Oral Health: An Untapped Resource in Managing Glycemic Control in Diabetes and Promoting Overall Health

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ABSTRACT

Periodontitis was declared the sixth complication of diabetes in 1993, and it is the sixth most common disease globally. Nonetheless, its 2-way relationship with diabetes is largely ignored by primary care providers. Poorly controlled diabetes predisposes to periodontitis. Periodontitis contributes to both the worsening of diabetes control and development of diabetes. Routine nonsurgical periodontal treatment improves glycemic control. In this article we describe simple, efficient ways for nurse practitioners to enhance oral health history-taking and examination, educate diabetes patients about their oral health needs, and promote collaborative relationships with dentists. This proactive approach can positively impact glycemic control and improve patients' health.

Keywords: diabetes mellitus, gingivitis, oral health, periodontitis, primary health care

INTRODUCTION

Periodontal diseases (gum diseases) are a greatly underemphasized complication of poorly controlled diabetes mellitus that *all* health care providers need to be aware of and address when assessing and counseling their patients. Prevention, early diagnosis, and intervention can reduce the impact of this "sixth complication of diabetes"[1] and greatly improve diabetes management.[2,3] The American Diabetes Association recommends providers ask about "dental disease" as part of a patient's medical history as well as refer for comprehensive periodontal examination.[4] Nonetheless, oral health is not routinely addressed in patients with diabetes. Traditionally, nursing and medical providers have perceived oral health issues like periodontitis as outside of their realm and, at best, advise patients to see a dentist without further explanation or attention.[5] Unfortunately, patients often do not follow through for multiple reasons, including lack of access to dental care or understanding its significance.[2,3] Reports by the Institute of Medicine,[2,3] as well as nursing, medical, and dental organizations, call for integration of oral and primary care to prevent disease and improve health, particularly for the chronically ill.[5-8]

The purpose of this study is to provide nurse practitioners and other primary care providers with information needed to efficiently and effectively address oral health issues during routine care of diabetes patients. Diabetes, the oral-systemic relationship, and the development of periodontal problems and their treatment are reviewed. We describe some brief additions to the medical history that can clue the provider to risks for periodontitis, common conditions in the mouth seen in patients with diabetes, and related common physical exam findings. Finally, we present recommendations to facilitate referral to dental health professionals as well as resources for patients and providers.

ORAL-SYSTEMIC RELATIONSHIP IN DIABETES

Diabetes

The prevalence of diabetes is increasing worldwide. By 2030, diabetes is projected to be the seventh

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leading cause of death globally.[9,10] In the United States, 9.3% (29.1 million) of the population are affected by diabetes and almost 30% of them (8.1 million) are unaware of their diabetes (undiagnosed).[11] Of people with diabetes, 90%-95% have type 2 diabetes (T2DM) and approximately 5% have type 1 diabetes. African Americans, Latinos, and Native Americans are at higher risk for T2DM and its complications, which include micro- and macrovascular changes, nephropathy, neuropathy, delayed wound healing, and higher susceptibility to infection.[11] Addressing oral health needs can provide an important adjuvant to prevention and management of diabetes.

Oral-Systemic Relationship

The link between diabetes and oral disease is complex and has been described as a "2-way street," or as "bidirectional," because hyperglycemia and oral infection mutually adversely affect each other.[12,13] Hyperglycemia may predispose to or worsen periodontal disease; conversely, periodontal disease and the accompanying inflammation have a negative impact on glycemic control. Obesity is associated with both T2DM and periodontitis and further complicates the situation.[14] Obesity elicits a low-grade, chronic inflammatory response that can intensify periodontitis and trigger insulin resistance, which in turn increases the risk for prediabetes and subsequent development of T2DM.[14] Although poorly controlled diabetes increases the risk for periodontal disease, a recent systematic review demonstrated that periodontal infection increases blood sugar levels in health, prediabetes, and manifest T2DM, and contributes to its complications.[15] The rate of developing end-stage renal disease over 22 years was shown to be doubled and risk of cardiorenal mortality (due to ischemic heart disease and diabetic neuropathy) tripled in individuals with poorly controlled T2DM and severe periodontitis, when compared with such patients without severe periodontitis.[16]

PERIODONTAL DISEASE, ITS PREVALENCE, AND LINKS TO GENERAL HEALTH

Periodontal disease refers to diseases in the soft and hard tissues surrounding the teeth and is the sixth most prevalent chronic condition worldwide.[17] Up to 90% of any population have gingivitis, which is a reversible inflammation in the gums.[18] Untreated, gingivitis can lead to periodontitis and permanent damage to the bone and supporting tissues around the tooth.[19] Periodontitis is found in almost 50% of the US population age $\geq$ 30 and in two thirds of those with lower socioeconomic status, those $\geq$ 65 years old, and in minorities.[20] Periodontitis is associated with the following: diabetes; metabolic syndrome; obesity; cardiovascular disease/ischemic stroke; adverse pregnancy outcomes (preterm birth, stillbirth/fetal death, preeclampsia, etc); (auto) immune diseases (Sjögren's syndrome, allergies, asthma, HIV/AIDS, rheumatoid arthritis); cancers (colon, pancreas); erectile dysfunction; alcoholism; illicit drug use/addiction; and oral piercings/body jewelry.[21,22] Two thirds of people with diabetes have severe periodontitis, which adversely effects their diabetes control.[13] This is a greatly underemphasized and largely ignored complication of poorly controlled diabetes that providers should be aware of and address when providing care to and counseling their patients.

Development of Periodontal Disorders

Unlike other tissues in the body, teeth do not shed and renew cells, allowing bacteria to over time build complex communities known as dental plaque or bacterial biofilm.[12,23] Patients with healthy gums usually have minimal plaque build-up and few clinical signs of inflammation. Without regular daily cleaning, dental plaque builds up on the tooth near the gum line and down into the periodontal sulcus. The calcium in the saliva causes calcification of this dental plaque (called "calculus" or tartar).[12,23] Plaque and calculus irritate the gums, causing inflammation, redness, and easy bleeding during brushing. In severe cases, spontaneous bleeding may result. This "gingivitis" is readily reversible; with 2-3 days of careful oral hygiene, the gums will return to their healthy state.[12,19]

In susceptible individuals, the inflammatory response leads to breakdown of the surrounding gums and bone, creating a periodontal "pocket," indicating progression to "periodontitis," the irreversible form of gum disease.[12,19,23] This entire process can happen with few or no symptoms and,