

The impact of oral infections on diabetes mellitus

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Abstract

Diabetes mellitus is a metabolic disease and is expressed as a chronic health condition with hyperglycemia, resulting from a defect in the secretion or utilization of insulin or a combination of the two. Scientific research has offered considerable data to prove the two-way link between diabetes mellitus and oral infections, specifically periodontal disease. The main focus of the review article is the biological mechanisms associated with the two health conditions, the current clinical data, and the multidisciplinary approach in the management of diabetic patients.

Keyword: Diabetes mellitus; Periodontitis; Oral infection; Inflammation; HbA1c; Insulin resistance; Periodontal pathogens

1. Introduction

Diabetes Mellitus (DM), one of the most common chronic conditions, is a major public health challenge worldwide {1,2,3}. Chronic hyperglycemia, a condition of high blood glucose, is associated with systemic complications, including nephropathy, neuropathy, retinopathy, heart disease, and other conditions. In addition to the classical complications, periodontal disease is also implicated as the "sixth complication" of diabetes {4}.

Oral infections, especially periodontitis, are chronic inflammatory diseases resulting from pathogenic microorganisms present in dental biofilm. The relationship between diabetes and gum disease is viewed as a two-way process, with diabetes increasing the likelihood and severity of periodontal disease, as well as affecting blood sugar levels {5,6,7}.

2. Oral Microbiota and Periodontal Infection

The mouth hosts a diverse microbiome that includes over 700 different bacterial species. Periodontal disease is closely linked to Gram-negative anaerobic pathogens such as {6,7,11}

- *Porphyromonas gingivalis*
- *Tannerella forsythia*
- *Treponema denticola*
- *Fusobacterium nucleatum*

These microbes trigger the body's immune system, causing a state of chronic inflammation, damage to connective tissues, and loss of alveolar bone. The immune system is altered, and neutrophil activity is decreased, affecting the progression of diabetes.

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2.1. Pathophysiological Mechanisms Linking Oral Infection to Diabetes

Several biological mechanisms explain how oral infections influence diabetes:

2.2. Systemic Inflammatory Response

Persistent periodontal infections increase systemic concentrations of pro-inflammatory cytokines, which include:

- Interleukin-1 β (IL-1 β)
- Interleukin-6 (IL-6)
- Tumor necrosis factor-alpha (TNF- α)

These mediators interfere with insulin signaling pathways, promoting peripheral insulin resistance.

2.3. Bacterial Endotoxins

Lipopolysaccharides (LPS) originating from Gram-negative bacteria that penetrate the bloodstream activate inflammatory pathways and elevate oxidative stress levels, which negatively affects glycemic regulation{6,11}.

2.4. Advanced Glycation End Products (AGEs)

Hyperglycemia facilitates the production of AGEs, which build up in periodontal tissues and engage with their receptors (RAGE), thereby intensifying both local and systemic inflammation{6,11,12}.

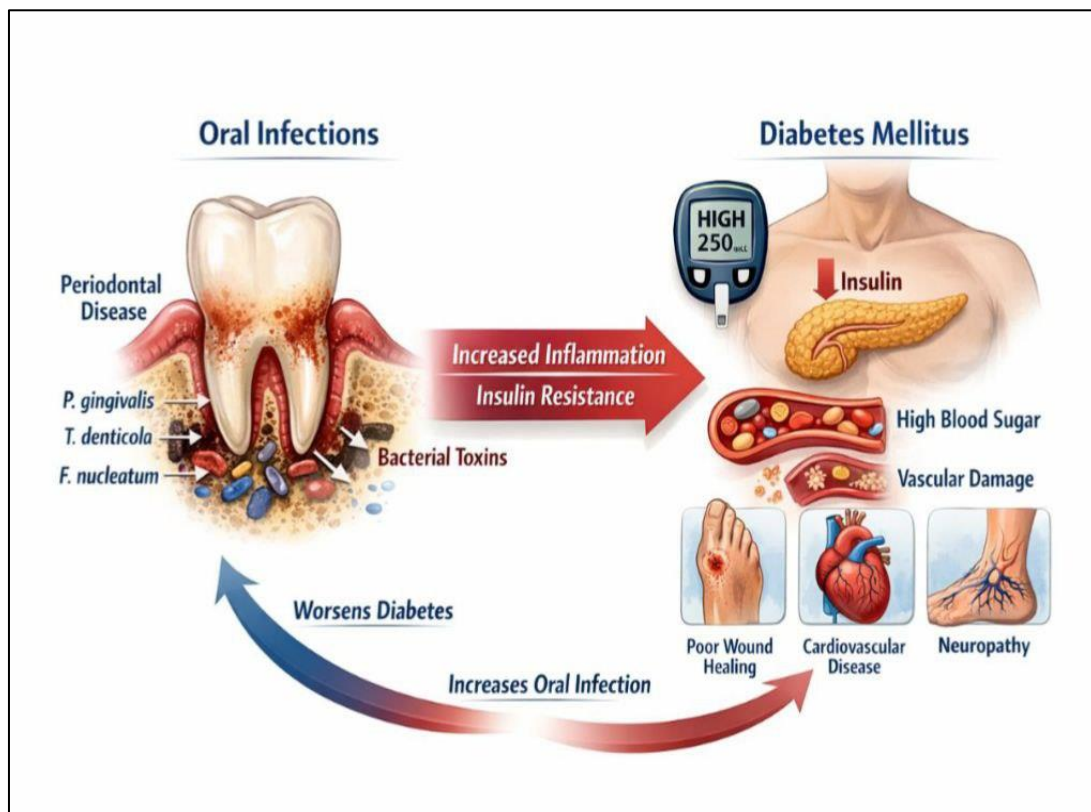


Figure 1 Associations of DM infection

3. Clinical and Epidemiological Evidence

Indeed, a vast body of observational and interventional studies has documented a two-way relationship :

- When diabetes is not well managed, the prevalence and severity of periodontitis increase{5,6,9}.
- Conversely, the management of periodontitis by means of scaling and root planning has consistently been documented to reduce HbA1c levels by 0.4-0.6% in numerous trials.

Moreover, the improvement in periodontal health has been noted to reduce systemic inflammatory levels{8,10}.

4. Conclusion

This review conclude the dm patients has harmful effect on general health, oral infection of dm patient which cause inflammations in gum and tongue also that may lead to bleeding and other Pathological complications.

References

- [1] American Diabetes Association. Standards of Care in Diabetes—2024. *Diabetes Care*. 2024;47(Suppl 1):S1–S350.
- [2] International Diabetes Federation. *IDF Diabetes Atlas*. 10th ed. Brussels, Belgium: IDF; 2021.
- [3] World Health Organization. *Global report on diabetes*. Geneva: WHO; 2016.
- [4] Loe H. Periodontal disease: The sixth complication of diabetes mellitus. *Diabetes Care*. 1993;16(1):329–334.
- [5] Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases. *Annals of Periodontology*. 2001;6(1):99–112.
- [6] Preshaw PM, et al. Periodontitis and diabetes: a two-way relationship. *Diabetologia*. 2012;55(1):21–31.
- [7] Chapple IL, Genco RJ. Diabetes and periodontal diseases: consensus report of the Joint Workshop. *Journal of Clinical Periodontology*. 2013;40(S14):S106–S112.
- [8] D'Aiuto F, et al. Periodontal therapy and glycaemic control in type 2 diabetes: systematic review and meta-analysis. *The Lancet Diabetes & Endocrinology*. 2018;6(12):954–965.
- [9] Sanz M, et al. Scientific evidence on the links between periodontal diseases and diabetes: consensus report (EFP/AAP Workshop). *Journal of Clinical Periodontology*. 2018;45(2):138–149.
- [10] Simpson TC, et al. Treatment of periodontal disease for glycaemic control in people with diabetes mellitus. *Cochrane Database of Systematic Reviews*. 2022;Issue 4:CD004714.
- [11] Polak D, Shapira L. An update on the evidence for pathogenic mechanisms linking periodontitis and diabetes. *Journal of Clinical Medicine*. 2023;12(5):1843.
- [12] Graziani F, et al. Periodontitis and systemic diseases: updated consensus report. *Journal of Clinical Periodontology*. 2023;50(S26):S178–S195.