore, there is evidence suggesting that periodontal treatment may reduce systemic inflammatory burden and potentially slow cognitive decline in affected individuals.[40]

These findings highlight the importance of early screening and diagnosis. In patients with Alzheimer's disease, proactive management of oral health is essential to prevent and control periodontitis. Conversely, in patients with periodontitis, monitoring of cognitive function may be considered as part of a broader, integrated approach to care.

7. Erectile dysfunction

Erectile dysfunction (ED) is defined as the persistent inability to achieve or maintain an erection sufficient for satisfactory sexual performance.[41]

The aetiology of ED is multifactorial and may include physical causes—such as cardiovascular disease, diabetes mellitus, and hormonal imbalances—as well as psychological factors, including stress, anxiety, and depression. Lifestyle factors, such as smoking, excessive alcohol consumption, and physical inactivity, also play an important role.[42]

The relationship between erectile dysfunction and periodontitis is an emerging area of research, with increasing evidence suggesting that periodontal health may influence sexual function (*Figure 6*).[43]

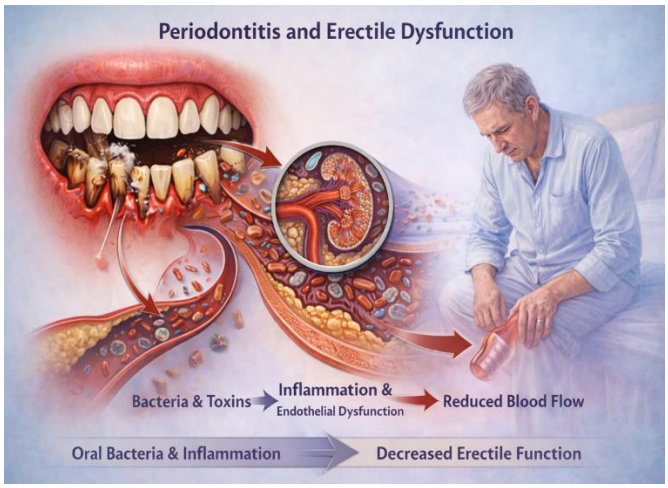

Figure 6. Relationship between periodontitis and erectile dysfunction.

Several shared mechanisms have been proposed to explain this association:

1. **Chronic inflammation:** Both ED and periodontitis are characterised by chronic inflammatory processes. Periodontal inflammation may contribute to elevated systemic inflammatory markers, such as C-reactive protein (CRP) and interleukins, which can adversely affect erectile function.[44]
2. **Endothelial dysfunction:** Periodontitis may contribute to endothelial dysfunction, impairing vascular integrity and blood flow. Chronic inflammation and oxidative stress associated with periodontal disease can compromise endothelial function, thereby limiting penile blood flow.[44]
3. **Cardiovascular health:** Both conditions are closely linked to cardiovascular health. Periodontitis may exacerbate cardiovascular disease, which is a well-established risk factor for erectile dysfunction.[45]
4. **Bacterial translocation:** Periodontal pathogens may enter the systemic circulation and negatively influence vascular health, which is essential for normal erectile function.[46]

Epidemiological evidence suggests that men with periodontitis may have an increased risk of developing erectile dysfunction. Furthermore, studies indicate that periodontal treatment may reduce systemic inflammatory burden and lead to improvements in erectile function.[47]

In addition to the clinical strategies outlined previously, lifestyle modifications remain essential. A balanced diet, regular physical activity, and smoking cessation should be encouraged as part of a comprehensive approach to both periodontal and systemic health.

8. Cancer

Cancer comprises a heterogeneous group of diseases characterised by uncontrolled cellular proliferation, with the capacity to invade surrounding tissues and metastasise to distant sites.[48]

An increasing body of evidence suggests associations between periodontitis and certain malignancies, including pancreatic and colorectal cancer.[49]

Shared risk factors include genetic predisposition, environmental exposures (such as smoking and radiation), and lifestyle-related factors, including diet and physical activity. In addition, chronic inflammation—such as that observed in periodontitis—is recognised as a contributing factor in carcinogenesis and tumour progression, partly through elevated levels of inflammatory cytokines and biomarkers. Increased oxidative stress, which may induce DNA damage and promote malignant transformation, is also a common feature of both conditions (*Figure 7*).[50]

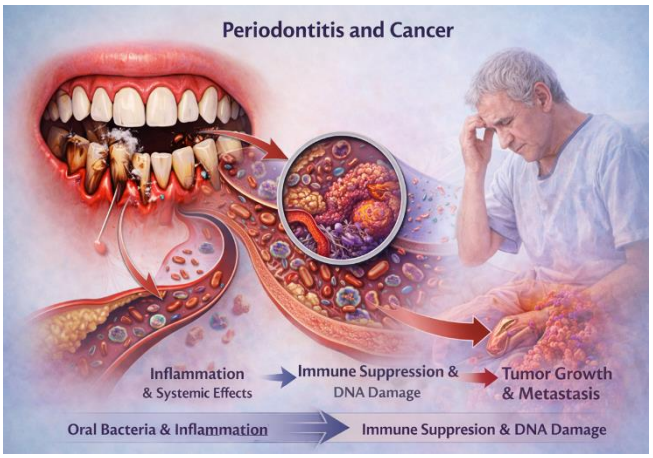

Figure 7. Relationship between periodontitis and cancer.

Specific periodontal pathogens, particularly *Porphyromonas gingivalis*, have been implicated in the development of certain cancers, potentially through mechanisms involving chronic inflammation and the release of bacterial virulence factors.

Types of cancer associated with periodontitis

- **Oral cancer:** There is evidence to suggest that periodontitis may act as a risk factor for oral cancer. The chronic inflammatory environment associated with periodontal disease may promote carcinogenic changes within oral tissues.[51]

- **Head and neck cancer:** Epidemiological studies have demonstrated associations between periodontitis and an increased risk of head and neck cancers, potentially mediated by sustained inflammatory processes.[52]
- **Colorectal cancer (CRC):** Current evidence indicates that periodontitis and oral pathogens, particularly *Fusobacteriun nucleatum* and *Porphyromonas gingivalis*, are significantly associated with CRC-development and progression.[53]
- **Other malignancies:** Some studies have suggested a possible association between periodontitis and pancreatic cancer; however, the current evidence remains less consistent and requires further investigation.[54]

Cancer and its treatment may also have significant effects on periodontal health. Chemotherapy and radiotherapy can adversely affect the oral environment, leading to xerostomia, mucositis, and an increased susceptibility to infections, including periodontitis. Furthermore, both the disease itself and its treatment can impair immune function, increasing vulnerability to periodontal disease. Changes in nutritional intake and oral hygiene practices during cancer treatment may further exacerbate periodontal conditions.

9. Metabolic syndrome

Periodontitis and metabolic syndrome are closely interconnected through shared pathways involving inflammation, insulin resistance, and alterations in the microbiome. Metabolic syndrome represents a cluster of conditions that collectively increase the risk of cardiovascular disease, stroke, and type 2 diabetes mellitus.[55]

It is characterised by several components, including central obesity (excess abdominal fat), hypertension, dyslipidaemia (abnormal cholesterol and triglyceride levels), insulin resistance, and a pro-inflammatory state marked by elevated inflammatory markers such as C-reactive protein (CRP) (Figure 8).[56]

Multiple mechanisms underpin the association between periodontitis and metabolic syndrome:

1. **Chronic inflammation:** Periodontitis contributes to systemic inflammation, reflected by increased levels of inflammatory markers such as CRP and cytokines (e.g. TNF-α, IL-6). This persistent inflammatory state is a key feature of metabolic syndrome and plays a role in the development of insulin resistance and endothelial dysfunction.[57]
2. **Insulin resistance:** Inflammatory processes associated with periodontitis may exacerbate insulin resistance by interfering with insulin signalling pathways.
3. **Microbiome dysbiosis:** Both conditions are associated with disturbances in microbial balance. Periodontitis is characterised by pathogenic oral microbiota, while metabolic syndrome is linked to alterations in the gut microbiome. Oral pathogens may enter the systemic circulation and influence gut microbiota composition, thereby contributing to metabolic disturbances.[58]
4. **Adipose tissue inflammation:** In metabolic syndrome, excess adipose tissue produces pro-inflammatory cytokines, which may further aggravate periodontal inflammation and tissue destruction.[59]
5. **Oxidative stress:** Both periodontitis and metabolic syndrome are associated with increased oxidative stress, contributing to cellular damage and the amplification of inflammatory processes.[60]

These shared mechanisms highlight the importance of an integrated approach to management. Lifestyle interventions are essential, including a balanced diet rich in anti-inflammatory nutrients (such as fruits and vegetables) and regular physical activity to improve insulin sensitivity and reduce systemic inflammation.

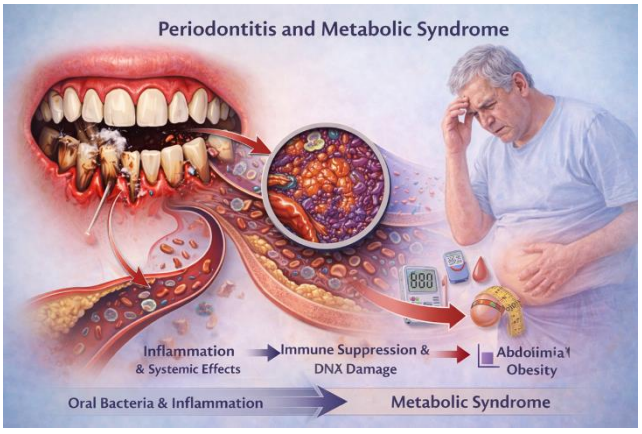

Figure 8. Relationship between periodontitis and metabolic syndrome.

Pharmacological strategies aimed at reducing inflammation and improving insulin sensitivity may benefit both conditions. In addition, the use of probiotics and prebiotics may help restore microbial balance and modulate inflammatory responses.[61]

10. Gut dysbiosis

Periodontitis and gut dysbiosis are interconnected through complex interactions between the oral and gut microbiomes, systemic inflammatory pathways, and

immune responses.[62] Gut dysbiosis refers to an imbalance in the intestinal microbiota, characterised by an overgrowth of pathogenic microorganisms—including bacteria, fungi, or viruses—and a reduction in beneficial microbial populations (*Figure 9*).

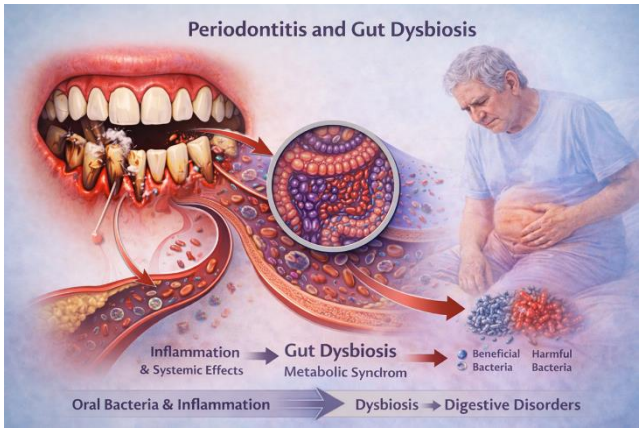

Figure 9. Relationship between periodontitis and metabolic syndrome.

This imbalance can impair digestive function, disrupt immune regulation, and negatively affect overall health.[63]

Dysbiosis may induce chronic intestinal inflammation, which can extend beyond the gastrointestinal tract and contribute to systemic inflammatory burden. It has been associated with conditions such as inflammatory bowel disease, irritable bowel syndrome, and various metabolic disorders.[64]

Several mechanisms underpin the relationship between periodontitis and gut dysbiosis:

1. **Systemic inflammation:** Periodontitis contributes to elevated systemic inflammatory markers, which may adversely affect gut health. Conversely, gut dysbiosis can promote systemic inflammation that may influence periodontal tissues.[62]
2. **Microbial translocation:** Oral bacteria may enter the systemic circulation and subsequently influence the composition of the gut microbiota. Notably, *Porphyromonas gingivalis* has been identified in the gastrointestinal tract and may contribute to dysbiosis.[65]
3. **Immune response:** Both conditions involve dysregulated immune responses to microbial imbalance, resulting in sustained inflammatory activity.
4. **Shared risk factors:** Factors such as diabetes mellitus, poor dietary habits, and smoking contribute to both periodontitis and gut dysbiosis.

In addition, antibiotic use can disrupt both oral and gut microbial ecosystems. Evidence suggests that management of periodontitis may positively influence gut health, and vice versa.[66] A comprehensive approach should include optimisation of oral hygiene, dietary modification, and strategies aimed at restoring microbial balance. Diets rich in fibre, prebiotics, and probiotics may support a healthy gut microbiome while also reducing systemic and periodontal inflammation.

11. Pregnancy

Pregnancy is not a pathological condition; however, it is accompanied by significant physiological changes that can influence oral health. Pregnant women with periodontitis have been reported to be at an increased risk of adverse pregnancy outcomes, as inflammatory mediators originating from periodontal infection may affect the foetal environment (*Figure 10*).[67]

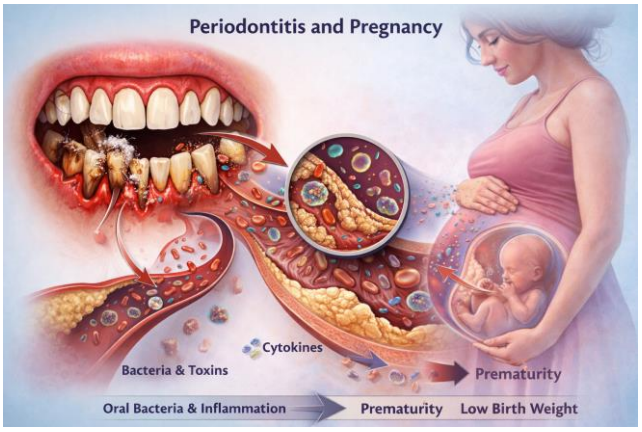

Figure 10. Relationship between periodontitis and pregnancy.

Impact of periodontitis on pregnancy
Periodontitis may influence pregnancy outcomes through several mechanisms:

1. **Preterm birth:** Periodontitis has been associated with an increased risk of preterm delivery (before 37 weeks of gestation). Inflammatory mediators produced in response to periodontal infection may enter the systemic circulation and contribute to the initiation of premature labour.[68]
2. **Low birth weight:** Inflammatory cytokines and bacterial endotoxins derived from periodontal infections may impair placental function, potentially resulting in low-birth-weight infants.[69]
3. **Preeclampsia:** Periodontitis has been linked to an increased risk of preeclampsia, a pregnancy complication characterised by hypertension and multi-organ involvement, most commonly affecting the kidneys.[70]

Impact of pregnancy on periodontal health

Pregnancy may also affect periodontal status through several pathways:

1. **Pregnancy gingivitis:** Elevated hormone levels can increase gingival sensitivity and susceptibility to inflammation, leading to pregnancy gingivitis. If left untreated, this condition may progress to periodontitis.[71]
2. **Exacerbation of existing periodontitis:** Hormonal changes during pregnancy may aggravate pre-existing periodontal disease, partly due to increased gingival blood flow and alterations in the immune response.[72]
3. **Altered oral hygiene:** Factors such as nausea, vomiting, and dietary changes may contribute to increased plaque accumulation, negatively affecting periodontal health.[73]

Underlying mechanisms

The interaction between pregnancy and periodontitis is influenced by several physiological processes:

- **Hormonal changes:** Elevated levels of oestrogen and progesterone may enhance the inflammatory response in gingival tissues.[74]
- **Immune system modulation:** Adaptations of the maternal immune system to support fetal development may alter the host response to periodontal pathogens.[75]
- **Increased inflammatory mediators:** Cytokines and prostaglandins produced during periodontal inflammation may influence pregnancy outcomes.[75]
- **Increased blood volume:** Enhanced vascularity may increase gingival sensitivity and bleeding tendency.[74]

Clinical considerations

These interactions highlight the importance of preventive and supportive care. Recommended measures include preconception counselling, regular dental assessments during pregnancy, reinforcement of oral hygiene practices, professional cleaning, nutritional guidance, and appropriate management of pregnancy-related symptoms such as morning sickness.

Limitations

This narrative review has several limitations. First, the included studies exhibit heterogeneity in design, populations, and outcome measures, which may limit direct comparisons. Second, much of the available evidence is based on observational studies, restricting the ability to establish definitive causal relationships. Third, variations in diagnostic criteria for periodontitis and systemic diseases may influence the consistency of reported associations.

Future Perspectives

Future research should focus on well-designed longitudinal and interventional studies to better elucidate causal mechanisms linking periodontitis and systemic diseases. Standardization of diagnostic criteria and outcome measures is essential to improve comparability across studies. Moreover, increasing emphasis should be placed on interdisciplinary approaches, integrating dental and medical care to optimize patient outcomes. Public health strategies should aim to enhance awareness among both patients and healthcare professionals regarding the oral–systemic health connection, ultimately promoting a more holistic model of healthcare delivery.

Summary

The impact of periodontitis extends well beyond the oral cavity. In addition to causing tooth loss, periodontal disease can have significant and far-reaching effects on overall health. Periodontal pathogens and their associated toxins may influence multiple organs and systems, contributing to systemic disease processes.

This underscores the broader responsibility of healthcare professionals. Dentists, alongside other medical practitioners, play an important role not only within their own discipline but also in supporting the general health of their patients through early detection, prevention, and interdisciplinary collaboration.

It is therefore essential to raise awareness among patients regarding the link between oral health and systemic health. Equally important is the need to increase awareness among healthcare professionals, fostering a more integrated approach to patient care that recognises the interrelationship between dentistry and general medicine.

DECLARATION

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