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# REVIEW OF CLINICAL PAPERS

## EDITION ONE

# 1. PERIODONTAL DISEASE AND DIABETES

*Professor Philip Preshaw, Specialist in Periodontics, Visiting Professor, Newcastle University*

People with diabetes are more prone to gum disease, especially if their diabetes is poorly controlled. Good oral hygiene and regular dental check-ups are particularly important for people with diabetes.

## What is periodontal disease?

Periodontal disease is the scientific name used to describe gum disease. There are two common forms of periodontal disease. The first is called gingivitis, which is mild inflammation of the gums. The other, more serious, form of gum disease is called periodontitis, in which there is more advanced inflammation of the gums, and the bone that holds the teeth in place begins to be gradually destroyed. If you have diabetes you are more likely to have periodontal disease. There is increasing evidence that serious gum disease can also make it harder for you to control your diabetes. Reassuringly, treatment of the gum disease can improve this problem.

## How is periodontal disease linked with diabetes?

In the general population, around 10% of all adults suffer from advanced periodontitis. The risk of developing periodontitis is approximately three times higher in people with diabetes, particularly if their diabetes is poorly controlled. We still do not know the precise reasons why people with diabetes are more likely to suffer from periodontal disease, and this is an ongoing area of research. There are probably several factors which are important, including:

- The immune system may not function properly in people with diabetes, thereby increasing the risk of periodontal disease.
- Excess lipid tissue (body fat) in obese people with diabetes may produce chemicals which make the gums more likely to become inflamed.
- Damage to capillaries (the small delicate blood vessels) in the gums may reduce the blood supply to the gums, thereby limiting the actions of defence cells.
- Wound healing is impaired in diabetes, and therefore, healing in the gums is also reduced.

The key thing to remember is that glycaemic control (of blood sugar levels) seems to be very important in determining how likely someone may be to develop periodontal disease.
Previous research has suggested that people with diabetes with good glycaemic control did not have any greater risk of periodontal disease than people without diabetes. In the other direction, gum disease might affect your diabetes by increasing inflammation in your body and reducing how well your own insulin works.

*Source:* *Diabetes Research and Wellness Foundation. V5.0 published: April 2019*

## 2. DIABETES AND PERIODONTAL DISEASE

Diabetes mellitus – a condition in which the body is unable to control its sugar levels properly - is an increasingly common disease in Western countries, affecting at least 5% of the population. In fact, it is thought likely that only about half of people affected with diabetes have actually been diagnosed. Overall, 80% of known diabetics are more than 40 years of age, with just 0.05% below the age of 15 years.

Dentists now know that, in patients with diabetes, untreated periodontal disease progresses very rapidly, often leading to early tooth loss. In addition, wound healing following dental extractions is often very slow and inefficient in these individuals. Other problems that might be encountered are abscesses (painful infections), gingivitis with ulcers or sores, and fissures or cracks at the corners of the mouth. Anti-diabetic medications may also cause a patient to suffer from a very dry mouth, which makes dental decay more likely.

Patients with Type 1 (primary, insulin-dependent) diabetes and the more common Type 2 (non-insulin dependent) diabetes each have a three times greater risk of periodontitis, compared with non-diabetic individuals. There is also a higher chance that they will suffer bone loss and experience an active and rapid form of the disease. In turn, the presence of unrecognized or untreated periodontitis makes it more likely that their diabetes will be poorly controlled. Therefore, treatment of periodontal disease in diabetic patients is crucial, not only to preserve the teeth, but to help prevent possible complications of uncontrolled diabetes.

### Self-care at home

Your co-operation with the oral hygiene recommendations of your dentists is vital to the success of preventive treatment. It is essential that you maintain a regular and thorough cleaning routine at home, including careful tooth brushing twice daily and interdental cleansing once daily. Fluoride toothpastes, mouthwashes and gels will help provide protection against tooth decay.

*Source:* *European Federation of Periodontology 2015*

## 3. PERIODONTAL DISEASE AND DIABETES - A TWO-WAY STREET

*Brian L. Mealey, DDS, MS*

Background: The association between diabetes and inflammatory periodontal diseases has been studied extensively for more than 50 years. The author reviews the bidirectional relationships between diabetes and periodontal diseases.

Conclusions: A large evidence base suggests that diabetes is associated with an increased prevalence, extent and severity of gingivitis and periodontitis. Furthermore, numerous mechanisms have been elucidated to explain the impact of diabetes on the periodontium. While inflammation plays an obvious role in periodontal diseases, evidence in the medical literature also supports the role of inflammation as a major component in the pathogenesis of diabetes and diabetic complications. Research suggests that, as an infectious process with a prominent inflammatory component, periodontal disease can adversely affect the metabolic control of diabetes.
Conversely, treatment of periodontal disease and reduction of oral inflammation may have a positive effect on the diabetic condition, although evidence for this remains somewhat equivocal.

Clinical implications: Patients with diabetes who have periodontal disease have two chronic conditions, each of which may affect the other, and both of which require frequent professional evaluations, in-depth patient education and consistent educational reinforcement by health care providers.

*Source:* *JADA 2006;137(10 supplement):26S-31S. JADA, Vol. 137 http://jada.ada.org October 2006*

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## 4. BRITISH DENTAL JOURNAL | VOLUME 223 NO. 5 SEPTEMBER 8 2017

Poorly managed blood sugar levels in people with diabetes uses damage to nerves, blood vessels, the heart, the kidneys, the eyes and the feet. In the same way, the periodontium can also be affected. The damage to the blood vessels makes infections of the soft tissues and the bone supporting the teeth more likely. Poorly controlled blood sugar levels lead in turn to a rise in sugar levels in saliva, which increases the formation of dental plaque. Evidence shows that severe periodontal disease can increase blood sugar levels in people with diabetes and also in those who do not have diabetes. Interestingly, there is some scientific evidence to suggest that having periodontal treatment can improve long-term blood glucose levels in people with poor control. This in turn lowers the risk of experiencing the other common long-term complications of diabetes, including heart and kidney disease. In other words, we now know that periodontal disease and diabetes are linked in both directions. Keeping blood glucose levels low and stable can reduce the risk of periodontal disease, and looking after oral health could help to improve long-term outcomes in people living with diabetes.

## 5. OXIDATIVE STRESS, SYSTEMIC INFLAMMATION, AND SEVERE PERIODONTITIS

*F. D'Aiuto, L. Nibali, M. Parkar, K. Patel, J. Suvan, and N. Donos*

### Abstract:

Periodontal infections have been associated with a state of chronic inflammation. To ascertain whether severe periodontitis and its treatment are associated with oxidative stress, we recruited 145 cases (periodontitis) and 56 controls in a case-control study. A further pilot intervention study of 14 cases (periodontal therapy) was performed. Blood samples were taken at baseline (case-control) and 1, 3, 5, 7, and 30 days after treatment (intervention). Diacron-reactive oxygen metabolites (D-ROM), anti-oxidant potential, C-reactive protein (CRP), interleukin-6, and lipid profiles were determined with high-sensitivity assays in serum. Patients with severe periodontitis exhibited higher D-ROM levels ($P < 0.001$) and lower total anti-oxidant capacity ($P < 0.001$) compared with healthy control individuals. These findings were independent of age, gender, smoking habits, ethnicity, and standard lipids differences. D-ROM levels were positively correlated with CRP ($R = 0.4$, $P < 0.001$) and clinical periodontal parameters ($R = 0.20$, $P < 0.05$). Acute increases of D-ROM ($P < 0.01$) were observed following periodontal therapy. Analysis of these data suggests a positive association between severe periodontitis and oxidative stress.

*Source:* *J Dent Res. 2010 Nov; 89(11): 1241–1246*

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## 6. DIABETES AND PERIODONTAL DISEASE: A TWO-WAY RELATIONSHIP.

*Casanova L, Hughes FJ, Preshaw PM.*

### Abstract:

Periodontitis and diabetes are common, complex, chronic diseases with an established bidirectional relationship. That is, diabetes (particularly if glycaemic control is poor) is associated with an increased prevalence and severity of periodontitis, and, severe periodontitis is associated with compromised glycaemic control. Periodontal treatment (conventional non-surgical periodontal therapy) has been associated with improvements in glycaemic control in diabetic patients, with reductions in HbA1c of approximately 0.4% following periodontal therapy. For these reasons, management of periodontitis in people with diabetes is particularly important. The dental team therefore has an important role to play in the management of people with diabetes. An emerging role for dental professionals is envisaged, in which diabetes screening tools could be used to identify patients at high risk of diabetes, to enable them to seek further investigation and assessment from medical healthcare providers.

*Source:* *Br Dent J. 2014 Oct;217(8):433-7. doi: 10.1038/sj.bdj.2014.907*

## 7. CORRELATION BETWEEN SALIVARY GLUCOSE LEVEL AND GINGIVITIS IN PATIENTS WITH DIABETES

*Sadia Iqbal, Saad Asad, Farhat Kazmi, Fareeha Bokhari*


### Abstract:

**Introduction:** Type 1 Diabetes has been linked with an increased risk of gingivitis and periodontal disease. Patients with periodontal disease and/or diabetes show differences in the profile of constituents in whole saliva. This profile reflects the nature and amplitude of the host response to a periodontal microbial challenge and /or response to diabetes mellitus.

**Objectives:** To compare gingival health between control group and patients with type I Diabetes and to assess whether there is any association between gingivitis/periodontitis and salivary glucose level.

**Patients and methods:** Study was conducted on 90 subjects; 30 control and 60 diabetics. Gingival and periodontal status was assessed for both the groups clinically. Then unstimulated whole saliva samples from diabetics and control group were collected stored and frozen at -20 C. Saliva samples were then thawed, centrifuged and its supernatant portion was analyzed by Dimension Clinical Chemistry System for Salivary glucose levels. SPSS 17.0 was used for statistical analysis.

**Results:** Results showed that gingivitis was statistically significantly higher among the type I diabetic patients when compared with the control group $p < 0.05$.

**Conclusion:** It was concluded that gingival health was compromised in diabetic children. It was also concluded that salivary glucose levels were higher in the patients with type I as compared to control group.



*Source:* *Journal of Islamabad Medical & Dental College (JIMDC); 1211(1):10-13*


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## 8. SCIENTIFIC EVIDENCE ON THE LINKS BETWEEN PERIODONTAL DISEASES AND DIABETES: CONSENSUS REPORT AND GUIDELINES OF THE JOINT WORKSHOP ON PERIODONTAL DISEASES AND DIABETES BY THE INTERNATIONAL DIABETES FEDERATION AND THE EUROPEAN FEDERATION OF PERIODONTOLOGY

*Sanz, Mariano; Ceriello, Antonio; Buysschaert, Martin; Chapple, Iain; Demmer, Ryan T.; Graziani, Filippo; Herrera, David; Jepsen, Søren; Lione, Luca; Madianos, Phoebus; Mathur, Manu; Montanya, Eduard; Shapira.*


### Abstract:

**Background:** Diabetes and periodontitis are chronic non- communicable diseases independently associated with mortality and have a bidirectional relationship.

**Aims:** To update the evidence for their epidemiological and mechanistic associations and re- examine the impact of effective periodontal therapy upon metabolic control (glycated haemoglobin, HbA1C).

Epidemiology: There is strong evidence that people with periodontitis have elevated risk for dysglycaemia and insulin resistance. Cohort studies among people with diabetes demonstrate significantly higher HbA1C levels in patients with periodontitis (versus periodontally healthy patients), but there are insufficient data among people with type 1 diabetes. Periodontitis is also associated with an increased risk of incident type 2 diabetes.

Mechanisms: Mechanistic links between periodontitis and diabetes involve elevations in interleukin (IL)- 1- β, tumour necrosis factor- α, IL- 6, receptor activator of nuclear factor- kappa B ligand/ osteoprotegerin ratio, oxidative stress and Toll- like receptor (TLR) 2/4 expression.

Interventions: Periodontal therapy is safe and effective in people with diabetes, and it is associated with reductions in HbA1C of 0.27–0.48% after 3 months, although studies involving longer-term follow-up are inconclusive.

Conclusions: The European Federation of Periodontology (EFP) and the International Diabetes Federation (IDF) report consensus guidelines for physicians, oral healthcare professionals and patients to improve early diagnosis, prevention and comanagement of diabetes and periodontitis.

*Source:* *Wiley, Journal of Clinical Periodontology. Accepted 4th July 2017. Co-published in the journal Diabetes Research and Clinical Practice*

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## 9. A SYSTEMATIC REVIEW AND META- ANALYSIS OF EPIDEMIOLOGIC OBSERVATIONAL EVIDENCE ON THE EFFECT OF PERIODONTITIS ON DIABETES. AN UPDATE OF THE EFP- AAP REVIEW

*Filippo Graziani, Stefano Gennai, Anna Solini, Morena Petrini*

Aim: To update the available evidence on the impact of periodontitis on diabetes control, incidence and complications.

Methods: Observational studies on the effect of periodontitis on diabetes, published after 2012, were identified through electronic databases and hand-searched journals. Findings were summarized by evidence tables, using PRISMA statement. Quality of the included studies was evaluated through the Newcastle Ottawa scale.

Results: Healthy individuals with periodontitis exhibit a poor glycaemic control and a higher risk of developing diabetes. Individuals affected by diabetes show a deterioration of glycaemic control if also affected by periodontitis and significantly higher prevalence of diabetes-related complications. Limited evidence is available on gestational diabetes and type 1 diabetes.

Conclusions: Periodontitis has a significant impact on diabetes control, incidence and complications. Nevertheless, the heterogeneity and quality of the included publications suggest that caution should be exercised when interpreting the data and that there remains an important need for additional evidence.

*Source:* *Clin Periodontol. 2018;45:167–187. Wileyonlinelibrary.com/journal/jcpe. Accepted 22 October 2017.*

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