

How Dental Practitioners Can Help Prevent Diabetic Complications

By Michelle Routhenstein, MS, RD, CDE, CDN

Scientific research has predicted that the prevalence of type 1 and type 2 diabetes mellitus (collectively “diabetes”, or “DM”) will increase by 54% to more than 54.9 million Americans between 2015 and 2030.¹ Dentists and dental practitioners have the ability to positively impact peoples’ lives by identifying DM early on and referring them to the proper healthcare professional for further guidance to control blood sugar levels and prevent diabetic complications.

In 2015, an estimated 30.3 million people in the United States aged 18 and older had DM, of which 1.5 million were newly diagnosed cases. Of the 30.3 million American adults living with DM, nearly one in four (about 7.2 million) did not know they had DM and only 11.6% of adults with prediabetes knew they were prediabetic. It is predicted that by the year 2030, annual deaths attributed to DM will climb by 38% to approximately 385,800, and annual medical and societal costs related to DM will increase by 53% to more than \$622 billion.²

DM occurs when blood sugar levels rise above normal levels and is highly influenced by carbohydrate intake and lifestyle factors. There are several types of DM, such as: a) type 1 diabetes, where destruction of pancreatic function causes one’s body to not produce insulin, the hormone required for glucose uptake, b) type 2 diabetes, where one’s body does not utilize insulin properly primarily due to insulin resistance and is heavily influenced by weight, behavior, and lifestyle factors, c) gestational diabetes, where uncontrolled blood sugar levels during pregnancy impact the mother and the baby, d) prediabetes, where slightly elevated blood sugar levels due to insulin resistance and lifestyle factors, puts individuals at risk for progressing to type 2 diabetes. Blood sugar levels can be optimized and managed for lifelong implementation via diet, medication, and lifestyle.³

If DM is uncontrolled and high blood sugar levels (hyperglycemia) remain above normal levels for extended periods of time, DM lingers in unwanted places and causes weakening of the microvascular and macrovascular systems. Commonly known DM complications include retinopathy, nephropathy, neuropathy, increased risk of stroke, cerebrovascular disease including transient ischemic attack, cognitive impairment; peripheral vascular disease, and coronary heart disease.⁴ Oftentimes not discussed, but equally important, is the sixth

most prevalent complication of DM, periodontal disease.⁵

DM is a risk factor for developing tooth decay, gum disease, and other oral health problems. The risk of developing periodontitis in patients with DM has been reported to be 3x higher than the general population. Periodontitis is more frequent and severe in patients with DM who have poor glycemic control. Chronic periodontal disease results in progressive destruction of the supporting tissues of the teeth as well as pocket formation, recession, or both, which may lead to tooth loss from extensive destruction of alveolar bone.⁵ Furthermore, severe periodontal disease may be a strong predictor of various diabetic complications, including nephropathy, stroke, transient ischemic attack, angina, myocardial infarction, and heart failure. People with DM have an increased risk of severe periodontitis because diabetes affects the periodontal flora, decreases the immune response due to neutrophil impairment and phagocytosis defect, and decreases production of bone matrix osteoblasts due to a collagen defect and impaired wound healing.⁶ Controlling high blood sugar within a tight normal range with proper diet and medications (as necessary) can help to control inflammation, bacterial flora, boost immunity, and help repair wounds quicker.

A recent study in the *Journal of Dental Research* showed that a simple screening approach, which includes periodontal findings, has an unrealized capacity to identify patients at risk for, or who are impacted by, diabetes, and increases treatment effectiveness by directing them to receive appropriate care. Researchers, Lalla et al, found that the presence of $\geq 26\%$ deep pockets or ≥ 4 missing teeth correctly identified 73% true unrecognized prediabetes or diabetes cases. Adding the point of care A1c test, resulted in correct identification of 92% of these patients.⁷

Diabetic patients can also have chronic salivary hypofunction (xerostomia), and generalized immune dysfunction that can lead to the development of disorders of the oral mucosa, including atrophy of the mucosa, candidiasis, lichen planus, oral fungal infections, and lichenoid mucositis. Studies have shown that patients with poorly controlled type 2 diabetes have a lower stimulated parotid gland flow rate and have bilateral enlargement of the parotid salivary glands compared to well-controlled DM patients and patients without DM.⁸ Studies show

a downward trend of salivary flow rates as HgA1c, a 3 month average blood sugar level that gauges management of DM and glycemic control, increased.⁹ The oral mucosa is normally protected by saliva which provides lubrication, cleansing, pH buffering, antimicrobial proteins, and clearance of bacteria. Lack of adequate saliva leads to an increased risk of oral yeast and periodontal infections, increased rate of dental caries, and difficulty with maintaining oral hygiene, as well as a decrease in quality of life due to discomfort when eating, swallowing, and talking.⁸

Early identification and management of the aforementioned oral manifestations may help in the early diagnosis of DM and in attaining better glycemic control to help mitigate oral manifestations and avoid the other complications associated with DM. Dentists can identify DM in their patients based on a thorough examination of their periodontal tissues, gums, oral site, and mucosa of the tongue. Fissured tongue can be present due to low salivary function. Candida and candida lesions can appear due to increased salivary glucose promoting Candida overgrowth as well as decreased antifungal immunoglobulins in diabetic patients’ saliva.¹⁰ Benign migratory glossitis has been shown to appear 4x more frequently in diabetes and the more uncontrolled it is (with other complications present such as retinopathy and neuropathy) than non-diabetics.¹¹ Burning mouth sensations can be present due to a neuropathic basis and is frequently accompanied by changes in taste (dysgeusia) or other sensory distortions.¹⁰ Dental caries’ risk is increased due to decreased salivary secretion, increase of carbohydrates in the parotid gland saliva, growth of oral yeasts, and increased counts of Mutans streptococci and lactobacilli.⁵

The role of the dental practitioner is vital in helping to prevent complications of this systemic disease. The dentist should begin by collecting patient and family medical history, identifying oral manifestations that may identify poor diabetic control or elude to first time diagnosis. If available, the dentist should test for DM diagnosis/control in the dental office. A referral to an endocrinologist should be made if a first time diagnosis is suspected. If a person has diabetes which appears uncontrolled, he/she should be referred to a Registered Dietitian who is also a Certified Diabetes Educator.

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Research has shown that lifestyle modification achieved a greater reduction in the risk of DM than reliance on medication. Specifically, a systemic review and meta-analysis of type 2 DM nutrition therapy from an RD compared with dietary advice from other healthcare professionals, showed a significant reduction in HgA1c, BMI, weight and LDL cholesterol. Specifically, five randomized controlled trials comprising 912 participants in total showed in the first year of intervention (at 6 or 12 months), nutrition therapy compared with dietary advice was followed by a 0.45% (95% CI: 0.36%, 0.53%) lower mean difference in HbA1c, a 0.55 (95% CI: 0.02, 1.1) lower BMI, a 2.1-kg (95% CI: 1.2-, 2.9-kg) lower weight, and a 0.17-mmol/L (95% CI: 0.11-, 0.23-mmol/L) lower LDL cholesterol.¹³ Dietitians played a key role in the overwhelmingly positive Diabetes Prevention Program finding that lifestyle intervention is more effective than medication in the prevention of type 2 diabetes.¹⁴

Dentists and dietitians have a great opportunity to partner together to reduce the societal cost of poorly controlled DM. Dentists can help identify patients with prediabetes and uncontrolled DM, and properly refer to specialists like endocrinologists, RD/RDN, and CDEs to prevent diabetic complications and to provide optimal patient care.

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