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DIABETES AND ORAL HEALTH

Dental Science

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ABSTRACT

Diabetes is a major public health issue with oral complications. It represents a public health problem due to its high prevalence, morbidity and mortality. The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the 'Diabetes capital of the world'. Diabetes (especially if it is not well controlled) brings with it a greater risk of periodontal disease, which is the most frequent complication. On the other hand, the possible influence of periodontal disease on glycemic control is still not well established. Other reported manifestations are xerostomia, sialadenosis and burning mouth syndrome. With regard to dental caries, oral lichen planus and candidosis, recent studies have not revealed a significantly higher incidence in these patients. Given the epidemic proportion of diabetes, it is critical for all health professionals to be well educated about diabetes. Dentists are well-positioned to provide patients with diabetes prevention information, support the need for good glycemic control, and facilitate referral to other health care providers.

KEYWORDS:

Diabetes, dental management, periodontal disease, dental considerations.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia due to the absence of insulin or its inability to function properly. It represents a public health problem due to its high prevalence, morbidity and mortality.[1] The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. Over the past 30 years, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle aged people.[2] Diabetes mellitus is one of the main threats to human health in the 21st century. The past two decades have seen an explosive increase in the number of people diagnosed with diabetes world-wide.

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the *'Diabetes capital of the world'*. According to the Diabetes Atlas 2012 published by the International Diabetes Federation, the number of people with diabetes in India is currently around 61.3 million which is expected to rise to 101.2 million by 2030 unless urgent preventive steps are taken.[3] The effect of diabetes mellitus on a person's health can be profound. A diagnosis of DM carries with it the knowledge that the patient will be at high risk of developing cardiovascular diseases, kidney disease, eye disease, nerve disorders and alterations in wound-healing capacity and numerous other maladies.[4] Compromised oral health is one of the many complications of poorly controlled or uncontrolled diabetes. Such oral complications include periodontal disease, fungal infections, xerostomia, oral ulcers and many others.[5]

Given the epidemic proportion of diabetes, it is critical for all health professionals to be well educated about diabetes. Dentists are well-positioned to provide patients with diabetes prevention information, support the need for good glycemic control, and facilitate referral to other health care providers.[6] In 1993, Loe[7] proposed that periodontal disease was the sixth complication of diabetes mellitus. In a 2008 article, Taylor and Borgnakke[8] identified periodontal disease as a possible risk factor for poor metabolic control in people with diabetes mellitus. This bidirectional relationship between periodontal disease and diabetes mellitus makes diabetes a disorder of importance to dentists and dental hygienists and to patients seen in the dental office.

CLASSIFICATION OF DIABETES MELLITUS[9]

Diabetes can be classified into four clinical categories:

1. Type 1 diabetes (due to Beta-cell destruction, usually leading to absolute insulin deficiency)

2. Type 2 diabetes (due to a progressive insulin secretory defect on the background of insulin resistance)

3. Other specific types of diabetes due to other causes, e.g., genetic defects in beta-cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced (such as in the treatment of HIV/ AIDS or after organ transplantation)

4. Gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy that is not clearly overt diabetes)

DIAGNOSIS OF DIABETES

Diabetes is usually diagnosed based on plasma glucose criteria, either the fasting plasma glucose (FPG) or the 2-h plasma glucose (2-h PG) value after a 75-g oral glucose tolerance test (OGTT). Recently, an International Expert Committee added the A1C (threshold ≥6.5%) as a third option to diagnose diabetes.

Criteria for diagnosis[9]

A1C≥6.5%. The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

OR
- ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*

OR
- Two-hour PG ≥200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR
- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose >200 mg/dL (11.1 mmol/L).

(*In the absence of unequivocal hyperglycemia, result should be confirmed by repeat testing)

Criteria for testing for Diabetes in asymptomatic adult individuals[9]

1. Testing should be considered in all adults who are overweight (BMI≥25 kg/m^2*) and have additional risk factors:

- physical inactivity
- first-degree relative with diabete
- high-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
- women who delivered a baby weighing >9 lb or were diagnosed with GDM
- hypertension (≥140/90 mmHg or on therapy for hypertension)
- HDL cholesterol level <35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
- women with polycystic ovarian syndrome
- A1C ≥5.7%, IGT, or IFG on previous testing
- other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
- history of CVD

2. In the absence of the above criteria, testing for diabetes should begin at age 45 years.

3. If results are normal, testing should be repeated at least at 3-year intervals, with consideration of more frequent testing depending on initial results (e.g., those with prediabetes should be tested yearly) and risk status.

(*At-risk BMI may be lower in some ethnic groups)

ORAL MANIFESTATIONS OF DIABETES

A number of oral conditions have been associated with DM, particularly in patients with poor disease control. However it has been noticed that most patients with DM are unaware of the oral health complications of their disease. Therefore, it is important for dentists to educate patients about the oral implications of DM and the need for proper preventive care.

Periodontal disease:

In 1999, the American Academy of Periodontology issued a position paper about diabetes and periodontal diseases. This report indicates that DM, especially when poorly controlled, increases the risk of periodontitis.[11] Some evidence suggests that periodontal infection and periodontal treatment have the potential to alter glycemic control. The presence of severe periodontal infection may increase the risk of microvascular and macrovascular diabetic complications. Control of periodontal infection has been shown to have a positive effect on glycemic control. However, further research is required to better understand the pathways through which DM and periodontal disease interact. Patients with poorly controlled DM have an increased rate of surgical wound infections and poor wound healing, and, therefore, some researchers have recommended that management of periodontal disease be conservative and nonsurgical as much as possible. Since prevention plays a primary role in periodontal disease control in diabetic patients, they may need more frequent plaque control and scaling than nondiabetic patients.[12] Studies have indicated that smoking increases the risk of periodontal disease severalfold in diabetic patients.[13,14] Therefore, tobacco use cessation counseling should be a part of the management of patients with DM.

Salivary gland dysfunction:

Studies have reported xerostomia in 40 to 80 percent of diabetic patients.[15,16] Diabetic patients with poorly controlled disease have been found to have lower stimulated parotid flow rates than people with well-controlled DM and nondiabetic control subjects.[17]

Fungal infections:

Diabetic people have an increased predisposition to manifestations of oral candidiasis, including median rhomboid glossitis, denture stomatitis and angular cheilitis. Candidiasis has been found to be associated with poor glycemic control and use of dentures. This predisposition may be due to xerostomia, increased salivary glucose levels or immune dysregulation.

Oral burning and taste disturbances:

Patients who have undiagnosed type 2 DM may have burning mouth or tongue. Therefore, clinicians should consider DM in the diagnosis of such complaints. The burning may be due to peripheral neuropathy, xerostomia or candidiasis. Good glycemic control may alleviate the burning sensation.

Lichen planus and lichenoid reactions:

Petrou-Amerikanou and colleagues[18] reported that the prevalence of oral lichen planus is significantly higher in patients with type 1 DM and slightly higher in patients with type 2 DM than in control subjects. However, this may be a side effect of oral hypoglycemic agents or antihypertensive medications.[19]

Dental caries:

The relationship between diabetes and dental caries has been investigated, but no clear association has been clarified. It is important to note that patients with diabetes are susceptible to oral sensory, periodontal and salivary disorders, which could increase their risk of developing new and recurrent dental caries. Some studies have demonstrated that diabetic patients have more active dental caries than control subjects.[20,21] Other studies have shown no increase in prevalence of caries in diabetic patients.[22,23]

CONSIDERATIONS FOR TREATING THE DENTAL PATIENT WITH DIABETES (AMERICAN DENTAL ASSOCIATION)[24]

A) General guidelines:

1. A MORE FREQUENT RECALL SCHEDULE, IF INDICATED
- Consider a 3-4 month cycle for checkups (and cleanings) to keep gingivitis and periodontitis in check

2. EMPHASIS ON SOFT TISSUE MANAGEMENT
- Scaling and root planing as indicated
- Antibiotic treatment where indicated

3. EMPHASIS ON HOME CARE
- Brush teeth twice a day and clean between teeth daily with floss or interdental cleaner per dentist instructions
- Consider recommending products, such as toothpaste and mouthrinse, that have been shown to be effective in reducing plaque and gingivitis
- In-office hygiene training

B) Non-Surgical procedures: (Periodontal debridement, Restorative procedures, Fixed and removable prosthetics procedures, Orthodontic adjustments, Scaling and root planning, Prophylaxis, Intracanal endodontics, Fluoride treatments, Impressions, Local anesthesia injections, Intraoral radiographs etc.)

1) MORNING APPOINTMENTS — OR WHENEVER INSULIN IS AT ITS PEAK
- Diabetic patients are often more stable and better able to tolerate dental procedures in the morning
- Shorter, rather than longer, appointments are often better tolerated

2) TREATMENT BREAKS
- Use of the bathroom
- Availability of small snacks

C) Surgical procedures: (Extractions, Periodontal surgery, Implants)

1) MORNING APPOINTMENTS — OR WHENEVER INSULIN IS AT ITS PEAK

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2) TREATMENT BREAKS
- Use of the bathroom
- Availability of small snacks

3) ANTIBIOTIC COVERAGE
- Possibly test plasma glucose levels
- Consider systemic antibiotics for uncontrolled diabetic patients who have frequent infections or heal poorly

4) PATIENT/PHYSICIAN DISCUSSION
- If oral surgery is planned, discuss with patient or patient's physician about meal schedule and timing/dosage of insulin

CONCLUSION

Diabetes mellitus affects people of all ages, and its prevalence has been increasing. Providing safe and effective oral medical care for patients with diabetes requires an understanding of the disease and familiarity with its oral manifestations. The goal of therapy is to promote oral health in patients with diabetes, to help prevent and diagnose diabetes in dental patients receiving routine stomatological care and to enhance the quality of life for patients with this incurable disease.

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