



▶ Type 1 v. Type 2 Diabetes and Oral Health: What We Know



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From Your Dentistry for Diabetics (DFD) Professional
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Informed

The truth about the diabetic & oral care

Diabetes Mellitus 1 & 2: How they affect Oral Health?

When experts speak on the subject of oral health and diabetes mellitus, it seems more often than not they refer to the two most common forms (type 1 and type 2) as if they are one and the same. Research results are also lumped into a single category, with little distinction made as to the epidemiology of the test subjects.

As a diabetic care practitioner, however, you know that there are key differences between the two, in treatment, in risk factors and management, and in the severity of the

complications that result from them. So the question arises — is there a difference in the way the two affect and are affected by oral health diseases? Are there some factors that are endemic to one and not the other? Is there enough evidence to make such a determination?

This month's issue of *Informed* will look closely at the impact of type 1 and type 2 diabetes on oral health, what research tells us and what we have yet to learn.



Type 1



Type 2

Did You Know?

Diabetes mellitus is the most common endocrine disorder and affects an estimated 20.8 million people in the United States. An additional estimated 6 million people have diabetes but do not know it.

Type 1 v. Type 2 Diabetes and Oral Health: What We Know

What precisely is the causal relationship between diabetes mellitus and periodontal disease?

Why does metabolic control play such a key role in periodontal health?

And is there a difference between how diabetes type 1 affects periodontal health versus type 2?

Periodontal disease, often referred to as the sixth complication of diabetes mellitus, is caused by infection of the subgingival layer, and it is highly common among diabetic patients with poor metabolic control. Beginning as a common, low-level infection called gingivitis, when it is left untreated it may reach advanced stages rapidly. And the consequences can range from loss of alveolar bone and attachment loss, to ongoing infection and inflammation that some researchers believe can drive glucose levels out of target ranges.

Thus, good oral hygiene practices among patients with diabetes mellitus, in addition to frequent examinations by dentists trained in oral care for diabetics, are recommended.

Type 1 Diabetes

Much has been documented in the last 20 years about the connection between type 1 diabetes mellitus and periodontal disease. In fact, several studies have demonstrated that patients with type 1 diabetes and chronic, marginal metabolic control of the disease have more extensive and severe periodontal disease than do patients who maintain rigorous control of their diabetes. In addition, patients with type 1 diabetes and retinopathy tend to exhibit more loss of periodontal attachment by the fourth and fifth decades of life.¹

Though the relationship between periodontal disease and diabetes is not wholly understood, there may be several pathologies at work. What is known is that type 1 diabetics experience periodontal disease at a

rate two to three times that of non-diabetics.² Studies have shown that the subgingival microflora of subjects with diabetes appears exhibits virtually all the same characteristics as that of non-diabetic subject. This suggests that differences in the host response to periodontal pathogens are related to the increased tissue destruction in diabetes. The pathological events in diabetes may also include impairment in cell-mediated immunity such as neutrophil (polymorphonuclear leukocyte, or PMN) chemotaxis and macrophage function and vascular disease.^{3,4}

Hyperglycemia is a hallmark of diabetes mellitus—as are its chronic metabolic complications. These are generally more severe in the patient with type 1 diabetes mellitus.

Chronic metabolic complications of type 1 diabetes are generally believed to be more severe in type 1 patients than in type 2. Is that also true in the case of periodontal diseases? If so, what are the differences? What is the epidemiology of periodontal disease in the presence of type 1 and type 2 diabetes mellitus?

Type 2 Diabetes

While fewer studies have been conducted on the relationship between type 2 diabetes and periodontal disease, evidence is growing. In 2002, two Native American populations were selected for a comprehensive study on the relationship between gum disease and type 2 DM. The populations -- the Pueblo Indians of San Felipe and Santo Domingo, and the Pima Indians of Mesa, Arizona -- were selected due to their unusually high concentration of type 2 diabetics.

Check it out:

The risk of microvascular disease increases with the progression in postprandial glucose levels from 180 to 260 mg/dL.

— Intensive insulin therapy prevents the progression of diabetic microvascular complications : a randomized prospective 6-year study. *Diabetes Res Clin Pract* 1995;28(2):103-17

Pueblo Indian Study

The Pueblo community study involved 75 test subjects, who had both type 2 diabetes and severe periodontal disease. Subjects were randomized into four treatment groups – with each group receiving precisely the same antibiotic treatment, but dispensed via different regimens. After testing glycated hemoglobin levels every tested subject at intervals of 3, 6, 9 and 12 months, results showed glycated hemoglobin could be reduced and maintained at a reduced level most effectively on a regimen combining a repeated oral antibiotic with a topical antibiotic applied to the gums every three months.

Meaning that treatment of periodontal infection may increase glucose control, independent of any other diabetes medication.

Pima Indian Analysis

The Pima Indian study was a retrospective analysis of data collected about 818 subjects by Indian Health Services. All subjects had been diagnosed with type 2 diabetes mellitus. They were divided into three groups for evaluation:

Group A - subjects were endentulous

Group B – subjects had severe periodontitis

Group C - subjects exhibited moderate gum disease (either gingivitis or early-stage periodontal disease).

Researchers found that Group A (those with complete tooth loss) showed glycated hemoglobin levels that were equal to or higher than those with severe periodontal disease (Group B). Group A had also lived with diabetes longer than Groups B and C, suggesting that:

Subjects with type 2 diabetes also displayed greater alveolar bone loss associated with increased glucose intolerance or poor metabolic control.

1. The longer the subjects lived with diabetes and periodontal infection the greater the affect on oral health – specifically tooth attachment.
2. That a history of chronic periodontal disease can disrupt control of diabetes, suggesting that periodontal infections may have systemic repercussions. This latter point is also supported by multiple studies.⁵

These findings lead Sara Grossi, D.D.S., supervising scientist for both studies, to state that it is her belief that periodontal disease may be the most important of all the factors known to contribute to diabetes onset, including age, gender, obesity and smoking.⁶

Additional Research: Similar Findings, More In-depth Data

Additional studies performed on the Pima Indian population highlight other key characteristics of type 2 diabetes and periodontal disease:

- Subjects with type 2 diabetes, who were 40 years of age or younger, had increased attachment loss compared with those who did not have diabetes
- Subjects with type 2 diabetes also displayed greater alveolar bone loss associated with increased glucose intolerance or poor metabolic control.
- Periodontal tissue destruction increased with age and occurred at a higher rate in subjects with type 2 DM compared with those without the disease in all age groups.

- Tooth loss occurred at a rate 15 times higher in Pima Indians with diabetes than in Pima Indians without diabetes.

In Sum

While it is clear that additional research is needed to fully understand the relationship between diabetes mellitus (both types 1 and 2), it is clear that poorly controlled type 2 diabetes exacerbates periodontal disease at a rate similar to type 1. Impacts include greater tissue periodontal destruction, aveolar bone loss and

Did you know?

Dentists can reduce morbidity associated with diabetes through a diligent and rigorous oral health maintenance program, and by helping monitor systemic health.

tooth loss (including edentulous at a greater rate). Additionally, as with type 1 diabetes, type 2 appears to impact glycemic control at the systemic level (probably due to increased infection and host inflammatory response).

According to research among test subjects with type 2 diabetes, periodontal tissue destruction increased with age and occurred at a higher rate compared to subjects without diabetes mellitus.

In both cases, strict monitor and control of metabolic levels coupled with rigorous oral hygiene and regular and frequent visits to a dentist trained in diabetic care have been proven to limit periodontal destruction and support overall, systemic health. No matter the patient’s age, number of years living with the disease

or whether it is type 1 or type 2, proper care and management are key to patient health.

1. Sievers ML, Nelson RG, Bennett PH: Adverse mortality experience of a southwestern American Indian community: overall death rates and underlying causes of death in Pima Indians. *J Clin Epidemiol* 43:1231–1242, 1990
2. National Institute of Dental and Craniofacial Research, National Institutes of Health. Oral opportunistic infections: links to systemic diseases. Available at: "www.nidr.nih.gov/spectrum/NIDCR2/2grasec3.htm". Accessed July 22, 2003.
3. Brownlee M. Glycation and diabetic complications. Lilly Lecture 1993. *Diabetes* 1994;43:836–41.
4. Genco RJ, Van Dyke TE, Levine MJ, Nelson RD, Wilson ME. 1985 Kreshover lecture: molecular factors influencing neutrophil defects in periodontal disease. *J Dent Res* 1986;65:1379–91.
5. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann Periodontol* 1998;3(1):51–61.
6. Studies in Pima and Pueblo Indians Underscore Unhealthy Relationship Between Gum Disease and Diabetes. Release Date: March 8, 2002. <http://www.buffalo.edu/news/fast-execute.cgi/article-page.html?article=55990009>

What’s Clicking? Referral to Physician Key to Diabetic Care

Dentists, who are trained in proper care and treatment of the diabetic, can be a tremendous ally to the physician as an additional team member and clinician.

These such dentists (most notably *Dentistry for Diabetes* dentists) receive instruction on oral treatments for diabetic patients, including compulsory training in prescription medications and treatment options, as well as instruction on how to monitor A1C levels. In addition, they are able to identify patients who are candidates for diabetes mellitus based on visible symptoms and manifestations (both systemic and oral), including polydipsia, polyuria, polyphagia, weight loss, weakness, oral xerostomia and candidiasis, gingivitis, and periodontal disease.

In such cases, the treating dentists may take the following steps to ensure the patient is afforded the

best possible care:

1. Blood glucose test
2. If results are consistent with hyperglycemia, immediate referral to diabetic care physician
3. If test results do not indicate hyperglycemia, but the patient displayed one or more of the above-mentioned symptoms and manifestations of diabetes, referral to physician would still take place.

In Sum

A dentist can be a tremendous asset to the healthcare team in both ongoing management program support and identification (and referral) of potential candidates for diabetic care.

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