

# Diabetes and periodontitis: an update

**Neesha Patel** and **Reena Wadia** discuss the key role that general dental practitioners play in detecting and diagnosing diabetes mellitus

Inflammation is the primary pathological feature of periodontal disease, and bacterial plaque is the key aetiological factor responsible for inducing the host inflammatory process (Bascones-Martinez et al, 2011). However, it is the host susceptibility and the ability of the host defence system to respond appropriately to the bacterial challenge that results in differences in periodontal disease severity from one individual to another.

This individual susceptibility to periodontitis is influenced by a number of factors, including systemic diseases such as diabetes mellitus. In addition, more recent evidence suggests that the presence of chronic inflammation associated with periodontitis may significantly affect systemic health (Newman et al, 2006).

## Diabetes mellitus

Diabetes mellitus is a complex metabolic disorder characterised by chronic hyperglycaemia. Its prevalence in the general population has been estimated as 1-6% (Mealey, 2003).

Two major types of diabetes can be distinguished: type 1 and type 2.

Type 1 diabetes mellitus accounts for 5-10% of all cases and most often occurs in children and young adults. It results from a lack of insulin production and can be very unstable and difficult to control. Patients often present with the symptoms traditionally associated with diabetes – polyphagia, polydipsia, polyuria and a predisposition to infections. It requires injected insulin to be controlled (Newman et al, 2006; Mealey, 2003).

In contrast, type 2 diabetes mellitus is far more common, accounting for 90-95% of all cases, and usually has an adult onset.

### Aims and objectives

To discuss the role that general dental practitioners have in detecting and diagnosing diabetes mellitus.

### Expected outcomes

Correctly answering the questions on page 78 will demonstrate you understand the duty of care to inform patients with diabetes about the bi-directional link and the importance of maintaining good oral health.

Verifiable CPD hours: 1



**Figure 1:** Severe periodontitis in a patient with uncontrolled diabetes mellitus (Persson, 2011)

These patients usually present with less severe symptoms and can often be controlled by diet and oral hypoglycaemic agents (Newman et al, 2006; Mealey, 2003).

Diabetes mellitus is often discovered at a late stage, when severe symptoms and complications arise. This highlights the key role that general dental practitioners play in detecting and diagnosing undiagnosed or, more commonly, poorly controlled diabetes mellitus (Bascones-Martinez et al, 2011).

## Diabetes mellitus as a risk factor for periodontitis

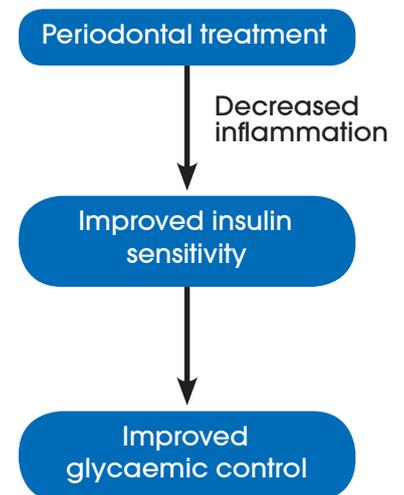
### Oral manifestations

Table 1 outlines the oral manifestations associated with diabetes mellitus. However,

the classic description of an undiagnosed or poorly controlled diabetic is a patient presenting with multiple periodontal abscesses and rapid destruction of periodontal support (Persson, 2011).

In patients with a systemic disease such as diabetes, periodontal manifestations tend to be generalised. Patients with poor glycaemic control (HbA1c more than 9%) often present with severely inflamed gingival tissues and evidence of loss of periodontal support seen by increased spacing and drifting of the teeth (Figure 1). More specifically, attachment loss occurs more frequently in poorly controlled diabetic patients versus well-controlled diabetics.

**Figure 2:** Potential effects of periodontal therapy on glycaemic control in diabetic patients (Newman et al, 2006)



**Dr Neesha Patel** BSc Hon(Can) BDS(Glasg) MFGDP(UK) MClInDent Periodontics(Lon) MRD RCS(Ed) is practice principal at Pure Periodontics. She is a specialist in periodontics and consultant periodontist at King's College Hospital, London.  
**Dr Reena Wadia** BDS Hons(Lon) MJDF RCS(Eng) is associate at Pure Periodontics in London and a specialty registrar in periodontology at Guy's Hospital, London.

**Table 1: Oral manifestations of diabetes mellitus**

- Reduced salivary flow
- Burning mouth or tongue
- Increased candidal infections
- Denture-induced stomatitis
- Angular cheilitis
- Taste disturbance
- Oral lichen planus
- Multiple periodontal abscesses
- Increased periodontitis in poorly controlled diabetic patients
- Increased risk of developing periodontitis with severity and duration of diabetes

In addition, poorly controlled diabetics are approximately 3.5 times more likely to exhibit alveolar bone loss (Westfeld et al, 1996). Interestingly, diabetics that present with more advanced systemic complications present with a greater frequency and severity of periodontitis (Karjalainen, Knuutila, Dickhoff, 1994).

## Pathophysiology of periodontitis as a complication of diabetes

Chronic hyperglycaemia in diabetics leads to a cascade of events that have wide ranging effects on host response and wound healing (Table 2) (Mealey, 2003).

In patients with poorly controlled diabetes, the function of neutrophils is impaired. Therefore, the primary defence against a periodontal infection is diminished and, in turn, bacterial proliferation is unchecked (Offenbacher, 1996).

In the hyperglycaemic state, the formation and accumulation of advanced glycation end products (AGEs) is excessive. Collagen is cross-linked by AGE formation, making it less soluble and less likely to be normally repaired and replaced.

Therefore, collagen in the tissues of poorly controlled diabetics is more susceptible to breakdown associated with periodontal destruction (Newman et al, 2006; Offenbacher, 1996).

## Periodontitis: 'the sixth complication of diabetes mellitus'

Diabetes mellitus is a well-recognised and well-characterised risk factor for periodontitis.

**Table 2: Effects of diabetes on host response and wound healing**

- Reduced neutrophil function
- Defective chemotaxis
- Increased collagenase activity in GCF
- Increased release of cytokines (eg, IL-1 and TNF- $\alpha$ )
- Accumulation of advanced glycation end products (AGEs)
- Decreased collagen synthesis, increased collagen degradation and defective collagen remodelling

The increased prevalence and severity of periodontitis exhibited in diabetic patients, particularly those with poor glycaemic control, led to the designation of periodontitis as the 'sixth complication of diabetes' (Table 3) (Løe, 1993).

Will treating periodontal disease improve a diabetic patients' glycaemic control?

There is emerging evidence that the link between diabetes mellitus and periodontitis is bi-directional such that not only is diabetes mellitus a risk factor for periodontitis but that periodontitis is also a risk factor for poor glycaemic control.

There is some evidence of improvement in metabolic control in diabetic patients following periodontal treatment. Data from a meta-analysis of available literature on periodontal intervention suggests a positive impact on glycaemic control. In patients with HbA1c levels of more than 9%, periodontal therapy may reduce HbA1c levels by 0.6% in the absence of any changes to diabetic medication (Bascones-Martinez et al, 2011).

## What are our responsibilities as healthcare providers?

Dental and medical care providers should pay particular attention to oral manifestations of diabetes. This may help to improve our ability to identify individuals unaware of their diabetic status.

Dentists should establish referral protocols, liaise with physicians (general medical practitioners, endocrinologists, diabetic nurses), and use dental/periodontal screening as a tool for referral of patients with periodontal disease and a suspected underlying systemic aetiology.

**Table 3: Complications of diabetes mellitus**

1. Retinopathy
2. Nephropathy
3. Neuropathy
4. Macrovascular disease
5. Altered wound healing
6. Periodontal disease

In particular, dental care providers should refer their patients who respond poorly to initial periodontal therapy or where the degree of periodontal destruction is not concomitant with the amount of local factors (plaque/calculus) present.

Likewise, physicians should refer patients with type 2 diabetes to general dental practitioners, and periodontists, for the prevention and management of gingival or periodontal disease (Mealey, 2000).

## Conclusions

Diabetic patients are often poorly informed about the relationship between periodontal disease and diabetes. Therefore, as healthcare providers we have a duty of care to inform our patients with diabetes about this bi-directional link and the importance of maintaining good oral health. [PD](#)

## References

For the list of references that accompany this article, please email [pd@fmc.co.uk](mailto:pd@fmc.co.uk).



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