

## Periodontitis as a triggering factor for chronic systemic diseases. A Literature Review

Periodontitis como factor desencadenante de enfermedades  
sistémicas crónicas. Revisión bibliográfica.

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### INTRODUCTION.

Oral health is a fundamental part of the general health of the population, but is often seen as separate from general health measures.<sup>1</sup> There are several oral pathologies that are closely related to systemic complications, such as periodontal disease, which is characterized by producing a state of permanent inflammation in the tissues that surround and support teeth.<sup>2</sup>

If periodontitis is chronic, it can affect the body in general, causing a persistent state of systemic inflammation,<sup>3</sup> which increases the probability developing systemic diseases related to persistent inflammation, such as chronic diseases, or non-communicable diseases,<sup>4,5</sup> that are long lasting, slow progressing and are not easily cured, sometimes never at all.

These include cardiovascular diseases,<sup>3,6-9</sup> chronic respiratory diseases and diabetes,<sup>3,7,8,10,11</sup> all preventable and controllable conditions.

### MATERIALS AND METHODS.

Descriptive study; bibliographic review of scientific publications on periodontitis as a triggering factor for chronic systemic diseases.

The bibliographic search was carried out in *PubMed* and *SciELO* databases, in which the following terms were searched: “periodontal disease” and “systemic diseases”; “periodontal disease” or “periodontitis” and “systemic diseases”.

The inclusion criteria were articles published in English and in Spanish between April 2016 and June 2020.

The exclusion criteria were articles published more than 5 years prior in other languages than English and Spanish.

The selection of the articles was done through filters in the aforementioned search pages and then using the Mendeley application.

## RESULTS.

### Diabetes mellitus type 2

Regarding Diabetes Mellitus, six studies were selected in which a relationship was established: four studies showed a bidirectional relation,<sup>3,7,10,11</sup> one mentions diabetes as a risk factor for the development of periodontal disease<sup>8</sup> and one study on the association of interleukins (IL-1, IL-6 and TNF-alpha) with insulin resistance.<sup>12</sup>

### Liver disease

Two studies were found that related non-alcoholic fatty liver disease (NAFLD) to periodontitis. One mentioned the significant association between enzyme levels of NAFLD, which were higher when there were periodontal pockets greater than 4mm.<sup>12</sup> The other study described a correlation between IgG antibodies and periodontal pathogens which were higher when there was NAFLD.<sup>11</sup> Mention was also made of non-alcoholic liver cirrhosis: when both diseases were present there was a greater loss of clinical adherence, as well as an increase in dental calculus and progression of periodontal disease which could be related to decreased blood flow in the long gingival junction and increased serum alkaline phosphatase.<sup>11</sup>

### Rheumatoid arthritis

Three studies addressed rheumatoid arthritis; One established a bidirectional link between both pathologies,<sup>10</sup> and the other two studies indicated a possible association between the oral microbiota of periodontitis and the presence of antibodies associated with rheumatoid arthritis.<sup>9,12</sup>

### Osteoporosis

An increased risk of suffering from osteoporosis has been reported in the presence of periodontitis. Along with this increased risk, with a higher degree of inflammation and the presence of osteoporosis, there is a 6-fold increased risk of suffering from periodontitis.<sup>10</sup>

### Cancer

Three articles were found that report a positive association between periodontitis and pancreatic cancer.

Regarding squamous cell carcinoma, one study reported a statistically significant association,<sup>12</sup> one study described a greater probability of developing

squamous cell carcinoma, and another reported a positive correlation between this type of neoplasm and periodontitis.<sup>3</sup>

A positive correlation is described between lung cancer and periodontitis.<sup>3,13</sup> Other types of cancer are mentioned such are hepatocellular carcinoma, which is related to the stage of periodontitis,<sup>13</sup> oral cancer and head and neck cancer showing a positive correlation, adenoma-colorectal carcinoma associated with periodontal bacteria (*Fusobacterium nucleatum*) that contribute to the progression of the disease<sup>3</sup> and alveolar bone loss associated with periodontitis considered a risk factor for tongue cancer.<sup>13</sup> In addition, the oral microbiota is suggested to be a biomarker of these malignancies.<sup>3,12</sup>

### Alzheimer's disease

Five studies reported an association with Alzheimer's disease. One study described a link between the clinical signs of both diseases.<sup>10</sup> Three studies connected periodontal bacteria with the onset of Alzheimer's disease; one correlated it with periodontitis and the presence of *Porphyromonas gingivalis*.<sup>12</sup> Another study mentioned the direct invasion of bacteria into brain tissue,<sup>14</sup> and a third revealed an indirect increase in risk;<sup>3</sup> the last study reported that the inflammatory mediators of periodontitis can contribute, exacerbate, and share risk factors with neuroinflammatory diseases such as Alzheimer's disease.<sup>4</sup>

### Arterial hypertension

One study described a relationship between both diseases due to a systemic inflammatory reaction in response to periodontal bacteremia, which increases systemic blood pressure.<sup>11</sup>

### Atherosclerosis

Three studies were found that addressed atherosclerosis. In two, periodontitis is shown as a risk factor of said disease,<sup>11,15</sup> In the third study, *Treponema denticola* and *Porphyromonas gingivalis* increase the formation of aortic atherosclerosis in an animal model. In addition, this latter bacterium also increases the rate of platelet aggregation and can induce thrombosis *in vivo*.<sup>3</sup>

### Cardiovascular disease

Six studies mentioned cardiovascular disease.

One reported periodontitis as a risk factor<sup>6</sup> and

five studies<sup>3,7,8,9,12</sup> described a positive association between both pathologies. Of these, one states that suffering from periodontitis increases the risk of cardiovascular disease by 1.14 times, as well as raising the prevalence and incidence of the disease.

### Adverse Reactions In Pregnancy

Three studies reported the most common adverse reactions are premature birth, low birth weight and preeclampsia.<sup>8,12</sup> In one of the studies, spontaneous abortion, intrauterine growth retardation and neonatal sepsis<sup>3</sup> are also mentioned.

### Schizophrenia

One study associated both diseases bidirectionally. Inadequate plaque control due to mental illness and xerostomia resulting from the use of antipsychotic medication are mentioned as contributing to poor periodontal health. Likewise, the increase in *Porphyromonas gingivalis* due to periodontitis can modulate dopaminergic metabolism that leads to the development of schizophrenia.<sup>14</sup>

### Respiratory disease

Two studies were found that indicated a positive association between periodontal diseases and respiratory diseases. In both articles references are made to pneumonia as the main associated disease.<sup>3,7</sup> In addition, in one of them, other types of respiratory diseases are mentioned, such as asthma, bronchitis and chronic obstructive pulmonary disease.<sup>3</sup>

### Metabolic syndrome

One study refers to metabolic syndrome and reports that the main common connection between both diseases is oxidative stress, also pointing out a bidirectionality with dysglycemia.<sup>2</sup> In the mentioned study, the main associated diseases described are obesity, atherogenic dyslipidemia, hypertension and hyperglycemia.

### Beneficial effects of treatment

One article suggested periodontal treatment is beneficial at a systemic level, reporting that periodontal treatment reduces systemic inflammation, thus contributing to the control of systemic diseases.<sup>10</sup>

### Knowledge of dentists of the link between oral health and systemic health

A study of surveys conducted among dentists concluded that oral health is related to systemic health, that oral disease has a negative impact on

quality of life, and that if patients were aware of the relationship between oral and general health they would seek oral care.<sup>1</sup>

## CONCLUSION.

When analyzing the cited studies, most showed a close relationship between periodontal disease and systemic diseases, also known as chronic non-communicable diseases.

This relationship is bidirectional,<sup>2,10</sup> as the periodontal status has a systemic influence and systemic diseases affect oral health. The parallel treatment of both variables allows for the improvement of a patient's quality of life.<sup>10</sup> Prevention measures for periodontal disease should be aimed at periodontal health, prompt diagnosis and treatment since it has been shown that periodontal treatment in patients with periodontal disease (of varying severity) helps to control systemic inflammation, and therefore, to better manage chronic systemic diseases. An integrated work between dentists and doctors will be the best ally to achieve a good general state of health of the patient.

The existence of a direct relationship between periodontitis and systemic diseases can be concluded. Therefore, it is of utmost importance to encourage the participation of the different healthcare specialists, thus achieving adequate communication and interdisciplinary work.

With these previously exposed measures, the patient will be able to value their oral health as an integral part of their systemic health, and to understand its relevance in improving their quality life.<sup>1</sup>

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